رؤية VISION 2030
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY
كلية الهندسة

برنامج بكالوريوس الهندسة الكهربائية

Electrical Engineering Bachelor’s Program

وكالة الجامعة للشؤون الأكاديمية
Vice Presidency of Academic Affairs

نظام الفصلين الدراسيين
Two-semester System

1445 هـ - 2024 G

من الشمال...إلى الوطن

Declaration

من الشمال...إلى الوطن

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Northern Border University Overview

1. Foundation

Being the only university in the Northern Borders Region, Northern Border University enjoys a unique position in higher education in Saudi Arabia, which is why it holds the name of this precious region. The university plans are inspired by the region's rich values, culture, history, and location. We also ensure that our Strategic Plan 2020-2025 goes along with the region's rich natural resources, Vision 2030, and with the New University System, guided by the strategic priorities of the Northern Borders Region's Emirate.

The Northern Border University (NBU) traces its origin to the 1981 founding of the Intermediate College for Girls, which formed the nucleus of its present iteration. In 1987, the Intermediate College for Girls was renamed the Teachers' College, which also coincided with the awarding of its first Bachelor's degree. Seventeen years later, a College of Science in Arar and a community college in Rafha were founded as extension campuses of the King Abdulaziz University in Jeddah. The College of Science housed five academic departments that included biology, chemistry, computer science, mathematics, and physics while the community college included the departments of administrative sciences, computer science, engineering science, applied medical sciences, and basic sciences.

In 2007 during his historic visit to the Northern Border's Region, the late Custodian of the Two Holy Mosques King Abdullah bin Abdul Aziz declared the founding of the NBU through a royal decree. The nascent university amalgamated the previously established Teachers' College and both extension campuses of the King Abdulaziz University in Arar and Rafha. Soon after NBU's founding, a number of new colleges were founded. These colleges included: medicine, pharmacy, nursing, applied medical sciences, engineering, computer science, business administration, and community colleges dispersed over its main campus in Arar plus three branch campuses in Rafha, Turaif and Al-Owaigeelah. The nascent institution has gone through a period of rapid growth becoming a major transformative hub of knowledge and socioeconomic development in the Region.

[NBU-Strategic Plan – P6]

2. Vision

We aspire to become a distinguished and credible university, recognized for our academic programs based on building competency, research, innovation, and providing services across the region and the Kingdom. [NBU-WEBSITE]

3. Mission

We are a regionally serving, comprehensive university committed to educational excellence. Guided by our core values, heritage, and place, we deliver innovative educational programs characterized by outcomes that leverage the human, economic, cultural, and natural resources for the Northern Borders Region and beyond.

[NBU-WEBSITE]

4. Objectives

Table 1. NBU Objectives

UO1	Providing excellent education that sharpens intellect and professionalism.
UO2	Stimulating research and innovation following the university's research priorities.
UO3	Developing community partnership.
UO4	Developing an administrative and financial system that enhances management efficiency and diversifies sources of income.

[NBU-WEBSITE]

5. Graduate attributes

Figure 1. NBU- Graduate Attributes

6. Values

- Integrity.
- Community Engagement and Civic Responsibility.
- Accountability.
- Collaboration.

[NBU-Strategic Plan - P6]

College Overview

1. Foundation

The College of Engineering in Arar was established after the founding of the Northern Border University under the Higher Education Council Resolution No. 20/46/1428 dated 06/2/1428 AH. The College of Engineering is committed at Northern Border University to provide high quality engineering programs, distinguished scientific research, and contribute to the community service to meet the needs of development and supporting mining fields in the northern border region and throughout the kingdom. The College of Engineering at Northern Border University offers five-degree programs. These programs include: Civil, Chemical, Electrical, Industrial, and Mechanical engineering, all of which are fully accredited by the Engineering Accreditation Commission of ABET. Our distinguished faculty prepares qualified capable of supporting the industry and contributing to the technological revolution that the Kingdom of Saudi Arabia is witnessing today. College of Engineering provides graduates with the theory and practical application necessary to meet tomorrow's challenges and contribute to achieve the objectives of Kingdom vision 2030. To achieve its goals that are in line with the Strategic Goals of the Northern Border University, the College of Engineering always strives to provide an environment that promotes continuous improvement, quality, innovation, creativity and curriculum development. There are many opportunities for engineers in the Kingdom. Currently, our graduates are employed in various industries in the region, such as petroleum, chemical, mines, automotive, electronic, energy, and manufacturing. Others are employed either by private companies or occupy positions in Government Ministries and other national Agencies, including Defense and Aviation. Starting from the year 2022, the three-semester study system (trimester) will be adopted in all programs offered by the College of Engineering. Each semester consists of twelve weeks. The periods of registration, deletion, addition, and final exams are not included.

2. Vision

Excellence in engineering education, scientific research, and community service

3. Mission

To provide high quality engineering programs, distinguished scientific research and contribute to community service to meet the needs of development and supporting mining fields in the northern border region and throughout the kingdom.

4. Objectives

- Providing distinguished academic programs that meet the requirements of development and mining.
- Preparing distinguished engineering cadres to compete in the labor market.
- Attracting and retaining distinguished faculty and researchers.
- Promoting scientific research and innovation.
- Developing Community partnership.
- Continuous development of services, equipment, and facilities.

5. Scientific Departments

The College of Engineering at Northern Border University offers five-degree programs. These programs include: Civil, Chemical, Electrical, Industrial, and Mechanical engineering, all of which are fully accredited by the Engineering Accreditation Commission of ABET.

Department Overview

1. Foundation

The Electrical Engineering Department (EED) was established in 2007. It offers a Bachelor of Science (B.Sc.) degree in Electrical Engineering. The Electrical Engineering Program produced its first graduates in the spring of 2013. In 2018, the program was approved by the Accreditation Board for Engineering and Technology (ABET).

2. Vision

The Vision of Electrical Engineering Department (EED) is:

Excellence in electrical engineering fields.

3. Mission

The Mission of Electrical Engineering Department (EED) is:

To provide high-quality education in electrical engineering fields, produce distinguished scientific research, and serve the society.

4. Objectives

The Objectives of Electrical Engineering Department (EED) are:

- Providing electrical engineering programs that meet the development needs and national and international standards.
- Preparing distinguished electrical engineers to fulfil labor market needs and professional requirements.
- Encouraging scientific research activities in electrical engineering fields.
- Strengthen communication and cooperation with the community.

5. Academic Programs and Degrees Awarded

The Electrical Engineering Department (EED) offers only a Bachelor of Science (B.Sc.) degree in Electrical Engineering.

Table 2. Academic Programs and Degrees Awarded

Code	Program Name	Track 1	Degree Awarded
EE	Electrical Engineering Program	Electrical Power and Machines Engineering	Bachelor of Science in Electrical Engineering
		Track 2	
		Electronics and Communications Engineering	

Program Overview

1. Versions

The Electrical Engineering Program (EEP) with a track in Power was initiated within the Electrical Engineering Department since the first establishment of Northern Border University (NBU) in 2007. Initially, the Departments were overseen by the College of Engineering of King Abdul-Aziz University in Jeddah. At the end of fall 2009, the program admitted the first group of students. These were 14 students who had successfully completed a mandatory one-year Preparatory program. The program started with two Professors, one Associate Professor and two Instructors hired from different nations (Egypt, Tunisia, and Pakistan). At the beginning of fall 2016, there were 80 students enrolled in the different study levels; 53 of them were working on the old plan and 27 registered on the new plan. The first group, comprising 14 students, who were initially enrolled in this Program, was graduated in spring 2013. Graduates received the Bachelor of Science degree in Electrical Engineering (BSEE). The program was accredited by ABET Accreditation Board for Engineering and Technology in 2018.

2. Mission

The Mission of the Electrical Engineering Program (EEP) is:

To prepare electrical engineering graduates that compete in the labor market, sustain self-learning and professional development, and contribute to scientific research and community service.

3. Objectives

The Objectives of the Electrical Engineering Program (EEP) are:

PO1: Serve competently in the professional career and academia by demonstrating high-quality knowledge and skills in the Electrical Engineering field.

PO2: Display self-learning, research, and critical thinking capability and take initiative in advancing their education and professional standing.

PO3: Function as a team member with the capability for leadership and effective communication.

PO4: Exhibit commitment to social responsibilities, ethical values, and meaningful community contributions.

4. Curriculum Structure

4.1. Track 1: Electrical Power and Machines Engineering

Table 3. (Track 1: Electrical Power and Machines Engineering) - Curriculum Structure

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Institution Requirements	Required	5	10	6.45%
	Elective	2	4	2.58%
College Requirements	Required	11	37	23.87%
	Elective	0	0	0%
Program Requirements	Required	33	87	56.13%
	Elective	3	9	5.81%
Capstone Course/Project	Required	2	4	2.58%
Field Training/ Internship	Required	1	0	0%
Residency year		0	0	0%
Others (Free Courses)	Elective	2	4	2.58%
Total		59	155	100%

4.2. Track 2: Electronics and Communications Engineering

Table 4. (Track 2: Electronics and Communications Engineering) - Curriculum Structure

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Institution Requirements	Required	5	10	6.45%
	Elective	2	4	2.58%
College Requirements	Required	11	37	23.87%
	Elective	0	0	0%
Program Requirements	Required	33	87	56.13%
	Elective	3	9	5.81%
Capstone Course/Project	Required	2	4	2.58%
Field Training/ Internship	Required	1	0	0%
Residency year		0	0	0%
Others (Free Courses)	Elective	2	4	2.58%
Total		59	155	100%

5. Study Plan - Track 1

5.1. Academic Year-1

5.1.1. Level-1

Table 5. Study Plan - Level 1

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit: Theory	Contact Unit: Lab	Contact Unit: Tutorial	Type of Requirements	Course Name in Arabic
MATH101	Calculus 1	R		4	3	0	2	College	حساب التفاضل والتكامل 1
LNGT101	English 1	R		4	20	0	0	College	اللغة الإنجليزية 1
IT100	Digital Culture	R		2	2	0	0	Institution	الثقافة الرقمية
ISLSxxx	Islamic Culture (1)	R		2	2	0	0	Institution	ثقافة اسلامية 1
Total				12	27	0	2	الإجمالى	

R/E: Required/ Elective. Type of requirements: Institution/ College/ Program. Other: can be Tutorial/Clinical

5.1.2. Level-2

Table 6. Study Plan - Level 2

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit Theory	Contact Unit Lab	Contact Unit Tutorial	Type of Requirements	Course Name in Arabic
MATH202	Calculus 2	R	MATH101	4	3	0	2	College	حساب التفاضل والتكامل 2
GNCR100	University Skills	R		2	2	0	0	Institution	المهارات الجامعية
LNGT102	English 2	R		4	20	0	0	College	اللغة الإنجليزية 2
LNGT103	English for Scientific and Engineering Purposes	R		2	4	0	0	College	اللغة الإنجليزية للأغراض العلمية والهندسية
Total				12	29	0	2	الإجمالي	

5.2. Academic Year-2

5.2.1. Level-3

Table 7. Study Plan - Level 3

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit Theory	Contact Unit Lab	Contact Unit Tutorial	Type of Requirements	Course Name in Arabic
MATH222	Linear Algebra	R	MATH101	3	3	0	0	College	الجبر الخطي
PHYS101	General Physics 1	R		4	3	2	0	College	الفيزياء العامة 1
MATH241	Differential Equations 1	R	MATH202	3	3	0	0	College	المعادلات التفاضلية 1
EE210	Electrical Circuits I	R	PHYS101 (co)	3	2	0	2	Program	الدوائر الكهربائية 1
EE200	Introduction to Computer Programming	R		3	2	2	0	College	مقدمة في برمجة الحاسب
xxxxxxxx	University Elective (1)	E		2	2	0	0	Institution	اختياري جامعة 1
Total				18	15	4	2	الإجمالي	

5.2.2. Level-4

Table 8. Study Plan - Level 4

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit Theory	Contact Unit Lab	Contact Unit Tutorial	Type of Requirements	Course Name in Arabic
EE220	Analytical Methods in Engineering	R	MATH241	3	2	0	2	Program	الطرائق التحليلية في الهندسة
EE221	Statistics and Probability for Electrical Engineers	R	MATH202	3	2	0	2	Program	الإحصاء والاحتمالات للمهندسين الكهربائيين
EE211	Electrical Circuits II	R	EE210	3	2	0	2	Program	الدوائر الكهربائية 2
EE212	Electrical Circuits Laboratory	R	EE211(co)	1	0	2	0	Program	معمل الدوائر الكهربائية
ISLSxxx	Islamic Culture (2)	R		2	2	0	0	Institution	ثقافة إسلامية 2
CHEM101	General Chemistry 1	R		4	3	2	0	College	الكيمياء العامة 1
Total				16	11	4	6	الإجمالي	

5.3. Academic Year-3

5.3.1. Level-5

Table 9. Study Plan - Level 5

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE322	Physics of Electricity and Magnetism	R	EE211, MATH202	3	2	0	2	Program	فيزياء الكهرباء والمغناطيسية
EE323	Numerical Methods in Engineering	R	MATH241	3	2	0	2	Program	الطرائق الحسابية في الهندسة
EE330	Electronics	R	EE211	3	2	2	0	Program	الكترونيات
EE331	Digital Logic Design	R	EE211	3	2	2	0	Program	تصميم المنطق الرقمي
HR100	Entrepreneurship	R		2	2	0	0	Institution	ريادة الأعمال
EE313	Signals and Systems Analysis	R	EE211, MATH241	3	2	0	2	Program	تحليل الإشارات والنظام
Total				17	12	4	6	الإجمالي	

5.3.2. Level-6

Table 10. Study Plan - Level 6

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE324	Electromagnetic Fields	R	EE322, EE220	3	2	0	2	Program	المجالات الكهرومغناطيسية
EE332	Microelectronics Devices and Circuits	R	EE330	3	2	0	2	Program	نبائط ودوائر الميكروإلكترونيات
xxxxxxx	University Elective (2)	E		2	2	0	0	Institution	اختياري جامعة 2
EE301	Structured Computer Programming	R		3	2	2	0	Program	برمجة الحاسب المهيكلة
EE302	Microcontrollers	R	EE200, EE331	2	1	2	0	Program	المتحكمات الدقيقة
EE390	Electrical Engineering Design	R	EE330	2	1	0	2	Program	تصميم الهندسة الكهربائية
Total				15	10	4	6	الإجمالي	

5.4. Academic Year-4

5.4.1. Level-7

Table 11. Study Plan - Level 7

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE440	Automatic Control Engineering	R	EE313	3	2	2	0	Program	هندسة التحكم الآلي
EE450	Electrical Power Systems I	R	EE324	3	2	0	2	Program	نظم القوى الكهربائية 1
EE460	Electromechanical Energy Conversion I	R	EE324	3	2	0	2	Program	التحويل الكهروميكانيكي للطاقة 1
EE470	Communication Systems	R	EE313	3	2	0	2	Program	نظم الاتصالات

EE471	Communication Systems Laboratory	R	EE470(co)	1	0	2	0	Program	معمل نظم الاتصالات
xxxxxx	Free Course 1	E		2	2	0	0	Institution	مقرر حر 1
Total				15	10	4	6	الإجمالي	

5.4.2. Level-8

Table 12. Study Plan - Level 8

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
CE201	Computer Aided Drawing	R		2	1	2	0	College	الرسم بالحاسب
EE414	Electrical Measurements and Instrumentation	R	EE330	3	2	2	0	Program	قياسات كهربية وأجهزة قياس
EE461	Electromechanical Energy Conversion II	R	EE460	3	2	0	2	Program	التحويل الكهروميكانيكى للطاقة 2
EE462	Electrical Machines Laboratory	R	EE461(co)	1	0	2	0	Program	معمل الآلات الكهربائية
EE433	Power Electronics I	R	EE330	3	2	2	0	Program	الكترونيات القوى 1
EE451	Renewable Energy	R	EE450	3	2	0	2	Program	الطاقة المتجددة
xxxxxx	Free Course 2	E		2	2	0	0	Institution	مقرر حر 2
Total				17	11	8	4	الإجمالي	

5.4.3. Field Training

Table 13. Study Plan - Field Training

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE491	Field Training	R	Dep. Approval & 110 credit hours	0	0	0	240	Program	تدريب ميداني
Total				0	0	0	240	الإجمالي	

5.5. Academic Year-5

5.5.1. Level-9

Table 14. Study Plan - Level 9

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE541	Programmable Logic Controller	R	EE302	3	2	2	0	Program	الحاكم المنطقي المبرمج
EE552	Electrical Power Systems II	R	EE450, EE461	3	2	0	2	Program	نظم القوى الكهربائية 2
EE553	Power systems Laboratory	R	EE552(co)	1	0	2	0	Program	معمل نظم القوى
EE592	Electrical Installations	R	EE450	2	1	2	0	Program	التركيبات الكهربائية
IE221	Engineering Economy	R		2	1	0	2	Program	اقتصاد هندسى
EE5xx	Program Elective I	E		3	2	0	2	Program	اختيارى برنامج 1
EE598	Capstone Project I	R	Dep. Approval & 120 credit hours	2	1	0	2	Program	مشروع تخرج 1
Total				16	9	6	8	الإجمالي	

5.5.2. Level-10

Table 15. Study Plan - Level 10

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE554	Electric Power Transmission and Distribution	R	EE552	3	2	0	2	Program	نقل وتوزيع الطاقة الكهربائية
EE555	Switchgear and Protection of Power System	R	EE552	3	2	2	0	Program	نظم الوقاية ومعدوات القطع
ME465	Power Plants for Non-mechanical Engineers	R		3	2	0	2	Program	محطات القدرة لغير طلبة ميكانيكا
EE5xx	Program Elective II	E		3	2	0	2	Program	اختياري برنامج 2
EE5xx	Program Elective III	E		3	2	0	2	Program	اختياري برنامج 3
EE599	Capstone Project II	R	EE598	2	1	1	1	Program	مشروع تخرج 2
Total				17	11	3	9	الإجمالي	

5.6. Elective Courses

5.6.1. University Elective Courses

*Table 16- University Elective Courses**

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Other	
GNCR103	Kingdom & Its Pioneering Role	-	2	2	0		المملكة ودورها الريادي
ARAB103	Academic Writing Skills	-	2	2	0		مهارات الكتابة الأكاديمية
GNCR104	Fitness and Sport Science	-	2	2	0		اللياقة البدنية وعلوم الرياضة
BIO104	Sustainable Development	-	2	2	0		التنمية المستدامة
CUET101	Lifelong learning skills	-	2	2	0		مهارات التعلم مدى الحياة

*The student chooses two courses out of 5 courses.

5.6.2. University Elective Islamic Culture Courses

*Table 17- University Elective Islamic Culture Courses**

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Other	
ISLS100	The origins of Islamic culture	-	2	2	0		أصول الثقافة الإسلامية
ISLS102	Studies in the Prophet's biograph	-	2	2	0		دراسات في السيرة النبوية
ISLS109	Medical jurisprudence	-	2	2	0		الفقه الطبي
ISLS104	The family in Islam	-	2	2	0		الأسرة في الإسلام
ISLS105	Professional ethics		2	2	0		أخلاقيات المهنة
ISLS106	Women and their developmental role		2	2	0		المرأة ودورها التنموي
ISLS107	Economic system		2	2	0		النظام الاقتصادي
ISLS108	Contemporary issues	-	2	2	0		قضايا معاصرة

*The student chooses two courses out of 8 courses.

5.6.3. Program Elective Courses Track 1

Table 18. Program Elective Courses (Track 1: Electrical Power and Machines Engineering)

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Tutorial	
EE563	Electric Drive Systems	EE461, EE433	3	2	2	0	نظم التحريك الكهربائية
EE539	Power Electronics II	EE433	3	2	0	2	الكترونيات القوى 2
EE564	Electromechanical Energy Conversion III	EE461	3	2	0	2	التحويل الكهروميكانيكي للطاقة 2
EE565	Special Electrical Machines	EE461	3	2	0	2	الآلات الكهربائية الخاصة
EE566	Professional Safety	EE450	3	2	0	2	السلامة المهنية
EE567	Special Topics in Electrical Engineering I		3	2	0	2	موضوعات مختارة فى الهندسة الكهربائية 1
EE556	Power System Transients	EE450	3	2	0	2	أنظمة القوى العابرة
EE557	High Voltage Engineering	EE450	3	2	0	2	هندسة الجهد العالي
EE558	Power Systems Economy	EE552	3	2	0	2	اقتصاد أنظمة القوى
EE559	Energy Efficiency	EE450	3	2	0	2	كفاءة الطاقة
EE508	Smart Grid and Enabling Technologies	EE552	3	2	0	2	الشبكات الذكية والتقنيات التمكينية
EE542	Advanced Control Systems	EE440	3	2	0	2	نظم التحكم المتقدمة
EE403	Introduction to Artificial Intelligence	EE301	3	2	0	2	مقدمة في الذكاء الإصطناعي
EE509	Computer Applications in Electrical Systems	EE552	3	2	0	2	تطبيقات الحاسب فى الأنظمة الكهربائية
EE543	Special Topics in Electrical Engineering II		3	2	0	2	موضوعات مختارة في الهندسة الكهربائية 2

5.7. Free Courses

5.7.1. Free Courses

*Table 19- Free Courses**

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Other	
IS101	Digital transformation	-	2	2	0		التحول الرقمي
ELP102	Leadership and change management	-	2	2	0		القيادة وإدارة التغيير
GNCR105	Volunteering and social responsibility	-	2	2	0		التطوع والمسؤولية المجتمعية
PSY115	Skills to deal with people with disabilities	-	2	2	0		مهارات التعامل مع ذوي الإعاقة

*The student chooses two courses out of 4 courses.

6. Study Plan - Track 2

6.1. Academic Year-1

6.1.1. Level-1

Table 20. Study Plan - Level 1

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
MATH101	Calculus 1	R		4	3	0	2	College	حساب التفاضل والتكامل 1
LNGT101	English 1	R		4	20	0	0	College	اللغة الإنجليزية 1
IT100	Digital Culture	R		2	2	0	0	Institution	الثقافة الرقمية

ISLSxxx	Islamic Culture (1)	R		2	2	0	0	Institution	ثقافة اسلامية 1
Total				12	27	0	2	الإجمالي	

R/E: Required/ Elective. Type of requirements: Institution/ College/ Program. Other: can be Tutorial/Clinical

6.1.2. Level-2

Table 21. Study Plan - Level 2

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
MATH202	Calculus 2	R	MATH101	4	3	0	2	College	حساب التفاضل والتكامل 2
GNCR100	University Skills	R		2	2	0	0	Institution	المهارات الجامعية
LNGT102	English 2	R		4	20	0	0	College	اللغة الإنجليزية 2
LNGT103	English for Scientific and Engineering Purposes	R		2	4	0	0	College	اللغة الإنجليزية للأغراض العلمية والهندسية
Total				12	29	0	2	الإجمالي	

6.2. Academic Year-2

6.2.1. Level-3

Table 22. Study Plan - Level 3

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
MATH222	Linear Algebra	R	MATH101	3	3	0	0	College	الجبر الخطي
PHYS101	General Physics 1	R		4	3	2	0	College	الفيزياء العامة 1
MATH241	Differential Equations 1	R	MATH202	3	2	0	2	College	المعادلات التفاضلية 1
EE210	Electrical Circuits I	R	PHYS101 (co)	3	3	0	0	Program	الدوائر الكهربائية 1
EE200	Introduction to Computer Programming	R		3	2	2	0	College	مقدمة في برمجة الحاسب
xxxxxxx	University Elective (1)	E		2	2	0	0	Institution	اختياري جامعة 1
Total				18	15	4	2	الإجمالي	

6.2.2. Level-4

Table 23. Study Plan - Level 4

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE220	Analytical Methods in Engineering	R	MATH241	3	2	0	2	Program	الطرائق التحليلية في الهندسة
EE221	Statistics and Probability for Electrical Engineers	R	MATH202	3	2	0	2	Program	الإحصاء والاحتمالات للمهندسين الكهربائيين
EE211	Electrical Circuits II	R	EE210	3	2	0	2	Program	الدوائر الكهربائية 2
EE212	Electrical Circuits Laboratory	R	EE211(co)	1	0	2	0	Program	معمل الدوائر الكهربائية
ISLSxxx	Islamic Culture (2)	R		2	2	0	0	Institution	ثقافة إسلامية 2
CHEM101	General Chemistry 1	R		4	3	2	0	CHEM101	General Chemistry 1
Total				16	11	4	6	الإجمالي	

6.3. Academic Year-3

6.3.1. Level-5

Table 24. Study Plan - Level 5

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE322	Physics of Electricity and Magnetism	R	EE211, MATH202	3	2	0	2	Program	فيزياء الكهرباء والمغناطيسية
EE323	Numerical Methods in Engineering	R	MATH241	3	2	0	2	Program	الطرائق الحسابية فى الهندسة
EE330	Electronics	R	EE211	3	2	2	0	Program	الكترونيات
EE331	Digital Logic Design	R	EE211	3	2	2	0	Program	تصميم المنطق الرقمي
HR100	Entrepreneurship	R		2	2	0	0	Institution	ريادة الأعمال
EE313	Signals and Systems Analysis	R	EE211, MATH241	3	2	0	2	Program	تحليل الإشارات والنظم
Total				17	12	4	6	الإجمالى	

6.3.2. Level-6

Table 25. Study Plan - Level 6

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE324	Electromagnetic Fields	R	EE322, EE220	3	2	0	2	Program	المجالات الكهرومغناطيسية
EE332	Microelectronics Devices and Circuits	R	EE330	3	2	0	2	Program	نبائط ودوائر الميكروإلكترونيات
Xxxxxxx	University Elective (2)	E		2	2	0	0	Institution	اختياري جامعة 2
EE301	Structured Computer Programming	R		3	2	0	2	Program	برمجة الحاسب المهيكلة
EE302	Microcontrollers	R	EE200, EE331	2	1	2	0	Program	المتحكمات الدقيقة
EE390	Electrical Engineering Design	R	EE330	2	1	0	2	Program	تصميم الهندسة الكهربائية
Total				15	10	2	8	الإجمالى	

6.4. Academic Year-4

6.4.1. Level-7

Table 26. Study Plan - Level 7

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE440	Automatic Control Engineering	R	EE313	3	2	2	0	Program	هندسة التحكم الآلى
EE450	Electrical Power Systems I	R	EE324	3	2	0	2	Program	نظم القوى الكهربائية 1
EE403	Introduction to Artificial Intelligence	R	EE301	3	2	0	2	Program	مقدمة في الذكاء الاصطناعي
EE470	Communication Systems	R	EE313	3	2	0	2	Program	نظم الاتصالات
EE471	Communication Systems Laboratory	R	**EE470(co)**	1	0	2	0	Program	معمل نظم الاتصالات
xxxxxxx	Free Course 1	E		2	2	0	0	Institution	مقرر حر 1
CE201	Computer Aided Drawing	R		2	1	0	2	College	الرسم بالحاسب
Total				17	11	4	8	الإجمالى	

6.4.2. Level-8

Table 27. Study Plan - Level 8

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE434	VLSI Circuit Design	R	EE332	3	2	2	0	Program	تصميم الدوائر الرقمية المتكاملة واسعة النطاق
EE435	FPGA Laboratory	R	EE404(co)	1	0	2	0	Program	معمل الرقائق القابلة للبرمجة
EE404	Microprocessors	R	EE200, EE331	3	2	0	2	Program	المعالجات الدقيقة
EE405	Microprocessor and Microcontroller Laboratory	R	EE302 EE404(co)	1	0	2	0	Program	معمل المعالجات والمتحكمات الدقيقة
EE472	Digital Communication systems	R	EE470	3	2	0	2	Program	نظم الاتصالات الرقمية
EE414	Electrical Measurements and Instrumentation	R	EE330	3	2	2	0	Program	قياسات كهربية وأجهزة قياس
xxxxxx	Free Course 2	E		2	2	0	0	Institution	مقرر حر 2
Total				16	10	8	4	الإجمالي	

6.4.3. Field Training

Table 28. Study Plan - Field Training

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE491	Field Training	R	Dep. Approval & 110 credit hours	0	0	0	240	Program	تدريب ميداني
Total				0	0	0	240	الإجمالي	

6.5. Academic Year-5

6.5.1. Level-9

Table 29. Study Plan - Level 9

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE573	Antenna Theory	R	EE324	3	2	0	2	Program	نظرية الهوائيات
EE574	Antenna laboratory	R	EE573(co)	2	1	2	0	Program	معمل هوائيات
EE536	Introduction to Optoelectronic Devices and Systems	R	EE332	3	2	0	2	Program	مقدمة في الأنظمة والأجهزة الإلكترونية الضوئية
EE580	Digital Signal Processing	R	EE313	3	2	2	0	Institution	المعالج الرقمي الدقيق
EE5xx	Program Elective I	E		3	2	0	2	Program	اختياري برنامج 1
EE598	Capstone Project I	R	Dep. Approval & 120 credit hours	2	1	0	2	Program	مشروع تخرج 1
Total				16	10	4	8	الإجمالي	

6.5.2. Level-10

Table 30. Study Plan - Level 10

Course Code	Course Title	R/E	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Type of Requirements	Course Name in Arabic
					Theory	Lab	Tutorial		
EE541	Programmable Logic Controller	R	EE302	3	2	0	2	Program	الحاكم المنطقي المبرمج
EE506	Introduction to Embedded Systems	R	EE434	3	2	0	2	Program	مقدمة فى الأنظمة المدمجة
IE221	Engineering Economy	R		2	1	0	2	Program	اقتصاد هندسي
EE5xx	Program Elective II	E		3	2	0	2	Program	اختياري برنامج 2
EE5xx	Program Elective III	E		3	2	0	2	Program	اختياري برنامج 3
EE599	Capstone Project II	R	EE598	2	1	1	1	Program	مشروع تخرج 2
Total				16	10	1	11	الإجمالي	

6.6. Elective Courses

6.6.1. University Elective Courses

*Table 31- University Elective Courses**

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Other	
GNCR103	Kingdom & Its Pioneering Role	-	2	2	0		المملكة ودورها الريادي
ARAB103	Academic Writing Skills	-	2	2	0		مهارات الكتابة الأكاديمية
GNCR104	Fitness and Sport Science	-	2	2	0		اللياقة البدنية وعلوم الرياضة
BIO104	Sustainable Development	-	2	2	0		التنمية المستدامة
CUET101	Lifelong learning skills	-	2	2	0		مهارات التعلم مدى الحياة

*The student chooses two courses out of 5 courses.

6.6.2. University Elective Islamic Culture Courses

*Table 32- University Elective Islamic Culture Courses**

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Other	
ISLS100	The origins of Islamic culture	-	2	2	0		أصول الثقافة الإسلامية
ISLS102	Studies in the Prophet's biograph	-	2	2	0		دراسات في السيرة النبوية
ISLS109	Medical jurisprudence	-	2	2	0		الفقه الطبي
ISLS104	The family in Islam	-	2	2	0		الأسرة في الإسلام
ISLS105	Professional ethics		2	2	0		أخلاقيات المهنة
ISLS106	Women and their developmental role		2	2	0		المرأة ودورها التنموي
ISLS107	Economic system		2	2	0		النظام الاقتصادي
ISLS108	Contemporary issues	-	2	2	0		قضايا معاصرة

*The student chooses two courses out of 8 courses.

6.6.3. Program Elective Courses Track 2

Table 33. Program Elective Courses (Track 2: Electronics and Communications Engineering)

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Tutorial	
EE581	Digital Image Processing	EE470	3	2	2	0	معالج الصور الرقمية

EE575	Optical Communication	EE472	3	2	2	0	الاتصال البصري
EE576	Special Topics in Electronics and Communication Engineering I		3	2	0	2	موضوعات خاصة في هندسة الإلكترونيات والاتصالات 1
EE577	Information Theory and Coding	EE580	3	2	0	2	نظرية المعلومات والترميز
EE507	Applications of AI and Machine Learning in Electrical Engineering	EE403	3	2	0	2	تطبيقات الذكاء الاصطناعي والتعلم الآلي في الهندسة الكهربائية
EE537	Electronic Warfare Principles	EE403	3	2	0	2	مبادئ الحرب الإلكترونية
EE538	Special Topics in Electronics and Communication Engineering II		3	2	0	2	موضوعات خاصة في هندسة الإلكترونيات والاتصالات 2
EE578	Fundamentals of Wireless Communication	EE572	3	2	0	2	أساسيات الاتصال اللاسلكي
EE582	Introduction to Radar Systems	EE573	3	2	0	2	مقدمة في أنظمة الرادار
EE583	Special Topics in Electronics and Communication Engineering III		3	2	0	2	موضوعات خاصة في هندسة الإلكترونيات والاتصالات 3

6.7. Free Courses

6.7.1. Free Courses

*Table 34- Free Courses**

Course Code	Course Title	Pre-Requisite Courses Code	Credit Unit	Contact Unit			Course Name in Arabic
				Theory	Lab	Other	
IS101	Digital transformation	-	2	2	0		التحول الرقمي
ELP102	Leadership and change management	-	2	2	0		القيادة وإدارة التغيير
GNCR105	Volunteering and social responsibility	-	2	2	0		التطوع والمسؤولية المجتمعية
PSY115	Skills to deal with people with disabilities	-	2	2	0		مهارات التعامل مع ذوي الإعاقة

*The student chooses two courses out of 4 courses.

7. Degree(s) Awarded.

After the completion of 155 credits approved in the program of Electrical Engineering, the awarded Degree is Bachelor of Science in Electrical Engineering (BSc. EE) (بكالوريوس العلوم في الهندسة الكهربائية).

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY

Electrical Engineering Program Specification

NCAAA 2023 Template

من الشمال...إلى الوطن

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAA

2023
TP-151

Program Specification

(Bachelor)

Program:	Electrical Engineering
Program Code (as per Saudi university ranking):	071301
Qualification Level:	Level 6/Bachelor of Science
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Program Specification:	New ☐ updated* ☒
Last Review Date:	11/02/2024

*Attach the previous version of the Program Specification.

Table of Contents

A. Program Identification and General Information

1. Program's Main Location :

College of Engineering
Main Campus of Northern Border University
Arar City - Northern Border Region.

2. Branches Offering the Program (if any):

None

3. Partnerships with other parties (if any) and the nature of each:

None

4. Professions/jobs for which students are qualified

- Electrical Engineer
- Electromechanical engineer
- Automation engineer
- Power generation engineer,
- Power transmission and distribution engineer
- Electrical wiring engineer
- Instrumentation Electronic Engineer
- Medical Devices Engineer
- Instrumentation Engineer
- Protection Engineer
- Telecommunication Engineer
- Network Engineer
- Control Engineer
- Maintenance Engineer
- Operation Engineer
- Broadcast Engineer
- Instrumentation Engineer

5. Relevant occupational/ Professional sectors:

- The consulting and engineering offices.
- The constructions and contracting companies
- The general institution for water refined
- The military occupations management
- The water and sewage authority
- The Saudi commission for the engineers
- The general institution for ports
- The Saudi company for basic industries (SABIC)
- The construction materials factories
- The Saudi airlines

- The Saudi Arabia Aramco company
- The unified Saudi company for Electricity (SCECO)
- Ministry of Water and Electricity
- Ministry of Municipal and Rural Affairs
- The General Establishment for Water Desalination
- General Organization for Ports
- Saudi Airlines
- Construction and contracting companies
- Electronics and communications companies
- Power and electric power companies
- Ministry of Transportation
- General Electricity Corporation
- Saudi Consolidated Electricity Company
- Research & Development

6. Major Tracks/Pathways (if any):

Major track/pathway	Credit hours (For each track)	Professions/jobs (For each track)
1. Electrical Power and Machines Engineering	155	• Electrical Engineer • Electromechanical engineer • Automation engineer • Power generation engineer, • Power transmission and distribution engineer • Electrical wiring engineer • Instrumentation Electronic Engineer • Medical Devices Engineer • Instrumentation Engineer Protection Engineer
2. Electronics and Communications Engineering	155	• Telecommunication Engineer • Network Engineer • Control Engineer • Maintenance Engineer • Operation Engineer • Broadcast Engineer Instrumentation Engineer

7. Exit Points/Awarded Degree (if any):

exit points/awarded degree	Credit hours
1. None	

8. Total credit hours: (155)

B. Mission, Objectives, and Program Learning Outcomes

1. Program Mission:

The Mission of the Electrical Engineering Program (EEP) is:

To prepare electrical engineering graduates that compete in the labor market, sustain self-learning and professional development, and contribute to scientific research and community service.

2. Program Objectives:

The Objectives of the Electrical Engineering Program (EEP) are:

PO1: Serve competently in the professional career and academia by demonstrating high-quality knowledge and skills in the Electrical Engineering field.
PO2: Display self-learning, research, and critical thinking capability and take initiative in advancing their education and professional standing.
PO3: Function as a team member with the capability for leadership and effective communication.
PO4: Exhibit commitment to social responsibilities, ethical values, and meaningful community contributions.

3. Program Learning Outcomes*

Knowledge and Understanding	
K1	Demonstrate a coherent and broad body of knowledge in basic sciences, mathematics, and concepts in the electrical engineering discipline.
Skills	
S1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. [ABET (1)]
S2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. [ABET (2)]
S3	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. [ABET (6)]
S4	Communicate effectively with a range of audiences. [ABET (3)]
Values, Autonomy, and Responsibility	
V1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. [ABET (4)]
V2	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. [ABET (5)]
V3	Acquire and apply new knowledge as needed, using appropriate learning strategies. [ABET (7)]

The two tracks of the Electrical Engineering Program have the same Program Learning Outcomes (PLOs) since the EE Program takes the (7) ABET Student Outcomes as benchmarking and adds one PLO to be consistent with NQF learning domains.

C. Curriculum

1. Curriculum Structure

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Institution Requirements	Required	5	10	6.45%
	Elective	2	4	2.58%
College Requirements	Required	12	37	23.87%
	Elective	0	0	0%
Program Requirements	Required	33	87	56.13%
	Elective	3	9	5.81%
Capstone Course/Project	Required	2	4	2.58%
Field Training/ Internship	Required	1	0	0%
Residency year	--	0	0	0%
Others (Free Courses)	Elective	2	4	2.58%
Total		60	155	100%

Electronics and Communications Engineering (Track 2)

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Institution Requirements	Required	5	10	6.45%
	Elective	2	4	2.58%
College Requirements	Required	12	37	23.87%
	Elective	0	0	0%
Program Requirements	Required	33	87	56.13%
	Elective	3	9	5.81%
Capstone Course/Project	Required	2	4	2.58%
Field Training/ Internship	Required	1	0	0%
Residency year	--	0	0	0%
Others (Free Courses)	Elective	2	4	2.58%
Total		60	155	100%

2. Program Courses

2.1 Program Courses of Electrical Power and Machines Engineering (Track 1)

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 1	MATH101	Calculus I	Required		4	College
	LNGT101	English I	Required		4	College
	IT100	Digital Culture	Required		2	Institution
	ISLSxxx	Islamic Culture (1)	Required		2	Institution
Level 2	MATH202	Calculus II	Required	MATH101	4	College
	LNGT102	English II	Required		4	College
	GNCR100	University Skills	Required		2	Institution

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
	LNGT103	English for Scientific and Engineering Purposes	Required		2	College
Level 3	EE200	Introduction to Computer Programming	Required		3	College
	EE210	Electrical Circuits I	Required	PHYS101 (co)	3	Program
	PHYS101	General Physics I	Required		4	College
	MATH241	Differential Equations 1	Required	MATH202	3	College
	MATH222	Linear Algebra	Required	MATH101	3	College
	XXXXXXX	University Elective (1)	Elective		2	Institution
Level 4	CHEM101	General Chemistry I	Required		4	College
	EE211	Electrical Circuits II	Required	EE210	3	Program
	EE212	Electrical Circuits Laboratory	Required	EE211 (co)	1	Program
	EE220	Analytical Methods in Engineering	Required	MATH241	3	Program
	EE221	Statistics and Probability for Electrical Engineers	Required	MATH202	3	Program
	ISLSxxx	Islamic Culture (2)	Required		2	Institution
Level 5	EE313	Signals and Systems Analysis	Required	EE211, MATH241	3	Program
	EE322	Physics of Electricity and Magnetism	Required	EE211 MATH202	3	Program
	EE323	Numerical Methods in Engineering	Required	MATH241	3	Program
	EE330	Electronics	Required	EE211	3	Program
	EE331	Digital Logic Design	Required	EE211	3	Program
	HR100	Entrepreneurship	Required		2	Institution
Level 6	EE301	Structured Computer Programming	Required		3	Program
	EE302	Microcontrollers	Required	EE200, EE331	2	Program
	EE324	Electromagnetic Fields	Required	EE220, EE322	3	Program
	EE332	Microelectronics Devices and Circuits	Required	EE330	3	Program

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
	EE390	Electrical Engineering Design	Required	EE330	2	Program
	XXXXXXX	University Elective (2)	Elective		2	Institution
Level 7	EE440	Automatic Control Engineering	Required	EE313	3	Program
	EE450	Electrical Power Systems I	Required	EE324	3	Program
	EE460	Electromechanical Energy Conversion I	Required	EE324	3	Program
	EE470	Communication Systems	Required	EE313	3	Program
	EE471	Communication Systems Laboratory	Required	EE470 (co)	1	Program
	XXXXXXX	Free Course 1	Elective		2	Institution
Level 8	CE201	Computer Aided Drawing	Required		2	College
	EE414	Electrical Measurements and Instrumentation	Required	EE330	3	Program
	EE433	Power Electronics I	Required	EE330	3	Program
	EE451	Renewable Energy	Required	EE450	3	Program
	EE461	Electromechanical Energy Conversion II	Required	EE460	3	Program
	EE462	Electrical Machines Laboratory	Required	EE461 (co)	1	Program
	XXXXXXX	Free Course 2	Elective		2	Institution
Summer	EE491	Field Training	Required	110 credit hours	0	Program
Level 9	EE541	Programmable Logic Controller	Required	EE302	3	Program
	EE552	Electrical Power Systems II	Required	EE450, EE461	3	Program
	EE553	Power systems Laboratory	Required	EE552 (co)	1	Program
	EE592	Electrical Installations	Required	EE450	2	Program
	IE221	Engineering Economy	Required		2	Program
	EE5xx	Program Elective I	Elective		3	Program
	EE598	Capstone Project I	Required	Dep. Approval & 120	2	Program

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
				credit hours		
Level 10	EE554	Electric Power Transmission and Distribution	Required	EE552	3	Program
	EE555	Switchgear and Protection of Power System	Required	EE552	3	Program
	ME465	Power Plants for Non-mechanical Engineers	Required		3	Program
	EE5xx	Program Elective II	Elective		3	Program
	EE5xx	Program Elective III	Elective		3	Program
	EE599	Capstone Project II	Required	EE598	2	Program

Elective Courses of Electrical Power and Machines Engineering (Track 1)

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 8 Program Elective I	EE563	Electric Drive Systems	Elective	EE461, EE433	3	Program
	EE539	Power Electronics II	Elective	EE433	3	Program
	EE564	Electromechanical Energy Conversion III	Elective	EE461	3	Program
	EE565	Special Electrical Machines	Elective	EE461	3	Program
	EE566	Professional Safety	Elective	EE450	3	Program
	EE567	Special Topics in Electrical Engineering I	Elective		3	Program
Level 10 Program Elective II	EE556	Power System Transients	Elective	EE450	3	Program
	EE557	High Voltage Engineering	Elective	EE450	3	Program
	EE558	Power Systems Economy	Elective	EE552	3	Program
	EE559	Energy Efficiency	Elective	EE450	3	Program
	EE508	Smart Grid and Enabling Technologies	Elective	EE552	3	
Level 10 Program Elective III	EE542	Advanced Control Systems	Elective	EE440	3	Program
	EE403	Introduction to Artificial Intelligence	Elective	EE301	3	Program
	EE509	Computer Applications in Electrical Systems	Elective	EE552	3	Program

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
	EE543	Special Topics in Electrical Engineering II	Elective		3	Program

2.2 Program Courses of Electronics and Communications Engineering (Track 2)

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 1	MATH101	Calculus I	Required		4	College
	LNGT101	English I	Required		4	College
	IT100	Digital Culture	Required		2	Institution
	ISLSxxx	Islamic Culture (1)	Required		2	Institution
Level 2	MATH202	Calculus II	Required	MATH101	4	College
	LNGT102	English II	Required		4	College
	GNCR100	University Skills	Required		2	Institution
	LNGT103	English for Scientific and Engineering Purposes	Required		2	College
Level 3	PHYS101	General Physics I	Required		4	College
	MATH241	Differential Equations 1	Required	MATH202	3	College
	MATH222	Linear Algebra	Required	MATH101	3	College
	EE200	Introduction to Computer Programming	Required		3	College
	EE210	Electrical Circuits I	Required	PHYS101 (co)	3	Program
	XXXXXXX	University Elective (1)	Elective		2	Institution
Level 4	EE211	Electrical Circuits II	Required	EE210	3	Program
	EE212	Electrical Circuits Laboratory	Required	EE211 (co)	1	Program
	CHEM101	General Chemistry I	Required		4	College
	EE220	Analytical Methods in Engineering	Required	MATH241	3	Program
	EE221	Statistics and Probability for Electrical Engineers	Required	MATH202	3	Program
	ISLSxxx	Islamic Culture (2)	Required		2	Institution
Level 5	EE313	Signals and Systems Analysis	Required	EE211, MATH241	3	Program
	EE322	Physics of Electricity and Magnetism	Required	EE211, MATH202	3	Program

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
	EE323	Numerical Methods in Engineering	Required	MATH241	3	Program
	EE330	Electronics	Required	EE211		Program
	EE331	Digital Logic Design	Required	EE211	3	Program
	HR100	Entrepreneurship	Required		2	Institution
Level 6	EE301	Structured Computer Programming	Required		3	Program
	EE302	Microcontrollers	Required	EE200, EE331	2	Program
	EE332	Microelectronics Devices and Circuits	Required	EE330	3	Program
	EE324	Electromagnetic Fields	Required	EE220, EE322	3	Program
	EE390	Electrical Engineering Design	Required	EE330	2	Program
	XXXXXXX	University Elective (2)	Elective		2	Institution
Level 7	EE403	Introduction to Artificial Intelligence	Required	EE301	3	Program
	EE440	Automatic Control Engineering	Required	EE313	3	Program
	EE450	Electrical Power Systems I	Required	EE324	3	Program
	EE470	Communication Systems	Required	EE313	3	Program
	EE471	Communication Systems Laboratory	Required	EE470 (co)	1	Program
	CE201	Computer Aided Drawing	Required		2	College
	XXXXXXX	Free Course 1	Elective		2	Institution
Level 8	EE404	Microprocessors	Required	EE200, EE331	3	Program
	EE405	Microprocessor and Microcontroller Laboratory		EE302, EE404 (co)	1	
	EE414	Electrical Measurements and Instrumentation	Required	EE330	3	Program
	EE434	VLSI Circuit Design	Required	EE332	3	Program
	EE435	FPGA Laboratory	Required	EE404 (co)	1	Program
	EE472	Digital Communication systems	Required	EE470	3	Program
	XXXXXXX	Free Course 2	Elective		2	Institution
Summer	EE491	Field Training	Required	110 credit hours	0	Program
Level 9	EE573	Antenna Theory	Required	EE324	3	Program
	EE574	Antenna Laboratory	Required	EE573 (co)	2	Program

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
	EE536	Introduction to Optoelectronic Devices and Systems	Required	EE332	3	Program
	EE580	Digital Signal Processing	Required	EE313	3	Program
	EE5xx	Program Elective I	Elective		3	Program
	EE598	Capstone Project I	Required	Dep. Approval & 120 credit hours	2	Program
Level 10	EE541	Programmable Logic Controller	Required	EE302	3	Program
	EE506	Introduction to Embedded Systems	Required	EE434	3	Program
	IE221	Engineering Economy	Required		2	Program
	EE5xx	Program Elective II	Elective		3	Program
	EE5xx	Program Elective III	Elective		3	Program
	EE599	Capstone Project II	Required	EE598	2	Program

Elective Courses of Electronics and Communications Engineering (Track 2)

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 9 Program Elective I	EE581	Digital Image Processing	Elective	EE470	3	Program
	EE575	Optical Communication	Elective	EE472	3	Program
	EE576	Special Topics in Electronics and Communication Engineering I	Elective		3	Program
Level 10 Program Elective II	EE577	Information Theory and Coding	Elective	EE580	3	Program
	EE507	Applications of AI and Machine Learning in Electrical Engineering	Elective	EE403	3	Program
	EE537	Electronic Warfare Principles	Elective	EE403	3	Program
	EE538	Special Topics in Electronics and Communication Engineering II	Elective		3	Program

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 10 Program Elective III	EE578	Fundamentals of Wireless Communication	Elective	EE472	3	Program
	EE582	Introduction to Radar Systems	Elective	EE573	3	Program
	EE583	Special Topics in Electronics and Communication Engineering III	Elective		3	Program

3. Course Specifications:

Insert hyperlink for all course specifications using NCAAA template (T-104)

- **Course Specification Link**
- **Field Training Link**

4. Program learning Outcomes Mapping Matrix:

Align the program learning outcomes with program courses, according to the following desired levels of performance *(I = Introduced & P = Practiced & M = Mastered).*

4.1 Program Learning Outcomes Mapping Matrix of Track 1 (Electrical Power and Machines Engineering)

Course code & No.	Program Learning Outcomes							
	Knowledge and understanding	Skills				Values, Autonomy, and Responsibility		
	K1	S1	S2	S3	S4	V1	V2	V3
MATH101	I	I						
MATH202	I	I						
MATH222	I	I						
PHYS101	I			I				
EE200	I	I	I					
EE210	I	I				I		
EE221	I	I					I	
MATH241	I	I						
EE211	I	I				I		
EE212				I	I	I	I	
EE220	I	I					I	
CHEM101	I	I		I	I		I	

Course code & No.	Program Learning Outcomes							
	Knowledge and understanding	Skills				Values, Autonomy, and Responsibility		
	K1	S1	S2	S3	S4	V1	V2	V3
EE322	I	P						
EE323	P	P					P	
EE330	I	P	P	I		I		
EE331	I	P	P	P			I	
EE313	I	P	P				I	
EE301	I	I	I					
EE302		P	P	P	P			P
EE324	P	P			P			
EE332	P	P	P		P			I
EE390		P	P			p	p	P
EE440	P	P	P	P			P	
EE450	M	M	M		M			M
EE460	M	M				M		
EE470	P	P					P	P
EE471				P	P	P	P	
EE414	P	P		P	P			
EE451	M	M	M			M		M
EE461	M	M			M			M
EE462				M	M	M	M	
EE433	M	M	M	M			M	
CE201	M	M	M		M			
EE491	M	M			M	M	M	M
EE541	M		M	M	M			M
EE552	M	M	M		M		M	
EE553	M	M		M	M	M	M	
EE592	M		M			M	M	
IE221	M	M				M		
EE554	M	M	M			M		
EE555		M	M	M				M
ME465	M	M						M
EE598		M	M		M	M	M	M
EE599		M	M		M	M	M	M
Elective Courses of Track 1								
EE563	M	M		M	M	M		
EE539	M	M	M					M
EE564	M	M	M					M
EE565	M	M			M			M
EE566	M	M			M			M
EE556		M	M			M		M
EE557	M		M			M		
EE558		M	M			M		M

Course code & No.	Program Learning Outcomes							
	Knowledge and understanding	Skills				Values, Autonomy, and Responsibility		
	K1	S1	S2	S3	S4	V1	V2	V3
EE559		M	M			M		M
EE508		M	M			M		M
EE542		M	M				M	M
EE403			M				M	M
EE509		M	M				M	M
EE543	M	M	M					M

4.2 Program Learning Outcomes Mapping Matrix of Track 2 (Electronics and Communications Engineering)

Course code & No.	Program Learning Outcomes							
	Knowledge and understanding	Skills				Values, Autonomy, and Responsibility		
	K1	S1	S2	S3	S4	V1	V2	V3
MATH101	I	I						
MATH202	I	I						
MATH222	I	I						
PHYS101	I			I				
EE200	I	I	I					
EE210	I	I				I		
MATH241	I	I						
EE211	I	I				I		
EE212				I	I	I	I	
EE220	I	I					I	
EE221	I	I					I	
CHEM101	I	I		I	I		I	
EE322	I	P						
EE323	P	P					P	
EE330	I	P	P	I		I		
EE331	I	P	P	P			I	
EE313	I	P	P				I	
EE324	P	P			P			
EE332	P	P	P		P			I
EE301	I	I	I					
EE302		P	P	P	P			P
EE390		P	P			p	p	P

Course code & No.	Program Learning Outcomes							
	Knowledge and understanding	Skills				Values, Autonomy, and Responsibility		
	K1	S1	S2	S3	S4	V1	V2	V3
EE403		M	M				M	M
EE440	P	P	P	P			P	
EE450	M	M	M		M			M
EE470	P	P					P	P
EE471				P	P	P	P	
CE201	M	M	M		M			
EE404	P	P	P					P
EE405				P	P	P	P	
EE434	M		M	M	M	M	M	
EE435				M	M	M	M	
EE472	M	M	M				M	
EE414	P	P		P	P			
EE491					M	M	M	M
EE573	M	M	M				M	M
EE574				M	M	M	M	
EE580	M	M		M	M		M	M
EE536	M	M			M			M
EE598		M	M		M	M	M	M
EE506	M		M	M	M		M	
EE541	M		M	M	M			M
IE221	M					M		
EE599		M	M	M	M	M	M	M
Elective Courses of Track 2								
EE581	M	M	M	M			M	M
EE575	M	M		M				
EE577	M	M	M					
EE507	M	M	M					
EE537	M	M	M					
EE578	M	M					M	
EE582	M	M	M				M	

5. Teaching and learning strategies applied to achieve program learning outcomes.

Learning Domain	Teaching and Learning Strategies Curricular Activities	Extracurricular Activities
Knowledge and understanding	– Class / Group Discussion. – Problem-Based Learning. – Scientific Research. – Collaborative Learning. – Self-Learning. – Brainstorming. – Peer Learning. – Observation	– General Cultural Competition. – Participation in the Founding Day of the Kingdom – Training Programs.
Skills	– Problem-Based Learning. – Scientific Research. – Lab-Based Learning. – Role-Play. – Collaborative Learning. – Self-Learning. – Peer Learning. – Observation.	– Internet of Things Training Program. – Digital Innovation Training Program. – PLC Training Program. – Renewable Energy Training Program. – Electrical Hazards Training Program.
Values, Autonomy, and Responsibility	– Class / Group Discussion. – Problem-Based Learning. – Scientific Research. – Role-Play. – Collaborative Learning. – Self-Learning. – Peer Learning.	– Ethics Workshops. – Community Service Activities. – Sports Activities.

6. Assessment Methods for program learning outcomes.

The program should devise a plan for assessing Program Learning Outcomes (all learning outcomes should be assessed at least twice in the bachelor program’s cycle and once in other degrees).

Learning Domain	Assessment Methods	
	Direct	Indirect
Knowledge and understanding	– Open book exam. – Rubric. – Discussion. – Peer evaluation. – Presentations. – Reports. – Oral exams. – Written Tests.	– Alumni surveys. – Employer feedback. – Exit surveys of graduating students
Skills	– Open book exam. – Rubric. – Discussion. – Self-assessment – Presentations. – Reports. – Projects. – Oral exams. – Problem-based Assessment. – Written Tests.	– Alumni surveys. – Employer feedback. – Exit surveys of graduating students – Meetings with Program Advisory Board.
Values, Autonomy, and Responsibility	– Rubric. – Case Study. – Discussion – Peer evaluation – Presentations – Reports – Field Training Assessment – Projects, – Problem-based Assessment	– Alumni surveys. – Employer feedback. – Exit surveys of graduating students – Team-based extracurricular activities,

D. Student Admission and Support:

1. Student Admission Requirements

General Admission Requirements (NBU):

- Be a Saudi national or born of a Saudi mother (Exception can be subjected to special rules).
- Hold a General Secondary Education Certificate or equivalent within five years.
- Obtain a certificate of good conduct and pass required exams/interviews.
- Be medically fit and
- Obtain the approval of his employer if he is an employee.
- Meet any additional University Council requirements at the time of application.

Admission to the College of Engineering (COE):

- Competitive selection based on secondary school grades and weighted scores from national exams.

Admission to the Electrical Engineering Program (EEP):

- Complete at least one year (two semesters) before specialization.
- Complete at least 25 credit hours with a minimum GPA of 3.0 out of 5.0 in the first year.
- Pass English courses with at least a C grade.
- Unsuccessful candidates may be transferred to other colleges based on their choices and university rules.
- Submit specialization request forms listing preferred programs.
- Program allocation based on GPA, preferences, and program capacity.

Additional Information:

- The College of Engineering uses a 5.0 GPA scale with grades ranging from A+ (exceptional) to F (fail).
- Academic Advisors continuously monitor student progress and ensure they meet program requirements.
- The computerized registration system automatically checks prerequisites, but consultation with advisors is recommended.
- Workload limits are set based on GPA and academic level.
- Students can discuss any deviation from the standard study plan with their advisor.

Admission to the EEP is a multi-step process with specific requirements and considerations. This information aims to guide students through the process and help them make informed decisions about their future studies. The students should consult their academic advisors for personalized advice and support.

2. Guidance and Orientation Programs for New Students

Northern Border University (NBU) and the College of Engineering (COE) are committed to providing a smooth and informative transition for new students. Here's a summary of the guidance and orientation programs offered at different levels:

University Level:

- **Induction Week:** An annual event organized by the Deanship of Admissions and Registrar introduces the university's admission process, registration procedures, and key dates.
- **Foundation Year:** This mandatory year equips new students with the necessary skills and knowledge for successful university studies.

College of Engineering Level:

- **Induction Meeting:** Hosted by program heads of departments, this session details admission requirements, program features, career opportunities, and available facilities.
- **Academic Advisor Assignment:** Upon admission, each student is assigned an advisor who guides them through registration and the specialization process.

Electrical Engineering Department Level:

- **Program Overview Session:** This session provides in-depth information about the Electrical Engineering program, its faculty, career prospects, and program requirements.
- **Program Advisor Assignment:** After selecting their specialization, students receive a dedicated program advisor for ongoing academic and career support and guidance.

NBU and the COE recognize the importance of a seamless transition for new students. These multi-level programs ensure students have the knowledge and support needed to navigate their academic journey successfully.

3. Student Counseling Services

The College of Engineering (COE) at NBU recognizes the importance of individual support for student success. That's why we offer comprehensive student counseling services through dedicated faculty advisors.

Academic Guidance:

- **Assigned Advisor:** Each student is paired with a faculty member approved by the EE Department Council to serve as his academic advisor.
- **Personalized Support:** The advisors provide regular guidance and assistance on various academic matters, including:
  - Course selection and scheduling
  - Adding/dropping courses
  - Resolving course conflicts
  - Transferring credits
  - Withdrawing from courses
- **Graduation Support:** the advisors help the students stay on track and graduate on time by monitoring their academic progress and ensuring they meet all program requirements.

Career Guidance:

- **Career Exploration:** the advisors help the students explore career opportunities in the Electrical Engineering field based on their interests and aspirations.
- **Job Placement Support:** the advisors provide guidance and resources to help students secure their dream job, whether in Saudi Arabia or abroad.
- **Graduate Studies Support:** If the students are interested in pursuing higher studies, the advisors can offer guidance on relevant programs and application processes.

The COE's student counseling services are designed to empower you with the knowledge and support you need to succeed academically and professionally. Your dedicated advisor is here to guide you through every step of your journey, from course selection to career planning.

4. Special Support

Advising and Support for All Students:

The College recognizes the diverse needs of all learners and offers various support systems:

- **Academic Advisors:** Monitors the performance of all students, not just low achievers, and provides personalized counseling and guidance on academic progress and challenges.
- **Gifted and Talented Support:** Encourages and challenges high-performing students, offering resources to meet their needs and interests. Additionally, they are given opportunities to mentor their peers.

NBU and the College of Engineering strive to create a supportive and inclusive learning environment where all students, can thrive and achieve their academic goals.

E. Faculty and Administrative Staff:

1. Needed Teaching and Administrative Staff

Academic Rank	Specialty		Special Requirements / Skills (if any)	Required Numbers		
	General	Specific		M	F	T
Professor	Electrical Engineering	Electrical Machines Control		1		1
Associate Professor	Electrical Engineering Engineering Mathematics	Power Electronics. Engineering Mathematics -Power systems -Electrical system control -Communication -Electronics and Computer Science		8		8
Assistant Professor	Electrical Engineering	-Electric Machines. Telecom.		6		6

		Electrical Power. Power and Control Engineering of Electrical Systems Computer Engineering Computer Science and Telecom.				
Lecturer	Electrical Engineering	Power Electronics		1		1
Teaching Assistant						
Technicians and Laboratory Assistant	Electrical Engineering	Electrical Engineering		2		2
Administrative and Supportive Staff	College			1		1
Others (specify)						

F. Learning Resources, Facilities, and Equipment:

1. Learning Resources

The Electrical Engineering Program (EEP) prioritizes providing adequate and current learning resources to support student success. This aligns with the College of Engineering's policy, recognizing that quality learning materials are crucial for preparing graduates for the labor market.

Resource Selection and Approval:

- Specialized committees regularly review and update learning resources lists, ensuring they are relevant and meet program objectives.
- Proposed lists are presented to the department council for discussion and refinement.
- Final approval is granted by the college council before submission to the university's purchase department.

Resource Adequacy and Feedback:

- Operative procedures guarantee that available resources effectively support teaching and learning.

- Regular feedback from faculty and students is actively sought to assess the appropriateness of learning materials for achieving program outcomes.

Computing Resources and Support:

- The Department of Information Technology (DIT) manages the maintenance and upgrades of all computing resources used by students and faculty.
- DIT technicians readily provide technical support for equipment and computing resources in offices and laboratories, ensuring uninterrupted learning experiences.
- The EEP's resource selection process, feedback mechanisms, and dedicated technical support ensure that students have access to high-quality, up-to-date learning materials, ultimately contributing to their success in the program and the job market.

2. Facilities and Equipment

Temporary Location:

The College of Engineering (COE) currently operates on the 3rd floor of the Science College building while its dedicated building is under construction. This temporary arrangement ensures all necessary facilities and resources are available to deliver the Electrical Engineering Program (EEP).

Classrooms:

- Suitably sized and well-lit classrooms equipped with modern instructional aids like smart boards, video projectors, and internet access.
- Traditional lecture format with individual chairs for comfortable learning.

Laboratories:

- **Science Building:**
  - **Shared Computer Laboratory:** Serves all engineering programs and supports scholarly activities for both faculty and students.
  - **Adequate computing resources:** Centralized IT platforms track enrollment, academic progress, and offer online resources.
  - **E-library and search engines:** Provide access to paper and electronic references.
  - **Software tools:** Prepare graduates for successful careers by using industry-standard software.
- **Engineering Laboratories Building:**
  - Dedicated EEP laboratories for various specialized courses:
    - Power System
    - Electrical Machine
    - Power Electronics
    - Electrical & Electronics Measurements
    - Basic Electrical Engineering
    - Electronics

- Communications
- Digital Systems
- Microprocessors & Microcontrollers
- Automatic Control

  - Well-equipped: Laboratories are constantly updated with modern equipment to meet program needs.

Offices:

- Administration and faculty offices are conveniently located on the 2nd corridor of the 3rd floor in the Science building.
- Adequate office space with good lighting, ventilation, and modern amenities.
- Desks, chairs, bookcases, computers, internet access, printers, photocopiers, and phones facilitate efficient work.
- Dedicated conference room for program meetings.

Library Services:

- **Shared library:** Located on the 2nd floor of the Science building and supplemented by the University's Central Library.
- **Diversified collection:** Books, textbooks, technical reports, and papers in both English and Arabic.
- **Dedicated engineering section:** Stocked with relevant resources covering all EE fields.
- **Extensive online access:** Faculty and students can utilize Academic Digital Library (ADL) and Saudi Digital Library (SDL) for world-wide and national databases.
- **Book acquisition:** EEP faculty can request additional resources from the Deanship of Library Affairs.

While temporarily housed in the Science building, the College of Engineering ensures its facilities and equipment adequately support the EEP's educational objectives and student learning outcomes. Modern classrooms, well-equipped labs, comfortable offices, and extensive library resources provide a comprehensive environment for a successful learning experience.

2. Procedures to ensure a healthy and safe learning environment

The College of Engineering (COE) at Northern Border University prioritizes the health and safety of its students, faculty, and staff. We adhere to strict safety standards established by the Department of Security and Safety and implement comprehensive procedures to create a secure and supportive learning environment.

General Safety Measures:

- **Active protection:** All university buildings, including classrooms, laboratories, offices, and libraries, are equipped with automatic fire detection systems, fire extinguishers, fire hoses, evacuation signage, and emergency response plans. Regular drills and awareness programs ensure timely and effective responses to potential hazards.

- **Emergency Response System:** An efficient system assesses emergencies, coordinates responses, and notifies individuals for safe and swift evacuation.

Laboratory Safety:

- **Electrical Safety:** Emphasis is placed on safe handling of electricity in Electrical Engineering Program (EEP) labs. Students receive thorough training on electrical hazards and safe laboratory practices through dedicated instruction and individual safety manuals.
- **Laboratory-Specific Procedures:** Each EEP lab has a specific manual outlining safety guideline for tools, equipment, and activities. Instructors emphasize safe practices and ensure adherence to these guidelines.
- **Safety Equipment:** Personal protective equipment like gloves, eye protection, and workwear are readily available in all labs. Additionally, aid kits, eyewashes, showers, and emergency phones are strategically located for immediate access.
- **Safe Storage:** All hazardous materials are stored securely according to regulations.

Communication and Collaboration:

- **Safety Committee:** The COE's Safety Committee (SC) regularly updates and distributes safety brochures to ensure awareness and compliance.
- **Supervisory Involvement:** Laboratory supervisors identify specific safety requirements and notify department heads. The SC chairman then informs the Dean about overall program needs for a safe learning environment.
- **Student Responsibility:** Students are required to wear personal safety equipment in workshops and laboratories. Emergency exits, safety signs, and instructions are prominently displayed in all COE buildings. Instructors provide clear safety instructions before using tools, equipment, and computing resources.

Emergency Response:

In case of an emergency, department heads inform the Dean who, in consultation with relevant authorities, takes immediate action to minimize harm and safeguard individuals and facilities.

Overall, the COE's comprehensive safety procedures create a secure and healthy learning environment for all. These measures, combined with ongoing communication and collaboration, demonstrate our unwavering commitment to the well-being of our community.

G. Program Quality Assurance:

1. Program Quality Assurance System

Provide a link to the quality assurance manual.

EE-Quality System Manual Link

2. Procedures to Monitor Quality of Courses Taught by other Departments

This program utilizes various strategies to assess the quality of courses taught by other departments, ensuring they align with program learning outcomes (PLOs) and contribute to student success:

1. Curricular Design and Planning:

- **Course specifications:** The program readily accesses specifications of courses taught by other departments, including university and college requirements. These specifications provide insights into the course content, learning resources, and assessment methods.
- **Peer review:** The program manager engages in collaborative discussions with peers from other programs. This dialogue focuses on course content design, alignment with PLOs, and resource quality, aiming to identify potential areas for improvement.

2. Curricular Delivery:

- **Assessment reports:** While the program cannot directly control teaching strategies or assessment methods for external courses, it leverages college-required courses' end-of-term reports for assessment purposes.
- **External assessment data:** The program actively analyzes assessment results from other departments to identify areas where courses might require adjustments to better support program objectives.

3. Procedures Used to Ensure the Consistency between Main Campus and Branches (including male and female sections).

Not Applicable.

4. Assessment Plan for Program Learning Outcomes (PLOs),

The Electrical Engineering program at Northern Border University adheres to a rigorous assessment plan to ensure its Program Learning Outcomes (PLOs) are effectively measured and continuously improved. This plan ensures that graduates possess the necessary knowledge, skills, and values to excel in their chosen careers.
This plan incorporates both direct and indirect assessment methods.

1. **Direct Assessment:** This involves mapping Course Learning Outcomes (CLOs) to relevant PLOs and utilizing various assessment tools within each course.

   - ***Course-level assessment*** (***Every semester***): Each course contributes to achieving specific PLOs, as mapped in a designed matrix in section 4. Course assessment tools, such as exams, projects, and presentations, are designed to evaluate students' acquisition of knowledge, skills, and values aligned with the mapped PLOs.

- ***Program-level assessment*** (***Every academic year***): Assessment data from individual courses, typically those at higher levels, are aggregated and analyzed to gain insights into PLO achievement at the program level.
- ***Evaluation***: student achievement percentages are used to evaluate overall learning outcome achievement, based on predefined performance thresholds.

2. **Indirect Assessment:** This method collects feedback from students, alumni, and employers via surveys to determine whether the program adequately prepares graduates for the job market and satisfies the needs of the industry.

The assessment data is regularly analyzed to identify areas for improvement. This data informs curriculum revisions, teaching methodologies, and resource allocation decisions, ensuring the program remains relevant and aligned with industry needs and accreditation standards.

5. Program Evaluation Matrix

Evaluation Areas/Aspects	Evaluation Sources/References	Evaluation Methods	Evaluation Time
Effectiveness of teaching & assessment	- Students - Peer Review	- Surveys - Peer Review Form - Course Portfolio	By the end of each academic Semester
Extent of Achievement of Course Learning Outcomes (CLOs)	- Students - Faculty members	- Surveys - Assessment Tools	By the end of each academic Semester
Extent of Achievement of Program Learning Outcomes (PLOs)	- Faculty Members - Quality and Academic Accreditation Committee	- Course Report - Data gathering and Statistical analysis.	By the end of each academic year
Quality of Learning Resources	- Students - Faculty - Quality and Academic Accreditation Committee	- Surveys - Course Reports - Data gathering and Statistical analysis.	By the end of the academic year
Quality of Facilities and Equipment	- Students - Faculty members - Laboratories Committee	- Surveys - Course Reports - Data gathering and Statistical analysis.	By the end of each academic year

6. Program KPIs*

The period to achieve the target (5) year(s).

No.	KPIs Code	KPIs	Targeted Level	Measurement Methods	Measurement Time
1	KPI-P-01	Students' Evaluation of quality of learning experience in the program	4.5	Surveys	Every Semester
2	KPI-P-02	Students' evaluation of the quality of the courses	4.2	Surveys	Every academic Year
3	KPI-P-03	Completion rate	80%	Data gathering and Statistical analysis.	Every academic Year
4	KPI-P-04	First-year students retention rate	100%	Data gathering and Statistical analysis.	Every academic Year
5	KPI-P-05	Students' performance in the professional and/or national examinations	80%	Data gathering and analysis.	Every academic Year
6	KPI-P-06	Graduates' employability **and** enrolment in postgraduate programs	85% **and** 10%	Data gathering and Statistical analysis.	Every academic Year
7	KPI-P-07	Employers' evaluation of the program graduates' proficiency	4.4	Survey	Every academic Year
8	KPI-P-08	Ratio of students to teaching staff	6:1	Data gathering and Statistical analysis.	Every academic Year
9	KPI-P-09	Percentage of publications of faculty members	100%	Data gathering and Statistical analysis.	Every Gregorian Year
10	KPI-P-10	Rate of published research per faculty member	6.3/1	Data gathering and Statistical analysis.	Every Gregorian Year
11	KPI-P-11	Citations rate in refereed journals per faculty member	70:1	Data gathering and Statistical analysis.	Every Gregorian Year

* including KPIs required by NCAAA

H. Specification Approval Data:

Council / Committee	DEPARTMENT COUNCIL
Reference No.	NO. (9)
Date	12/02/2024

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY
2007 _ ١٤٢٨

Courses Specification

NCAAA 2023 Template

من الشمال...إلى الوطن

Table of Courses Specification

Program Core Courses	
Course Code	Course Title
EE210	Electrical Circuits I
EE221	Statistics and Probability for Electrical Engineers
EE211	Electrical Circuits II
EE212	Electrical Circuits Laboratory
EE220	Analytical Methods in Engineering
EE301	Structured Computer Programming
EE322	Physics of Electricity and Magnetism
EE330	Electronics
EE331	Digital Logic Design
EE313	Signals and Systems Analysis
EE324	Electromagnetic Fields
EE332	Microelectronics Devices and Circuits
EE414	Electrical Measurements and Instrumentation
EE323	Numerical Methods in Engineering
EE440	Automatic Control Engineering
EE390	Electrical Engineering Design
EE302	Microcontrollers
EE470	Communication Systems
EE471	Communication Systems Laboratory
EE450	Electrical Power Systems I
EE460	Electromechanical Energy Conversion I
ME465	Power Plants for Non-mechanical Engineers
EE461	Electromechanical Energy Conversion II
EE462	Electrical Machines Laboratory
EE433	Power Electronics I
EE552	Electrical Power Systems II
EE553	Power systems Laboratory
EE451	Renewable Energy
EE491	Field Training
EE541	Programmable Logic Controller
IE221	Engineering Economy
EE5xx	Program Elective I
EE592	Electrical Installations
EE5xx	Program Elective II
EE598	Capstone Project I
EE554	Electric Power Transmission and Distribution

EE555	Switchgear and Protection of Power System
EE5xx	Program Elective III
EE599	Capstone Project II
EE404	Microprocessors
EE405	Microprocessor and Microcontroller Laboratory
EE450	Electrical Power Systems I
EE434	VLSI Circuit Design
EE435	FPGA Laboratory
EE403	Introduction to Artificial Intelligence
EE506	Introduction to Embedded Systems
EE536	Introduction to Optoelectronic Devices and Systems
EE472	Digital Communication systems
EE491	Field Training
EE580	Digital Signal Processing
EE541	Programmable Logic Controller
EE5xx	Program Elective I
EE573	Antenna Theory
EE574	Antenna laboratory
EE5xx	Program Elective II
EE598	Capstone Project I
IE221	Engineering Economy
EE5xx	Program Elective III
EE599	Capstone Project II

Program - Elective Courses (Track 1: Electrical Power and Machines Engineering)	
Course Code	Course Title
EE563	Electric Drive Systems
EE539	Power Electronics II
EE564	Electromechanical Energy Conversion III
EE565	Special Electrical Machines
EE566	Professional Safety
EE567	Special Topics in Electrical Engineering I
EE556	Power System Transients
EE557	High Voltage Engineering
EE558	Power Systems Economy
EE559	Energy Efficiency
EE508	Smart Grid and Enabling Technologies
EE542	Advanced Control Systems
EE403	Introduction to Artificial Intelligence
EE509	Computer Applications in Electrical Systems
EE543	Special Topics in Electrical Engineering II

Program -Elective Courses (Track 2: Electronics and Communications Engineering)	
Course Code	Course Title
EE581	Digital Image Processing
EE575	Optical Communication
EE576	Special Topics in Electronics and Communications Engineering I
EE577	Information Theory and Coding
EE507	Applications of AI and Machine Learning in Electrical Engineering
EE537	Electronic Warfare Principles
EE538	Special Topics in Electronics and Communications Engineering II
EE578	Fundamental of Wireless Communications
EE582	Introduction to Radar Systems
EE583	Special Topics in Electronics and Communications Engineering III

Required College Courses	
Course Code	Course Title
MATH101	Calculus I
LNGT101	English 1
PHYS101	General Physics 1
MATH202	Calculus II
LNGT102	English 2
MATH222	Linear Algebra
LNGT103	English for Scientific and Engineering Purposes
CHEM101	General Chemistry 1
MATH241	Differential Equations 1
EE200	Introduction to Computer Programming
CE201	Computer Aided Drawing

University Courses	
Required University Courses	
Course Code	Course Title
IT100	Digital Culture
GNCR100	University Skills
HR100	Entrepreneurship
Elective University Courses	
ISLSxxx	Islamic Culture (1)
ISLSxxx	Islamic Culture (2)
xxxxxx	University Elective (1)
xxxxxx	University Elective (2)

Free Courses	
Course Code	Course Title
xxxxxx	Free Course 1
xxxxxx	Free Course 2

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY
2007 _ ١٤٢٨

Required Courses of Electrical Engineering Program

من الشمال...إلى الوطن

Course Specification

(Bachelor)

Course Title:	Introduction to Computer Programming
Course Code:	EE200
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering College
Institution:	Northern Border University
Version:	3
Last Revision Date:	27/01/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
(2 Lecture, 0, 2 Lab)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 3/2nd year)					
4. Course general Description:					
This course introduces basic computer programming concepts using the C++ language. From variables and data types to control structure and functions, students will learn how to transform ideas into code and, solve problems.					
5. Pre-requirements for this course (if any)**:**					
None.					
6. Co-requisites for this course (if any)**:**					
None.					
7. Course Main Objective(s):					
This course aims to provide students with the basic concepts of C++ Language Programming emphasizing the design of user-defined functions to solve engineering problems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the basics of C++.	K1	-Class/Group discussion.	-Written Tests. -Discussion
1.2	Describe appropriate input and output methods and formats.	K1	-Class/Group discussion.	-Written Tests. -Discussion
2.0	**Skills**			
2.1	Utilize appropriate control structure suitable for different programming cases.	S1	-Problem-based learning	- Problem-based Assessment. -Written Tests.
2.2	Apply simple and derived data types such as arrays, character strings.	S1	-Problem-based learning	- Problem-based Assessment. - Written Tests.
2.3	Define and utilize functions to modularize code and improve readability.	S1	Computer Lab-Based Learning	- Computer Lab-Based Assessment -Presentation -Project
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	**C01-Introduction to Computers and Programming**	**4**
2.	**Introduction to C++**	**6**
3.	**Expressions and Interactivity**	**6**

4.	**Making Decisions**	**8**
5.	**Loops**	**12**
6.	**Functions**	**8**
7.	**Arrays**	**12**
8.	**String**	**4**
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Quizzes)	2-15th	10%
2.	Labs	2-15th	10%
3.	Assignments	3-15th	10%
4.	Written test (Periodical tests)	6-12th	30 %
5.	Written test (Final Exam)	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Gaddis, T. , "Starting Out with C++: From Control Structures to Objects", 10th edition. 2021, Pearson.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computers Lab
Technology equipment (projector, smart board, software)	Data show, Whiteboard, C++ software (dev C++ or Internet to use online C++ Compiler)
Other equipment (depending on the nature of the specialty)	None.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	- Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Circuits I
Course Code:	EE210
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	25/01/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3rd/2nd)					
4. Course general Description:					
The course provides students with fundamental concepts of charge, current, voltage and power; passive circuit elements; mesh and nodal analysis; Thevenin's and Norton's theorems; source transformation; transient analysis in time.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requirements for this course (if any)**:**					
PHYS101: General Physics I					
7. Course Main Objective(s):					
– The course objective is to introduce fundamental concepts of electric DC circuits, and provide students with basic electric DC circuits analysis techniques.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	**30**
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Identify basic definitions of electric quantities, equivalent resistance of series and parallel resistive networks, and passive circuit elements.	K1	– Class/Group discussion.	– Written Tests – Discussion.
1.2	Describe Ohm's law, KCL and KVL for the calculation of electrical magnitudes in resistive networks.	K1	– Class/Group discussion.	– Written Tests. – Discussion.
2.0	Skills			
2.1	Analyze DC circuits using main circuit analysis methods	S1	– Problem-based learning	– Problem-based Assessment. -Written Tests.
2.2	Calculate power in DC circuits	S1	– Problem-based learning	– Problem-based Assessment. - Written Tests.
2.3	Analyze transient response of RL, RC, and RLC Circuits in time domain.	S1	– Problem-based learning	– Problem-based Assessment. – - Written Tests.
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional engineering situations that require electrical circuit analysis helping in solving electrical engineering problems and the main standards used in the solution.	V1	– Class/Group discussion. – Collaborative learning. – Self-learning.	– Presentations – Reports – Project

C. Course Content

No	List of Topics	Contact Hours
1.	Basic Definition of Electric quantities: voltage, current, power, and energy	6
2.	Electrical Independent and dependent sources.	4
3.	Calculating the Equivalent Resistance of series and parallel resistive networks	8
4.	Passive circuit elements	4
5.	Basic laws in circuit analysis: Ohm's laws and Kirchhoff's laws (KVL & KCL) in DC circuits	8
6.	Main circuit analysis methods: nodal, mesh, and source transformation	8
7.	Superposition, Thevenin, Norton theorems.	8
8.	Power calculations and maximum power transfer	8
9.	Transient analysis of RL, RC, and RLC Circuits in time domain	6
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report /Presentation	13th	10 %
4.	Project	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Alexander, C. K., & Sadiku, M. (2020). ISE Fundamentals of Electric Circuits (ISE HED IRWIN ELEC&COMPUTER ENGINERING) (7th ed.). McGraw-Hill Education.
Supportive References	Electric Circuits by James W. Nilsson, Susan Riedel, 10th Edition 2015, Pearson Education, Inc.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Circuits II
Course Code:	EE211
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: ($4^{th}/2^{nd}$)					

4. Course general Description:

The course covers a range of topics in electrical engineering, including complex numbers and phasor analysis, AC sinusoidal analysis, power calculations, balanced 3-phase circuits, operational amplifier circuits and applications, circuits with magnetic coupling elements, electrical transformer circuits, frequency responses, passive and active filter analysis and design, and two-port networks. Students will learn how to analyze and design electrical circuits using these techniques and apply them to real-world problems.

5. Pre-requirements for this course (if any)**:**

1. EE210: Electrical Circuits I

6. Co-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

The main objective of the course is to provide students with a comprehensive understanding of various techniques used in electrical engineering, such as AC sinusoidal analysis, complex numbers and phasor analysis, power calculations, balanced 3-phase circuits, operational amplifier circuits and applications, circuits with magnetic coupling elements, electrical transformer circuits, frequency responses, passive and active filter analysis and design, and two-port networks.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recall basic definitions of AC electric quantities to describe Ohm's law, KCL and KVL for the calculation of electrical quantities in AC networks.	K1	-Class/Group discussion.	-Written Tests. -Discussion
1.2	Define some ideal operational amplifier functions	K1	-Class/Group discussion.	-Written Tests. - Discussion.
2.0	Skills			
2.1	Solve single Phase and 3-Phase AC circuits in the phasor domain	S1	-Problem-based learning	-Problem-based Assessment. -Written Tests.
2.2	Analyze AC circuits for power calculations and maximum power transfer	S1	-Problem-based learning	-Problem-based Assessment. - Written Tests.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Analyze the two-port networks study	S1	-Problem-based learning	- Problem-based Assessment. - Written Tests.
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional engineering situations that require AC circuit analysis to help in solving electrical engineering problems and the main standards used in the solution	V1	-Class/Group discussion. -Collaborative learning. -Self-learning.	-Presentations -Reports -Project

C. Course Content

No	List of Topics	Contact Hours
1.	AC sinusoidal analysis	6
2.	Complex numbers and phasor analysis	6
3.	power calculations	4
4.	balanced 3-phase circuits	6
5.	Operational amplifier circuits and applications	4
6.	Circuits with magnetic coupling elements	8
7.	Analyze electrical transformer circuits	6
8	Frequency responses	8
9	passive and active filter analysis and design	6
10	two-port networks	6
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report /Presentation	13th	10 %
4.	Project	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Alexander, C. K., & Sadiku, M. (2020). ISE Fundamentals of Electric Circuits (ISE HED IRWIN ELEC&COMPUTER ENGINERING) (7th ed.). McGraw-Hill Education.
Supportive References	Electric Circuits by James W. Nilsson, Susan Riedel, 10th Edition 2015, Pearson Education, Inc.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Electrical Circuits Laboratory	
Course Code: EE212	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 03	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)

2. Course type

A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	

3. Level/year at which this course is offered: ($4^{th}/2^{nd}$)

4. Course general Description:

This course covers practical laboratory experiments on the basics of electrical dc and ac circuits that have been studied theoretically, The course enables students to conduct experiments by themselves and analyze the results.

5. Pre-requirements for this course (if any)**:**

6. Co-requirements for this course (if any)**:**

EE211: Electrical Circuits II

7. Course Main Objective(s):

The course objective is to provide students with the ability to develop and test electrical circuits practically and conduct basic electrical engineering experiments.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2 x 15 = 30 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours

1.	**Lectures**	
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
2.0	Skills			
2.1	Conduct electrical circuits experiments, analyze and interpret data, and draw conclusions	S3	Lab-based learning. Observation	-Discussion. -Laboratory Exam.
2.2	Communicate effectively with a range of audiences	S4	Lab-based learning. Observation	- Discussion. -Laboratory Exam - presentation.
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional standards utilized in communication system situations and be informed of safety factors and hazards that must be considered in laboratory	V1	-Lab-based learning. -Collaborative learning.	-Mini project Presentations -Reports
3.2	Function effectively on a team whose members together provide collaboration and cooperation in conducting and analyzing practical experiments and performing mini projects.	V2	-Lab-based learning. -Collaborative learning.	-Presentations -Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Experiment 1: Assembly of Simple Circuit	4
2.	Experiment 2: Ohm's Low.	4
3.	Experiment 3: Series and Parallel Connection of Resistors	5
4.	Experiment 4: Voltage Divider in No-load Operation	5

5.	Experiment 5: Superposition and Thevenin's Theorems	4
6.	Experiment 6: Ohmic Resistance in AC Circuits	4
7.	Experiment 7: R-C And R-L Circuits	4
Total		24

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report	13th	10 %
4.	Mini project Presentation	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Alexander, C. K., & Sadiku, M. (2020). ISE Fundamentals of Electric Circuits (ISE HED IRWIN ELEC&COMPUTER ENGINERING) (7th ed.). McGraw-Hill Education.
Supportive References	Electric Circuits by James W. Nilsson, Susan Riedel, 10th Edition 2015, Pearson Education, Inc.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Analytical Methods in Engineering
Course Code:	EE220
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: (4th/2nd)

4. Course general Description:

The different subsections of this course are presented in the following order:
complex numbers, analytic functions (limits, continuity, derivatives, Cauchy-Riemann equations, analytic functions, harmonic functions), Elementary functions (exponential, logarithm, complex exponents, trigs, hyperbolic functions), Integrals (definite integrals, contour integrals, Cauchy theorem, Cauchy integral formula), Series (sequences, convergence of series, Taylor series, Laurent series), Residues and poles (residues, Cauchy's residue theorem, residue at infinity, zeros of analytic functions). Classification of partial differential equations, solving partial differential equations with initial and boundary conditions using different methods.

5. Pre-requirements for this course (if any)**:**

MATH241: Differential Equations 1

6 Co- requirements for this course (if any)**:**

None

7. Course Main Objective(s):

- The main objective of this course is to provide the students with the basic concepts of complex variables, residue integration, conformal transformation, and the basic concept and the solution of partial differential equations.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the basic concepts of complex numbers, complex variable functions and conformal mapping.	K1	- Discussion during Classroom lecture. - Problem-Based Learning.	- Written test - Problem-Based Assessment.
1.2	Recognize the basic concept of partial differential equations.	K1	- Discussion during Classroom lecture. - Problem-Based Learning.	- Written test - Problem-Based Assessment.
2.0	**Skills**			
2.1	Compute the integral along a path in the complex plane, contour integral, and real improper integrals using the Cauchy integration formula and residual theorem.	S1	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.2	Evaluate the series expansion of a	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	complex function, determining the nature of the singularities and calculating residues			
2.3	solve different partial differential equations using different methods.	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Complex numbers and their operations	6
2.	functions of a complex variable	6
3.	Complex derivatives and conformal mapping	7
4.	Series representation of analytic functions: power, Taylor, and Laurent	7
5.	Integration in the complex plane	6
6.	Residue theorem	7
7.	Introduction to PDEs	7
8.	Methods of solution for PDE	7
9.	Solution of the Wave equation, Transmission line Equations	7
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	5 %
2.	Written test (Quiz 1)	3rd	10 %
3.	Written test (Periodical tests)	6-12th	30 %
4.	Homework	During the semester	5 %
5.	Written test (Quiz 2)	8th	10 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
6.	Written test (Final Exam)	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	H. K. Dass, Advanced Engineering Mathematics, Twenty Second Edition, 2018, S Chand Publishing, ISBN: 9789352533831
Supportive References	K.A. Stroud, Dexter J. Booth, Advanced Engineering Mathematics, 6th Edition, 2020, Bloomsbury Academic, ISBN-10 : 1352010259
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Statistics and Probability for Electrical Engineers
Course Code:	EE221
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	07/02/ 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th/2nd)					
4. Course general Description:					
This course covers the role of statistics and probability in electrical engineering. It includes the basic concepts of probability; random variables; discrete and continuous probability distributions (discrete; continuous and joint probability distributions); functions of random variables; the law of large numbers; the central limit theorem; sample mean and variance; estimating distributions; correlation; regression and hypothesis testing.					
5. Pre-requirements for this course (if any)**:**					
MATH202: Calculus II					
6 Co- requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
– The main objective of this course is to provide the students with the concept of probability and statistics and be able to apply these concepts to electrical engineering applications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the methods for describing sets of data and graphing them	K1	- Discussion during Classroom lecture. - Problem-Based Learning.	- Written test - Problem-Based Assessment.
	Identify the basic concepts of probability, statistics	K1	- Discussion during Classroom lecture. - Problem-Based Learning.	- Written test - Problem-Based Assessment.
2.0	**Skills**			
2.1	Compute the Probability Density Function of a random variable	S1	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.2	Use fundamentals of statistics and probability to analyze data and interpret results	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.3	solve electrical engineering problems related to discrete and continuous distributions	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Statistics and Data Analysis	6
2.	Probability	6
3.	Random Variables and Probability Distributions	7
4.	Mathematical Expectation	7
5.	Some Discrete Probability Distributions	6
6.	Some Continuous Probability Distributions	7
7.	Functions of Random Variables	7
8.	Simple linear regression and correlation	7
9.	Statistical Estimation and Hypotheses Testing	7
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	5 %
2.	Written test (Quiz 1)	3rd	10 %
3.	Written test (Periodical tests)	6-12th	30 %
4.	Homework	During the semester	5 %
5.	Written test (Quiz 2)	8th	10 %
6.	Written test (Final Exam)	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Walpole, R. E., Myers, R. H., Myers, S. L., Ye, K. (2016). Probability & statistics for engineers and scientists. Upper Saddle River: Pearson Education.

Supportive References	Montgomery, D. C., & Runger, G. C. (2018). Applied statistics and probability for engineers, Hoboken, NJ: Wiley.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title: Signals and Systems Analysis	
Course Code: EE313	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 3	
Last Revision Date: 26/02/2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3					
2. Course type					
A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (5^{th} /3^{rd})					

4. Course general Description:

This course introduces different Types of Electrical signals in both Continuous time and discrete time states. Also Fourier series, Fourier transform, Laplace transform, and z-transform are introduced to manage transformation of signals in different domains. The course demonstrates different types of electrical systems with special concern to clarify LTI system concepts such as impulse response, step Response convolution, transfer function, and frequency response. Finally, the course discusses sampling and Nyquist theorems used to convert analog signals into discrete-time signals and hence to digital signals.

5. Pre-requirements for this course (if any):

EE211 Electrical Circuits II
MATH241 Differential Equations

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

The course objective is to introduce fundamental concepts of continuous-time signals, discrete-time signals, and systems, recognize and compare several transform-domain approaches, and use the sampling theorem to transform analog to digital signals.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify different Types of Electrical signals in both Continuous time and discrete time states	K1	-Class/Group discussion. -Problem-based learning.	-Written Tests. -Discussion
1.2	Describe LTI system concepts such as impulse response, step Response convolution, and transfer function and frequency response	K1	-Class/Group discussion. -Problem-based learning.	-Written Tests. -Discussion
…				
2.0	**Skills**			
2.1	Analyze Electrical signals and system in different parameters domains using Fourier, Laplace and z-transforms	S1	-Problem-based learning -Collaborative learning.	- Problem-based Assessment. -Written Tests.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Design analog-to-digital conversion model satisfying certain aspects.	S2	-Problem-based learning -Collaborative learning.	-Problem-based Assessment. -Projects. -Written Tests.
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively on a team whose members together create a collaboration in discussions and performing mini projects meet some defined specifications for different systems explained in the course	V2	-Class / Group discussion. -Problem-based learning.	-Presentation -Project
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Continuous-Time Signals and Systems	6
2.	Continuous-Time Linear Time-Invariant Systems	6
3.	Fourier Series	6
4.	Fourier Transform	7
5.	Application of Fourier Transform	6
6.	Laplace Transform	7
7.	Sampling and Reconstruction	7
8.	Discrete-Time Linear Time-Invariant Systems	8
9.	z-Transform	7
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written test (Mid Term Test)**	**5th Week**	**30%**
2.	**Written test (Quiz)**	**weekly**	**10%**
3.	**Discussion and Participation**	**During the semster**	**10%**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Maltlab assignment	3-6-9-12th week	10%
5.	Written test (Final Test)	16th Week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Signals, Systems, and Transforms, 4th Ed. C. L. Phillips, J. M. Parr, and E. A. Riskin, 2013
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer Lab
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	- Peer Reviewer	- Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Development Committee
REFERENCE NO.	NO (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: **Physics of Electricity and Magnetism**
Course Code: EE322
Program: Electrical Engineering
Department: Electrical Engineering
College: Engineering
Institution: Northern Border University
Version**: V3**
Last Revision Date**:** 01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (5/3)					
4. Course general Description:					
This course provides the students with the basic principles of theories of vector algebra; Electric Fields; Gauss's Law; Electric Potential; Capacitance and Dielectrics; Current and Resistance; Magnetic Fields and Biot-Savart Law.					
5. Pre-requirements for this course (if any)**:**					
Electrical Circuits II : EE211 Calculus II : MATH202					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The main objective of this course is to provide students with the fundamental principles of electromagnetism. This includes topics such as electric fields, magnetic fields, electric potential, and electromagnetic waves. Through this course, students should develop the ability to apply these principles to solve problems in physics and engineering					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify)**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain the basic principles and fundamentals of vector algebra.	K1	Class / Group discussion.	Written tests Discussion
	Identify the basics of capacitance, dielectric material, resistance, and superconductors	K1	Class / Group discussion.	Written tests Discussion
2.0	**Skills**			
2.1	Apply Coulomb's law and Gauss's law to compute the electric force and the electric field intensity.	S1	Problem-Based Learning.	Written Tests Problem-Based Assessment.
2.2	Calculate the electric potential and potential difference.	S1	Problem-Based Learning.	Written Tests Problem-Based Assessment.
2.3	Compute the magnetic field generated by the electric current using Biot-Savart Law.	S1	Problem-Based Learning. •	Written Tests • Problem-Based Assessment.
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Vector Algebra background	8
2.	Electric Force and Electric Field	6
3.	Continuous and discontinuous Charge Distribution Electric Field Lines	6
4.	Electric Flux and Gauss' Law	8
5.	Potential Energy and Conservative Forces	6
6.	Electric Potential	6
7.	Capacitors	6
8.	DC Circuits and conductors	6
9.	Magnetic Force and Magnetic Field	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	5 %
2.	Written test (Quiz 1)	3rd	10 %
3.	Written test (Periodical tests)	6-12th	30 %
4.	Report /Presentation	13th	5 %
5.	Written test (Quiz 2)	8th	10 %
6.	Written test (Final Exam)	17-18th	40 %
...			**100%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Halliday, D., Resnick, R., & Walker, J. (2020). Fundamentals of physics. John Wiley.
Supportive References	- Young, H.D., Freedman, R.A. and Ford, A.L. (2020) Sears and Zemansky's University physics with modern physics. Hoboken, NJ: Pearson. - Serway, R. A., & Jewett, J. W. (2018, January 1). Physics for Scientists and Engineers with Modern Physics. In-Text Citation: (Serway & Jewett, 2018).
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratories
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student Faculty Program Leaders	Direct Indirect Indirect
Effectiveness of Students assessment	Student Faculty Program Leaders	Indirect Direct Indirect
Quality of learning resources	Students Program Leaders	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Electrical Engineering Council
REFERENCE NO.	Department Council Meeting Minutes No.
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Numerical Methods in Engineering
Course Code:	EE323
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/ 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th/3rd)					
4. Course general Description:					
This course covers the concepts and techniques for numerical methods and algorithms, Solution of non-linear equations- solution of large systems of linear equations, Interpolation, Curve fitting, Numerical differentiation and integration, and Solution of differential equations.					
5. Pre-requirements for this course (if any)**:**					
MATH241: Differential Equations 1					
6 Co- requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
– The main objective of this course is to provide the students with the concepts of numerical methods in solving mathematical problems numerically, analyze the error for these methods and implement these methods for solving mathematical engineering problems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the sources of errors in mathematical operations.	K1	- Discussion during Classroom lecture. - Problem-Based Learning.	- Written test - Problem-Based Assessment.
2.0	**Skills**			
2.1	Apply numerical Methods for differentiating and integrating complicated functions related to engineering applications.	S1	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.2	Perform data analysis using interpolation and curve fitting.	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.3	Solve linear and nonlinear algebraic equations and systems of nonlinear equations using numerical techniques.	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively in teamwork during solving differential	V2	- Report - Discussion	- Report. - Presentation.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	equations related to engineering applications.			

C. Course Content

No	List of Topics	Contact Hours
1.	Mathematical Preliminaries and Error Analysis	6
2.	Solutions of Equations in One Variable	7
3.	Interpolation and Polynomial Approximation	8
4.	Numerical Solutions of Nonlinear Systems of Equations	7
5.	Numerical Differentiation and Integration	8
6.	Initial-Value Problems for Ordinary Differential Equations	8
7.	Direct Methods for Solving Linear Systems	8
8.	Iterative Techniques in Matrix Algebra	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	5 %
2.	Written test (Quiz 1)	3rd	10 %
3.	Written test (Periodical tests)	6-12th	30 %
4.	Report /Presentation	13th	5 %
5.	Written test (Quiz 2)	8th	10 %
6.	Written test (Final Exam)	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Chapra, S. C., & Canale, R. P. (2020), "Numerical Methods for Engineers", 8th Edition. McGraw-Hill, ISBN-10 : 1260232077
Supportive References	Richard L. Burden and J. Douglas Faires (2015), "Numerical Analysis", 10th Edition, Cengage Learning, ISBN-10: 1305253663

Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electronics
Course Code:	EE330
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (5th/3th)					

4. Course general Description:

This course introduces semiconductors physics, which are the basics of electronic devices. It also introduces the concepts in the analysis and design of electronic circuits. The subsequent parts of this course are presented in the following order: an introduction to semiconductors physics, the construction of diode and its characteristics and application circuits; the construction of bipolar junction transistors (BJT) and its characteristics; operation modes of BJT; DC and AC analysis of BJT circuits; BJT application and circuits, the construction of field effect transistors (FET) and its characteristics; operation modes of FET; DC and AC analysis of FET circuits, and FET application and circuits.

5. Pre-requirements for this course (if any)**:**

EE211: Electrical Circuits II.

6. Pre-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

By the end of the semester, students should understand the fundamentals of semiconductors and electronic components like diode, transistor, FET, and MOSFET. Students should build mathematical and numerical background for designing electronic circuits.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	identify the types of semiconductors materials used in the manufacture of electronic devices	K1	- Classroom Lectures - Class Work - Class Discussion	- Written test - Observation
			-	-
2.0	**Skills**			
2.1	Solve basic diode circuits (rectifiers, clippers)	S1	Written Tests	- Written test - Observation - Practical tests
2.2	Analyze FET, BJT and operational amplifiers of various configurations.	S1	Problem-based Assessment. -Written Tests.	- Written test - Observation
2.3	Design FET, BJT, and operational amplifiers with given gain, input, and output resistance.	S2	Problem-based Assessment. -Written Tests.	- Written test - Observation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Conduct appropriate experiments practically on various studied electronic devices.	S3	Problem-based Assessment. - -Written Tests.	- Observation - Practical tests
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional engineering situations that require different electronic devices in solving electrical engineering problems and the main standards used in the solution.	V1	Problem-based Assessment Discussion. Reports	- Observation - Report

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to physics of semiconductor materials	10
2.	Diode theory and applications circuits	10
3.	BJT theory and DC circuits Analysis	10
4.	BJT theory and AC circuits Analysis	10
5.	FET theory and DC circuits Analysis	10
6.	FET theory and AC circuits Analysis	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	2-14	10%
2.	Periodic Exams	6-14	30%
3.	Lab Exam	16	20%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Final Exam	17-18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Albert Malvino, David J. Bates, Electronic Principles, 9th edition, Prentice Hall. (2020), ISBN: 978-1260570564
Supportive References	"Microelectronic Circuits" (8th Edition) Adel S. Sedra, Kenneth C.(KC) Smith, Tony Chan Carusone, and Vincent Gaudet Publication. Date - November 2019 ISBN: 9780190853549
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Electronics Laboratory
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL

REFERENCE NO.	NO. (9)
DATE	12/02/2024

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Digital Logic Design
Course Code:	EE331
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	26/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (5^{th} /3^{rd})					

4. Course general Description:
The course describes the basic principle of logic design. The course enables the students to apply algebraic and graphical techniques such as Boolean Algebra and Karnaugh Maps among others. A wide variety of devices such as Multiplexers, Decoders, and encoders are studied for designing complex combination networks. Special emphasis on the study of flip-flops memory devices enables the student to design several sequential networks.
5. Pre-requirements for this course (if any)**:**
EE211 Electrical Circuits II
6. Co-requirements for this course (if any)**:**
None
7. Course Main Objective(s):
This course aims to provide students with the basics of Digital Logic electrical circuits. Students should be able to analyze and design both combinational and sequential digital logic networks.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify different numbering systems and codes and the conversion between them.	K1	Class/Group discussion..	- Written Tests.
1.2	Describe Boolean functions, simplification methods and its realization methods using multilevel logic gates.	K1	- Class/Group discussion.	- Written Tests.
2.0	**Skills**			
2.1	Utilize multiplexers and decoders in designing basic combinational circuits.	S1	Problem-based learning	- Problem-based Assessment. - Written Tests.
2.2	Analyze and design Digital circuits using programmable logic devices	S1	Problem-based learning	- Problem-based Assessment. - Written Tests.
2.3	Design and implement sequential networks such as counters, code converters, shift registers, and similar networks	S2	Problem-based learning	- Discussion - Written Tests.
2.4	Construct experiments for the design of	S3	-Lab-based learning. Observation	Laboratory Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	combinational and sequential circuits.			
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively on a team whose members together provide collaboration to establish digital logic experiments and co-operate together in mini projects that satisfy some objectives	V2	- Lab-based learning. - Observation	- Project - Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	Numbering Systems, Base Conversion and Arithmetic Operations	5
2.	Boolean Algebra and Functions, Canonical forms and Standard forms	5
3.	The Map simplification Method (Two, three and Four-Variable Map)	5
4.	(AND-OR), NAND and NOR Implementation	5
5.	Design procedure for Combinational circuits	5
6.	Decoders, Encoders and Multiplexers	5
7.	Programmable logic devices and gate arrays.	5
8.	Sequential circuits (Latches and Flip-flops)	5
9.	Analysis of clocked sequential circuits	5
10.	Design procedure of clocked sequential circuits	7
11.	Design of Shift Registers and similar Sequential Networks	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion	2-14	10%
2.	Periodic Exams	6-14	30%
3.	Project and presentation	15	10%
4.	Laboratory Exam	16	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	Final Exam	17-18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Mano, M. M., & Ciletti, M. (2017). Digital Design (6th ed.). Pearson.
Supportive References	Kinney, L. A. R. C. J. R. H. L. (2022). Fundamentals of Logic Design (7th ed.). CENGAGE INDIA.
Electronic Materials	
Other Learning Materials	PowerPoint slides and notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Projector, Smart board
Other equipment (depending on the nature of the specialty)	Digital Logic Training Kit Y-0020/01 & Y-0020/02 Experiment Set in the Digital Design Laboratory (L106)

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Structured Computer Programming
Course Code:	EE301
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6/3rd)					
4. Course general Description:					
This course presents MATLAB basics, built-in functions for the computation of mathematical formula, user-defined functions, various structured computer programs via the m-files of MATLAB.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
This course aims to provide students with the basic concepts of MATLAB Language Programming, and design user-defined functions to solve engineering problems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**30**
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the basics of MATLAB	K1	• Class/Group Discussion	• Written Tests.
1.2	Discuss MATLAB commands in the matrix computation and polynomial operations	K1	• Class/Group Discussion	• Written Tests.
2.0	Skills			
2.1	Calculate mathematical formula using the built-in functions	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment.
2.2	Design user-defined functions to solve engineering problems	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment.
3.0	Values, autonomy, and responsibility			

C. Course Content

No	List of Topics	Contact Hours
1.	Basics of MATLAB	5
2.	Array and matrix operations	10
3.	Polynomial operations	10
4.	Graphing functions: XY plots, subplots	5
5.	Built-in functions	10
6.	User-defined functions	10
7.	Application of the user-defined functions to solve some physical problems.	10
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30 %
2.	Assignments	4th to 12th	20 %
3.	LAB Exam	15-16th	10 %
4.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Introduction to MATLAB® for Engineers. Third Edition, William J. Palm III, 2011
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee.	- Direct (Students Work-Exams)

Assessment Areas/Issues	Assessor	Assessment Methods
	Students	Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Microcontrollers
Course Code:	EE302
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	27/01/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (6/3rd)					

4. Course general Description:

This is an introductory course in designing microcontroller-based systems. Topics include an overview of a single-chip microcontroller, hardware and software concepts in microcontroller, system architecture, central processing unit (CPU), internal memory (ROM, EEPROM, RAM, FLASH), Input/ Output ports, serial communication, programmable interrupts and timers, microcontroller programming model and instruction set, assembly language programming.

5. Pre-requirements for this course (if any):

Digital Logic Design: EE331,
Introduction to Computer Programming: EE200

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

The main objective of this course is to make students familiar with 8051 Assembly Language Programming and give him the experience to use Arithmetic and Logic Instructions to write programs for 8051 microcontrollers.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1			•	•
1.2				
...				
2.0	**Skills**			
2.1	Use the internal registers and I/O ports of the 8051 microcontrollers	S1	• Problem-based learning.	• Written Tests • Problem-Based Assessment.
2.2	Apply branch instructions and delay subroutines.	S2	• Problem-based learning.	• Written Tests • Problem-Based Assessment.
2.3	Practice 8051 Assembly Language Program	S3	• Lab-based learning.	• Written Tests • Laboratory Exam

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Communicate actively in discussions during presentation	S4	• Class/Group discussion. • Self-learning	• Oral presentation • Rubrics
3.0	**Values, autonomy, and responsibility**			
3.1	Collect information about new generation of microcontrollers by asking key questions and by using a variety of sources such as the internet, textbooks.	V3	• Scientific research. • Self-learning	• Reports • Rubrics
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	The Hardware description of 8051 microcontroller	6
2.	The internal architecture of 8051 microcontroller family	6
3.	Interfacing with 8051 microcontrollers	8
4.	Addressing modes in 8051 and memory	8
5.	Assembly language directives	8
6.	The instruction set of 8051	8
7.	Writing a simple program to 8051 microcontrollers	8
.8	Applications of 8051	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written test (Mid Term Test)**	**5th Week**	**30%**
2.	**Written test (Quiz)**	**10th Week**	**10%**
3.	**Report and Oral Presentation**	**13th Week**	**10%**
4.	**Lab Exam**	**14th Week**	**10%**
5.	**Written test (Final Test)**	**16th Week**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Ghoshal, S. (2022). *8051 Microcontrollers: Internals, Instructions, Programming &Interfacing* (2nd ed.). PEARSON INDIA.
Supportive References	Godse, A. P., & Godse, D. A. (2020). *Microcontrollers: 8051 & MSP430 Microcontrollers Family Architecture, Programming, Interfacing & Applications*. 9789333223454.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Microprocessors and Microcontrollers Laboratory
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	The MDA-Win8051 Training Kit in the Microprocessors and Microcontrollers Laboratory in Lab rooms building-L106

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	- Peer Reviewer	- Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electromagnetic Fields
Course Code:	EE324
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6^{th}/3^{rd})					

4. Course general Description:

This course aims to provide the student with the fundamentals and theories of Magnetic field. Magnetic forces and torques, Biot-Savart law; Force between parallel conductors; Ampere's law; Magnetic boundary conditions; Inductance; Magnetic energy; Time Varying Fields: Faraday's Law; Stationary Loop in Time-Varying Magnetic Field; Ideal Transformer; Moving Conductor in Static Magnetic Field; Moving Conductor in Time-Varying Magnetic Field; Continuity Equation will be attained; Finally, Maxwell's Equations and Hertz's Discoveries; Plane Electromagnetic Waves; Energy Carried by Electromagnetic Waves.

5. Pre-requirements for this course (if any)**:**

1. **Physics of Electricity and Magnetism:EE322**
2. **Analytical Methods in Engineering:EE220**

6. Co-requirements for this course (if any)**:**

7. Course Main Objective(s):

The main objective of this course is to learn students the basics of electromagnetic Waves, provide the students with the basic fundamentals and theories of Electric and Magnetic fields and finally approve theories that relate both electric and magnetic fields together with other parameters.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	**30**
5.	**Others (specify)**	
Total		60

B. . Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define the basic principles and fundamentals of vector algebra	K 1	-Class/Group discussion..	Written Tests.
1.2	Describe the magnetic field due to different current distribution using Biot-Savart law.	K 1	-Class/Group discussion.	Written Tests.
1.3	Explain Faraday's law of induction and the transformer emf and motional emf.	K 1	-Class/Group discussion..	Written Tests.
1.4	Identify the physical meaning of the four Maxwell's equations.	K 1	-Class/Group discussion.	Written Tests.
2.0	Skills			
2.1	Apply Ampere's law and Gauss's Law to find the relation between electrical current and the magnetic field density.	S1	-Problem-based learning	- Problem-based Assessment. -Written Tests.
2.2	Communicate effectively with classmates and instructors during discussions.	S4	-Class/Group discussion. -Collaborative learning.	-Presentations -Reports
3.0	Values, autonomy, and responsibility			

C. Course Content

No	List of Topics	Contact Hours

1.	Vector Analysis: Vector Algebra; Coordinate Systems; Vector Calculus	10
2.	Electrostatics: Maxwell's Equations; Coulomb's & Gauss's Laws;	10
3.	Laplace's and Poisson's Equations.	10
4.	Magneto-statics: Biot-Savart Law; Ampere's Law; Magnetic	10
5.	Boundary Conditions; Inductance; Magnetic Energy.	10
6.	Time Varying Fields: Faraday's Law.	10
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report	13th	10 %
4.	Presentation	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Textbook: "Fundamentals of Applied Electromagnetics", (7th edition) by Fawwaz T. Ulaby, Eric Michielssen and Umberto Ravaioli, Pearson Prentice Hall, ISBN 13: 9780133356816
Supportive References	"Engineering Electromagnetics" ,(8th Edition) William H. Hayt, Jr. , John A. Buck Mc Graw-Hill , ISBN 978-0-07-338066-7 MHID 0-07-338066-0
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board

Items	Resources
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Microelectronics Devices and Circuits
Course Code:	EE332
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	27/01/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (2 Th., 0 Tut., 2 Lab.)					
2. Course type					
A.	☐University	☐College	☒ Department	☐ Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6/3rd)					
4. Course general Description:					
This course includes frequency response of BJT and MOSFET amplifiers, Feedback in amplifiers, Differential amplifier, Current Mirror, Operational amplifiers (design and applications as linear and non-linear analog building blocks), adders, subtractors, differentiators, integrators, analog simulation, Logarithmic and exponential amplifiers, Op-amp frequency response, precision converters, analog multipliers, Sinusoidal oscillators, Introduction to nano-electronics and comparison of microelectronic and nano-electronic devices.					
5. Pre-requirements for this course (if any):					
Electronics: EE330					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					
This course aims at providing the students with the analysis and design of analog electronic circuits using op-amps, BJTs, and/or MOSFETs for different electrical parameters such as gain, input and output resistances, transfer function, and frequency response characteristics.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize response and performance characteristics of electronic circuits and devices such as op-amp applications, negative feedback circuits, differential amplifiers, oscillators, and analog-to-digital converters (ADC) and digital-to-analog converters (DAC).	K1	• Class / Group discussion. • Self-learning.	• Written Tests
1.2				
...				
2.0	**Skills**			
2.1	Design electronic circuits and active filters to achieve most economical designs while meeting performance requirements.	S2	• Problem-based learning.	• Written Tests • Problem-Based Assessment.
2.2	Interpret frequency response of BJT and MOSFET amplifiers, rating their	S1	• Problem-based learning.	• Written Tests

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	parameters, and measurement techniques.			• Problem-Based Assessment.
2.3	Communicate actively in discussions during solving problems of microelectronics devices	S4	• Class/Group discussion. • Self-learning	• Oral presentation • Rubrics
3.0	**Values, autonomy, and responsibility**			
3.1	Collect information about amplification features of semiconductor devices by asking key questions and by using a variety of sources such as the internet, textbooks.	V3	• Scientific research. • Self-learning	• Reports • Rubrics
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Linear op-amp applications: inverting and non-inverting amplifiers, Inverting Amplifier with a T-Network, Summing Amplifier, Current to Voltage Converter, Voltage to Current Converter, Instrumentation amplifier, integrator, differentiator, difference amplifier.	8
2.	Non-linear op-amp applications: Logarithmic Amplifier, Antilog Amplifier.	8
3.	Feedback in amplifiers: Principles of feedback, negative and positive feedback, Effects of negative feedback: noise, gain, frequency response, impedance. Types of feedback: voltage, and current.	10
4.	Differential Amplifiers: MOS and BJT Differential amplifiers. Current Mirrors.	10
5.	Sinusoidal Feedback Oscillators: General operating criteria, Phase shift oscillators, Wien bridge oscillators, Hartley oscillator, and Colpitts Oscillators.	8
6.	Frequency response of BJT and MOSFET amplifiers: Gain and frequency measurements, bode plot, and Low- and high-frequency response.	8
7.	Introduction to nano-electronics and nano-electronic devices.	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Mid Term Test)	5th Week	30%
2.	Written test (Quiz)	10th Week	10%
3.	Report and Oral Presentation	13th Week	10%
4.	Discussion	14th Week	10%
5.	Written test (Final Test)	16th Week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Jaeger & Blalock, Microelectronic Circuit Design, 6th edition, McGraw-Hill, 2023.
Supportive References	Donald Neamen, Microelectronics Circuit Analysis and Design 4th Edition, McGraw Hill 2010.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom,
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	- Peer Reviewer	- Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Electrical Engineering Design
Course Code:	EE390
Program:	Electrical Engineering Program
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	2/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (6/3)					
4. Course general Description:					
This course describes the concepts and principles of Electrical Engineering Design, Introduction to the design process, problem-solving skills, and practices dealing with open-ended problems. Also, this course enforces the skills in teamwork, group dynamics, critical thinking, planning, scheduling, and written/oral communications through the design of mini project.					
5. Pre-requirements for this course (if any):					
Electronics: EE330					
6. Co-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
The main objectives of this course are to provide students with the basic concepts of the Electrical Engineering Design Process and practices for dealing with open-ended problems. Also, this course deals with the presentation of skills in working in a team while presenting the behavior of leadership and soft skills.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4*15=60	100%
2	E-learning		
3	Hybrid ● Traditional classroom ● E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Prepare a need-assessment, define, and formulate the problem, consider the problem constraints, and specify a deliverable for a project.	**S1**	• Problem-based learning. • Collaborative learning.	• Problem-based assessment. • Written Tests.
2.3	Use adequate procedures to evaluate the solutions and select the "best" solution, decide on a course of action, and implement the selected solution.	**S2**	Problem-based Learning.	• Written Test • Problem-based Assessment.
3.0	**Values, autonomy, and responsibility**			
3.1	Distinguish standard, code, and specifications.	**V1**	Collaborative learning Class/Group discussion	Observation Reports
3.2	Apply national society of professional engineers' code of ethics	**V1**	• Collaborative learning • Class/Group discussion	• Observation • Reports
3.3	Engage and work effectively in teams with full group interaction during the work on the design project, exercise full responsibility in holding team	**V2**	• Collaborative learning • Class/Group discussion	• Observation • Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	meetings, distributing tasks, leadership, and team dynamics.			
3.4	Possess the ability to interpret and apply learned concepts in a format different from that taught in class	V3	• Class/Group discussion • Problem-Based Learning	• Rubrics • Problem-Based Assessment

C. Course Content

No	List of Topics	Contact Hours
1.	An Overview of Engineering Design	6
2.	Engineering Profession	6
3.	Engineering Need Analysis	7
4.	Problem Formulation	7
5.	Creativity in Design: Thinking Outside the box	6
6.	Human Factors Engineering	6
7.	Concepts Generation and Evaluation	5
8.	Intellectual Property – Legal Factors	6
9.	Standard, code, and specifications.	5
10.	National society of professional engineers' code of ethics	6
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	10%
3.	Active Participation	All Weeks	10%
4.	Report (mini project)	All Weeks	10%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Exploring Engineering An Introduction to Engineering and Design, Fifth Edition, Philip Kosky, Robert Balmer, William Keat , and George Wise, 2021 Elsevier, ISBN: 978-0-12-815073-3, Publisher: Katey Birtcher
Supportive References	
Electronic Materials	Web site: https://www.elsevier.com/books-and-journals
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Direct
Quality of learning resources	-Students -Peer review -Faculty	Direct
The extent to which CLOs have been achieved	-Quality and academic accreditation committee -students	-Direct (students work- exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Department council**
REFERENCE NO.	**NO. (09)**
DATE	**12/02/2024**

Course Specification

(Bachelor)

Course Title: Automatic control engineering
Course Code: EE440
Program: Electrical Engineering
Department: Electrical Engineering
College: Engineering
Institution: Northern Border University
Version: 3
Last Revision Date: 01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (2 Th., 0 Tut., 2 Lab.)					
2. Course type					
A.	☐University	☐College	☐ Department	☒ Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7/4)					

4. Course general Description:

This course introduces different concepts in the analysis and synthesis of control systems. The subsequent parts of this course are presented in the following order: an introduction to automatic control systems with various examples of real controlled systems is addressed in the first part, while modeling of these systems by means of transfer functions and signal flow graphs is presented in the second part. The other parts are devoted especially to the stability analysis, the industrial controllers' synthesis and the performance study of automatic control systems in their closed-loop architecture.

5. Pre-requirements for this course (if any)**:**

Signals and Systems Analysis: EE313

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

The main objective of this course is to provide students with the basics of automatic control theories, and develop a stable model with its controller from a real system.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100%
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the mathematical background and important components of control systems	K1	• Problem-based learning.	• Written Tests • Problem-Based Assessment.
1.2				
...				
2.0	**Skills**			
2.1	Derive the transfer function of dynamic systems block diagrams and signal flow graphs	S1	• Problem-based learning.	• Written Tests • Problem-Based Assessment.
2.2	Apply stability theories for control systems	S2	• Problem-based learning.	• Written Tests

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
				• Problem-Based Assessment
2.3	Evaluate the performance of controlled systems in the time domain	S3	• Lab-based learning.	• Written Tests • Laboratory Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Perform effectively in teamwork and discussions during solving problems of automatic control	V2	• Self-learning. • Scientific research.	• Reports
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to control systems	4
2.	Modelling of dynamic systems	4
3.	Solution of differential equations of dynamic systems	6
4.	Block diagrams and Signal flow graphs	6
5.	Time domain performance of control systems	8
6.	Stability analyze of control systems	8
7.	Root-Locus Analysis	8
.8	Frequency-Domain Analysis	8
.9	Important components of feedback control systems	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written test (Mid Term Test)**	**5th Week**	**30%**
2.	**Written test (Quiz)**	**10th Week**	**10%**
3.	**Reports**	**13th Week**	**10%**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Laboratory Exam	14th Week	10%
5.	Written test (Final Test)	16th Week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	G. (2018). Automatic Control Systems (10th ed.). Mc Graw Hill India.
Supportive References	Ogata, K. (2022). Modern Control Engineering (5th ed.). PRENTICE HALL.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom , Automatic Control Laboratory**
Technology equipment (projector, smart board, software)	**Data Show , Smart Board**
Other equipment (depending on the nature of the specialty)	**Laboratory room equipped with 8 tables for control systems.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	- Peer Reviewer	- Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Electrical Power Systems I
Course Code:	EE450
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	25/01/ 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7th/4th)					
4. Course general Description:					
This course introduces the basic concepts and fundamentals of the generation, transmission and distribution in Electrical Power Systems. Also, it presents the transmission Line Parameters, Line Model and Performance, Complex Power Flow, and Per-unit Systems model.					
5. Pre-requirements for this course (if any):					
Electromagnetic Fields: (EE324)					
6. Co-requirements for this course (if any):					
7. Course Main Objective(s):					
This course aims to provide the students with the basic principles of electrical power systems, covering the transmission Line Parameters, Line Model and Performance, Complex Power Flow, Equivalent Circuit Diagrams, and Per unit Systems modeling.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the main components of electrical power system and the parameters of transmission lines.	K1	- Discussion during Classroom lecture. - Problem-Based Learning.	- Written test - Problem-Based Assessment.
2.0	**Skills**			
2.1	Identify the basic concepts and relationship between power, current, and voltage for the power factor correction.	S1	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.2	Design the model for short, medium, and long transmission lines.	S2	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.3	Analyze the power system using per-unit representation.	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
3.0	**Values, autonomy, and responsibility**			
3.1	Acquire new knowledge about renewable energy	V3	- Report - Discussion	- Report. - Presentation.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	resources for electrical power generation.			

C. Course Content

No	List of Topics	Contact Hours
1.	Electrical Power system configuration	6
2.	Power Plants types and Comparison	6
3.	Basic concepts	7
4.	Power Factor Correction	7
5.	Line parameters: R, L, C	6
6.	Short T.L	7
7.	Medium TL	7
8.	Long line and constants	7
9.	Per-unit representation	7
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	5 %
2.	Written test (Quiz 1)	3rd	10 %
3.	Written test (Periodical tests)	6-12th	30 %
4.	Report /Presentation	13th	5 %
5.	Written test (Quiz 2)	8th	10 %
6.	Written test (Final Exam)	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	J. Duncan Glover, Thomas J. Overbye, Mulukutla S. Sarma, “Power System Analysis and Design ", Cengage Learning, 6th ed, 2017.

Supportive References	Yoshihide Hase, Tanuj Khandelwal, Kazuyuki Kameda, "Power System Dynamics with Computer-Based Modeling and Analysis ", Wiley, 2020.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electro-mechanical energy conversion I
Course Code:	EE460
Program:	Electrical Engineering Program
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	25/04/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☐Department	☒Track	☐Others
B.	☒Required			☐Elective	

3. Level/year at which this course is offered: (7/4)

4. Course general Description:

This course provides students with theory of electromechanical energy conversion, Magnetic circuit, Physical construction and applications of DC machines, types of dc machines, characteristics of dc machines, Starting and control of dc machines. Also, Construction and applications of power transformers, types of transformer, equivalent circuit of power transformer, voltage regulation and efficiency of transformer, and transformer parallel operation.

5. Pre-requirements for this course (if any):

Electromagnetic Fields: EE324

6. Pre-requirements for this course (if any):

7. Course Main Objective(s):

The objective of this course is to provide the knowledge about construction and characteristics of DC machines and transformers and analyze the performance of both DC machines and transformers.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4*15=60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the construction and theory of operation of direct current machines.	**K1**	•Class/ Group discussion	•Written Test.
1.2	Explain the transformer construction, theory of operation and performance analysis	**K1**	•Class/ Group discussion	•Written Test.
...				
2.0	**Skills**			
2.1	Apply the basic concepts of electromechanical energy conversion devices and their magnetic circuits.	S1	•Problem based Learning.	•Written Test Problem based assessment
2.2	Evaluate the operational characteristics of transformers.	S1	• Problem based Learning. •Observation	•Written Test. •Problem based assessment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Analyze the performance of direct current machines	S1	•Problem based Learning. • Observation	•Written Test. •Problem based assessment
2.4	Distinguish speed control methods of dc motors	S1	Problem Solving based Learning. •Scientific research	Written Test Problem based assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Develop informed decisions about selection of dc machines and transformer applications which must consider the impact of engineering solutions in global, economic, environmental, sustain ability, and societal contexts.	V1	•Scientific research •Collaborative learning	• Reports Discussion
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	The static and dynamic induced emf expressions for the electrical machines and classify deferent types electrical machines	6
2.	Construction, armature windings, armature reaction and commutation	6
3.	Types and operating characteristics of dc generators	6
4.	Characteristics operating, starting and speed control of dc motors	6
5.	Power flow, losses and efficiency of dc machines	6
6.	magnetic circuits transformers	6
7.	Principle operation of single phase transformer, equivalent circuit, efficiency, voltage regulation, phasor diagram and experimental tests	12

8.	Three-phase transformers, auto-transformer, voltage and current transformers	6
9.	Parallel operation of three phase transformers	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	10%
3.	Active Participation	All Weeks	10%
4.	Homework	14th	10%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Jacek F. Gieras, " Electrical Machines", CRC Press, 1st Edition, , 2020, ISBN-13: 978-0367736941
Supportive References	E. Fitzgerald, Charles Kingsley, Jr. and Stephen D. Umans, "Electric Machinery", 7th Edition, McGraw-Hill, USA 2013, ISBN-13: 978-0073380469
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board

Items	Resources
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Instructor	Indirect
The extent to which CLOs have been achieved	Quality and accreditation Committee Students	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	EE Department council
REFERENCE NO.	**NO.9**
DATE	**12-2-2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Communication Systems
Course Code:	EE470
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	07/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: (7^{th}/4^{th})

4. Course general Description:

This course introduces and emphasizes major communication system analytical tools and theories for signal transmission through linear systems. It covers recalling Fourier series and Fourier transforms, analog communications (Amplitude Modulation (AM) and Angle Modulation (FM and PM), an introduction to digital communication (BPSK, BFSK, OOK, and M-ary modulation). Then, the sampling theorem, quantization process, and encoding process are covered as keys to recognize PCM system

5. Pre-requirements for this course (if any)**:**

Signals and Systems Analysis: EE313

6. Co-requirements for this course (if any)**:**

7. Course Main Objective(s):

The course objective is to provide students with the basic concepts of analog and digital communication systems, different analog and digital modulation schemes, and the conversion of analog signals to digital signals and vice versa.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recall Fourier series and Fourier transforms	K1	-Class/Group discussion.	Written Tests.
1.2	Describe fundamentals concepts of analog and digital communication systems	K1	-Class/Group discussion.	Written Tests.
2.0	Skills			
2.1	Analyze analog and digital communication systems	S1	-Problem-based learning -Collaborative learning.	- Problem-based Assessment. -Written Tests.
2.2	Solve analog-to-digital conversion models satisfying certain PCM system requirements.	S1	-Problem-based learning -Collaborative learning.	- Problem-based Assessment. -Written Tests.
3.0	Values, autonomy, and responsibility			
3.1	Function effectively on a team whose members together create collaborate in discussions and perform mini projects to meet some defined specifications for different communication systems introduced by the course	V2	- Collaborative learning.	-Presentation -Project
3.2	Acquire and apply new	V3		-Presentations

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	knowledge in communication systems especially advanced systems through technical reports.		-Self-learning.	-Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to communication systems	4
2.	Recall of Fourier Transform	4
3.	Amplitude Modulation	4
4.	Angle Modulation	4
5.	Angle De-Modulation	4
6.	FM Modulation	5
7.	FM De-Modulation	5
8.	Baseband Communication	5
9.	Sampling Theorem and Signal Reconstruction	5
10	Digital Communication Systems	5
11.	M-ary- Communication	5
12.	PCM	5
13.	Topics in Communication Technologies	5
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report /Presentation	13th	10 %
4.	Project	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	B.P. Lathi, Zhi Ding, " Modern Digital & Analog Communication Systems", 5th Ed., 2018
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (--)
DATE	--/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Communications laboratory
Course Code:	EE471
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	1 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (7th/4th)					

4. Course general Description:

This course practically emphasizes analog communications (Amplitude Modulation (AM) and Angle Modulation (FM and PM) Followed by digital communication (BPSK, BFSK, OOK) experiments.

5. Pre-requirements for this course (if any):

None

6. Co-requirements for this course (if any):

Communication Systems: EE470

7. Course Main Objective(s):

The course objective is to provide students with the ability to develop and test communication systems practically and conduct experiments. The course also uses Matlab/Simulink package in projects to simulate and test communication systems

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2 x 15 = 30 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
2.0	Skills			
2.1	conduct experiments with analysis and interpretation of communication systems and drawing conclusions	S3	-Lab-based learning. -Observation	-Discussion. -Laboratory Exam.
2.2	Communicate effectively with a range of audiences	S4	-Lab-based learning. -Observation	- Discussion. -Laboratory Exam.
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional responsibilities in practical electrical engineering situations and make informed with safety factors and hazards that must be considered in the laboratory	V1	-Lab-based learning. -Collaborative learning.	-Presentations -Reports
3.2	Function effectively on a team whose members together provide collaboration and cooperation in conducting and analyzing practical experiments.	V2	-Lab-based learning. -Collaborative learning.	-Presentations -Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Experiment 1: Double Sideband Amplitude Modulation (DSB-AM)	4
2.	Experiment 2: Single Sideband Amplitude Modulation (SSB-AM)	4
3.	Experiment 3: Frequency Modulation (FM)	4

4.	Experiment 4: Phase Modulation (PM)	4
5.	Experiment 5: Amplitude Shift Keying (OOK , BPSK)	4
6.	Experiment 6: Frequency Shift Keying (BFSK)	5
7.	Experiment 7: Pulse Code Modulation (PCM)	5
	Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Projects	6-12th	30 %
3.	Report	13th	10 %
4.	Presentation	15-16th	10 %
5.	Final Laboratory Exam.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	B.P. Lathi, Zhi Ding, " Modern Digital & Analog Communication Systems", 5th Ed., 2018
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory
Technology equipment (projector, smart board, software)	Matlab/Simulink Simulation Package Data Show , Smart Board,
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (--)
DATE	--/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Computer Aided Drawing (CAD)
Course Code:	CE201
Program:	Civil Engineering
Department:	Civil Engineering
College:	Engineering College
Institution:	Northern Border University
Version:	Version 01
Last Revision Date:	07/02//2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2 (0 Theoretical, 0 Tutorial, 2 Lab))					
2. Course type					
A.	☐ University	☒ College	☐ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (8th level/4th year)					
4. Course general Description:					
This course represents an introductory to engineering drawings. Computer-aided drawings (CAD) is utilized to produce 2-D engineering drawings. The course is divided into two sections: AutoCAD and drawing. The course begins by teaching the main basics and features of AutoCAD software. Then AutoCAD is used to create pictorial projections, section views, auxiliary views, and dimensioning.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
By the end of this course, the students will be able to use AutoCAD software to create engineering drawings, including multiview projections, dimensions, sections, and auxiliary views					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid ● Traditional classroom ● E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	0
2.	**Laboratory/Studio**	60
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Handle and customize Autocad environment for higher productivity and drawing management.	K1	Class discussion, Observations	• Discussion
2.0	**Skills**			
2.1	Create 2D drawings using Autocad draw, modify and annotation tools.	S1	• Computer Lab based learning • Model-based learning • Observation	• Computer Laboratory exam • Discussion
2.2	Produce high quality Autocad drawings thats meets industry standards	S4	• Computer Lab based learning • Model-based learning • Observation	• Computer Laboratory exam • Discussion
2.3	Draw multi-view drawings of any given pictorial drawings.	S2	• Computer Lab based learning • Model-based learning • Observation	• Computer Laboratory exam • Discussion

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Determine auxiliary and sectional views.	S2	• Computer Lab based learning • Model-based learning • Observation	• Computer Laboratory exam • Discussion
3.0	**Values, autonomy, and responsibility**			
3.1				

C. Course Content

No	List of Topics	Contact Hours
1.	Understanding the AutoCAD workspace and user interface	2
2.	Using basic drawing, editing, and viewing tools	8
3.	Organizing drawing objects on layers	4
4.	Inserting reusable symbols (blocks)	2
5.	Adding text, hatching, and dimensions	6
6.	Using more advanced editing and construction techniques	8
7.	Geometric constructions.	8
8.	Orthographic projection.	4
9.	Multi-view drawing.	7
10.	Dimensioning of views.	4
11.	Third view prediction (missing view).	5
12.	Sectional drawing.	2
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion	1^{st} - 15^{th}	10%
2.	Computer Laboratory Exam (Exercises)	3^{rd} – 14^{th}	20%
3.	Computer Laboratory Exam (Midterm Exam)	6^{th} - 8^{th}	30%
4.	Computer Laboratory Exam (Final Exam)	16^{th}	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Plantenberg K. (2020). Engineering graphics essentials with autocad 2021 instruction. SDC Publications.
Supportive References	Goetsch D. L. & Rickman R. L. (2016). Technical drawing and engineering communication (Seventh). Cengage Learning
Electronic Materials	AutoDesk Publication, AUTOCAD User's Manual, AutoDesk Inc., 2023.
Other Learning Materials	Giesecke F. Lockhart S. Goodman M. & Johnson C. (2023). Technical drawing with engineering graphics (16th ed.). Pearson Education Limited. Retrieved May 6 2023 from https://public.ebookcentral.proquest.com/choice/PublicFullRecord.aspx?p=7216920.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Computer lab with 20 computers**
Technology equipment (projector, smart board, software)	**Projector, smart board, AutoCAD software version 2024.**
Other equipment (depending on the nature of the specialty)	**Printer, photocopier, paper A3, Whiteboard markers of different colors, a wiper of whiteboard**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	○ Students	Indirect (survey)
Effectiveness of Students assessment	○ Peer Reviewer	Direct / Indirect
Quality of learning resources	○ Students ○ Peer Reviewer ○ Faculty	Direct / Indirect
The extent to which CLOs have been achieved	○ Quality and academic accreditation committee ○ students	Direct / Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**CIVIL ENGINEERING DEPARTMENT COUNCIL**
REFERENCE NO.	**NO. (7)**
DATE	**13/02/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Measurements and instrumentation
Course Code:	EE414
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	07/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8th/4rd)					
4. Course general Description:					
The course provides students with a background in electrical and electronic measurements and instrumentation. Terms related to electrical measurements are investigated. The function elements of a general measuring instrument are introduced. Principles, limitations, and applications of analog DC and AC ammeters and voltmeters will be studied. Ohmmeters, DC and AC bridges are analyzed. The principle of operation and construction of the oscilloscope and function generator will be investigated. Electronic and digital measurement systems will also be given some consideration.					
5. Pre-requirements for this course (if any)**:**					
1. **EE330: Electronics**					
6. Co-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
This course aims to provide students with the basics of Analog and Digital measuring instruments.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the instrument functions, analog instruments, and wattmeter instruments.	K1	- Class/Group discussion.	- Written Tests.
2.0	Skills			
2.1	Analyze the applications of different AC bridges	S1	- Problem-based learning	- Problem-based Assessment. - Written Tests.
2.2	Analyze the applications of different, sensors, transducers, and actuators.	S1	- Problem-based learning	- Problem-based Assessment. - Written Tests.
2.3	Discover the principle of operation and construction of oscilloscope, function generator, and digital Multi-meter.	S1	- Problem-based learning	- Problem-based Assessment. - Written Tests.
2.4	Conduct appropriate experimentation.	S3	- Lab-based learning.	- Laboratory Exam - Discussion
2.5	Communicate effectively with a range of audiences through presentation and discussion of reports corresponding to measurements and instruments	S4	- Collaborative learning. - Self-learning	- Presentations. - Reports
3.0	Values, autonomy, and responsibility			

C. Course Content

No	List of Topics	Conta

		ct Hours
1.	Introduction, Description of the instrument functions, classification of the measuring instruments	4
2.	Analog instruments: principle of operation, types, and operating forces.	4
3.	DC instruments: construction, principle of operation, torque equation, extension of range, limitation, errors, and applications of Permanent magnet moving coil.	8
4.	AC instruments: construction, torque equation, extension of range, limitations, and applications of: Moving iron.	8
5.	Induction type instruments.	6
6.	Wattmeter: principle of operation, construction, torque equations, errors, Wattmeter: advantages, disadvantages and applications of the dynamometer Wattmeter and the induction type wattmeter.	8
7	AC Bridges: Wheatstone Bridge, Wien's bridge, Schering Bridge, Hay Bridge, Owen Bridge and Maxwell bridge.	6
8	Oscilloscope: Construction and principle of operation of the oscilloscope and function generator	8
9	Digital instruments: digital versus analog instruments, analog-to-digital ramp type conversion, decade counter, digital display units, and digital voltmeter.	8
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report /Presentation	13th	10 %
4.	Laboratory	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Sawhney A. K. & Sawhney P. (2016). A course in electrical and electronic measurements and instrumentation, (19th ed.). Dhanpat Rai Publications
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Power Electronics I
Course Code:	EE433
Program:	Electrical Engineering Program
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	07/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☐Department	☒Track	☐Others
B.	☒Required		☐Elective		

3. Level/year at which this course is offered: (8/4)

4. Course general Description:

This course provides students with the classifications of power electronic circuits, power semiconductor devices characteristics, design uncontrolled and controlled single phase rectifiers, analysis of uncontrolled and controlled three phase rectifier circuits, analysis of AC voltage controllers, study the behavior of DC-DC converters, Introduction to frequency converters and inverter.

5. Pre-requirements for this course (if any)**:**

Electronics: EE330

6. Pre-requirements for this course (if any)**:**

7. Course Main Objective(s):

The objective of this course is to study different types of power semiconductor devices and their switching characteristics and specifications and analyze the power electronic circuits including operation modes, waveforms, input-output performance parameters, and circuit design requirements for different loads.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4*15=60	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the different types of power semiconductor devices, their switching characteristics, specifications and their applications.	K1	•Class/ Group discussion	•Written Test.
1.2	Describe operation of single phase and three-phase Inverters.	K1	•Problem based Learning. •Class/ Group discussion	•Written Test. •Problem based assessment.
...				
2.0	**Skills**			
2.1	Implement the single-phase ac-dc converters.	S3	•Problem based Learning. •Lab based learning	•Written Test. •Problem based assessment.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				•laboratory exam
2.2	Demonstrate types, applications, circuits, and parameters of dc choppers.	S2	•Problem based Learning.	•Written Test. Discussion
2.3	Analyze with practical implementation of ac voltage controller using phase angle and integral cycle control.	S3	•Problem based Learning. •Lab based learning	•Written Test. •Problem based assessment. •laboratory exam
2.4	Analyze the operation of single phase and three-phase Inverters.	S1	•Problem based Learning. •Class/ Group discussion	•Written Test. •Problem based assessment.
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively in teamwork during experiments of three-phase ac-dc converters circuits.	V2	•Collaborative learning	• Reports
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to power electronics	04
2.	Power semiconductor devices	06
3.	Uncontrolled rectifiers	10
4.	Phase controlled rectifiers	14
5.	AC voltage controllers	08
6.	DC choppers	10
7.	Frequency converters	02
8.	Inverter	06

Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Lab Exam	16th	10%
3.	Discussion and Participation	1-10	10%
4.	Report	12th-15th	10%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Power Electronics Handbook, Mohammad H. Rashid, 5th Edition, 2023, ISBN 9780323992169.
Supportive References	Mohammad H. Rashid, "Power Electronics: Circuits, Devices, and Applications", 4th ed, Prentice-Hall, 2013, ISBN-10: 1111531005
Electronic Materials	MATLAB software, www.mathworks.com
Other Learning Materials	Hardware Laboratory (Power Electronics Laboratory).

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	Hardware Laboratory (Power Electronics Laboratory).

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Instructor	Indirect
The extent to which CLOs have been achieved	Quality and accreditation Committee Students	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	EE Department council
REFERENCE NO.	**NO.9**
DATE	**12-2-2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Renewable Energy
Course Code:	EE451
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	07/02/ 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: (8th Level / 4th Year)

4. Course general Description:

This course presents renewable energy conversion systems with an overview of today's energy use, fossil fuels and environmental impact, renewable energy sources and their applications in electrical power generation. Also, it discusses different renewable energy sources including Solar Energy: (Solar radiation, Solar thermal energy conversion and applications, Concentrated solar power (CSP), Photovoltaics (Solar cells)), Biomass and Bioenergy: (Biomass types, Conversion processes and production), Wind Energy: (Introduction of wind energy, Wind turbines, wind farms, and power control, Wind energy conversion system, Wind power), Hydropower: (Hydropower types, Water sources, and power), Energy Storage: {Energy storage systems components and applications, Flywheel Energy, Pumped hydro, Superconducting magnetic energy storage (SMES), Batteries types and specifications, Hydrogen and Fuel Cells: (Basics of electrochemistry, Polymer membrane electrolyte (PEM) fuel cells, Fuel cells' electrical characteristics).

5. Pre-requirements for this course (if any)**:**

Electrical Power Systems I: EE450

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

This course aims to provide students with the basic concepts to apply different methods and theories to use renewable energy and how electricity can be generated from commonly used renewable energy systems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15=60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe different types of energy, their utilizations, and energy storage systems.	K1	• Class/Group Discussion	• Written Tests
2.0	**Skills**			
2.1	Identify hydroelectric power plants.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment.
2.2	Analyze the generation of electrical energy from biomass energy.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment.
2.3	Design wind power system.	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Justify the impact of renewable energy solutions in global, economic, environmental, and societal contexts	V1	• Problem-Based Learning. • Class/Group Discussion	• Problem-Based Assessment. • Discussion
3.2	Use the principles of solar energy to choose the suitable utilization of solar energy and the suitable type of photovoltaic cells.	V3	• Problem-Based Learning. • Class/Group Discussion	• Problem-Based Assessment. • Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Overview of today's energy use, fossil fuels and environmental impact	6
2.	Hydrogen and Fuel Cells	6
3.	Solar Energy and Concentrated Solar Power (CSB)	6
4.	Solar Energy and Solar cell (Photovoltaic (PV))	6
5.	Biomass and Bioenergy	6
6.	Power in Wind	6
7.	Wind Energy and Its Conversion System	6
8.	Hydropower	6
9.	Energy storage systems components	6
10.	Applications of Energy storage systems	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Periodical Tests)	6th-12th	40%
2.	Written Test (Quizzes)	4th-14th	10%
3.	Discussion	All Weeks	10%
5.	Written Test (Final Exam)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Robert Ehrlich (2022) Renewable Energy a First Course. (3rd ed.). CRC Press.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electro-mechanical energy conversion II
Course Code:	EE461
Program:	Electrical Engineering Program
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐Department	☒Track	☐Others
B.	☒Required		☐Elective		
3. Level/year at which this course is offered: (8/4)					
4. Course general Description:					
This course provides students with, Physical construction and applications of Induction machines, types of induction machines, Equivalent circuit of induction motor, performance of induction motor, Starting and speed control of induction motor. Also, Construction and applications of synchronous generator, Armature winding for a.c machines, induced emf equation of synchronous generator, voltage regulation and efficiency of synchronous generator, and synchronous generator parallel operation.					
5. Pre-requirements for this course (if any)**:**					
Electro-mechanical energy conversion I : EE460					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The objective of this course is to provide the knowledge about construction and characteristics of synchronous machines and to provide the knowledge about construction and characteristics of induction machines.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4*15=60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the construction, principle operations, types of three-phase synchronous machines and three phase inductions machines.	**K1**	•Class/ Group • Discussion	•Written Test.
...				
2.0	**Skills**			
2.1	Determine the features, the rotating mmf and mmf equation of ac machines.	S1	•Problem based Learning.	•Written Test. •Problem based assessmentd
2.2	Calculate torque, power flow, voltage regulation, losses and efficiency of ac machines.	S1	•Problem based Learning.	•Written Test. •Problem based assessment
2.3	Analyze the equivalent circuit and parameters of ac machines.	S1	• Problem based Learning.	•Problem based assessment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Communicate effectively during analyzing the parallel operation of synchronous generator.	S4	•Scientific research	•Report
3.0	**Values, autonomy, and responsibility**			
3.1	Develop informed decisions about starting and speed control methods of three phase induction motors which must consider the impact of engineering solutions in global, economic, and environmental contexts.	**V3**	•Scientific research •Class discussion	• Reports • Discussion
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Construction and principle of operation for induction motor.	4
2.	Equivalent circuit of induction motor.	4
3.	Operating Characteristics of induction motor	4
4.	Power flow, losses, torque and efficiency of ac machines.	6
5.	Starting methods and speed control of induction motor.	6
6.	Construction and principle of operation for synchronous machines.	6
7.	Induced EMF equation for synchronous generator.	6
8.	Equivalent circuit of synchronous machines.	4
9.	Circle diagram for synchronous machines.	4

10.	Voltage regulation for synchronous generator.	4
11.	Parallel operation for synchronous generator.	6
12.	Fractional horse power and single phase motor	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	10%
3.	Active Participation	All Weeks	10%
4.	Report	All Weeks	10%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Jacek F. Gieras, " Electrical Machines", CRC Press, 1st Edition, , 2020, ISBN-13: 978-0367736941
Supportive References	E. Fitzgerald, Charles Kingsley, Jr. and Stephen D. Umans, "Electric Machinery", 7th Edition, McGraw-Hill, USA 2013, ISBN-13: 978-0073380469
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom

Items	Resources
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Instructor	Indirect
The extent to which CLOs have been achieved	Quality and accreditation Committee Students	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	EE Department council
REFERENCE NO.	**NO.9**
DATE	**12-2-2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Machines Lab
Course Code:	EE462
Program:	Electrical Engineering Program
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
2. Course type					
A.	☐University	☐College	☐Department	☒Track	☐Others
B.	☒Required		☐Elective		
3. Level/year at which this course is offered: (8/4)					

4. Course general Description:

This course covers the following parts: No-load and short circuit tests for single phase transformer, Load characteristics of single phase transformer, Different connections for three phase transformer, Voltage build up for dc generator, No-load and load characteristics of dc generator, Study the performance of dc motor under different conditions, Study the performance of synchronous motor under different conditions, V-curves of synchronous motor, No-load and short circuit tests for synchronous generator, Study the performance of induction motor under different conditions, Speed control of induction motor.

5. Pre-requirements for this course (if any)**:**

6. Co-requirements for this course (if any)**:**

EE461 (Electromechanical Energy Conversion II)

7. Course Main Objective(s):

The objective of this course is to teach the students how to connect the required experiments for different electrical machines and analyze the results and curves under different conditions of electrical machines.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3*15=45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
1.2				
…				
2.0	**Skills**			
2.1	Communicate effectively during connecting the required experiments for different electrical machines.	S4	•Lab based learning	• Laboratory exam • Discussion
2.2	Determine the required measurement instruments for each experiment	S3	• Lab based learning	• Laboratory exam
2.3	Sketch the curves which determine the relation between different variables.	S3	•Lab based learning	• Laboratory exam • Report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize professional responsibilities during determination the components of each experiment, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	V1	•Cooperative learning Class discussion	• Discussion • Laboratory exam
3.2	Engage in team work to analyze the results and curves of electrical machines response under different operating conditions.	V2	•Cooperative learning Class discussion	• Report Discussion
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Single phase transformer experiments	5
2.	Three phase transformer experiments	6
3.	Dc generator experiments	6
4.	Dc motor experiments	8
5.	Synchronous generator experiments	6
6.	Synchronous motor experiments	8
7.	Induction motor experiments	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Lab test	6-12th	20%
2.	Active Participation	All Weeks	20%
3.	Lab Report	All Weeks	20%
4.	Final Test (written+experimental)	17-18th	40%
5.			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Lab Manuals**
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Machine laboratory
Technology equipment (projector, smart board, software)	Data show PC
Other equipment (depending on the nature of the specialty)	Hardware Laboratory

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Students Peer Reviewer Instructor	Indirect
The extent to which CLOs have been achieved	Quality and accreditation Committee Students	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	EE Department council
REFERENCE NO.	**NO.9**
DATE	**12-2-2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Programmable Logic Controller
Course Code:	EE541
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (9/5)					
4. Course general Description:					

This course provides students with an introduction to Programmable Logic Controller (PLC) and their applications in industrial settings. The course covers the basics of PLC, including input/output devices such as sensors, transducers, and actuators, as well as programming elements such as timers, counters, comparators, sensors, and actuators. Students will design ladder diagrams and program a PLC to control industrial processes and explore the different applications of PLC in manufacturing, production, quality control, and other relevant areas through case studies.

5. Pre-requirements for this course (if any)**:**

Microcontrollers (EE302)

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

This course aims to introduce students to the basics of Programmable Logic Controllers (PLC) and their use in industrial applications and equip them with the skills and knowledge necessary to design, program, and troubleshoot PLC systems for industrial process control.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid ● Traditional classroom ● E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the fundamental concepts and devices of Programmable Logic Controller (PLC) in industrial applications.	K1	Class / Group discussion. Problem-based learning.	Written tests Discussion
1.2				
...				
2.0	**Skills**			
2.1	Develop proficiency in designing ladder diagrams to program a PLC for controlling industrial processes.	S2	Problem-Based Learning.	Written Tests Problem-Based Assessment.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Evaluate the performance of PLC systems by identifying errors and diagnosing problems in the programming and operation.	S3	Problem-Based Learning. Lab-based learning.	Written Tests Problem-Based Assessment. Laboratory exams.
2.3	Use PLCs in controlling processes such as manufacturing, production, and quality control.	S3	Problem-Based Learning. Lab-based learning.	Written Tests Problem-Based Assessment. Laboratory exams.
2.4	Communicate effectively during experiments	S4	Collaborative learning. Class /Group discussion.	Reports Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Apply critical thinking skills to design and implement innovative solutions for industrial automation using PLC and associated input/output devices, sensors, and actuators.	V3	Class / Group discussion.	Reports Presentation
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to PLC, Input/Output Devices, Performance of sensors Mechanical Switches and Proximity Switches	8
2.	Digital Systems, The Binary, Octal and Hexadecimal System, Binary Coded Decimals I/O Processing, Input/Output Unit	6
3.	A/D & D/A Converters, Signal Conditioning, Processing Inputs, I/O Addresses	6
4.	PLC Ladder Programming	6
5.	Lab experiment: Logic Functions, (AND-OR-XOR) and Latching, Counters	6
6.	Lab experiment: Comparators and Timers	6
7.	Lab experiment: Winsps PLC programming	6
8.	Lab experiment: Hardware configuration of Winsps PLC	6
9.	Lab experiment: Conveyor system control by PLC	6
10.	Lab experiment: Lift system control by PLC	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion	1-15	5%
2.	Quiz 1 (written test)	5	5%
3.	Quiz 2 (written test)	14	5%
4.	Midterm (written test)	6-12	30%
5.	Report/Presentation	10	5%
6.	Laboratory Exam (Mini Project)	16	10%
7.	Final Exam (written test)	17/18	40%
…			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	William Bolton, "Programmable Logic Controllers", 6th edition, Newnes, 2018.
Supportive References	Frank D. Petruzella, "LogixPro PLC Lab Manual for Programmable Logic Controllers 5th Edition, Kindle Edition", McGraw-Hill Higher Education; 5th edition (January 22, 2016).
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Data show, Smart board, 8 Work station equipped with Siemens SIMATIC S7-300, PC and Winsps software.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
	Peer Reviewer Faculty	
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work- Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Power System II
Course Code:	EE552
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	02
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☐ Department	☒ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: 9th/5th					
4. Course general Description:					
This course presents performance analysis methods for power systems. The Course covers the fault analysis for both symmetrical and unsymmetrical faults, sequence networks. Then, it presents the definition of Load flow problem, how to solve the load flow equations by using Gauss-Seidel, Newton-Raphson, and Fast-Decoupled techniques. Finally, the course introduces the power system stability issue including steady-state and transient stability problem.					
5. Pre-requirements for this course (if any)**:**					
EE450: Electrical Power System I EE461: Electromechanical Energy Conversion II					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
To teach students how to study and analyze faults, load flow, and the stability of a power system.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4*15=60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the matrix of power system networks.	K1	Class / Group discussion, Problem-based learning,	Written Tests
2.0	**Skills**			
2.1	Analyze balanced and unbalanced faults in power systems	S1	Problem-based learning, Observation,	Problem-based Assessment, Written Tests
2.2	Test the stability of a synchronous generator feeding an infinite bus	S2	Problem-based learning, Observation,	Problem-based Assessment, Written Tests
2.3	Investigate the power flow problem by using different numerical methods	S2	Problem-based learning, Observation,	Problem-based Assessment, Written Tests
2.4	Communicate effectively in classroom discussions	S4	Role play, Collaborative learning, Peer learning, Observation,	Discussion
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively to develop a plan for team-based assignments	V2	Problem-based learning, Role play, Collaborative learning, Peer learning,	Presentations, Reports, Projects,

C. Course Content

No	List of Topics	Contact Hours
1.	Symmetrical fault analysis	6
2.	Symmetrical components theorem	4
3.	Sequence Component Networks for generators, lines, and transformers.	4
4.	Unsymmetrical faults: line-to-ground, line-to-line, and Double line-to-ground faults.	6
5.	Basic definition of load flow problem: Formulation using System Admittance Network.	6
6.	Gauss-Seidel and Newton-Raphson methods for load flow analyses, convergence, and acceleration forces.	8
7.	Fast decoupled technique for load flow.	6
8.	Stability problem: an overview, power balance equations.	6
9.	Steady state stability limit, stability improvement, Transient stability, basic definition, an overview.	6
10.	Application of Equal area criterion to assess system stability.	8
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (periodical tests)	6th-12th	30%
2.	Written Test (Quizzes)	2nd - 15th	10%
3.	Problem-based Assessment & Discussion	2nd - 15th	10%
4.	Project, Reports, Presentations	12th - 15th	10%
5.	Final Term Exam FE	17th-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Power System Analysis, A. Nagoor Kani, CBS Publishers & Distributors, 2020
Supportive References	Power System Analysis, Hadi Saadat, PSA Publishing LLC, 3rd Edition, 2011
Electronic Materials	
Other Learning Materials	Power Point Slides

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Projector, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students' assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work- Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (7)
DATE	12 FEBRUARY 2024

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Power Systems Laboratory
Course Code:	EE553
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/ 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (9^{th}/5^{th})					
4. Course general Description:					
This course provides students with Transmission Line Model, Transmission Line at no-load, Faults on Transmission Line, Methods of earthing, Reactive Power Compensation (series and shunt Compensation), 3-phase Alternator, Characteristics of isolated alternator, Characteristics of alternator coupled to network, Manual synchronization, Automatic synchronization circuits, Active and reactive power sharing.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Pre-requirements for this course (if any)**:**					
Electrical Power System II: EE552					
7. Course Main Objective(s):					
This course aims to provide students with how to connect the required experiments for different issues of Power systems and analyze the obtained results and curves under different conditions of experimental tests.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3 x15 = 45 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	

2.	**Laboratory/Studio**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the effect of various types of loads on transmission line characteristics.	K1	• Class / Group Discussion Problem-based learning	• Discussion
2.0	**Skills**			
2.1	Examine the effect of system earthing on transmission line subjected to ground faults by means of experimental implementation.	S3	• Lab based learning Observation	• Laboratory exam -
2.2	Study the reactive power compensation impact using experimental implementation.	S1	• Lab-based learning - Observation	• Laboratory exam -
2.3	Communicate effectively in classroom and LAB discussions	S4	• Observation - Collaborative learning	• Reports -
3.0	**Values, autonomy, and responsibility**			
3.1	Interpret the operation of the synchronous generator once it has been connected to the electrical grid with and without load.	V1	• Class / Group Discussion. • Collaborative learning	• Discussion
3.2	Interpret the operation of the synchronous generator once it has been connected to the electrical grid with and without load.	V1	• Class / Group Discussion. • Collaborative learning	• Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Transmission Line Performance at no-load	6
2.	Matched Load Performance Characteristics	6
3.	Performance characteristics of inductive loads (RL loads)	6
4.	Performance characteristics of capacitive loads (RC loads)	8
5.	Symmetrical and unsymmetrical fault analysis (3-ph short circuit, LG fault, LL fault, and LLG fault)	8
6.	Methods of grounding and the effect of system grounding on transmission lines subjected to ground faults	8
7.	Reactive Power Compensation (Parallel and series compensation)	8
8.	Manual and automatic synchronization circuits of synchronous machine	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Laboratory exam (Midterm)	8-11th	30%
2.	Report	16th	15%
3.	oral test	All week	15%
4.	Laboratory Exam (Final exam)	17th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Power System LAB manual -2022
Supportive References	Power System Analysis, Hadi Saadat, PSA Publishing LLC, 3rd Edition, 2011
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory Equipment

Items	Resources
Technology equipment (projector, smart board, software)	Data Show Smartboard
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	NO. (09)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Electrical Installation	
Course Code: EE592	
Program: Electrical Engineering Program	
Department: Electrical Engineering	
College: College of Engineering	
Institution: Northern Border University	
Version: 3	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒Department	☐Track	☐Others
B.	☒Required		☐Elective		
3. Level/year at which this course is offered: (9/5)					
4. Course general Description:					
This course provides students with Basic electrical system installation and load calculation for residential, office and commercial buildings. Concept of light, vision, and color. Luminaries and lamps. Lighting system design procedures; calculation and measurement techniques, evaluation of interior lighting quality, and day-lighting. Grounding methods for different buildings. The course features an electrical design mini-project where students are required to develop and present a basic set of electrical design documents for a medium-size building.					
5. Pre-requirements for this course (if any)**:**					
Electrical Power System I: EE450					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The objective of this course is to provide the knowledge about Basic electrical system installation including types of luminaries and lighting system as well as grounding systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3*15=45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the importance of light, sources of light and types of lighting and lamps	K1	•Class/ Group discussion	•Written Test.
1.2	Explain different types of cables, conductors and wires and types of their insulation.	K1	•Class/ Group discussion	•Written Test.
...				
2.0	**Skills**			
2.1	Design distribution board including fuses and circuit breakers	S2	• Problem based Learning.	•Written Test. •Problem based assessment.
2.2	Design a grounding system	S2	•Problem based Learning.	• Written Test. •Problem based assessment.
2.3				
2.4				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Be responsible for selection the luminance, number of luminaires in the working plane based national standards and codes relevant to professional responsibilities in engineering situations	V1	•Collaborative learning •Classroom discussion	• Reports • Discussion
3.2	Perform effectively in teamwork to implement an electrical installation system	V2	•Collaborative learning •Classroom discussion	• Reports Mini-project
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Importance of light, sources of light and types of lighting and lamps	6
2.	Types of lamps	6
3.	Lighting calculations	6
4.	Design of distribution board including fuses and circuit breakers	6
5.	Types of cables, wires, conductors and their insulation	6
6.	Types of grounding systems	6
7.	Design mini-project	9
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm (written test)	7-9	30%
2.	Report	12	10%
3.	Mini project	13-15	20%
4.	Final Exam (written test)	17-18th	40%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	
Supportive References	A.J. Watkins and Chris Kitche, "Electrical Installation Calculation" Eight Edition 2009, ISBN 978-1-85617-665-1
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Instructor	Indirect
The extent to which CLOs have been achieved	Quality and accreditation Committee Students	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	EE Department council
REFERENCE NO.	**NO.9**
DATE	**12-2-2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Engineering Economy
Course Code:	IE221
Program:	Electrical Engineering
Department:	Industrial Engineering
College:	Engineering
Institution:	Northern Border University
Version:	02
Last Revision Date:	8 May 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (3rd level/ 2nd year)					
4. Course general Description:					
Engineering Economy introduces fundamental concepts and techniques for making sound economic decisions in engineering projects. The course covers topics such as the time value of money, interest rates, cash flow analysis, benefit-cost analysis, risk analysis, and depreciation. Students will gain the skills to evaluate project proposals, allocate resources, and assess the financial feasibility of engineering investments. Engineering Economy provides a practical foundation for making informed economic decisions in engineering contexts..					
5. Pre-requirements for this course (if any)**:**					
None					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The main objective of this course is to introduce the principles and techniques of economic analysis in engineering as applied in various fields of engineering. This includes evaluating a single project or choosing among several alternatives.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Describe** the principles of economic analysis in engineering and their importance in decision making.	K1	Lecturing Class/Group Discussions	Written tests Assignments
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	**Analyze** cash flow series using present worth, annual equivalent worth, and internal rate of return methods.	S1	Lecturing Problem-Based Learning Modeling	Written tests Assignments
2.2	**Evaluate** the effects of inflation on engineering investments.	S1	Lecturing Problem-Based Learning Modeling	Written tests Assignments
2.3	**Evaluate** the best alternative among several options based on equivalent present worth, future worth, capitalized cost, payback period, annual worth values, and benefit-cost ratios.	S1	Lecturing Problem-Based Learning Modeling Case studies	Written tests Assignments
2.4	**Allocate** costs and capital budgets for engineering projects.	S2	Lecturing Problem-Based Learning Modeling Case studies	Written tests Assignments
2.5	**Analyze** the effects of depreciation using various methods.	S2	Lecturing Problem-Based Learning Modeling	Written tests Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	**Recognize** the ethical implications of engineering economic decisions and their impact on society and the environment.	V1	Lecturing Class / Group Discussions Case studies	Assignments

C. Course Content

No	List of Topics	Contact Hours
1	Time Value of Money	6
2	Cash Flow Analysis	4
3	Economic Decision Criteria	2
4	Cost Estimation and Analysis	5
5	Depreciation and Taxes	5
6	Replacement Analysis	4
7	Risk and Uncertainty	3
8	Breakeven Analysis	6
9	Capital Budgeting	3
10	Cost of Capital	5
11	Ethics in Engineering Economics	2
	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments & Quizzes	**2-15**	**20%**
2.	Report (With Presentation)	11-15	10%
3.	Written test (Midterm Exam)	7-8	30%
4.	Written test (Final Exam)	16-17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Blank, L., & Tarquin, A. (2020). Basics of Engineering Economy (3rd ed.). McGraw-Hill.
Supportive References	
Electronic Materials	E-Learning Management System (Blackboard)
Other Learning Materials	Lecture notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector, Microsoft Excel, E-Learning Management Systems (Blackboard)
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Teaching and learning	• Students • Peer-faculty evaluation • Head of department	• Course Evaluation survey • In class peer observation • Course File review • Pass rate and distribution of grades
Extent of achievement of course learning outcomes	• Students • Course instructor • Course coordinator	• Course Evaluation survey • CLOs assessment • Course File review
Quality of learning resources	• Students • Course instructor • Course coordinator	• Course Evaluation survey • Faculty feedback
Quality of assessment procedures	• Students • Peer-faculty evaluation • Course coordinator	• Course Evaluation survey • Course File review • Pass rate and distribution of grades
Academic Counseling and Support	• Students • Head of department	• Course Evaluation survey • Visits

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of facilities required	• Students • Course Instructor • Course coordinator	• Course Evaluation survey • Faculty feedback
Effectiveness of Teaching and learning	• Students • Peer-faculty evaluation • Head of department	• Course Evaluation survey • In class peer observation • Course File review • Pass rate and distribution of grades
Extent of achievement of course learning outcomes	• Students • Course Instructor • Course coordinator	• Course Evaluation survey • CLOs assessment • Course File review
Quality of learning resources	• Students • Course Instructor • Course coordinator	• Course Evaluation survey • Faculty feedback
Quality of assessment procedures	• Students • Peer-faculty evaluation • Course coordinator	• Course Evaluation survey • Course File review • Pass rate and distribution of grades
Overall evaluation	• Program Quality Committee	• Review and approve all the reports and course files.

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Industrial Engineering Council
REFERENCE NO.	No. (15)
DATE	14/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electric Power Transmission and Distribution
Course Code:	EE554
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (10th Level / 5th Year)					

4. Course general Description:

The course provides students with all details of two methods of electric power transmission (overhead lines, cables, and the transmission line parameters). In this context, the course includes the following items, suspension insulators of overhead transmission lines, corona discharge, surges on transmission systems, load characteristics, and underground cables. Besides, the system grounding is provided. Nevertheless, in the last part of the course, distribution systems are addressed namely, the design of distribution systems complied with the Saudi Arabian Distribution Code.

5. Pre-requirements for this course (if any)**:**

Electrical Power Systems II: EE552

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

This course aims at providing the students with all details of two methods of electric power transmission (overhead lines and cables), grounding, and designing AC distribution feeders.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15=60 Hours	100%
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain details of overhead lines and cables.	K1	• Class/Group Discussion	• Written Tests.
1.2	Describe the effect of different over-voltage transients in power systems and methods to protect against them.	K1	• Class/Group Discussion	• Written Tests.
1.3	Classify types of connection schemes of distribution system and the grounding systems	K1	• Class/Group Discussion	• Written Tests.
2.0	**Skills**			
2.1	Compute the necessary load estimation.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
2.2	Design AC distribution feeders fed from supply terminals to satisfy consumer’s voltage regulation requirements.	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Apply ethical and professional standards during the design of AC distribution feeders.	V1	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Overhead Transmission Line Components	8
2.	Sag and Tension Calculations	6
3.	Corona Discharge	4
4.	Suspension Insulators	4
5.	Grounding Systems	6
6.	Underground Cables	4
7.	Overvoltage Transients in Transmission Systems	4
8.	Protection against Overvoltage Transients in Transmission Systems	4
9.	Connection Schemes of Distribution Systems	4
10.	Load Characteristics	6
11.	An introduction to The Saudi Arabian Distribution Code	4
12.	Design of Distribution Systems Using the Saudi Arabian Distribution Code	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written Test (Periodical Tests)**	**6th-12th**	**35%**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Written Test (Quizzes)	4th-14th	15%
3.	Discussion	All Weeks	10%
5.	Written Test (Final Exam)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Grigsby L. L. (2018). Electric Power Generation, Transmission, and Distribution. (3rd ed.). CRC Press.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Switchgear and Protection of Power System
Course Code:	EE555
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (10th Level / 5th Year)					

4. Course general Description:

This course provides students with the basic power system protection techniques. It includes the following items, general philosophy of power system protection, circuit breakers, fuses, current transformers, voltage transformers, protective-relay technology, various principles of power system protection (over-current, distance, and differential protection), protection of various apparatuses (transmission lines, transformer, busbar, generator, and induction motor).

5. Pre-requirements for this course (if any)**:**

Electrical Power Systems II: EE552

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

This course aims at providing the students with knowledge about elements associated with power system protection and basic design skills for the protection of power system elements.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15=60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Distinguish the types of circuit-breakers and fuses.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment. • Discussion
2.2	Evaluate the suitability of current transformers and voltage transformers for protection schemes.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment. • Discussion
2.3	Analyze the faults and methods to protect against them in transformer, generator, and induction motor.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment. • Discussion
2.4	Design the basic protection scheme of the transmission line and busbar.	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment. • Discussion
2.5	implement Practically the basic protection schemes using lab facilities	S3	• Lab-Based Learning.	• Laboratory Exam • Reports

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Use the philosophy of protection techniques to choose suitable protective relays.	V3	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction: general philosophy of protective relays and power system protection.	4
2.	Circuit Breakers, theory, operation, and ratings.	4
3.	Fuses operation, types, and uses.	4
4.	Current transformers and voltage transformers	4
5.	Protective-relay technology	4
6.	Over-current relay and over-current protection	4
7.	Distance relays; their significance, types and application in Feeders and Transmission line protection	4
8.	Differential relays and differential protection	4
9.	Transformer protection	6
10.	Busbar protection	5
11.	Generator protection	6
12.	Induction motor protection	5
13.	Laboratory applications	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Periodical Tests)	6th-12th	40%
2.	Discussion	All Weeks	4%
3.	Laboratory Report	16th	6%
4.	Laboratory Test	16th	10%
5.	Written Test (Final Exam)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Kezunovic M. & Ren J. & Lotfifard S. (2016). Design, Modeling and Evaluation of Protective Relays for Power Systems. (1st Ed.). Springer.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title: Plants for Non-mechanical Engineers	
Course Code: ME465	
Program: Electrical Engineering	
Department: Mechanical Engineering	
College: Engineering	
Institution: Northern Border University	
Version:	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: (Level 8/ Year 4)

4. Course general Description:

Fundamentals of thermodynamics, Properties of pure substances, heat and work, First Law of thermodynamics. Applications of first law on closed system and control volume. Second Law of thermodynamics. Power Cycles. Steam cycles, Diesel and gas turbine cycles, Combined cycle power plant. Performance of power plant components, Power Plant Economy: (Load curves, plant selection, Energy rates)

5. Pre-requirements for this course (if any)**:**

6. Pre-requirements for this course (if any)**:**

7. Course Main Objective(s):

By the end of this course, the student should be able to analyze processes for closed systems and open systems (systems and control volume), apply the first and the second laws of thermodynamics to solve energy balance problems of cycles and cyclic devices, also develop the isentropic efficiencies for various steady-flow devices. Analyze basic and auxiliary systems of a steam power plant and the performance of Steam generator, Steam turbines, steam condensers (power plant components) and identify Power Plant Economy: (Load curves, Plant selection, Energy rates)..

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	(4*15)=60	100
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Economics of power generation	K1	• Lectures and Exercises/Homework	• Written Test, Assignment
1.2	Combined cycle	K2	• Lectures and Exercises/Homework	• Written Test, Assignment
2.0	**Skills**			
2.1	Economics of power generation	S1	• Lectures and Exercises/Homework	• Written Test, Assignment
2.2	Analysis of steam cycle	S1	• Lectures and Exercises/Homework	• Written Test, Assignment
2.3	Steam power plant	S2	• Lectures and Exercises/Homework	• Written Test, Assignment
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction and basic concepts	4
2.	Energy, energy transfer, and general energy analysis	4
3.	Properties of pure substances	4
4.	Energy analysis of closed systems	4
5.	Mass and energy analysis of control volumes	4
6.	The second law of thermodynamics	8
7.	Gas Power Plant	8
8.	Steam Power Plant	8
9.	Combined Power Cycle	8
10.	Power Plant Economics and load curve	8
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test	6, 12	70%
2.	Assignment	2, 4, 6, 8, 10	20%
3.	Presentation	11	10%
4.			
5.			
6.			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Farshid Zabihian, Power Plant Engineering, CRC Press; 1st edition (June 28, 2021)
Supportive References	Dipak Sarkar, Thermal Power Plant: Design and Operation, Elsevier; 1st edition (September 4, 2015)
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	projector, smart board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect: (survey)
	Faculty	Direct: (Classroom Observation)
	Program Leaders	Direct: (Course Report)
Effectiveness of students assessment	Students	Indirect: (survey)
	Faculty	Direct: (CLOs Results)
	Program Leaders	Direct: (Course Report)
Quality of learning resources	Students	Indirect: (survey)
	Program Leaders	Direct: (Course Report)
The extent to which CLOs have been achieved	Students	Indirect: (survey)
	Faculty	Direct: (CLOs Results)
	Program Leaders	Direct: (Course Report)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) **Assessment Methods** (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	MECHANICAL ENGINEERING DEPARTMENT COUNCIL
REFERENCE NO.	NO. (11)
DATE	13-02-2024

Course Specification

(Bachelor)

Course Title:	Introduction to Artificial Intelligence
Course Code:	EE403
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐ Department	☒ Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (Level 7/4)					
4. Course general Description:					
This course provides students with fundamental concepts and techniques of intelligent systems. Topics include knowledge representation and interpretation, search strategies and control, active research and applications in intelligent agents and expert systems.					
5. Pre-requirements for this course (if any):					
EE301: Structured Computer Programming					
6. Pre-requirements for this course (if any):					
None.					
7. Course Main Objective(s):					
The main objective of this course is to make students familiar with major concepts and approaches of knowledge representation, machine learning, blind methods as well as informed search and ability to practically apply them to real life and develop intelligent systems by constructing programs to solve concrete computational problems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 * 15 = 60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
2.0	**Skills**			
2.1	Search in the knowledge space of an AI problem	S1	Problem-Based Learning.	• Written test Problem-Based Assessment
2.2	Use AI programming tools to write basic programs	S1	Problem-Based Learning.	• Written test Problem-Based Assessment
2.3	Design basic AI applications	S2	Problem-Based Learning.	• Written test Problem-Based Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively on a team while solving problems	V1	• Class/Group Discussion Problem-Based Learning.	• Problem-Based Assessment • Report Presentation
3.2	Apply different search techniques within a given knowledge space.	V3	• Class/Group Discussion Problem-Based Learning.	• Problem-Based Assessment • Report Presentation
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Artificial Intelligence	6
2.	The Knowledge Space of an AI problem using variety of Techniques (e.g. Semantic networks, production rules)	6
3.	The search in the Knowledge Space of an AI problem: uninformed search	6
4.	The search in the Knowledge Space of an AI problem: informed search	6
5.	AI and Games	6
6.	Logic Programming	6
7.	Logic Programming (cont.)	6
8.	Expert Systems	6
9.	Reasoning under uncertainty	6
10.	Artificial Neural Networks and Some applications of AI	6
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid Term Exam ME	6th-12th	30%
2.	Quizzes	5th-12th	10%
3.	Final Term Exam FE	17th-18th	40%
4.	Reports and Presentations	12t-14th	20%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Artificial Intelligence: Foundations of Computational Agents 2nd edition, 2017, David L. Poole and Alan K. Mackworth.
Supportive References	Artificial Intelligence: A Modern Approach 3rd Ed., 2016, Stuart Russell and Peter Norvig.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title: Automatic control engineering	
Course Code: EE440	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 3	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (2 Th., 0 Tut., 2 Lab.)

2. Course type

A.	☐University	☐College	☐ Department	☒ Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: (7/4)

4. Course general Description:

This course introduces different concepts in the analysis and synthesis of control systems. The subsequent parts of this course are presented in the following order: an introduction to automatic control systems with various examples of real controlled systems is addressed in the first part, while modeling of these systems by means of transfer functions and signal flow graphs is presented in the second part. The other parts are devoted especially to the stability analysis, the industrial controllers' synthesis and the performance study of automatic control systems in their closed-loop architecture.

5. Pre-requirements for this course (if any)**:**

Signals and Systems Analysis: EE313

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

The main objective of this course is to provide students with the basics of automatic control theories, and develop a stable model with its controller from a real system.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100%
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the mathematical background and important components of control systems	K1	• Problem-based learning.	• Written Tests • Problem-Based Assessment.
1.2				
...				
2.0	**Skills**			
2.1	Derive the transfer function of dynamic systems block diagrams and signal flow graphs	S1	• Problem-based learning.	• Written Tests • Problem-Based Assessment.
2.2	Apply stability theories for control systems	S2	• Problem-based learning.	• Written Tests

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
				• Problem-Based Assessment
2.3	Evaluate the performance of controlled systems in the time domain	S3	• Lab-based learning.	• Written Tests • Laboratory Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Perform effectively in teamwork and discussions during solving problems of automatic control	V2	• Self-learning. • Scientific research.	• Reports
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to control systems	4
2.	Modelling of dynamic systems	4
3.	Solution of differential equations of dynamic systems	6
4.	Block diagrams and Signal flow graphs	6
5.	Time domain performance of control systems	8
6.	Stability analyze of control systems	8
7.	Root-Locus Analysis	8
.8	Frequency-Domain Analysis	8
.9	Important components of feedback control systems	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written test (Mid Term Test)**	**5th Week**	**30%**
2.	**Written test (Quiz)**	**10th Week**	**10%**
3.	**Reports**	**13th Week**	**10%**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Laboratory Exam	14th Week	10%
5.	Written test (Final Test)	16th Week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	G. (2018). Automatic Control Systems (10th ed.). Mc Graw Hill India.
Supportive References	Ogata, K. (2022). Modern Control Engineering (5th ed.). PRENTICE HALL.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom , Automatic Control Laboratory**
Technology equipment (projector, smart board, software)	**Data Show , Smart Board**
Other equipment (depending on the nature of the specialty)	**Laboratory room equipped with 8 tables for control systems.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	- Peer Reviewer	- Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Electrical Power Systems I
Course Code:	EE450
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: ($7^{th}/4^{th}$)					
4. Course general Description:					
This course introduces the basic concepts and fundamentals of the generation, transmission and distribution in Electrical Power Systems. Also, it presents the transmission Line Parameters, Line Model and Performance, Complex Power Flow, and Per-unit Systems model.					
5. Pre-requirements for this course (if any)**:**					
Electromagnetic Fields: EE324					
6. Co-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
This course aims to provide the students with the basic principles of electrical power systems, covering the transmission Line Parameters, Line Model and Performance, Complex Power Flow, Equivalent Circuit Diagrams, and Per unit Systems modeling.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the main components of electrical power system and the parameters of transmission lines.	K1	- Discussion during Classroom lecture. - Problem-Based Learning.	- Written test - Problem-Based Assessment.
2.0	**Skills**			
2.1	Identify the basic concepts and relationship between power, current, and voltage for the power factor correction.	S1	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.2	Design the model for short, medium, and long transmission lines.	S2	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.3	Analyze the power system using per-unit representation.	S1	Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
3.0	**Values, autonomy, and responsibility**			
3.1	Acquire new knowledge about renewable energy	V3	- Report - Discussion	- Report. - Presentation.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	resources for electrical power generation.			

C. Course Content

No	List of Topics	Contact Hours
1.	Electrical Power system configuration	6
2.	Power Plants types and Comparison	6
3.	Basic concepts	7
4.	Power Factor Correction	7
5.	Line parameters: R, L, C	6
6.	Short T.L	7
7.	Medium TL	7
8.	Long line and constants	7
9.	Per-unit representation	7
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	5 %
2.	Written test (Quiz 1)	3rd	10 %
3.	Written test (Periodical tests)	6-12th	30 %
4.	Report /Presentation	13th	5 %
5.	Written test (Quiz 2)	8th	10 %
6.	Written test (Final Exam)	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	J. Duncan Glover, Thomas J. Overbye, Mulukutla S. Sarma, “Power System Analysis and Design ", Cengage Learning, 6th ed, 2017.

Supportive References	Yoshihide Hase, Tanuj Khandelwal, Kazuyuki Kameda, “Power System Dynamics with Computer-Based Modeling and Analysis ", Wiley, 2020.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work- Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Communication Systems	
Course Code: EE470	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 03	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: (7^{th}/4^{th})

4. Course general Description:

This course introduces and emphasizes major communication system analytical tools and theories for signal transmission through linear systems. It covers recalling Fourier series and Fourier transforms, analog communications (Amplitude Modulation (AM) and Angle Modulation (FM and PM), an introduction to digital communication (BPSK, BFSK, OOK, and M-ary modulation). Then, the sampling theorem, quantization process, and encoding process are covered as keys to recognize PCM system

5. Pre-requirements for this course (if any):

Signals and Systems Analysis: EE313

6. Co-requirements for this course (if any):

7. Course Main Objective(s):

The course objective is to provide students with the basic concepts of analog and digital communication systems, different analog and digital modulation schemes, and the conversion of analog signals to digital signals and vice versa.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recall Fourier series and Fourier transforms	K1	-Class/Group discussion.	Written Tests.
1.2	Describe fundamentals concepts of analog and digital communication systems	K1	-Class/Group discussion.	Written Tests.
2.0	Skills			
2.1	Analyze analog and digital communication systems	S1	-Problem-based learning -Collaborative learning.	- Problem-based Assessment. -Written Tests.
2.2	Solve analog-to-digital conversion models satisfying certain PCM system requirements.	S1	-Problem-based learning -Collaborative learning.	- Problem-based Assessment. -Written Tests.
3.0	Values, autonomy, and responsibility			
3.1	Function effectively on a team whose members together create collaborate in discussions and perform mini projects to meet some defined specifications for different communication systems introduced by the course	V2	- Collaborative learning.	-Presentation -Project
3.2	Acquire and apply new	V3		-Presentations

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	knowledge in communication systems especially advanced systems through technical reports.		-Self-learning.	-Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to communication systems	4
2.	Recall of Fourier Transform	4
3.	Amplitude Modulation	4
4.	Angle Modulation	4
5.	Angle De-Modulation	4
6.	FM Modulation	5
7.	FM De-Modulation	5
8.	Baseband Communication	5
9.	Sampling Theorem and Signal Reconstruction	5
10	Digital Communication Systems	5
11.	M-ary- Communication	5
12.	PCM	5
13.	Topics in Communication Technologies	5
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report /Presentation	13th	10 %
4.	Project	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	B.P. Lathi, Zhi Ding, " Modern Digital & Analog Communication Systems", 5th Ed., 2018
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Communications laboratory
Course Code:	EE471
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (7th/4th)					

4. Course general Description:
This course practically emphasizes analog communications (Amplitude Modulation (AM) and Angle Modulation (FM and PM) Followed by digital communication (BPSK, BFSK, OOK) experiments.
5. Pre-requirements for this course (if any)**:**
None
6. Co-requirements for this course (if any)**:**
Communication Systems:EE470
7. Course Main Objective(s):
The course objective is to provide students with the ability to develop and test communication systems practically and conduct experiments. The course also uses Matlab/Simulink package in projects to simulate and test communication systems

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2 x 15 = 30 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
2.0	Skills			
2.1	conduct experiments with analysis and interpretation of communication systems and drawing conclusions	S3	-Lab-based learning. -Observation	-Discussion. -Laboratory Exam.
2.2	Communicate effectively with a range of audiences	S4	-Lab-based learning. -Observation	- Discussion. -Laboratory Exam.
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional responsibilities in practical electrical engineering situations and make informed with safety factors and hazards that must be considered in the laboratory	V1	-Lab-based learning. -Collaborative learning.	-Presentations -Reports
3.2	Function effectively on a team whose members together provide collaboration and cooperation in conducting and analyzing practical experiments.	V2	-Lab-based learning. -Collaborative learning.	-Presentations -Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Experiment 1: Double Sideband Amplitude Modulation (DSB-AM)	4
2.	Experiment 2: Single Sideband Amplitude Modulation (SSB-AM)	4
3.	Experiment 3: Frequency Modulation (FM)	4

4.	Experiment 4: Phase Modulation (PM)	4
5.	Experiment 5: Amplitude Shift Keying (OOK , BPSK)	4
6.	Experiment 6: Frequency Shift Keying (BFSK)	5
7.	Experiment 7: Pulse Code Modulation (PCM)	5
	Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Projects	6-12th	30 %
3.	Report	13th	10 %
4.	Presentation	15-16th	10 %
5.	Final Laboratory Exam.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	B.P. Lathi, Zhi Ding, " Modern Digital & Analog Communication Systems", 5th Ed., 2018
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory
Technology equipment (projector, smart board, software)	Matlab/Simulink Simulation Package Data Show , Smart Board,
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Microprocessor
Course Code:	EE404
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (8th/4th)					

4. Course general Description:

This course covers the basic concepts of Microprocessor, including designing microprocessor-based systems, an overview of a microprocessor, hardware and software concepts, system architecture, central processing unit (CPU), internal memory (ROM, EEPROM, RAM, FLASH), Input/ Output ports, serial communication, programmable interrupts and timers, microprocessor programming model and instruction set, assembly language programming.

5. Pre-requirements for this course (if any)**:**

Digital Logic Design: EE331 &
Introduction to Computer Programming: EE200

6. Co-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

This course aims to provide students with the basic concepts of 8086 microprocessor, assembly language programming, arithmetic, and logic instructions to write programs for 8086.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Introduce fundamentals of microprocessors	K1	-Class/Group discussion.	Written Tests.
1.2	Recognize 8086 microprocessor internal architecture and 8086 Hardware	K1	-Class/Group discussion.	Written Tests.
2.0	Skills			
2.1	Investigate 8086 instruction set	S1	-Problem-based learning -Collaborative learning.	- Problem-based Assessment. -Written Tests.
2.2	Use different microprocessor mechanisms and techniques such as Memory, I/O interfacing, Stack Operations, timers and interrupts	S1	-Problem-based learning -Collaborative learning.	- Problem-based Assessment. -Written Tests.
2.3	Design, code, test, and deploy assembly programs that use different data types.	S2	-Problem-based learning -Collaborative learning.	-Problem-based Assessment. -Written Tests.
3.0	Values, autonomy, and responsibility			
3.1	Acquire and apply new knowledge as needed, using appropriate learning strategies.	V3	-Self-learning.	-Presentations -Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to fundamentals of microprocessors	6
2.	8086 microprocessor internal architecture	6
3.	8086 Hardware and pin assignment	6
4.	8086 instruction set	7
5.	8086 I/O interfacing	7
6.	Timers	7
7	Memory and Stack Operations	7
8	Interrupts	7
9	Assembly programs that use different data types.	7
		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report	13th	10 %
4.	Presentation	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Microprocessor 8086: Architecture, Programming and Interfacing Kindle Edition by Sunil Mathur (Author)
Supportive References	Aspinall, D., & Dagless, E. L. (2014). Introduction to Microprocessors. Academic Press.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Microprocessor and Microcontroller Laboratory
Course Code:	EE405
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8th/4th)					
4. Course general Description:					
This course covers the basic concepts of Microprocessor, including designing microprocessor-based systems, an overview of a microprocessor, hardware and software concepts, system architecture, central processing unit (CPU), internal memory (ROM, EEPROM, RAM, FLASH), Input/ Output ports, serial communication, programmable interrupts and timers, microprocessor programming model and instruction set, assembly language programming.					
5. Pre-requirements for this course (if any)**:**					
Microcontrollers:EE302					
6. Co-requirements for this course (if any)**:**					
Microprocessors: EE404					
7. Course Main Objective(s):					
This course aims to provide students with the practical skills to be familiar with the 8051 microcontroller and 8086 microprocessor.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2 x 15 = 30 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
2.0	Skills			
2.1	Conduct basic experiments of utilizing and programming the 8051 microcontroller and 8086 microprocessor.	S3	- Lab-based learning. - Observation	- Discussion. - Laboratory Exam.
2.2	Communicate effectively with classmates and the instructor in the laboratory.	S4	- Lab-based learning. - Observation	- Discussion. - Laboratory Exam.
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional responsibilities in the laboratory during the experimentation work.	V1	- Lab-based learning. - Collaborative learning.	- Presentations - Reports
3.2	Function effectively on a team by demonstrating leadership and collaboration in the laboratory.	V2	- Lab-based learning. - Collaborative learning.	- Presentations - -Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Experiment 1: utilizing 8051 internal registers.	3
2.	Experiment 2: Simple Arithmetic Operations by 8051	3
3.	Experiment 3: Utilizing I/O Ports of 8051	3
4.	Experiment 4: Simple Assembly Program by 8051	3
5.	Experiment 5: Utilizing 8051 Stack Memory	3
6.	Experiment 6: utilizing 8086 internal registers.	3

7	Experiment 7: Simple Arithmetic Operations by 8086	3
8	Experiment 8: Utilizing I/O Ports of 8086	3
9	Experiment 9: Simple Assembly Program by 8086	3
10	Experiment 10: Utilizing 8086 Stack Memory	3
	Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written Laboratory test (Periodical tests)	$6\text{-}12^{th}$	30 %
3.	Report	13^{th}	10 %
4.	Presentation	$15\text{-}16^{th}$	10 %
5.	Final Laboratory Exam.	$17\text{-}18^{th}$	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Ghoshal, S. (2022). 8051 Microcontrollers: Internals, Instructions, Programming &Interfacing (2nd ed.). PEARSON INDIA.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory
Technology equipment (projector, smart board, software)	• Data Show, Smart Board, • 8086 training kit • 8051 training kit
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	VLSI Circuit Design
Course Code:	EE434
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	02
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐ Elective	

3. Level/year at which this course is offered: (8th /4th)

4. Course general Description:

This course covers MOS transistor structure and device modeling, MOS Inverters, MOS Combinational Circuits, Device feature size scaling, Multi-Vdd Circuits, Dynamic voltage scaling, Power Management, Hardware Software Trade-off, Bus Encoding, Architectural optimization, Clock Gating, Logic styles, Variable-threshold-voltage CMOS (VTCMOS) approach, Multi-threshold-voltage CMOS (MTCMOS) approach, Power gating, Transistor stacking, Dual-Vt assignment approach (DTCMOS), Adiabatic Switching Circuits, Battery-aware Synthesis, Variation tolerant design, and Simulation tools for low power synthesis.

5. Pre-requirements for this course (if any)**:**

EE332 Microelectronics Devices and Circuits

6. Co-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

This course aims to provide students with the essential background on VLSI Low power design, knowledge of modeling of various MOS parameters, and an understanding of the different design steps required to carry out a complete digital VLSI (Very-Large-Scale Integration) design in DSCH and MICROWIND simulations software.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify dynamic and static power dissipation and factors affecting them	K1	Problem-based learning. Self-learning.	Written Tests Problem-Based Assessment.
2.0	**Skills**			
2.1	Design power reduction techniques possible at circuit and logic level	S2	Problem-based learning.	• Written Tests - Problem-Based Assessment
2.2	Perform electrical measurement experiments	S3	Lab-based learning.	• Written Tests - Laboratory Exam
2.3	Communicate actively in discussions during experiments	S4	• Class/Group discussion. Self-learning	• Oral presentation Rubrics
3.0	**Values, autonomy, and responsibility**			
3.1	Bear the ethical and professional values during the design VLSI circuit	V1	• Class/Group Discussion Problem-Based Learning.	• Report - Presentation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Perform effectively in teamwork during experiments	V2	• Self-learning - Scientific research.	- Reports

C. Course Content

No	List of Topics	Contact Hours
1.	MOS transistor structure and device modeling, MOS Inverters, and MOS Combinational Circuits.	10
2.	Device feature size scaling, Multi-Vdd Circuits, and Architectural level approaches: Parallelism, Pipelining.	8
3.	Voltage scaling using high-level transformations, Dynamic voltage scaling, and Power Management.	8
4.	Hardware Software Trade-off, Bus Encoding, and Two's complement Vs Sign Magnitude.	6
5.	Architectural optimization, Clock Gating, and Logic styles.	6
6.	Variable-threshold-voltage CMOS (VTCMOS) approach, multi-threshold-voltage CMOS (MTCMOS) approach, and Power gating.	10
7.	Transistor stacking, and Dual-Vt assignment approach (DTCMOS)	6
8.	Adiabatic Switching Circuits, Battery-aware Synthesis, Variation tolerant design, Simulation tools for low power synthesis	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written tests (Quizzes)	2-14	10%
2.	Periodic Exams	6-14	30%
3.	Report	15	10%
4.	Laboratory Exam	16	10%
5.	Final Exam	17-18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Kang, S. M., & Leblebici, Y. (2016). CMOS digital integrated circuits, Fourth Edition, Tata McGraw-Hill Education
Supportive References	J. M. Rabaey, A. Chandrakasan, B. Nikolic (2003). Digital Integrated Circuits (2nd Edition): A Design Perspective, Pearson Roy, K., & Prasad, S. C. (2009). Low-power CMOS VLSI circuit design, First Edition John Wiley & Sons
Electronic Materials	
Other Learning Materials	PowerPoint slides and notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Projector, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

2023
TP-153

Course Specification
(Bachelor)

Course Title:	FPGA Laboratory
Course Code:	EE435
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	02
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (8th /4th)					
4. Course general Description:					
This course covers some practical experiments on modeling style and synthesis results, implementation of simple combinational design, design a Full Adder, 4-bit Adder, seven segment display, 3 to 8 Decoder, Up Counter, Up-Down Counter, implement a traffic light control circuit, FPGA system design using IP Integrator.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requirements for this course (if any)**:**					
EE404: Microprocessors					
7. Course Main Objective(s):					
This course aims to provide students with practical experiments for design and model systems in VHDL using modern software tools with emphasizing on programmable circuits (PLD, FPGA, ASIC).					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
				-
2.0	**Skills**			
2.1	Perform practical experiments for designing systems in VHDL using modern software tools with emphasizing on programmable circuits (PLD, FPGA, ASIC).	S3	- Lab-based learning. Observation	-Discussion. - -Laboratory Exam.
2.2	Communicate effectively with classmates and instructors during the laboratory.	S4	- Lab-based learning. Observation	- Discussion. - Laboratory Exam.
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in the laboratory during practical experiments.	V1	- Lab-based learning. Collaborative learning.	- Presentations - Reports
3.2	Function effectively on a team by demonstrating leadership and collaboration.	V2	- Lab-based learning. Collaborative learning.	- Presentations - Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Experiment 1: modeling style and synthesis results	4
2.	Experiment 2: Implementation of simple combinational design	2
3.	Experiment 3: Design a Full Adder	2
4.	Experiment 4: 4-bit Adder	4
5.	Experiment 5: seven segment display	2
6.	Experiment 6: 3 to 8 Decoder	4
7.	Experiment 7: Up Counter	2
8.	Experiment 8: Up-Down Counter	4
9.	Experiment 9: implement a traffic light control circuit	4
10.	Experiment 10: FPGA System Design Using IP Integrator	2
	Total	**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Laboratory Exam.	8	20%
2.	Discussion	1-14	30%
3.	Report	14	10%
4.	Presentation	15	40%
5.	Final Laboratory Exam.	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Chu, P. P. (2011). FPGA Prototyping by VHDL Examples: Xilinx Spartan-3 Version. John Wiley & Sons.
Supportive References	Ledin, J. (2021). Architecting High-Performance Embedded Systems: Design and build high-performance real-time digital systems based on FPGAs and custom circuits. Packt Publishing Ltd.
Electronic Materials	
Other Learning Materials	PowerPoint slides and notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory
Technology equipment (projector, smart board, software)	Projector, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Digital Communication
Course Code:	EE472
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	

3. Level/year at which this course is offered: (8th/4th)

4. Course general Description:

The Digital Communication Systems course focuses on the principles and techniques of digital communication systems, including Pulse-Code Modulation (PCM), M-ary modulation, and baseband and band-pass signal analysis. Students will explore the factors affecting binary signals and M-ary pulse waveforms, such as error probability, additive white Gaussian noise (AWGN), inter-symbol interference, and distortion. The course also provides a comparison between Amplitude, Frequency, and Phase Shift-Keying modulations and analysis of binary encoding formats. This course combines theoretical concepts with practical applications, enabling students to design and analyze digital communication systems.

5. Pre-requirements for this course (if any):

Communication Systems: EE470

6. Co-requirements for this course (if any):

7. Course Main Objective(s):

The main objective of this course is to provide students with basic principles of digital communication systems, including modulation and demodulation techniques, and to equip them with the skills required to analyze and design digital communication systems for various applications.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize the principles and techniques of Pulse-Code Modulation (PCM) and M-ary modulation.	K1	• Class/group discussion • Problem based learning	• Written Test. • Problem based assessment
1.2	Compare Amplitude, Frequency, and Phase Shift-Keying modulations in digital communication systems.	K1	• Class/group discussion • Problem-based learning	• Written Test. • Problem based assessment
2.0	Skills			
2.1	Analyze modulation, demodulation, and detection of baseband and band-pass signals in digital communication systems.	S1	• Class/group discussion • Problem-based learning	• Written Test. • Problem based assessment
2.2	Investigate the factors affecting binary signals and M-ary pulse waveforms, such as error probability, additive white Gaussian noise (AWGN), inter-symbol interference, and distortion	S2	• Class/group discussion • Problem-based learning	• Written Test. • Problem based assessment
2.3	Design digital communication systems	S2	• Class/group discussion	• Written Test

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	for real-world applications.		• Problem based learning	• Problem based assessment
3.0	Values, autonomy, and responsibility			
3.1	Function effectively on a team during executing project requirements.	V2	• Collaborative learning • Self-learning	• Presentation • Report • projects

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Digital Communication Systems	4
2.	Pulse-Code Modulation (PCM)	8
3.	M-ary Modulation Techniques	8
4.	Baseband and Band-pass Signal Analysis	8
5.	Factors Affecting Binary Signals and M-ary Pulse Waveforms	8
6.	Comparison of Amplitude, Frequency, and Phase Shift-Keying Modulations	8
7.	Binary Encoding Formats	8
8.	Practical Applications and Case Studies	8
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Quizzes	During the semester	10 %
4.	Mini-project	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	John G. Proakis and Masoud Salehi, Digital Communications, McGraw-Hill Education, 5th, 2007.
Supportive References	
Electronic Materials	

Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer Lab
Technology equipment (projector, smart board, software)	Matlab/Simulink Simulation Package
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Introduction to Optoelectronics Devices and Systems
Course Code:	EE536
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	01
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
This course focuses on review of Maxwell's equations; plane wave in simple media; Physics of optical radiation; interaction between optical radiation and matter; principles and applications of optoelectronic devices: sources, detectors as well as other optical materials, devices, components and equipment; wave optics; ray optics; beam optics; nano-photonics; and lasers.					
5. Pre-requirements for this course (if any)**:**					
EE332: Microelectronics Devices and Circuits					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
By the end of the semester, students should understand the fundamentals of nature of light and basic laws and phenomena that describe optoelectronics. They also should be able to analyze various premises, approaches, procedures related to optoelectronics systems, optical radiation, photodetectors and lasers.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify fundamental physics and technical base of optoelectronics.	K1	- Classroom Lectures - Class Work - Class Discussion	- Written test - Observation
			-	-
2.0	**Skills**			
2.1	analyze various premises, approaches procedures and results related to wave, ray, and beam optics,	S1	Written Tests	- Written test - Observation
2.2	Apply studied laws and equations to solve problems related to LEDs, photodetectors, optical amplifier, and lasers.	S1	Problem-based Assessment. -Written Tests.	- Written test - Observation
2.3	Communicate effectively in classroom	S4	Role play, Collaborative learning, Observation,	Oral presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Acquire latest knowledge of detectors, solar cells, optical amplifiers, and laser technologies	V3	Scientific Research	- Reports

C. Course Content

No	List of Topics	Contact Hours

1.	Wave nature of light	10
2.	Light Emitting Diodes	10
3.	Dielectric Waveguides and Optical Fibers	10
4.	Photodetectors	10
5.	Photovoltaic Devices: solar cells	10
6.	Optical amplifier and lasers	10
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	2-14	10%
2.	Periodic Exams	6-14	30%
3.	Report, Presentation	16	20%
4.	Final Exam	17-18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Optoelectronics and Principles and Practices, by S.O. Kasap, Prentice Hall, 2nd edition (2016) ISBN 13: 978-0-273-77417-4
Supportive References	Mitin, V., Kochelap, V., Dutta, M., & Stroscio, M.. Preface. In Introduction to Optical and Optoelectronic Properties of Nanostructures. (2019) ISBN: 978-1108428149
Electronic Materials	
Other Learning Materials	PowerPoint slides and notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Electronics Laboratory
Technology equipment (projector, smart board, software)	Projector, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	No. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Antenna Theory
Course Code:	EE573
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/ 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: ($9^{th}/5^{th}$)					
4. Course general Description:					
This course presents the fundamental principles of antenna theory, analysis, design, and measurements of antennas, structures of antenna, applications of the most basic and practical configurations, such as linear dipoles; loops; arrays; aperture antennas; horn antennas; micro strip antennas; and reflector antennas.					
5. Pre-requirements for this course (if any)**:**					
Electromagnetic Fields: EE324					
6. Co-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The course objective is to introduce fundamental concepts of antennas, and provide students with basics of different antenna types.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define basic definitions of antenna and radiation	K1	- Class/Group discussion.	- Written Tests.
1.2	Identify Fundamental Parameters of Antennas	K1	- Class/Group discussion.	- Written Tests.
2.0	Skills			
2.1	Analyze Linear Wire Antennas, Loop Antennas, Aperture Antennas and Horn Antennas	S1	- Problem-based learning - Collaborative learning.	- Problem-based Assessment. - Written Tests.
2.2	Design Arrays Antennas	S2	- Problem-based learning - Collaborative learning.	- Problem-based Assessment. - Written Tests.
3.0	Values, autonomy, and responsibility			
3.1	Function effectively on a team whose members together collaborate in projects to design certain types of antennas to meet pre-determined specifications	V2	- Problem-based learning. - Collaborative learning.	- Discussion - Presentation - Project
3.2	Acquire and apply new knowledge in antenna types	V3	- Self-learning.	- Presentations - Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Types of Antennas	2
2.	Radiation Mechanism	2
3.	Fundamental Parameters of Antennas	8
4.	Linear Wire Antennas	4

5.	Infinitesimal Dipole	4
6.	Finite Length Dipole	4
7.	Half-Wavelength Dipole	2
8.	Loop Antennas	4
9.	Small Circular Loop	3
10.	Circular Loop of Constant Current	3
11.	Circular Loop with Non-uniform Current	3
12.	Two-Element Array	3
13.	*N*-Element Linear Array: Uniform Amplitude and Spacing	3
14.	*N*-Element Linear Array: Directivity	3
15.	Design Procedure	5
16.	**Aperture Antennas**	5
17.	**Horn Antennas**	5
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Report /Presentation	13th	10 %
4.	Project	15-16th	10 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	"ANTENNA THEORY ANALYSIS AND DESIGN" by Constantine A. Balanis, 4th edition-2016
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (--)
DATE	--/02/2024

Education & Training Evaluation Commission

هيئة تقويم التعليم والتدريب

اعتماد

NCAAA

2023

TP-153

Course Specification

— (Bachelor)

Course Title: Antenna Laboratory	
Course Code: EE574	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 03	
Last Revision Date: 1 February 2024	

Table of Contents

A. General information about the course:

1. Course Identification

2. Teaching mode (mark all that apply)

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: (9th/5th)

4. Course general Description:

An antenna laboratory course typically provides students with hands-on experience in the design, fabrication, measurement, and analysis of various types of antennas. The course may be offered as an elective or as part of a larger program in electrical engineering, telecommunications engineering, or related fields.

5. Pre-requirements for this course (if any):

6. Co-requirements for this course (if any):

Antenna theory:EE573

7. Course Main Objective(s):

The main objective of an antenna laboratory course is to provide students with practical skills in the design, analysis, and testing of various types of antennas laboratory experiments and projects.

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	60
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
2.0	Skills			
2.1	Conduct experiments with analysis and drawing conclusions on different types of antennas	S3	-Lab-based learning. -Observation	-Discussion. -Laboratory Exam.
2.2	Communicate effectively with a range of audiences through group discussion sand presentations	S4	-Lab-based learning. -Observation	- Discussion. -Laboratory Exam.
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional responsibilities in practical situations that involves antenna utility, make informed with safety factors and hazards which must be considered in laboratory	V1	-Lab-based learning. -Collaborative learning.	- Presentations - Reports
3.2	Function effectively on a team whose members together provide collaboration and cooperation in conducting and analyzing practical antenna experiments.	V2	-Lab-based learning. -Collaborative learning.	- Presentations - Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Experiment 1: Measurement of antenna radiation patterns and gain.	10
2	Experiment 2: Design and analysis of wire antennas	10
3.	Experiment 3: Design and analysis of array antennas.	8
4	Experiment 4: Measurement of signal propagation in free space.	8
5.	Experiment 5: Design and analysis of wireless communication.	8
6.	Experiment 6: systems Analysis of Noise in communication systems.	8

7	Experiment 7: Design and analysis of directional couplers.	8
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	First Midterm Laboratory Exam	6-12th	30 %
3.	Report /Presentation	13th	10 %
4.	Project	15-16th	10 %
5.	Final Laboratory Exam.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	"ANTENNA THEORY ANALYSIS AND DESIGN" by Constantine A. Balanis, 4th edition-2016
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory
Technology equipment (projector, smart board, software)	Data Show , Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
	- Peer Reviewer Faculty	
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work- Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) **Assessment Methods** (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification

(Bachelor)

Course Title: Digital Signal Processing	
Course Code: EE580	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 03	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
This course covers the basic concepts of digital signal processing including discrete-time signals and systems, the z-transform, design of analog filters, and design and implementation of digital filters.					
5. Pre-requirements for this course (if any):					
Signals and Systems Analysis: EE313					
6. Co-requirements for this course (if any):					
7. Course Main Objective(s):					
This course aims to provide students with fundamental concepts of Digital Signal Processing, basics of FIR and IIR filters design and implementation.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize Frequency Domain Representation of Discrete-Time Signals	K1	– Class/Group discussion.	– Written Tests.
1.2				
2.0	– Skills			
2.1	Utilize z-Transform to describe DSP systems	S1	– Problem-based learning – Collaborative learning.	– Problem-based Assessment. – Written Tests.
2.3	Apply different realization structures of DSP systems	S3	– Lab-based learning.	– Written Tests – Laboratory Exam
2.4	Communicate actively in discussions during presentations	S4	– Problem-based learning – Collaborative learning.	– Presentations – Reports
3.0	Values, autonomy, and responsibility			
3.1	Perform effectively in teamwork during experiments	V2	– Lab-based learning. – Collaborative learning.	– Lab Discussion – Presentation – Project
3.2	Collect information about new generation of DSP systems by asking key questions and by using a variety of sources such as the internet, and textbooks.	V3	– -Self-learning.	– Presentations – Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods

C. Course Content

No	List of Topics	Contact Hours
1.	Signal Classification	**3**
2.	The Sampling Process	**3**
3.	Discrete-Time Signals and Systems	**3**
4.	The Discrete-Time Fourier Transform	**5**
5.	The Inverse Discrete-Time Fourier Transform	**5**
6.	Linear Convolution	**5**
7.	The z-Transform	**5**
8.	The Inverse z-Transform	**5**
9.	Realization Structures	**5**
10	Review analog filters design	**5**
11.	IIR Filter Design	**8**
12.	FIR Filter Design	**8**
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	$6\text{-}12^{th}$	30 %
3.	Report /Presentation	13^{th}	10 %
4.	Lab Exam	$15\text{-}16^{th}$	10 %
5.	Final term Written tests.	$17\text{-}18^{th}$	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Digital Signal Processing" by A. Anand Kumar 2013 by PHI Learning Private Limited, New Delhi. ISBN-978-81-203-4620-8
Supportive References	
Electronic Materials	

Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Matlab/Simulink Simulation Package
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Introduction to Embedded Systems
Course Code:	EE506
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	2
Last Revision Date:	26 February 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐ University	☐ College	☐ Department	☒ Track	☐ Others
B.	☒ Required			☐ Elective	

3. Level/year at which this course is offered: (10/5)

4. Course general Description:

This course introduces students to the fundamentals of the hardware and firmware architecture of embedded systems and their applications. It includes a comprehensive overview of the PIC and AVR microcontrollers, their architecture, interfacing, programming, and usage. In addition, the course provides students with an insight of embedded systems, real-time operating systems, development boards, sensors and actuators, embedded systems in real time, and embedded systems applications (IoT).

5. Pre-requirements for this course (if any)**:**

VLSI Circuit Design: EE434

6. Co-requisites for this course (if any)**:**

None.

7. Course Main Objective(s):

The main objective of this course is to make students familiar with embedded systems and their architecture, understand the architecture and interfacing of microprocessor/microcontroller in embedded systems, and use common microcontrollers in embedded systems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the basics and architecture of an embedded system.	K1	• Problem-based learning. Self-learning.	• Written Tests Problem-Based Assessment.
2.0	**Skills**			
2.1	Design embedded systems and real-time systems to solve real life engineering problems.	S2	Problem-based learning.	• Written Tests Problem-Based Assessment
2.2	Use software development for embedded systems	S3	Lab-based learning.	• Written Tests Laboratory Exam
2.3	Communicate actively in discussions during experiments	S4	• Class/Group discussion. Self-learning	• Oral presentation Rubrics
3.0	**Values, autonomy, and responsibility**			
3.1	Perform effectively in teamwork during experiments	V2	• Self-learning. Scientific research.	Reports
3.2				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction and Overview of Embedded Systems	6
2.	Interfacing: Interrupts - Communication and protocols	6
3.	Embedded System memory and peripherals	6
4.	PIC Microcontrollers	8
5.	AVR Microcontrollers	8
6.	Development boards – Arduino	8
7.	Sensors and Actuators	6
8.	Real-time Embedded Systems - Operating Systems and Design	6
9.	Wireless and Internet Embedded Systems: IoT	6
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Mid Term Test)	5th Week	30%
2.	Written test (Quiz)	10th Week	10%
3.	Reports	13th Week	10%
4.	Laboratory Exam	14th Week	10%
5.	Written test (Final Test)	16th Week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Wolf Ph.D. Electrical Engineering Stanford University, Marilyn. (2022). Computers as Components: Principles of Embedded Computing System Design (The Morgan Kaufmann Series in Computer Architecture and Design) (5th ed.). Morgan Kaufmann.
Supportive References	Frank Vahid and Tony Givargis, Embedded System Design: A Unified Hardware/ Software Introduction, John Wiley & Sons, 2002
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	NO (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Programmable Logic Controller
Course Code:	EE541
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (9/5)					

4. Course general Description:

This course provides students with an introduction to Programmable Logic Controller (PLC) and their applications in industrial settings. The course covers the basics of PLC, including input/output devices such as sensors, transducers, and actuators, as well as programming elements such as timers, counters, comparators, sensors, and actuators. Students will design ladder diagrams and program a PLC to control industrial processes and explore the different applications of PLC in manufacturing, production, quality control, and other relevant areas through case studies.

5. Pre-requirements for this course (if any):

Microcontrollers (EE302)

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

This course aims to introduce students to the basics of Programmable Logic Controllers (PLC) and their use in industrial applications and equip them with the skills and knowledge necessary to design, program, and troubleshoot PLC systems for industrial process control.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the fundamental concepts and devices of Programmable Logic Controller (PLC) in industrial applications.	K1	Class / Group discussion. Problem-based learning.	Written tests Discussion
1.2				
…				
2.0	**Skills**			
2.1	Develop proficiency in designing ladder diagrams to program a PLC for controlling industrial processes.	S2	Problem-Based Learning.	Written Tests Problem-Based Assessment.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Evaluate the performance of PLC systems by identifying errors and diagnosing problems in the programming and operation.	S3	Problem-Based Learning. Lab-based learning.	Written Tests Problem-Based Assessment. Laboratory exams.
2.3	Use PLCs in controlling processes such as manufacturing, production, and quality control.	S3	Problem-Based Learning. Lab-based learning.	Written Tests Problem-Based Assessment. Laboratory exams.
2.4	Communicate effectively during experiments	S4	Collaborative learning. Class /Group discussion.	Reports Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Apply critical thinking skills to design and implement innovative solutions for industrial automation using PLC and associated input/output devices, sensors, and actuators.	V3	Class / Group discussion.	Reports Presentation
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to PLC, Input/Output Devices, Performance of sensors Mechanical Switches and Proximity Switches	8
2.	Digital Systems, The Binary, Octal and Hexadecimal System, Binary Coded Decimals I/O Processing, Input/Output Unit	6
3.	A/D & D/A Converters, Signal Conditioning, Processing Inputs, I/O Addresses	6
4.	PLC Ladder Programming	6
5.	Lab experiment: Logic Functions, (AND-OR-XOR) and Latching, Counters	6
6.	Lab experiment: Comparators and Timers	6
7.	Lab experiment: Winsps PLC programming	6
8.	Lab experiment: Hardware configuration of Winsps PLC	6
9.	Lab experiment: Conveyor system control by PLC	6
10.	Lab experiment: Lift system control by PLC	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion	1-15	5%
2.	Quiz 1 (written test)	5	5%
3.	Quiz 2 (written test)	14	5%
4.	Midterm (written test)	6-12	30%
5.	Report/Presentation	10	5%
6.	Laboratory Exam (Mini Project)	16	10%
7.	Final Exam (written test)	17/18	40%
…			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	William Bolton, "Programmable Logic Controllers", 6th edition, Newnes, 2018.
Supportive References	Frank D. Petruzella, "LogixPro PLC Lab Manual for Programmable Logic Controllers 5th Edition, Kindle Edition", McGraw-Hill Higher Education; 5th edition (January 22, 2016).
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Laboratory
Technology equipment (projector, smart board, software)	Data show, Smart board, 8 Work station equipped with Siemens SIMATIC S7-300, PC and Winsps software.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
	Peer Reviewer Faculty	
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work- Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Engineering Economy
Course Code:	IE221
Program:	Electrical Engineering
Department:	Industrial Engineering
College:	Engineering
Institution:	Northern Border University
Version:	02
Last Revision Date:	8 May 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3rd level/ 2nd year)					
4. Course general Description:					
Engineering Economy introduces fundamental concepts and techniques for making sound economic decisions in engineering projects. The course covers topics such as the time value of money, interest rates, cash flow analysis, benefit-cost analysis, risk analysis, and depreciation. Students will gain the skills to evaluate project proposals, allocate resources, and assess the financial feasibility of engineering investments. Engineering Economy provides a practical foundation for making informed economic decisions in engineering contexts..					
5. Pre-requirements for this course (if any)**:**					
None					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The main objective of this course is to introduce the principles and techniques of economic analysis in engineering as applied in various fields of engineering. This includes evaluating a single project or choosing among several alternatives.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Describe** the principles of economic analysis in engineering and their importance in decision making.	K1	Lecturing Class/Group Discussions	Written tests Assignments
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	**Analyze** cash flow series using present worth, annual equivalent worth, and internal rate of return methods.	S1	Lecturing Problem-Based Learning Modeling	Written tests Assignments
2.2	**Evaluate** the effects of inflation on engineering investments.	S1	Lecturing Problem-Based Learning Modeling	Written tests Assignments
2.3	**Evaluate** the best alternative among several options based on equivalent present worth, future worth, capitalized cost, payback period, annual worth values, and benefit-cost ratios.	S1	Lecturing Problem-Based Learning Modeling Case studies	Written tests Assignments
2.4	**Allocate** costs and capital budgets for engineering projects.	S2	Lecturing Problem-Based Learning Modeling Case studies	Written tests Assignments
2.5	**Analyze** the effects of depreciation using various methods.	S2	Lecturing Problem-Based Learning Modeling	Written tests Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	**Recognize** the ethical implications of engineering economic decisions and their impact on society and the environment.	V1	Lecturing Class / Group Discussions Case studies	Assignments

C. Course Content

No	List of Topics	Contact Hours
1	Time Value of Money	6
2	Cash Flow Analysis	4
3	Economic Decision Criteria	2
4	Cost Estimation and Analysis	5
5	Depreciation and Taxes	5
6	Replacement Analysis	4
7	Risk and Uncertainty	3
8	Breakeven Analysis	6
9	Capital Budgeting	3
10	Cost of Capital	5
11	Ethics in Engineering Economics	2
	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments & Quizzes	**2-15**	**20%**
2.	Report (With Presentation)	11-15	10%
3.	Written test (Midterm Exam)	7-8	30%
4.	Written test (Final Exam)	16-17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Blank, L., & Tarquin, A. (2020). Basics of Engineering Economy (3rd ed.). McGraw-Hill.
Supportive References	
Electronic Materials	E-Learning Management System (Blackboard)
Other Learning Materials	Lecture notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector, Microsoft Excel, E-Learning Management Systems (Blackboard)
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Teaching and learning	• Students • Peer-faculty evaluation • Head of department	• Course Evaluation survey • In class peer observation • Course File review • Pass rate and distribution of grades
Extent of achievement of course learning outcomes	• Students • Course instructor • Course coordinator	• Course Evaluation survey • CLOs assessment • Course File review
Quality of learning resources	• Students • Course instructor • Course coordinator	• Course Evaluation survey • Faculty feedback
Quality of assessment procedures	• Students • Peer-faculty evaluation • Course coordinator	• Course Evaluation survey • Course File review • Pass rate and distribution of grades
Academic Counseling and Support	• Students • Head of department	• Course Evaluation survey • Visits

Quality of facilities required	• Students • Course Instructor • Course coordinator	• Course Evaluation survey • Faculty feedback
Effectiveness of Teaching and learning	• Students • Peer-faculty evaluation • Head of department	• Course Evaluation survey • In class peer observation • Course File review
Assessment Areas/Issues	**Assessor**	**Assessment Methods**
		• Pass rate and distribution of grades
Extent of achievement of course learning outcomes	• Students • Course Instructor • Course coordinator	• Course Evaluation survey • CLOs assessment • Course File review
Quality of learning resources	• Students • Course Instructor • Course coordinator	• Course Evaluation survey • Faculty feedback
Quality of assessment procedures	• Students • Peer-faculty evaluation • Course coordinator	• Course Evaluation survey • Course File review • Pass rate and distribution of grades
Overall evaluation	• Program Quality Committee	• Review and approve all the reports and course files.

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Industrial Engineering Council
REFERENCE NO.	No. (15)
DATE	14/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-155

Field Experience Specification

Course Title: Field Training	
Course Code: **EE491**	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Field Experience Version Number: **03**	
Last Revision Date: **01/02/2024**	

Table of Contents

A. Field Experience Details:

1. Credit hours: (0).		
2. Level/year at which Field Experience is offered: (Summer 4th year).		
3. Time allocated for Field Experience activities		
(8)Weeks	(5)Days	(8) Hours
4. Corequisite (or prerequisites if any) to join Field Experience		
Any summer semester after completion of minimum 110 Credits hours		
5. Mode of delivery		
☒ In-person/onsite	☐hybrid (onsite/online)	☐Online

B. Field Experience Course Learning Outcomes (CLOs), Training Activities and Assessment Methods

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
1.0	**Knowledge and understanding**				
1.1					
2.0	**Skills**				
2.1	An ability to communicate effectively with a range of audiences	**S4**	• Group Discussion • Self-learning • Onsite training	• Presentation • Reports	**Direct:** • Discussion • Presentation • Report • Oral Test **Indirect:** Student Survey
3.0	**Values, autonomy, and responsibility**				
3.1	An ability to Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	**V1**	• Brain storming • Group Discussions • Daily attendance • Onsite training	• Group tasks • Meetings	**Direct:** • Discussion • Presentation • Report • Oral Test **Indirect:** Student Survey
3.2	An ability to Function	**V2**	• Group Discussions	• Collaborative Learning	**Direct:**

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
	effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives		• Onsite training	• Group tasks • Meetings	• Discussion • Presentation • Report • Oral Test **Indirect:** Student Survey
3.3	An ability to Acquire and apply new knowledge as needed, using appropriate learning strategies	**V3**	• Self-learning • Onsite training • Self-learning • Individual tasks • Scientific research	• Group Discussions • Problem-based learning • Peer learning	**Direct:** • Discussion • Presentation • Report • Oral Test **Indirect:** Student Survey

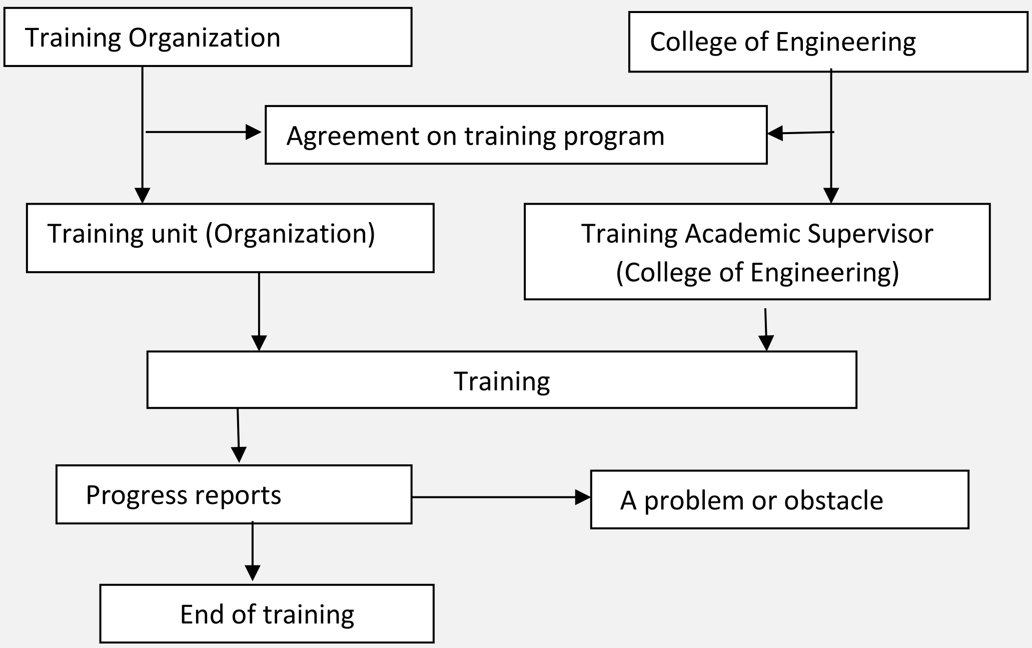
*Assessment methods (i.e., practical test, field report, oral test, presentation, group project, essay, etc.).

C. Field Experience Administration

1. Field Experience Flowchart for Responsibility

Including units, departments, and committees responsible for field experience identifying by the interrelations.

Insert a field experience flowchart for responsibility and decision-making (including a provision for conflict resolution).



2. Distribution of Responsibilities for Field Experience Activities

Activities	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Selection of a field experience site	✓		✓	✓	
Selection of supervisory staff	✓			✓	
Provision of the required equipment				✓	
Provision of learning resources		✓			✓
Ensuring the safety of the site				✓	✓
Commuting to and from the field experience site			✓		
Provision of support and guidance	✓	✓		✓	✓
Implementation of training activities (duties, reports, projects ...)					✓
Follow up on student training activities		✓			✓
Monitoring attendance and leave				✓	
Assessment of learning outcomes		✓			
Evaluating the quality of field experience	✓	✓	✓		
Others (specify)					

3. Field Experience Location Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
Electrical Power Stations	• Availability of qualified Electrical engineer • Training organization should cover at least one of the basic fields of the electrical engineering disciplines.	• Training organization should have clear procedures and rules to ensure the safety of the trainees.
Mining Companies		
Petroleum Companies		
Factories		

*E.g. provides information technology, equipment, laboratories, halls, housing, learning sources, clinics … etc.

** E.g. Criteria of the institution offering the training or those related to the specialization, such as safety standards, dealing with patients in medical specialties … etc.

4. Decision-Making Procedures for Identifying Appropriate Locations for Field Experience

1. The summer training coordinator is responsible for coordinating with the employers to provide suitable training opportunities for the students. Students can perform the summer training in any of the related fields to electrical engineering.
2. After registration, students will fill a form
3. Students select three preferable companies.
4. Then, the students will be assigned one of the three selected organizations.

Students are also encouraged to contact employers and arrange for their placement. In this case the steps are:

1. Students can start contacting companies before registration.
2. In such cases, approvals from both the Academic Department and the Summer Training Department are required.
3. The summer training coordinator is responsible for coordinating with the employers to provide suitable training opportunities for the students.

In both cases, the location can be approved as a suitable field experience location only if it fulfills the above-mentioned requirements.

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
Injuries or infections of the trainee during the training	- Awareness of the usage of Personal Protective Equipment - Awareness of safety/health rules and regulations in the training location Contract an agreement with the company.	Follow the instructions provided by the company

D. Training Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of training and assessment,	- Supervisory Staff Student	- Indirect Assessment - Indirect Assessment
Extent of achievement of CLO	- Faculty Students	- Direct Assessment - Indirect Assessment
Quality of learning resources	Students	- Indirect Assessment
Final report	Faculty	- Direct Assessment
Final presentation	Faculty	- Direct Assessment
Site evaluation	Students	- Indirect Assessment

Evaluation areas (e.g., Effectiveness of Training and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Supervisory Staff, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

E. Specification Approval Data

Council /Committee	DEPARTMENT COUNCIL
Reference No.	NO. (9)
Date	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Capstone Project I
Course Code:	EE598
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (1, 2, 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (9th Level / 5th Year)					
4. Course general Description:					
Senior Project 1 (SP1) is the first of a two-course sequence designed to provide undergraduate electrical engineering students with hands-on experience in tackling a complex engineering project from conception to completion. Working within a team environment, students will learn to research a chosen problem, define tasks and timelines, identify and secure necessary resources, establish project milestones, and communicate effectively through written and oral presentations. SP1 focuses primarily on selecting and analyzing a challenging electrical engineering problem, exploring design tradeoffs at various stages, and ensuring all necessary equipment is secured for the subsequent project phase.					
5. Pre-requirements for this course (if any)**:**					
120 credit hours					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
This course aims to enable students to research certain new engineering topics and write technical reports.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	0
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
1.2				
2.0	**Skills**			
2.1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	S1	Problem-Based Learning.	• Discussion • Final Report Oral Exam
2.2	Design solutions that meet specified needs while considering public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	S2	Problem-Based Learning.	• Final Report • Portfolio Oral Exam

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Identify the objectives of experiment and select appropriate equipment.	S3	Problem-Based Learning.	• Final Report • Portfolio Oral Exam
2.4	Communicate effectively with a range of audiences.	S4	• Collaborative Learning • Problem-Based Learning.	• Observation • Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	V1	• Class/Group Discussion Problem-Based Learning.	• Final Report Portfolio
3.2	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	V2	• Class/Group Discussion Problem-Based Learning.	• Observation Peer Evaluation
3.3	Acquire and apply new knowledge as needed, using appropriate learning strategies.	V3	• Class/Group Discussion Problem-Based Learning.	• Final Report Oral Exam

C. Course Content

No	List of Topics	Contact Hours
1.		
2.		

Total		

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion	All Weeks	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Working in Team and Ethics	All Weeks	10%
3.	Project Proposal	15	15%
4.	Peer Evaluation	15	5%
5.	Portfolio	15	5%
6.	Presentation	15	10%
7.	Final Report	15	25%
8.	Oral Exam	15	20%
…			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom Laboratory
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title: Capstone Project II	
Course Code: EE599	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 3	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	
3. Level/year at which this course is offered: (10th Level / 5th Year)					

4. Course general Description:

Senior Project 2 is the culmination of your electrical engineering design journey. In this project, you will build upon the foundation established in Project 1 and translate your conceptual design into a tangible working system or prototype. By refining their design proposals, incorporating safety and environmental considerations, and meticulously prototyping their ideas, students will develop a working system or prototype. Through rigorous testing, clear documentation, and engaging presentations, they will showcase their engineering prowess and prepare for their future careers.

5. Pre-requirements for this course (if any)**:**

Capstone Project I: EE598

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

This course aims to enable students to research certain new engineering topics and write technical reports.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid ● Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	0
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
1.2				
2.0	**Skills**			
2.1	Apply engineering knowledge, scientific principles, and mathematical tools to significantly improve the solution developed in Senior Project 1, addressing feedback, and incorporating advancements in technology.	S1	Problem-Based Learning.	• Discussion • Final Report Oral Exam
2.2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global,	S2	Problem-Based Learning.	• Final Report • Portfolio Oral Exam

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	cultural, social, environmental, and economic factors.			
2.3	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	S3	Problem-Based Learning.	• Final Report • Portfolio Oral Exam
2.4	Communicate effectively with a range of audiences.	S4	• Collaborative Learning • Problem-Based Learning.	• Observation • Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	V1	• Class/Group Discussion Problem-Based Learning.	• Final Report Portfolio
3.2	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	V2	• Class/Group Discussion Problem-Based Learning.	• Observation Peer Evaluation
3.3	Acquire and apply new knowledge as needed, using appropriate learning strategies.	V3	• Class/Group Discussion Problem-Based Learning.	• Final Report Oral Exam

C. Course Content

No	List of Topics	Contact Hours
1.		
2.		

Total		

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion	All Weeks	10%
2.	Working in Team and Ethics	All Weeks	10%
3.	Project Proposal	16	15%
4.	Peer Evaluation	16	5%
5.	Portfolio	16	5%
6.	Presentation	16	10%
7.	Final Report	16	25%
8.	Oral Exam	16	20%
…			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom Laboratory
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
	-Faculty	
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY
2007 - ١٤٢٨

Elective Courses of Electrical Engineering Program

من الشمال...إلى الوطن

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Power Electronics II
Course Code:	EE539
Program:	Electrical Engineering Program
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐Department	☒Track	☐Others
B.	☐Required		☒Elective		
3. Level/year at which this course is offered: (9/5)					
4. Course general Description:					
This course aims to make graduates aware of gate drive circuits, Buck-boost Converters, single and three phase inverters, Uninterruptible Power Supplies, Power Factor Improvement, Power Electronics for Renewable Energy Sources.					
5. Pre-requirements for this course (if any)**:**					
Power Electronics I: EE433					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The objective of this course is to design and analyze different power electronics circuits as inverter, Buck-boost Converters, Uninterruptible Power Supplies, Power Factor Improvement.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4*15=60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the basic principles of different uninterruptible power supply systems.	K1	•Class/ Group discussion	•Written Test.
1.2				
...				
2.0	**Skills**			
2.1	Analyze the buck-boost converter and its mode of operations.	S1	•Problem based Learning. Scientific Research	•Written Test Problem based assessment
2.2	Illustrate the operation of static VAR compensators	S1	• Problem based Learning. • Observation	•Written Test. •Problem based assessment.
2.3	Design the gate drive circuits	S2	•Problem based Learning.	•Written Test. •Problem based assessment.
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1	Appear ability to understand, interpret, and apply learned	V3	•Collaborative learning	• Reports • Discussion

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	concepts in analyzing the Power Electronics circuit in Renewable Energy Sources			
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Buck-boost Converters	10
2.	Single and three phase inverters.	10
3.	Gate drive circuits	10
4.	Uninterruptible Power Supplies	10
5.	Power Factor Improvement	10
6.	Power Electronics for Renewable Energy Sources.	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm (written test)	6-12th	30%
2.	Lab exam	16th	10%
3.	Quiz (written test)	13th	10%
4.	Discussion/ Participation	1-15th	10%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Power Electronics Handbook, Mohammad H. Rashid, 5th Edition, 2023, ISBN 9780323992169.

Supportive References	Mohammad H. Rashid, "Power Electronics: Circuits, Devices, and Applications", 4th ed, Prentice-Hall, 2013, ISBN-10: 1111531005
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Instructor	Indirect
The extent to which CLOs have been achieved	Quality and accreditation Committee Students	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	EE Department council
REFERENCE NO.	**NO.9**
DATE	**12-2-2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Electrical Drive Systems	
Course Code: EE563	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 03	
Last Revision Date: 01/02/ 2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☐Required		☒ Elective		

3. Level/year at which this course is offered: (9th/5th)

4. Course general Description:

This course describes the concepts and principles of electrical drive systems, components of drives, mechanical characteristics of loads, four quadrant operation, equivalent drive parameters, starting of electric motor (soft starting), breaking and reversing, and dynamic characteristics, open loop and closed loop systems, electric motor selection, Speed Torque Characteristics of DC Motor Using Half and full Controlled Rectifiers, Multi-quadrant Operation of DC Motor , Speed control of induction motor using stator voltage regulator, Variable voltage variable frequency control, Open loop V/F control, Slip speed control of induction motor, Constant Volt/Hz control with slip speed regulation

5. Pre-requirements for this course (if any)**:**

Electromechanical Energy Conversion II: EE461
Power Electronics I: EE433

6. Pre-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

The main objectives of this course are to provide students with essential conceptions of AC and DC electrical drives and their performances, soft starting of motors through various power electronic converters, and the applications of various drive systems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x15 = 60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	**30**
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe Energy Conservation methods in Electrical Drives.	K1	• Class / Group discussion Brainstorming	• Written tests Discussion
2.0	**Skills**			
2.1	Analyze the drive characteristics under transient conditions.	S1	• Problem-based learning. Collaborative learning.	• Problem-based assessment. - Written Tests.
2.2	Conduct experiments of electrical drive.	S3	• Lab based learning - Problem-based learning	• Laboratory exam - Oral exam
2.3	Evaluate the speed control techniques for electrical machines.	S1	• Collaborative learning. • Problem based learning -	• Written test - Problem based assessment
2.4	Communicate effectively in class room and LAB discussions	S4	• Summary - Observation	• Reports - presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Take a decision in engineering situations and make informed judgments regarding the selection of motor power rating to drive a specific mechanical load.	V1	• Class / Group discussion. • Problem-based learning. •	• Case study. • Discussion •
			•	•

C. Course Content

No	List of Topics	Contact Hours
1.	Introduce the electrical drive systems	4
2.	Study the dynamics of electrical drives	4
3.	Develop the mechanical characteristics of loads	4
4.	Select the motor power rating	6
5.	Study DC motor drives	6
6.	Conduct experiment for DC motor : open and closed loop speed control	8
7.	Induce the motor drives	6
8.	Conduct experiment for Induction Machine speed control	8
9.	Analyze the Speed control of induction motor: Open loop V/F control	8
10.	Analyze the Open loop and closed loop Control of Electrical Drives	6
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Tests (Midterm Exam)	6-12th	30%
2.	Written Tests (Quizzes)	5th-13th	10%
3.	oral test	All Weeks	10%
4.	Laboratory exam	12th-14th	10%
5.	Written Tests (Final Exam)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	El-Sharkawi, M. (2018). Fundamentals of Electric Drives (2nd ed.). Cengage Learning.
Supportive References	Ahmad, A., & Thakre, M. (2020). Fundamentals of Electric Drives. LAP LAMBERT Academic Publishing.
Electronic Materials	Web sites that involve the Electric Drives systems
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data Show Smartboard
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	NO. (09)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electro-mechanical energy conversion III
Course Code:	EE564
Program:	Electrical Engineering Program
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Northern Border University
Version:	3
Last Revision Date:	01/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☐Department	☒Track	☐Others
B.	☐Required		☒Elective		

3. Level/year at which this course is offered: (9/5)

4. Course general Description:

This course aims to make graduates aware of the basic principles of electrical machine design. The course discusses the different aspects in designing dc machines, three phase salient and non-salient synchronous machines and three phase induction motors.

5. Pre-requirements for this course (if any):

Electro-mechanical energy conversion II : EE461

6. Pre-requirements for this course (if any):

7. Course Main Objective(s):

The objective of this course is to analyze design problems and interpret numerical results in various machine designs and apply quality assurance procedures and follow codes and standards.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4*15=60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Demonstrate Characteristics of engineering materials related to electrical engineering.	K1	•Class/ Group discussion	•Written Test.
1.2	Describe the different design constraints of electrical machines.	K1	•Class/ Group discussion	•Written Test.
...				
2.0	**Skills**			
2.1	Determine the main dimension of electrical machines.	S1	•Problem based Learning.	•Written Test Problem based assessment
2.2	Analyze the design concepts and constraints of rotating electrical machines.	S1	• Problem based Learning.	•Written Test. • Problem based assessment
2.3	Design induction, synchronous and dc machines.	S2	•Problem Solving based Learning.	• Written Test. • Problem based assessment
2.4				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Use new software in the modeling and design of electrical electrical machines	V3	•Collaborative learning	• Reports • Discussion
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to engineering materials used in electrical machines.	10
2.	Design principles of electrical transformers.	10
3.	Design concepts and constraints of rotating electrical machines.	10
4.	Design of three phase Induction motors.	10
5.	Design of synchronous machines.	10
6.	Design of DC machines.	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	10%
3.	Active Participation	All Weeks	10%
4.	Report	14th	10%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Alexander Gray, "Electrical Machine Design: The Design and Specification of Direct and Alternating Current Machinery", 2018, ISBN-13 : 978-0266714828

Supportive References	E. Fitzgerald, Charles Kingsley, Jr. and Stephen D. Umans, "Electric Machinery", 7th Edition, McGraw-Hill, USA 2013, ISBN-13: 978-0073380469
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Instructor	Indirect
The extent to which CLOs have been achieved	Quality and accreditation Committee Students	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	EE Department council
REFERENCE NO.	**NO.9**
DATE	**12-2-2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Special Electrical Machines
Course Code:	EE565
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01/02/ 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (9^{th}/5^{th})					
4. Course general Description:					
This course presents a general overview of Special Electrical Machines; Single-phase induction motors, AC Commutator motors: universal motor, repulsion motor, Synchronous reluctance motors, Switched reluctance motors, Servo motors – Steppers motors. Dynamics of Electrical Drives, Selection of motor power rating.					
5. Pre-requirements for this course (if any):					
Electromechanical energy conversion II:EE461					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
This course aims to provide students with basic concepts of special electrical machines and their applications, the choice of the load parameters of electric drive systems, and the power rating of the driving motor					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x15 = 60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30

2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the principle of special electrical machine their operation characteristics.	**K1**	• Class/Group discussion Brainstorming	• Written tests Discussion
2.0	**Skills**			
2.1	Determine the principle of single-phase induction and ac commutating machines.	**S1**	• Problem-based learning. Collaborative learning.	• Problem-based assessment. - Written Tests.
2.2	Analyze the principle of operation of reluctance motors and servo motors	**S1**	• Problem-based learning. - Collaborative learning.	• Problem-based assessment. - Written Tests.
2.3	Evaluate the different types of stepping motors and analyze their power drivers.	**S1**	• Problem-based learning. - Collaborative learning.	• Problem-based assessment. - Written Tests.
2.4	Communicate effectively in classroom discussions	**S4**	• Observation • Summary	• Reports • presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Choose the load parameters of an electric drive system and determine the power rating of the driving motor	**V3**	• Class/Group discussion • Problem-Based Learning	• Rubrics • Problem-Based Assessment

C. Course Content

No	List of Topics	Contact Hours
1.	Single-phase induction motors	8
2.	Universal motor	8
3.	Repulsion motor	8
4.	Reluctance motors: Synchronous reluctance - Switched reluctance	6
5.	Servo motors	6
6.	Steppers motors	10
7.	Dynamics of electrical drives	10
8.	Selection of motor power rating	4
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	20%
3.	Active Participation	All Weeks	5%
4.	Observation	All Weeks	5%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Sen Paresh Chandra, Principles of Electric machine and power electronics, 3rd Edition, Wiley, ISBN 978-1-118-07887-7, USA 2013.
Supportive References	Stephen J.Chapman, Electric machinery fundamentals, 5th Edition, Mcgraw-Hill, ISBN 978-007-132581-3, NY 2012.
Electronic Materials	Web sites that involve the special electrical machines
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms

Items	Resources
Technology equipment (projector, smart board, software)	Data Show Smartboard
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	NO. (09)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title: Professional Safety	
Course Code: EE566	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 03	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
This course presents a general awareness of common electrical hazards associated with electricity. It also covers the effects of electricity on the human body, electrical hazard analysis, causes of electrical accidents, electrical safety controls and their hierarchy, methods to protect the workers, safe work practices, circuit protection devices, precautions for electrical safety at workplace, direct contact, indirect contact, earthing system, grounding computation					
5. Pre-requirements for this course (if any):					
Electrical Power Systems I : EE450					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
This course aims to enable students to identify hazards to people and equipment that are present in the electrical environment of a power supply utility, commercial or domestic installation, together with the design principles and working procedures that are implemented to minimize the risk of electrical accidents and fires.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x15 = 60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours

1.	**Lectures**	**30**
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	**30**
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain the objectives and precautions of electrical safety	**K1**	• Class / Group discussion Brainstorming	• Written tests Discussion
2.0	**Skills**			
2.1	Analyze the effects of electricity on the human body	**S1**	• Problem-based learning. Collaborative learning.	• Problem-based assessment. - Written Tests.
2.2	Study the various causes of electrical accidents and the protection against them	**S1**	• Problem-based learning. - Collaborative learning.	• Problem-based assessment. - Written Tests.
2.3	Evaluate the precautions for electrical safety at workplace	**S1**	• Problem-based learning. - Collaborative learning	• presentation - Problem based assessment.
2.4	Communicate effectively in classroom discussions	**S4**	• Observation • Summary	• Reports • presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Choose grounding system to protect people and property in the work area	V3	• Class/Group discussion • Problem-Based Learning	• Rubrics • Problem-Based Assessment

C. Course Content

No	List of Topics	Contact Hours
1.	Hazards associated with electricity	4
2.	Effects of electricity on the human body	4
3.	Causes of electrical accidents	4
4.	Safe work practices	8
5.	Circuit protection devices	8
6.	Direct contact	8
7.	Indirect contact	8
8.	Earthing system	8
9.	Grounding computation	8
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	20%
3.	Active Participation	All Weeks	5%
4.	Observation	All Weeks	5%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Electrical Safety Handbook, John Cadick, P.E. Cadick Corporation, Garland, Texas Mary Capelli-Schellpfeffer, M.D., M.P.A. CapSchell, Inc., Chicago, Illinois Dennis K. Neitzel, C.P.E. AVO Training Institute, Inc., Dallas, Texas , Third Edition, 2006
Supportive References	Electrical Safety of Low-Voltage Systems Dr. Massimo A. G. Mitolo Professional Engineer, ISBN 978-0-07-150818-6, 2009
Electronic Materials	Web sites that involve the electrical safety.
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data Show Smartboard
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	NO. (09)
DATE	12/02/2024

Course Specification

(Bachelor)

Course Title: Smart Grid and Enabling Technologies	
Course Code: EE508	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Northern Border University	
Version: 03	
Last Revision Date: 01/02/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (10th Level / 5th Year)					

4. Course general Description:

This course describes principles and technologies of smart grid systems, including power systems basics, smart grid definition, objectives, and benefits, communication networks, demand response, renewable energy integration and management, wide area measurement, security, privacy, and economics and market operations

5. Pre-requirements for this course (if any)**:**

Electrical Power Systems II: EE552

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

This course aims to provide students with a comprehensive study of the smart grid, the communication networks, demand response, renewable energy integration, wide-area measurement, security and privacy, and economics and market operations that are key components of a smart grid, the challenges associated with implementing a smart grid and the technologies and protocols used to ensure its reliable and secure operation.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Analyze the basic principles and components of power systems and their interdependencies with other energy systems	S1	Problem-Based Learning. •	Written Tests • Problem-Based Assessment.
2.2	Evaluate the concept of a smart grid, its key objectives, and benefits, and compare it with traditional power grids.	S2	Problem-Based Learning. •	Written Tests Problem-Based Assessment. • Open book exam
2.3	Design and evaluate communication networks used in smart grids and identify the key features of the protocols used to control and manage grid operations.	S2	Problem-Based Learning. •	Written Tests Problem-Based Assessment. • Open book exam
3.0	**Values, autonomy, and responsibility**			
3.1	Bear ethical and professional responsibilities during solving problem of smart grid.	V1	Class / Group discussion. • Problem-based learning.	Discussion • Reports/ Presentation

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Collect information about the integration and management of renewable energy sources in the context of smart grid by using a variety of sources such as the internet, textbooks.	V3	Class / Group discussion. • Problem-based learning.	Discussion Reports/ Presentation •

C. Course Content

No	List of Topics	Contact Hours
1.	Basics of Power Systems	10
2.	Introduction to Smart Grid: Definition, Objectives, and Benefits	8
3.	Smart Grid Communication Networks	9
4.	Demand Response (Definition, Applications)	9
5.	Renewable Energy Integration and Management	
6.	Wide Area Measurement (Sensor Networks and Phasor Measurement Units)	8
7.	Security and Privacy	8
8.	Economics and Market Operations	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written Test (Periodical Tests)**	**6th-12th**	**40%**
2.	**Discussion**	**All Weeks**	**4%**
3.	**Laboratory Report**	**16th**	**6%**
4.	**Laboratory Test**	**16th**	**10%**
5.	**Written Test (Final Exam)**	**17-18th**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Salman, S. K. (2017). Introduction to the Smart Grid: Concepts, Technologies and Evolution. IET.
Supportive References	Belu, R. (2022). Smart Grid Fundamentals: Energy Generation, Transmission, and Distribution.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2023
TP-153

Course Specification

(Bachelor)

Course Title:	High Voltage Engineering
Course Code:	EE557
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	8 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (10th Level / 5th Year)					
4. Course general Description:					
The course provides students with the basic knowledge and skills of high voltage engineering. In this context, the course includes the following items breakdown mechanism (in gas, liquid and solid). Additionally, this course includes high voltage generation and measurements (DC, AC, and impulse types).					
5. Pre-requirements for this course (if any)**:**					
Electrical Power Systems I: EE450					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
This course aims to provide the students with the basic concepts of high voltage engineering including details of breakdown mechanism and high voltage generation and measurements.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15=60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain the conduction and breakdown mechanisms in gases, liquid, and solid insulators.	K1	Class/Group Discussion	Written Tests.
1.2	Identify high voltage generation and measurements (DC, AC, and impulse voltages).	K1	Class/Group Discussion	Written Tests.
2.0	**Skills**			
2.1	Determine a proper insulated material for several applications.	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment. • Discussion
3.0	**Values, autonomy, and responsibility**			
3.1	Apply the ethical and professional standards during solving problems of high voltage engineering.	V1	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction	6

2.	Conduction and Breakdown in Gases	8
3.	Conduction & Breakdown in Liquid Dielectrics	8
4.	Breakdown in Solid Dielectrics	8
5.	Applications of Insulating Materials	8
6.	Generation of High Voltages and Currents	8
7.	Measurements of High Voltages and Currents	8
8.	Overvoltage Phenomena	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written Test (Periodical Tests)**	**6th-12th**	**40%**
2.	**Written Test (Quizzes)**	**4th-15th**	**10%**
3.	**Discussion**	**All Weeks**	**10%**
4.	**Written Test (Final Exam)**	**17-18th**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	C. L. WADHWA (2017). High Voltage Engineering. (3rd ed.). New Age International Publishers.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (--)
DATE	--/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Power Systems Economy
Course Code:	EE558
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	8 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☐ Required			☒ Elective	
3. Level/year at which this course is offered: (10th Level / 5th Year)					
4. Course general Description:					
The course introduces operating constraints, short-term load forecast, load curve analysis, economical load sharing between units and between stations, tariffs, incremental costs, unit commitment and generator scheduling, voltage and VAR control, and energy conservation.					
5. Pre-requirements for this course (if any)**:**					
Electrical Power Systems II: EE552					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
This course aims to provide the students with operating constraints, short-term load forecast, load curve analysis, economical load sharing between units and between stations, tariffs, incremental costs, unit commitment and generator scheduling, voltage and VAR control, and energy conservation.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15=60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Use operational constraints of Economic Load Dispatch (ELD).	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
2.2	Solve Unit Commitment (UC) problems using different methods.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
2.3	Design load forecasting method.	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
3.0	**Values, autonomy, and responsibility**			
3.1	Apply the ethical and professional standards during solving problems of power system economy.	V1	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion
3.2	Apply modern method of electrical load forecast.	V3	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to power system economics	10
2.	Electrical Energy Markets	10
3.	Participating in Markets for Electrical Energy	10
4.	System Security and Ancillary Services	10
5.	Transmission Networks and Electricity Markets	10
6.	Investing in Generation and Transmission	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written Test (Periodical Tests)**	**6th-12th**	**40%**
2.	**Written Test (Quizzes)**	**4th-15th**	**10%**
3.	**Discussion**	**All Weeks**	**10%**
4.	**Written Test (Final Exam)**	**17-18th**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1st Edition, "Power System Economic and Market Operations", By Jin Zhong, 2018
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities	Classroom

Items	Resources
(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	
Technology equipment (projector, smart board, software)	Data Show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (--)
DATE	--/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Energy efficiency
Course Code:	EE559
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	08/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☐ Required			☒ Elective	
3. Level/year at which this course is offered: (10th/5th)					
4. Course general Description:					
This course introduces the technologies and applications used to increase electrical energy efficiency. It also contains the different types of cables, lines, and lighting systems. This course includes an overview on the Saudi Building Code. Losses in transformers and electric motors will be detailed in this course. This course also contains the technologies of distributed energy resources and microgrids concept. Power quality will be treated, and reactive power compensation methods will be analyzed.					
5. Pre-requirements for this course (if any)**:**					
Electric Power Systems I: EE450					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
This course aims to provide students with the basics of energy efficiency in electrical utilities and systems, the concept of energy efficient lighting controls, and the various technologies of energy resources and the concept of microgrids. Also, it aims to analyze the factors affecting the power quality and apply the reactive power compensation methods					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x15 = 60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours

1.	**Lectures**	**30**
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	**30**
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
2.0	**Skills**			
2.1	Evaluate the basics of energy efficiency in electrical utilities.	S1	Problem-based learning.	• Problem-based assessment. - Written Tests.
2.2	Analyze the impact of electric motors and transformers losses on the energy efficiency and explore the efficiency motor technology	S1	- Problem-based learning.	• Problem-based assessment. - Written Tests.
2.3	Study the various technologies of energy resources and execute the concept of microgrids.	S2	- Problem-based learning	• Written test - Problem-based assessment.
3.0	**Values, autonomy, and responsibility**			
3.1	Take a decision in engineering situations and make informed judgments regarding the Energy efficient lighting controls and identify the electrical cable types.	V1	• Class / Group discussion. • Problem-based learning. •	• Discussion • Problem-based assessment.
	Estimate the factors affecting the power quality and apply the reactive power compensation methods.	V3	• Class/Group discussion. • Problem-Based Learning	• Rubrics • Problem Based Assessment.

C. Course Content

No	List of Topics	Contact Hours
1.	Basic Concepts of Energy	4
2.	Cables and Lines	4
3.	Lighting systems	4
4.	Power Transformers	8
5.	Saudi Building Code overview	8
6.	Electric Motors	8
7.	On Site Generation	8
8.	Power Quality	8
9.	Reactive Power Compensation	8
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	20%
3.	Active Participation	All Weeks	5%
4.	Observation	All Weeks	5%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Energy Efficiency: Concepts and Calculations. Elsevier Science. Martinez, D., Ebenhack, B. W., & Wagner, T. (2019).
Supportive References	Electrical Energy Efficiency: Technologies and Applications. Andreas Sumper and Angelo Baggini, 30 April 2012
Electronic Materials	Web sites that involve the Electrical Energy Efficiency.
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data Show Smartboard
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	NO. (09)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Introduction to Artificial Intelligence**
Course Code:	**EE403**
Program:	**Electrical Engineering**
Department:	**Electrical Engineering**
College:	**Engineering**
Institution:	**Northern Border University**
Version:	3
Last Revision Date:	**27 January 2024**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☐ Department	☒ Track	☐Others
B.	☐ Required		☐Elective		
3. Level/year at which this course is offered: (Level)					

4. Course general Description:

This course provides students with fundamental concepts and techniques of intelligent systems. Topics include knowledge representation and interpretation, search strategies and control, active research and applications in intelligent agents and expert systems.

5. Pre-requirements for this course (if any)**:**

Structured Computer Programming: EE301

6. Pre-requirements for this course (if any)**:**

None.

7. Course Main Objective(s):

The main objective of this course is to make students familiar with major concepts and approaches of knowledge representation, machine learning, blind methods as well as informed search and ability to practically apply them to real life and develop intelligent systems by constructing programs to solve concrete computational problems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 * 15 = 60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
2.0	**Skills**			
2.1	Search in the knowledge space of an AI problem	S1	Problem-Based Learning.	• Written test Problem-Based Assessment
2.2	Use AI programming tools to write basic programs	S1	Problem-Based Learning.	• Written test Problem-Based Assessment
2.3	Design basic AI applications	S2	Problem-Based Learning.	• Written test Problem-Based Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively on a team while solving problems	V1	• Class/Group Discussion Problem-Based Learning.	• Problem-Based Assessment • Report Presentation
3.2	Apply different search techniques within a given knowledge space.	V3	• Class/Group Discussion Problem-Based Learning.	• Problem-Based Assessment • Report Presentation
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Artificial Intelligence	6
2.	The Knowledge Space of an AI problem using variety of Techniques (e.g. Semantic networks, production rules)	6
3.	The search in the Knowledge Space of an AI problem: uninformed search	6
4.	The search in the Knowledge Space of an AI problem: informed search	6
5.	AI and Games	6
6.	Logic Programming	6
7.	Logic Programming (cont.)	6
8.	Expert Systems	6
9.	Reasoning under uncertainty	6
10.	Artificial Neural Networks and Some applications of AI	6
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid Term Exam ME	6th-12th	30%
2.	Quizzes	5th-12th	10%
3.	Final Term Exam FE	17th-18th	40%
4.	Reports and Presentations	12t-14th	20%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Artificial Intelligence: Foundations of Computational Agents 2nd edition, 2017, David L. Poole and Alan K. Mackworth.
Supportive References	Artificial Intelligence: A Modern Approach 3rd Ed., 2016, Stuart Russell and Peter Norvig.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	MEETING MINUTES NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Computer Applications in Electrical Systems
Course Code:	EE509
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	8 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (10th Level / 5th Year)					
4. Course general Description:					
This course introduces the utilization of MATLAB Programming Language for analysis of electrical systems such as mathematical methods for solving linear and nonlinear equations, power system matrices formation, and load flow problem solution.					
5. Pre-requirements for this course (if any)**:**					
Electrical Power Systems II: EE552					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
This course aims at providing the students with utilization of MATLAB Programming Language for analysis of electrical systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15=60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Explain the use of MATLAB package to develop admittance and impedance matrices of interconnected power systems.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
2.2	Design MATLAB code to solve power flow problem for simple power systems.	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively on a team.	V2	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion
3.2	Use MATLAB package to analyze faults in power system.	V3	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to MATLAB computer languages for power system analysis and operation.	12
2.	Power system matrices formation: bus admittance and impedance matrices, loop admittance and impedance matrices.	12
3.	Power system analysis: load flow problem solution.	12
4.	Symmetrical and unsymmetrical faults in power system.	12
5.	Analysis of electrical systems.	12
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Periodical Tests)	6th-12th	40%
2.	Written Test (Quizzes)	4th-15th	10%
3.	Discussion	All Weeks	10%
4.	Written Test (Final Exam)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Power System Analysis, Hadi Saadat, PSA Publishing LLC, 3rd Edition, 2011
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom

Items	Resources
Technology equipment (projector, smart board, software)	Data Show, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (--)
DATE	--/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Advanced Control Systems
Course Code:	EE542
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	08/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (10th/5th)					
4. Course general Description:					
The course provides students with the basic principles of deriving equivalent differential equations for mechanical, electrical, and electromechanical systems (Electrical Machines), state-space models, controllability, observability, and transfer functions. Besides, many feedback control syntheses are addressed namely the pole placement control, the state observer-based feedback control, and the optimal control. The stability analysis is also carried out in the Lyapunov framework. Nevertheless, the digital control synthesis, the stability analysis in the Z-plane, and the closed-loop control are provided in the last part of the course.					
5. Pre-requirements for this course (if any)**:**					
Automatic Control Engineering: EE440					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
This course aims to provide the students with the basic principles and theories of linear control systems in state space as well as the closed-loop control and stability of discrete-time systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x15 = 60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Derive a state-space model for mechanical, electrical, and Electrical Machines.	S1	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.2	Design a state feedback controller and state observer of linear control systems.	S2	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.3	Apply Z-Transform and Z-Domain analysis of control systems through transformations.	S1	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
2.4	Use discrete-time control principles for controller design and stability analysis.	S2	- Problem-Based Learning.	- Written Tests - Problem-Based Assessment.
3.0	**Values, autonomy, and responsibility**			
3.1	Perform effectively in teamwork and discussions to complete the assignment.	V2	- Class / Group discussion - Cooperative Learning	- Discussion. - Observation.
3.2	Possess the ability to interpret and apply stability concepts to design the digital filter.	V3	- Class / Group discussion - Problem-Based Learning	- Rubrics - Problem-Based Assessment.

C. Course Content

No	List of Topics	Contact Hours
1.	Modern Control Theory and State Space Representation	4
2.	State Space Forms	4
3.	Eigenvalues, Transfer Function of Control System in State Space.	4
4.	Relationship between state-space representation, differential equation, and transfer function	4
5.	Controllability and observability	3
6.	Control of Linear Systems in State Space	6
7.	State observer of Control Systems	6
8.	Optimal Control	2
9.	Lyapunov Stability Theory	2
10.	Digital control synthesis	4
11.	Properties of Z-Transform.	6
12.	Modeling of Open-Loop Discrete Time Control Systems	5
13.	Modeling of Closed-Loop Discrete Time Control Systems	5
14.	Stability analysis of discrete systems in the Z-plane	5
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Periodical tests)	6-12th	30%
2.	Written test (Quizzes)	5th-13th	20%
3.	Active Participation	All Weeks	5%
4.	Observation	All Weeks	5%
5.	Written test (Final Test)	17-18th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	[1] Golnaraghi, F., & Kuo, B. C. (2017b). Automatic Control Systems, Tenth Edition. McGraw-Hill Education. [2] Charles L. Phillips, H. Tory Nagle, and Aranya Chakrabortty (2015). Digital Control System Analysis and Design, Fourth Edition, Pearson.
Supportive References	Ogata K. (2010). Modern Control Engineering, Fifth Edition, Prentice Hall.

Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data Show Smartboard
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer - Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. - Students	- Direct (Students Work-Exams) - Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (09)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Power System Transients
Course Code:	EE556
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	8 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☒ Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (10th Level / 5th Year)					

4. Course general Description:

This course provides students with transients in lumped circuits, lightning strokes, shielding, back flashovers, switching transients and temporary overvoltages, current interruption in AC circuits, travelling waves, transient behavior of synchronous generators, flicker, bus-transfer, transients in low-voltage and grounding systems, surge arresters, horn gap.

5. Pre-requirements for this course (if any):

Electrical Power Systems I: EE450

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

This course aims to provide the students with transients in lumped circuits, lightning strokes, shielding, back flashovers, switching transients and temporary overvoltages, current interruption in AC circuits, travelling waves, transient behavior of synchronous generators, flicker, bus-transfer, transients in low-voltage and grounding systems, surge arresters, horn gap.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4x15=60 Hours	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Solve transients using different mathematical methods.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
2.2	Analyze the effects of transients on power system elements.	S1	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
2.3	Determine the suitable methods to detect and mitigate transients.	S2	• Problem-Based Learning.	• Written Tests • Problem-Based Assessment • Discussion
3.0	**Values, autonomy, and responsibility**			
3.1	Apply the ethical and professional standards during solving problems of power system transients.	V1	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion
3.2	Use power systems theories to show the external and internal sources of power system transients.	V3	• Class/Group Discussion • Problem-Based Learning.	• Problem-Based Assessment. • Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction; principles of analog and digital measurements.	8
2.	Power factor meter.	8
3.	Frequency meter.	8
4.	Synchroscope.	8
5.	Measurement of earth resistance.	8
6.	Wave analyzer.	10
7.	Harmonic distortion analyzer.	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Written Test (Periodical Tests)**	**6th-12th**	**40%**
2.	**Written Test (Quizzes)**	**4th-15th**	**10%**
3.	**Discussion**	**All Weeks**	**10%**
4.	**Written Test (Final Exam)**	**17-18th**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1st Edition, “Power System Transients Modelling Simulation and Applications” By Gevork Gharehpetian, Atousa Yazdani, Behrooz Zaker, 2023
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	-Students -Peer Reviewer -Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee	-Direct (Students Work - Exams) -Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (--)
DATE	--/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Digital Image Processing**
Course Code:	EE581
Program:	**Electrical Engineering**
Department:	**Electrical Engineering**
College:	**Engineering**
Institution:	**Northern Border University**
Version:	3
Last Revision Date:	**08-02-2024**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 (2 Theoretical, 2 Tutorial, 0 Lab))	
2. Course type	

A.	☐University	☐ College	☐ Department	☒ Track	☐Others
B.	☐ Required		☒ Elective		

3. Level/year at which this course is offered: (8th level/4th year)

4. Course general Description:

The Digital Image Processing course covers the fundamental concepts and techniques in the field of image processing, quantitative models of imaging systems, spatial domain and frequency domain methods, digital filter design for image enhancement and restoration, edge detection, image denoising, image segmentation, image enhancement, image restoration, image compression, and image representation and description. Students will learn to apply these techniques to various applications in digital image processing.

5. Pre-requirements for this course (if any)**:**

Communication Systems: EE470

6. Co-requirements for this course (if any)**:**

None.

7. Course Main Objective(s):

The main objective of this course is to provide students with basic concepts of digital image processing techniques and their applications and to design and implement effective image processing algorithms.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the quantitative models of imaging systems and the fundamentals of spatial and frequency domain methods.	K1	Class/group discussion	• Written Test.
2.0	**Skills**			
2.1	Analyze image representation and description methods.	S1	• Class/group discussion • Problem-based learning	• Written Test • Problem-based Assessment
2.2	Design digital filters for image enhancement and restoration, and apply edge detection and image denoising techniques.	S2	• Class/group discussion • Problem-based learning	• Written Test • Problem-based Assessment
2.3	Perform image segmentation, image enhancement, and image restoration tasks.	S3	• Problem-based learning. • Lab-based learning	• Problem-based Assessment • Project

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively on a team during executing team working projects.	V2	Collaborative learning	• Presentation • Report projects
3.2	Use the resources to search and apply recent image processing techniques.	V3	• Collaborative learning Self-learning	• Presentation • Report projects

C. Course Content

No	List of Topics	Contact Hours
1.	Quantitative Models of Imaging Systems	5
2.	Spatial Domain and Frequency Domain Methods	10
3.	Digital Filter Design for Image Enhancement and Restoration	8
4.	Edge Detection and Image Denoising	7
5.	Image Segmentation	7
6.	Image Enhancement and Image Restoration	8
7.	Image Compression	8
8.	Image Representation and Description	7
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Midterm	6^{th} - 12^{th}	30%
2.	Homework	2^{nd} – 14^{th}	5%
3.	Quizzes	2^{nd} - 15^{th}	10%
4.	Mini-project	4th-13th	15%
5.	Final Exam	16th-17th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing (4th Edition), Pearson, 2017, ISBN: 978-0133356724
Supportive References	Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing Using MATLAB, Gatesmark Publishing, 2020.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer Lab
Technology equipment (projector, smart board, software)	Matlab
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	○ Students	Indirect (survey)
Effectiveness of Students assessment	○ Peer Reviewer	Direct / Indirect
Quality of learning resources	○ Students ○ Peer Reviewer ○ Faculty	Direct / Indirect
The extent to which CLOs have been achieved	○ Quality and academic accreditation committee ○ students	Direct / Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**ELECTRICAL ENGINEERING DEPARTMENT COUNCIL**
REFERENCE NO.	**DEPARTMENT COUNCIL MEETING MINUTES NO. 09 1445**
DATE	**12/02/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification
(Bachelor)

Course Title:	Optical Communications
Course Code:	EE575
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	08/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (8^{th} /4^{th})					

4. Course general Description:

The Optical Communications course provides a comprehensive understanding of the principles and techniques of optical communication systems, including optical filters, power couplers/splitters, isolators, circulators, multiplexers, AWGs, Bragg gratings, single and multi-mode fibers, absorption, attenuation, dispersion, polarization, birefringence, lasers, LEDs, photodetectors, modulators, optical amplifiers, wavelength division multiplexers/de-multiplexers, optical switches, electro-optical switches, optical routers, and optical dispersion compensators. Students will explore fiber optic single and multi-wavelength design and various topologies, such as point-to-point, ring, mesh, tree, and bus. The course also introduces free-space optical communication, FTTH, access, metropolitan, long-haul, and undersea networks, and covers optical test and measurement instruments. Upon completion of the course, students will be able to design, analyze, and evaluate optical communication systems and networks.

5. Pre-requirements for this course (if any)**:**

- EE472 Digital Communication systems.

6. Co-requirisities for this course (if any)**:**

None

7. Course Main Objective(s):

The main objective of this course is to provide students with a solid understanding of optical communication systems, their components, and performance, and to equip them with the skills required to analyze, design, and evaluate various optical communication systems and networks.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60 Hrs	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid ● Traditional classroom ● E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the principles and techniques of optical communication systems	K1	Problem-based learning. Self-learning.	Written Tests - Problem-Based Assessment.
			-	-
2.0	**Skills**			
2.1	Analyze absorption, attenuation, dispersion, polarization, birefringence, lasers, LEDs, photodetectors, modulators, and optical amplifiers in	S1	Class/Group Discussion Problem-based learning.	Written Tests - Problem-Based Assessment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	optical communication systems.			
2.2	Analyze and evaluate free-space optical communication, FTTH, access, metropolitan, long-haul, and undersea networks.	S1	Class/Group Discussion Problem-based learning.	Written Tests - Problem-Based Assessment
2.3	Design and evaluate wavelength division multiplexers/de-multiplexers, optical switches, electro-optical switches, optical routers, and optical dispersion compensators in optical communication systems.	S2	Class/Group Discussion Problem-based learning.	Written Tests Problem-Based Assessment
3.0	**Values, autonomy, and responsibility**			
3.1	Acquire the latest knowledge in optical technologies used in communications.	V3	Class/Group Discussion. Scientific research.	Reports - Presentations

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Optical Communications	4
2.	Optical Filters, Power Couplers/Splitters, Isolators, Circulators, Multiplexers, AWGs, and Bragg Gratings	8
3.	Single and Multi-mode Fibers: Absorption, Attenuation, Dispersion, Polarization, and Birefringence	8
4.	Optical Amplifiers, Wavelength Division Multiplexers/De-multiplexers.	6
5.	Optical Switches, Electro-Optical Switches, and Optical Routers.	6
6.	Fiber Optic Single and Multi-wavelength Design: Multiplexing/De-multiplexing, Point-to-Point Topologies	8
7.	Fiber Optic Single and Multi-wavelength Design: Ring Topology, Mesh, Tree, and Bus Topologies	8

8.	Free-Space Optical Communication, FTTH, Access, Metropolitan, Long-Haul, and Undersea Networks	6
9.	Optical Dispersion Compensators	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	2-14	10%
2.	Periodic Exams	6-14	30%
3.	Report, Presentation	16	20%
4.	Final Exam	17-18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Willner Alan E. Optical Fiber Telecommunications VII. Academic Press 2020. ISBN: 978-0128165029
Supportive References	Govind P. Agrawal. Fiber-Optic Communication Systems, 4th Edition. Wiley; 2010. ISBN: 978-0470505113
Electronic Materials	
Other Learning Materials	PowerPoint slides and notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Electronics Laboratory
Technology equipment (projector, smart board, software)	Projector, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of	Peer Reviewer	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Students assessment		
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Applications of AI and Machine Learning in Electrical Engineering**
Course Code:	EE507
Program:	**Electrical Engineering**
Department:	**Electrical Engineering**
College:	**Engineering**
Institution:	**Northern Border University**
Version:	3
Last Revision Date:	**08-02-2024**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 (2 Theoretical, 2 Tutorial, 0 Lab))					
2. Course type					
A.	☐University	☐ College	☐ Department	☒ Track	☐Others
B.	☐ Required			☒ Elective	
3. Level/year at which this course is offered: (9th level/5th year)					
4. Course general Description:					
This course introduces artificial intelligence (AI) and machine learning (ML) concepts, with a focus on their applications in various areas of electrical engineering, including power systems, control systems, communication systems, signal processing, and electronics. Also, it covers various AI and ML techniques, such as supervised learning, unsupervised learning, reinforcement learning, neural networks, and deep learning, and their practical implementation in solving real-world problems in the electrical engineering domain.					
5. Pre-requirements for this course (if any)**:**					
Introduction to Artificial Intelligence: EE403					
6. Co-requirements for this course (if any)**:**					
None.					
7. Course Main Objective(s):					
he main objective of this course is to provide students with the basic principles of AI and ML techniques and their applications in electrical engineering, enabling them to apply these methods effectively in various engineering scenarios and projects.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the fundamental concepts of AI and ML, and their differences and applications in electrical engineering.	K1	Problem-based learning. Self-learning.	Written Tests • Problem-Based Assessment.
2.0	**Skills**			
2.1	Utilize AI and ML methods in control systems, including adaptive control, intelligent control, and swarm intelligence optimization algorithms.	S1	• Problem-based learning.	Written Tests • Problem-Based Assessment
2.2	Implement AI and ML approaches in communication systems, covering channel estimation, resource allocation, and cognitive radio.	S2	• Problem-based learning.	Written Tests • Problem-Based Assessment
2.3	Apply AI and ML techniques in signal processing tasks, such as	S2	• Problem-based learning.	Written Tests • Problem-Based Assessment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	feature extraction, pattern recognition, and deep learning for image and speech processing.			
2.4	Use AI and ML methodologies in electronics for component optimization, circuit design automation, and fault detection.	S1	• Problem-based learning.	Written Tests • Problem-Based Assessment
2.5	Apply AI and ML techniques in power systems, such as load forecasting, fault detection, and smart grid management.	S2	Problem-based learning. • Self-learning.	Written Tests • Problem-Based Assessment.
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to AI and Machine Learning 1.1. Overview of AI and ML concepts 1.2. Supervised, unsupervised, and reinforcement learning 1.3. Common ML algorithms: regression, classification, clustering 1.4. Neural networks and deep learning	10
2.	AI and ML Applications in Power Systems 2.1. Load forecasting and demand-side management 2.2. Fault detection and diagnosis 2.3. Power system optimization and control 2.4. Smart grid and distributed energy resource management	10
3.	AI and ML Applications in Control Systems 3.1. System identification and modeling 3.2. Adaptive control and model predictive control 3.3. Intelligent control: fuzzy logic, expert systems, and neural networks 3.4. Swarm intelligence and optimization algorithms in control design	10
4.	AI and ML Applications in Communication Systems 4.1. Channel estimation and equalization 4.2. Modulation and coding techniques 4.3. Resource allocation and scheduling	10

	4.4. Cognitive radio and dynamic spectrum management	
5.	AI and ML Applications in Signal Processing 5.1. Feature extraction and selection 5.2. Classification and pattern recognition 5.3. Time series prediction and forecasting 5.4. Deep learning for image and speech processing	10
6.	AI and ML Applications in Electronics 6.1. Component selection and optimization 6.2. Circuit design and layout automation 6.3. Fault detection and diagnosis in electronic systems 6.4. Electronic system testing and verification	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6th - 12th	30%
2.	Written test (Quiz)	2nd – 14th	15%
3.	Reports	4th-13th	15%
4.	Written test (Final Test)	16th-17th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Title: Artificial Intelligence: A Guide to Intelligent Systems Author: Michael Negnevitsky Publisher: Pearson Publication Year: 2011 ISBN: 978-0273753890
Supportive References	Title: Machine Learning for Electrical Engineers Author: Qammer H. Abbasi, Akram Alomainy Publisher: Wiley Publication Year: 2021 ISBN: 978-1119657689
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer Lab
Technology equipment (projector, smart board, software)	Matlab, Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	○ **Students**	**Indirect (survey)**
Effectiveness of Students assessment	○ **Peer Reviewer**	**Direct / Indirect**
Quality of learning resources	○ **Students** ○ **Peer Reviewer** ○ **Faculty**	**Direct / Indirect**
The extent to which CLOs have been achieved	○ **Quality and academic accreditation committee** ○ **students**	**Direct / Indirect**
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**ELECTRICAL ENGINEERING DEPARTMENT COUNCIL**
REFERENCE NO.	**DEPARTMENT COUNCIL MEETING MINUTES NO. 09 1445**
DATE	**12/02/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electronic Warfare Principles
Course Code:	EE537
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	1 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (10^{th} /5^{th})					
4. Course general Description:					
The Electronic Warfare Principles course provides an in-depth study of electronic warfare (EW) concepts, techniques, and systems. It covers topics such as EW taxonomy, electronic support measures (ESM), radar and electronic countermeasures (ECM), electronic counter-countermeasures (ECCM), signal intelligence, command, control, and communications (C3) systems, air defense systems, EW simulators, and future trends in EW technology. Students will learn to analyze and evaluate various EW systems and their applications in real-world scenarios.					
5. Pre-requirements for this course (if any)**:**					
Introduction to Artificial intelligence: EE403					
6. Co-requirements for this course (if any)**:**					
The main objective of this course is to equip students with the basic principles of electronic warfare principles, techniques, and systems, analysis and evaluation of the performance of various EW systems in practical applications.					
The main objective of this course is to equip students with the basic principles of electronic warfare principles, techniques, and systems, analysis and evaluation of the performance of various EW systems in practical applications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid ● Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Identify the principles, taxonomy, and definitions of electronic warfare (EW).	K1	• Problem-based learning. • Self-learning.	• Written Tests • Problem-Based Assessment.
1.2	Recognize electronic support measures (ESM) and radar electronic countermeasures (ECM) systems.	K1	• Problem-based learning. • Self-learning.	• Written Tests • Problem-Based Assessment.
2.0	Skills			
2.1	Evaluate command, control, and communications (C3) systems and their countermeasures.	S1	• Problem-based learning.	• Written Tests • Problem-Based Assessment
2.2	Design radar applications in weapon systems and electronic counter-	S2	• Problem-based learning.	• Written Tests • Problem-Based Assessment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	countermeasures (ECCM) techniques.			
2.3	Design electronic warfare signal processing and technology trends.	S2	• Problem-based learning.	• Written Tests • Problem-Based Assessment
2.4	Design electronic warfare in real-world scenarios and missions.	S2	• Problem-based learning.	• Written Tests • Problem-Based Assessment
3.0	Values, autonomy, and responsibility			

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Electronic Warfare (EW)	6
2.	Electronic Warfare Principles and Overview	6
3.	Command, Control, and Communications (C3) Systems	8
4.	Radar and Electronic Counter-Countermeasures (ECCM)	8
5.	Electronic Support Measures (ESM) Receivers	8
6.	Electronic Countermeasures (ECM)	8
7.	EW Signal Processing	8
8.	EW Technology and Future Trends	8
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Presentation	During the semester	5 %
4.	Reports	15-16th	15 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Title: Introduction to Electronic Warfare Author: Filippo Neri Publisher: Artech House Publication Year: 2004 ISBN: 978-1580530525
Supportive References	Title: Electronic Warfare and Radar Systems Engineering Handbook Author: Naval Air Warfare Center Weapons Division Publisher: CreateSpace Independent Publishing Platform Publication Year: 2013 ISBN: 978-1492155330
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Fundamental of Wireless Communication
Course Code:	EE578
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	08/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☐ Required		☒ Elective		

3. Level/year at which this course is offered: (10^{th} /5^{th})

4. Course general Description:

The Fundamentals of Wireless Communications course provides an in-depth study of the key concepts and techniques of wireless communication systems, including personal communication systems (PCS), cellular networks, wireless networks, call processing, frequency reuse, propagation loss, CDMA systems, fade reduction methods, error correction techniques, and multipath. Students will explore multiple access techniques such as FDMA, TDMA, and CDMA, and will use computer simulations to analyze different modulation techniques. The course also covers current and upcoming wireless standards, including 3G, 4G, LTE, 5G, and beyond. Upon completion of the course, students will be able to understand the design, specifications, and performance of various wireless communication systems.

5. Pre-requirements for this course (if any)**:**

Digital Communication Systems:EE472

6. Co-requirements for this course (if any)**:**

7. Course Main Objective(s):

The main objective of this course is to provide students with the fundamentals of wireless communication systems, their design principles, and performance, and the skills required to analyze and evaluate various wireless communication systems and technologies.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Discuss the fundamental concepts of wireless communication systems, including personal communication systems (PCS), cellular networks, and wireless networks.	K1	• Class/group discussion	• Written Test.
1.2	Recognize multiple access techniques, such as FDMA, TDMA, and CDMA.	K1	• Class/group discussion • Problem based learning	• Written Test • Presentation.
1.3	Compare Amplitude, Frequency, and Phase Shift-Keying modulations in digital communication systems.	K1	• Class/group discussion	• Written Test.
2.0	Skills			
2.1	Analyze call processing, frequency reuse, propagation loss, CDMA systems, fade reduction methods, error	S1	• Class/group discussion • Problem-based learning	• Written Test. • Problem-based Assessment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	correction techniques, and multipath in wireless communication systems.			
2.2	Use computer simulations to analyze different modulation techniques in wireless communication systems.	S1	• Class/group discussion • Problem based learning	• Written Test. • Problem-based Assessment
3.0	Values, autonomy, and responsibility			
3.1	Function effectively during completteing the project requirements.	V2	• Collaborative learning • Self learning	• Presentation • Report • projects

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Wireless Communications	6
2.	Personal Communication Systems (PCS) and Cellular Networks	6
3.	Wireless Networks and Call Processing	6
4.	Frequency Reuse and Propagation Loss	6
5.	CDMA Systems and Fade Reduction Methods	8
6.	Error Correction Techniques and Multipath	8
7.	Multiple Access Techniques: FDMA, TDMA, and CDMA	8
8.	Modulation Techniques and Computer Simulations	6
9.	Current and Upcoming Wireless Standards: 3G, 4G, LTE, 5G, and Beyond	6
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Quizzes	During the semester	5 %
4.	Mini-project	15-16th	15 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	David Tse and Pramod Viswanath, Fundamentals of Wireless Communication, Cambridge University Press, 2005
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer Lab
Technology equipment (projector, smart board, software)	Matlab/Simulink Simulation Package
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Introduction to Radar Systems
Course Code:	EE582
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	08/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐ University	☐ College	☒ Department	☒ Track	☐ Others
B.	☐ Required			☒ Elective	

3. Level/year at which this course is offered: (10th /5th)

4. Course general Description:

This course provides an introduction to the fundamentals of radar systems, covering essential concepts, principles, and applications. Students will learn about various radar types, including pulse and continuous wave (CW) radars, their characteristics, and operational principles. Also, it covers radar system components, signal processing techniques, detection theory, target tracking, radar performance analysis, and target cross-section. The course also addresses receiver noise and losses, matched filters, pulse compression, target parameter estimation, clutter, and interferences.

5. Pre-requirements for this course (if any)**:**

Antenna Theory: EE573

6. Co-requirements for this course (if any)**:**

The main objective of this course is to equip students with the basic principles of electronic warfare principles, techniques, and systems, analysis and evaluation of the performance of various EW systems in practical applications.

The main objective of this course is to provide students with the basic concepts of radar systems, their operation, and practical applications.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 x 15 = 60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the fundamentals of radar systems and their applications	K1	Problem-based learning. Self-learning.	Written Tests Problem-Based Assessment.
1.2	Identify various radar types and their operational principles, as well as target cross-sections	K1	Problem-based learning. Self-learning.	Written Tests Problem-Based Assessment.
2.0	Skills			
2.1	Analyze radar system components, including antennas, transmitters, receivers, and signal processors, as well as receiver noise and losses.	S2	Problem-based learning.	Written Tests Problem-Based Assessment
2.2	Apply signal processing techniques, such as detection theory and matched filters to radar systems	S1	Problem-based learning.	Written Tests Problem-Based Assessment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Estimate target parameters and evaluate radar performance in the presence of clutter and interferences.	S1	Problem-based learning.	Written Tests Problem-Based Assessment
3.02	Values, autonomy, and responsibility			
3.1	Function effectively on a team to accomplish the mini projects requirements.	V2	Self-learning. Scientific research.	Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Radar Systems	6
2.	Radar Types and Operational Principles	6
3.	Radar System Components	6
4.	Transmitters and Receivers	6
5.	Receiver Noise and Losses	6
6.	Detection Theory	6
7.	Matched Filters and Pulse Compression	8
8.	Clutter and Interferences	8
9.	Radar Performance Analysis	8
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Discussion and Participation	During the semester	10 %
2.	Written test (Periodical tests)	6-12th	30 %
3.	Presentation	During the semester	5 %
4.	Reports	15-16th	15 %
5.	Final term Written tests.	17-18th	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	M. I. Skolnik, Introduction to Radar Systems, 3rd Edition, McGraw-Hill, New York, 2001. ISBN: 978-0072881387
Supportive References	Peyton Z. Peebles, Jr.: "Radar Principles," John Wiley and Sons Inc., New York, 1998. ISBN: 978-0471252054
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Data Show, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	- Students - Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	- Quality and Academic Accreditation Committee. Students	- Direct (Students Work-Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Information Theory and Coding
Course Code:	EE577
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	03
Last Revision Date:	01-02-2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9^{th} /5^{th})					
4. Course general Description:					
This course introduces the fundamental concepts of information theory and coding, with a focus on understanding the difference between data and information, analyzing the information content of messages, designing efficient source compression codes, and applying error control codes for reliable communication. Students will also learn the basic theory needed for data encryption.					
5. Pre-requirements for this course (if any)**:**					
- EE580 Digital Signal Processing.					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The main objective of this course is to provide students with a solid understanding of the principles of information theory and coding techniques, enabling them to apply these methods effectively in various communication systems and data-processing scenarios.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60 Hrs	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the difference between data and information in a message and measure the information per symbol emitted from a source.	K1	Class/Group Discussion. Self-learning.	Written Tests -
2.0	**Skills**			
2.1	Adapt and tailor known error control codes for use in particular applications and learn the basic theory needed for data encryption.	S1	Problem-based learning.	Written Tests - Problem-Based Assessment
2.2	Analyze codes for reliable communication over noisy channels, including error-correcting codes and channel coding schemes.	S2	Problem-based learning.	Written Tests - Problem-Based Assessment
2.3	Design source compression codes to improve the efficiency of information transmission based on the evaluation of the information-carrying capacity of communication channels.	S2	Problem-based learning. Self-learning.	Written Tests Problem-Based Assessment.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
				-

C. Course Content

No	List of Topics	Contact Hours
1.	Information Theory	6
2.	Uncertainty, Information, and Entropy	6
3.	Source-Coding Theorem	6
4.	Huffman Coding	6
5.	Lempel-Ziv Coding	6
6.	Discrete Memoryless Channels (DMC)	6
7.	Mutual Information	4
8.	Channel Capacity	4
9.	Error-Control Coding, Block Codes, Linear Codes, Hamming Codes, Generator Matrix, Parity-Check Matrix, Syndrome, Cyclic codes	8
10.	Convolutional Codes, Convolutional Encoder, Tree Representation of Convolutional Codes, Finite-State Machine Code Representation, Trellis Representation of Convolutional Codes	8
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written test (Quizzes)	2-14	20%
2.	Periodic Exams	6-14	30%
3.	Report	16	10%
4.	Final Exam	17-18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Willner Alan E. Optical Fiber Telecommunications VII. Academic Press 2020. ISBN: 978-0128165029
Supportive References	Govind P. Agrawal. Fiber-Optic Communication Systems, 4th Edition. Wiley; 2010. ISBN: 978-0470505113

Electronic Materials	
Other Learning Materials	PowerPoint slides and notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	Projector, Smart board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Students Peer Reviewer Faculty	Indirect
The extent to which CLOs have been achieved	Quality and Academic Accreditation Committee. Students	Direct (Students Work Exams) Indirect (Students Survey)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	NO. (9)
DATE	12/02/2024

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY

Required College Courses

Return to the main list

من الشمال...إلى الوطن

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Calculus I
Course Code:	MATH101
Program:	Computer Engineering and Networks
Department:	Mathematics
College:	College of Science
Institution:	Northern Border University
Version:	Version 03
Last Revision Date:	7/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
4 (3 Theoretical, 0 Lab, 1 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 01 /1st Year)					
4. Course general Description:					
This course is considered as a first course in differential calculus, dealing mainly with differentiations of elementary functions and their applications.					
5. Pre-requirements for this course (if any):					
Not Applicable					
6. Co-requisites for this course (if any):					
Not Applicable					
7. Course Main Objective(s):					
By the end of this course the student will be able to demonstrate the idea of limit, continuity, and differentiability, evaluate the derivatives of fundamental functions, compute the extrema of functions, and apply the concepts of monotonicity and concavity in sketching the plane curves.					

2. Teaching mode **(mark all that apply)**

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify) Visiting Plant presentations and discussions**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Demonstrate the basic and fundamental concepts of calculus.	K 1	Class / Group discussion, Observation,	Discussion, Written exams,
2.0	**Skills**			
2.1	Discus and apply the principles and different theorems of differentiation for real functions.	S1	Problem-based learning, Observation,	Case Study, Written exams.
2.2	Formulate and solve differentiation of several types of functions.	S1	Problem-based learning, Observation,	Case Study, Written exams.
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Basic functions and their properties	10
2.	Limits and Continuity	15
3.	Derivatives, evaluation differentiations of functions.	25
4.	Applications of differentiations	20
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Assignments, Quizzes)	3,6,10,12,14	30%
2.	Written Test (Mid-Term Exam)	7- 9	30%
3.	Written Test (Final Exam)	16-17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Anton, H., Bivens, I., & Davis, S. (2021). Calculus: Early Transcendental (12th ed.). John Willy & Sons.). John Willy & Sons.
Supportive References	Stewart, J. (2016) Calculus: Early Transcendental (8th ed.). Cengage Learning. Adams, R., & Essex, C. (2017). Calculus: A Complete Course (9th ed.). Pearson.
Electronic Materials	Digital Library of the Northern Border University https://nbu.edu.sa/EN/E-library/Pages/default.aspx
Other Learning Materials	Lectures Notes

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Smart board, Projector
Other equipment (depending on the nature of the specialty)	Blackboard

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect assessment
Effectiveness of Students' assessment	Faculty member	Direct assessment
Quality of learning resources	Students	Indirect assessment

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Peer Reviewer	Direct and Indirect assessment
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Electrical Engineering Council
REFERENCE NO.	Department Council Meeting minutes NO.09 (1445)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title: Calculus II	
Course Code: MATH202	
Program: Computer Engineering and Networks	
Department: Mathematics	
College: College of Science	
Institution: Northern Border University	
Version: Version 04	
Last Revision Date: 04/2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
4 (3 Theoretical, 0 Lab, 1 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 02 /1st Year)					
4. Course general Description:					
This course is mainly dealing with integral calculus, including the following topics: Inverse functions, inverse trigonometric and hyperbolic functions and their derivatives, L'Hopital's rule, The indefinite integral, methods of integration (substitutions, parts, trigonometric substitutions, partial fractions …). The definite integral, the fundamental theorem of calculus. Applications of definite integral (Area between two curves, volumes, length of a plane curve, area of a surface of revolution …).					
5. Pre-requirements for this course (if any)**:**					
Calculus I (**MATH101**)					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
Apply the concepts of inverse function in deriving equivalent formulas for certain inverse, L' Hôpital's rule in finding the limit of undetermined forms, fundamental theorem of calculus. the techniques of integrations, and definite integral to compute area between two curves, volumes, length of a plane curve, and area of a surface of revolution.					

2. Teaching mode **(mark all that apply)**

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify) Visiting Plant presentations and discussions**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize fundamental concepts in calculus and related disciplines.	K1	Class / Group discussion, Problem-based learning, Observation,	Written exams,
1.2	Define definite and indefinite integral.	K1	Class / Group discussion, Problem-based learning, Observation,	Written exams
2.0	**Skills**			
2.1	Apply Inverse Trigonometric Functions. Hyperbolic Functions. Indeterminate forms and L'Hospital's rule.	S1	Problem-based learning, Observation,	Case Study. Written exams.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Apply different methods of integration	S1	Problem-based learning, Observation,	Case Study. Written exams.
2.3	Apply different methods to solve problems.	S1	Problem-based learning, Observation,	Case Study. Written exams.
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Inverse functions, Inverse of trigonometric and derivative, Inverse of hyperbolic functions and derivatives.	10
2.	L'Hopital's rule, other Indeterminate forms.	5
3.	The indefinite integral.	5
4.	Integration by substitutions, Integration by parts.	10
5.	Integration by trigonometric substitutions, Integration by partial fractions, The definite integrals.	20
6.	The fundamental theorem of calculus.	5
7.	Evaluating definite integrals by substitution.	5
8.	Application of definite integral (Area between two curves and volumes).	10
9.	Application of definite integral (length of a plane curve and area of a surface of revolution).	10
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Assignments, Quizzes)	3,6,10,12,14	30%
2.	Written Test (Mid-Term Exam)	7- 9	30%
3.	Written Test (Final Exam)	16-17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Adams, R., & Essex, C. (2017). Calculus: A Complete Course (9th ed.). Pearson.
Supportive References	Anton, H., Bivens, I., & Davis, S. (2021). Calculus: Early Transcendental (12th ed.). John Willy & Sons.). John Willy & Sons.
Electronic Materials	Digital Library of the Northern Border University https://nbu.edu.sa/EN/E-library/Pages/default.aspx
Other Learning Materials	Lectures Notes

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Smart board, Projector
Other equipment (depending on the nature of the specialty)	Blackboard

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect assessment
Effectiveness of Students' assessment	Faculty member	Direct assessment
Quality of learning resources	Students	Indirect assessment
The extent to which CLOs have been achieved	Peer Reviewer	Direct and Indirect assessment
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Department of Chemical and Materials Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO. 0. (1445)**
DATE	**/04/2024**

Course Specification
(Bachelor)

Course Title:	General Physics 1
Course Code:	PHYS101
Program:	Physics
Department:	Department of Physics
College:	College of Science
Institution:	Northern Border University
Version:	Version 02
Last Revision Date:	7/02/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
4 (3 Theoretical, 1 Lab, 0 Tutorial)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3rd Level / 2nd year)					
4. Course general Description:					
The course is interested in the study of units and dimensions, vectors and their properties, motion in different dimensions and projectile motion. Newton's laws with examples involving friction force or without friction force. The study of kinetic and potential energy conservation and the calculation of work and power. Elastic and inelastic collision and the difference between them. The study rigid body rotation. Lab Experiments: Simple pendulum, Verification of Newton’s 2nd law, Static and kinetic friction, Projectile motion, Hook’s law, Free fall, Force balance table, Rotational motion, collision					
5. Pre-requirements for this course (if any)**:**					
Not applicable					
6. Co-requisites for this course (if any)**:**					
Not applicable					
7. Course Main Objective(s):					
The main objective of this course is to use the concepts and the theories of classical physics to study the motion of the body, work, and energy. Likewise, by the end of this course the student will be able to demonstrate collaborative skills by conducting experiments, collection, and interpretation of data.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the fundamentals theory in motion, work, energy, and power and define the various physical quantities and their units & dimensions	K1	Class / Group discussion, Problem-based learning., interactive learning, Collaborative learning, Observation, Self-learning	Discussion, Problem-based Assessment, Written exams, Presentation, Report

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Use the suitable mathematical tools in solving problems	S1	Problem-based learning, Reciprocal Teaching, Self-learning	Problem-based Assessment, Written exams, Lab Exam, Report, Presentations, Self-Assessment
2.2	Conduct the experiment and Interpret The experimental data and The results.	S3	Problem-based learning, Lab-based learning, Observation, Self-learning, Peer Learning	Problem-based Assessment, Written exams, Lab Exam, Report, Presentations, Self-Assessment
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Units and Dimensions: System of Units, Consistency of Units, Units Conversion	6
2.	Vectors: Vectors Properties, Adding and Subtracting Vectors Graphically, Properties of Vector Components, Addition &Subtraction of Vectors by means of Components	6
3.	Motion in one dimension: Displacement, Average Velocity, Instantaneous Velocity, Acceleration, One Dimensional Motion with Constant Acceleration, Vertically Thrown Up and Freely Falling Bodies Motion, Motion in Two Dimensions. Projectile Motion	6
4.	Newton’s Law of Motion, Force and Fundamental Forces of Nature. Newton's First Law, Newton's Second Law, Newton's Third Law, Frictions	6

	Experimental Facts about Friction, Applications of Newton's Laws	
5.	Work, Energy and Power: Work, Kinetic Energy, and the Work Energy Theorem. Gravitational Potential Energy, Conservation Laws. Work, Energy and Power, Conservative and Non-Conservative Forces	6
6.	Momentum, Impulse and Collision: Linear Momentum and Impulse, Conservation of Linear Momentum for Two particle system Momentum, Impulse and Collision, Head on Collisions and Glancing Collisions, Solved Examples	6
7.	Rotation of Rigid bodies, Angular Velocity and Acceleration Rotation of Rigid bodies, Relationship between Linear and Angular Quantities	6
8.	Revision	3
Total		**45**

No	List of Topics (Practical)	Contact Hours
1.	Graphing	4
2.	Simple Pendulum	4
3.	Hook's Law	4
4.	Free falling	4
5.	Projectile motion	4
6.	Newton's second law	4
7.	Collision	4
8.	Final exam Revision	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework 1	6	5
2.	Quiz 1 (written test)	7	5
3.	Mid-Term Exam (written test)	9	20
4.	Mid-Term Practical Exam	10	10
5.	Homework 2	11	5
6.	Quiz 2 (written test)	12	5
7.	Report	15	5
8.	Presentation	15	5

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
9.	Final Practical Exam	15	10
10.	Final Exam (written test)	16-18	30
…	Total		100

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**1)** Heyde, K., (2018), Basic Ideas and Concepts in Nuclear Physics: An Introductory Approach, 3rd Ed (Series in Fundamental and Applied Nuclear Physics), CRC Press. **2)** Walecka J. D. (2020). Introduction to classical mechanics. World Scientific Publishing Company.
Supportive References	Halliday D. Resnick R. & Walker J. (2020). Fundamentals of physics (Australian and New Zeland). John Wiley.
Electronic Materials	1) Saudi Digital Library (sdl.edu.sa/SDLPortal/Publishers.aspx) 2) Set of Lectures by Walter Lewin, on Newton's laws and motion, on https://www.youtube.com/watch?v=oduZsA0Tk58
Other Learning Materials	YouTube videos for motion and Newton's laws, Power and Energy.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	-A classroom -Traditional Library -Laboratories
Technology equipment (projector, smart board, software)	Data show, Smart Board, Blackboard
Other equipment (depending on the nature of the specialty)	Internet connection

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	direct

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students' assessment	Program Leaders/peer review	Direct/indirect
Quality of learning resources	Students/ Faculty	Direct/ Indirect
The extent to which CLOs have been achieved	Program Leaders/peer review	Direct/indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Electrical Engineering Council
REFERENCE NO.	Department Council Meeting minutes NO.09. (1445)
DATE	12/02/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Linear Algebra
Course Code:	MATH222
Program:	Computer Engineering and Networks
Department:	Mathematics
College:	College of Science
Institution:	Northern Border University
Version:	Version 04
Last Revision Date:	04/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (2 Theoretical, 0 Lab, 1 Tutorial)					
2. Course type					
A.	☐University	☒ College	☐ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 03 /2nd Year)					
4. Course general Description:					
The course typically begins with an introduction to vectors and vector spaces, including concepts such as linear independence, basis, and dimension. Then, students learn about linear transformations and matrices, including topics such as matrix multiplication, inverses, and determinants.					
5. Pre-requirements for this course (if any)**:**					
Calculus I (**MATH101**)					
6. Co-requisites for this course (if any)**:**					
Not Applicable					
7. Course Main Objective(s):					
By the end of this course, students will be able to perform computation within matrix algebra, apply classical techniques to solve linear systems, practice vectors spaces tools, with focus on matrix transformations, diagonalization, and related applications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify) Visiting Plant presentations and discussions**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Introduce basic mathematical concepts and methods of linear algebra	K1	Class / Group discussion, Brainstorming	Discussion, Written exams
1.2	Identify the appropriate method for solving linear systems.	K1	Class / Group discussion, Brainstorming	Discussion, Written exams
2.0	**Skills**			
2.1	Apply matrix transformations on vectors and spaces, and diagonalization of matrices in solving differential linear systems.	S1	Problem-based learning, Observation	Case Study, Written exams

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Power of a matrix and solving differential linear systems	S1	Problem-based learning, Observation	Case Study, Written exams
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Elementary row operations, REF, RREF, PIVOT, Gaussian elimination method, linear systems	10
2.	Matrices and operations on matrices, product of matrices, transpose, inverse of matrix by Gauss method	10
3.	Determinant by Laplace expansions, properties of determinant	5
4.	General vector spaces and subspaces	5
5.	Basis, dimension, coordinates and Change of basis, rank of a matrix, orthogonality, product, orthonormal basis, Gram-Schmidt process, orthogonal projections	10
6.	Linear transformations, Properties, kernel, and range matrix representations operations on linear transformations	10
7.	Eigenvalues and eigenvectors, the characteristic polynomials and diagonalization	5
8.	Applications: power of a matrix and solving differential linear systems	5
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Quizzes, Assignments)	4-7,10-14	30%
2.	Written Test (Mid Term Exam)	7 - 9	30%
3.	Written Exam (Final Exam)	16-17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Anton, H., Rorres, C. (2019). Elementary Linear Algebra (12th ed.) John Willey & Sons, Inc.
Supportive References	Defranza, J., Gagliardi, D. (2015). Introduction to Linear Algebra with applications. Waveland Press.
Electronic Materials	Digital Library of the Northern Border University https://nbu.edu.sa/EN/E-library/Pages/default.aspx
Other Learning Materials	Authorized books are provided in local libraries and university libraries

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Smart board, Projector
Other equipment (depending on the nature of the specialty)	Online Lecture Facility

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect assessment
Effectiveness of Students' assessment	Faculty member	Direct assessment
Quality of learning resources	Students	Indirect assessment
The extent to which CLOs have been achieved	Peer Reviewer	Direct and Indirect assessment
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Chemical and Materials Engineering Council
REFERENCE NO.	Department Council Meeting minutes NO. 0. (1445)
DATE	/04/2024

Course Specification

(Bachelor)

Course Title:	Differential Equations 1
Course Code:	MATH241
Program:	Computer Engineering and Networks
Department:	Mathematics
College:	College of Science
Institution:	Northern Border University
Version:	Version 04
Last Revision Date:	04/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3 Theoretical, 0 Lab, 0 Tutorial)					
2. Course type					
A.	☐University	☒ College	☐ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 03 /2nd Year)					
4. Course general Description:					
The topics covered include ordinary differential equations and some methods to solve them.					
5. Pre-requirements for this course (if any)**:**					
Calculus II (**MATH202**)					
6. Co-requisites for this course (if any)**:**					
Not Applicable					
7. Course Main Objective(s):					
By the end of this course the student will be able to classify, apply classical various methods to solve first and second order ordinary differential equations and deduce solutions of related real-world systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify) Visiting Plant presentations and discussions**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Introduce fundamental principles and basic concepts of ordinary differential equations.	K1	Class / Group discussion, Problem-based learning	Written exams
2.0	**Skills**			
2.1	Laplace transform and its inverse to solve linear ordinary differential equations	S1	Problem-based learning, Observation	Case Study, Written exams
2.2	Apply classical methods for solving ordinary differential equations.	S1	Problem-based learning, Observation	Case Study, Written exams
	Modeling real word problem by ordinary differential: Falling body problem from physics, mixture problem from chemistry and orthogonal	S1	Problem-based learning, Observation	Case Study, Written exams

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	trajectories from geometry			
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to ordinary differential equations: physical motivation, terminology, classification, explicit and implicit solution, initial value problem (IVP), existence and uniqueness of local solution	10
2.	First order differential equations: Separable, linear, exact, and other reducible to them such as homogeneous, Bernoulli, integrating factor, maximal and global general & particular solutions	15
3.	Second order differential equations with constant coefficients: homogeneous case, particular solution to the inhomogeneous case by the undetermined coefficients method and the variation of parameter method	15
4.	Modeling real word problem by ordinary differential: Falling body problem from physics, mixture problem from chemistry and orthogonal trajectories from geometry	10
5.	Laplace transform and its inverse to solve linear ordinary differential equations	10
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Written Test (Quizzes, Assignments)	4-7,10-14	30%
2.	Written Test (Mid Term Exam)	7 - 9	30%
3.	Written Exam (Final Exam)	16-17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Boyce W. E. (2016). Elementary differential equations and boundary value problems 11th edition. John Wiley & Sons Incorporated.
Supportive References	Nagle R. K. Saff E. B. & Snider A. D. (2018). Fundamentals of differential equations and boundary value problems (Seventh). Pearson.
Electronic Materials	Digital Library of the Northern Border University https://nbu.edu.sa/EN/E-library/Pages/default.aspx
Other Learning Materials	Lectures Notes

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Smart board, Projector
Other equipment (depending on the nature of the specialty)	Online Lecture Facility

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect assessment
Effectiveness of Students' assessment	Faculty member	Direct assessment
Quality of learning resources	Students	Indirect assessment
The extent to which CLOs have been achieved	Peer Reviewer	Direct and Indirect assessment
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Chemical and Materials Engineering Council
REFERENCE NO.	Department Council Meeting minutes NO. 0. (1445)
DATE	/04/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023

TP-153

Course Specification

(Bachelor)

Course Title:	General Chemistry I
Course Code:	CHEM101
Program:	Chemical Engineering
Department:	Department of Chemistry
College:	College of Science
Institution:	Northern Border University
Version:	4
Last Revision Date:	04/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
(3 Theoretical, 1 Lab, 0 Tutorial)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 4 /2st year)					
4. Course general Description:					
Introduction to the general principles of chemistry for students planning a professional career in chemistry, a related science, the health professions, or engineering. The SI units, the chemical formula, Naming covalent and ionic compounds, Stoichiometry, Atomic structure, Electron configuration, Periodic table, Chemical bonding, Gases, Chemical equilibrium, Acids and Bases, Organic chemistry**,** and Biochemistry chemistry. Weekly laboratory experiments aiming **at** the safety rules in chemistry lab. and identify the main inorganic acidic and basic radicals based on specific qualitative tests. Weekly discussion sessions focus on homework assignments and lecture material.					
5. Pre-requirements for this course (if any)**:**					
None.					
6. Co-requisites for this course (if any)**:**					
None.					
7. Course Main Objective(s):					
The course aims to introduce students to the basic knowledge and principles of chemistry.					

2. Teaching mode **(mark all that apply)**

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5 x 15 = 75	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the principles concepts using information technology (analytical and mathematical tools) to perform data analysis in general chemistry.	K 1	Class / Group discussion, Observation	Discussion, Written exams
1.2	Recognize the SI units, the atomic structure, chemical reactions, the chemical equilibria, the gas laws, and the chemical formula, nomenclature.	K 1	Class / Group discussion, Observation	Discussion, Written exams
2.0	**Skills**			
2.1	Apply general chemistry knowledge and stoichiometry of reactions in solving stoichiometry problems.	S1	Problem-based learning, Lab-based learning, Observation,	Problem-based Assessment, Written exams.
2.2	Use standard laboratory equipment, techniques to carry out qualitative	S4	Problem-based learning, Lab-based	Laboratory Exams., Case

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	experiments in general chemistry and assume responsibility for performing tasks and developing work.		learning, Observation,	Reports, Written exams
3.0	**Values, autonomy, and responsibility**			
3.1	Communicate effectively in written chemistry report and in oral presentation.	V3	Class / Group discussion, Problem-based learning,	Case Study., Written exams,
3.2	Cooperate effectively as a member in teamwork on projects related to chemistry.	V2	Class / Group discussion, Problem-based learning,	Discussion, Reports, Oral exams, Written exams,

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to chemistry, matter, atom, molecule, compound, chemical formula, nomenclature Practical: Safety Lab.	5
2.	Introduction to chemistry, matter, atom, molecule, compound, chemical formula, nomenclature Practical: Acidic radicals: dil HCl Group	5
3.	Introduction to chemistry, matter, atom, molecule, compound, chemical formula, nomenclature Practical: Acidic radicals: dil HCl Group	5
4.	The stoichiometry Practical: Acidic radicals: conc. H_2SO_4 Group	5
5.	The stoichiometry Practical: Acidic radicals: conc. H_2SO_4 Group	5
6.	The Gases Practical: Acidic radicals: The general Group	5
7.	The atomic structure Practical: Scheme of identification Acidic radicals and Revision	5
8.	The atomic structure Practical: First Exam	5
9.	The periodic table and the chemical bonding Practical: Basic radicals: Group 1	5

10.	The chemical equilibrium Practical: Basic radicals: Group 2	5
11.	The ionic equilibrium Practical: Basic radicals: Group 3	5
12.	The ionic equilibrium Practical: Basic radicals: Group 4	5
13.	Basic principles of organic chemistry Practical: Basic radicals: Group 5	5
14.	Basic principles of Biochemistry Practical: Basic radicals: Group 6	5
15.	Practical: Scheme of identification of basic radicals and Revision	5
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework 1	5	5%
2.	Quiz 1 (written test)	6	5%
3.	Mid-Term Exam (written test)	7-9	20%
4.	Mid-Term Practical Exam	10	10%
5.	Homework 2	11	5%
6.	Quiz 2 (written test)	11	5%
7.	Report	12	5%
8.	Presentation	13	5%
9.	Final Practical Exam	15	10%
10.	Final Exam (written test)	16	30%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1) McMahon P. E. McMahon R. F. & Khomtchouk B. B. (2019). Survival guide to general chemistry. CRC Press Taylor & Francis Group. 2) Karen C. T., (2018). Chemistry: An Introduction to General, Organic, and Biological Chemistry. 13th Edition, Pearson Education Limited. 3) Toby F. B., George M. McKelvy. (2016). Lab Experiments for General Chemistry, 5th Edition, Cengage Learning.

Supportive References	1) Susan A. W. (2010). Introduction to Chemical Principles_ A Laboratory Approach, Seventh Edition (Brooks Cole Laboratory Series for General Chemistry), Mary Finch. 2) Bolotov V. V. (2011). Analytical chemistry. Part 1. Qualitative Analysis. 2nd edition. National University of Pharmacy, Ukraine.
Electronic Materials	YouTube Videos, PowerPoint presentations and Electronic Books, Black Board, Saudi Digital Library
Other Learning Materials	Computer-based programs/CD, professional standards or regulations and software.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- Lecture rooms with capacity of 50 students, conditioned and equipped with a display panel and an electronic computer with internet connection. - A General chemistry laboratory with capacity of 15 students, conditioned and equipped with a display panel and an electronic computer with internet connection - Interactive lecture Hall. - Interactive whiteboard - Pens blackboard.
Technology equipment (projector, smart board, software)	PC and counter displays Data Show (Network), Smart board
Other equipment (depending on the nature of the specialty)	None.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	direct
Effectiveness of Students assessment	Program Leaders/peer review	Direct/indirect
Quality of learning resources	- Students/ Faculty	- Direct/ Indirect
The extent to which CLOs have been achieved	- Program Leaders/peer review	- Direct/indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Chemical and Materials Engineering Council
REFERENCE NO.	Department Council Meeting minutes NO.07.(1444)
DATE	/4/2024

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY

Required University Courses

Return to the main list

من الشمال...إلى الوطن

2023
TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: الثقافة الرقمية
رمز المقرر: IT100
البرنامج: هندسة الحاسب الآلي والشبكات
القسم العلمي: تقنية المعلومات
الكلية: الحاسبات وتقنية المعلومات
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V3
تاريخ آخر مراجعة: 2024/01/25

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☒ إجباري		☐ اختياري		

3. السنة / المستوى الذي يقدم فيه المقرر:(السنة الأولى/ المستوى الأول)

4. الوصف العام للمقرر

التقدم التقني له تأثير كبير في جميع مناحي الحياة. ولمواكبة التطور المتسارع فيها، من المهم تطوير وتجهيز الجيل القادم حتى يكونوا على دراية كافية بأحدث الاتجاهات التقنية ومجهزين بفهم ثري لتطبيقاتها في القطاعات المختلفة بالإضافة إلى فوائدها المجتمعية وحل المشكلات المحتملة بما يخدم رؤية المملكة 2030. تم تصميم هذا المقرر لتمكين الطلاب من الثقافة الرقمية المطلوبة للتعامل بشكل صحيح مع التقنيات الرقمية الناشئة وتأثيرها على الأفراد والأعمال والمجتمع.

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

يهدف هذا المقرر اكساب الطلاب المهارات والمعارف والقيم الأساسية المرتبطة بالثقافة الرقمية المطلوبة للتعامل بشكل صحيح مع التقنيات الرقمية الناشئة وتأثيرها على الأفراد والأعمال والمجتمع.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي		
2	التعليم الإلكتروني		

م	نمط التعليم	عدد الساعات التدريسية	النسبة
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد	2	%100

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	%100
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	%100

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	شرح أساسيات الحاسب الآلي والاتجاهات الحديثة في التقنية الرقمية		الخرائط الدلالية (المعرفية) التعلم الذاتي الوحدات التعليمية المصغرة (المديولات)	الاختبارات التحريرية المناقشة
2.0	المهارات			
2.1	استخدام البرمجيات المكتبية الأساسية.		التعلم القائم على حل المشكلات الخرائط الذهنية الأنشطة المتدرجة التعلم الذاتي	التقويم المعتمد على الملاحظة المباشرة للمهارات مقياس الأداء المتدرج / سلالم التقدير المشروعات
2.2	توظيف التقنيات الحديثة في التعلم.		الخرائط الذهنية البناء المعرفي KWL	المشروعات التقارير

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
			التعلم الذاتي التطبيقات العملية التعلم بالنموذج	مقياس الأداء المتدرج / سلالم التقدير الاختبارات التحريرية
2.3	القدرة على التعامل مع محركات البحث والخدمات السحابية.		الأنشطة المتدرجة الخرائط الذهنية البناء المعرفي KWL التعلم الذاتي التطبيقات العملية التعلم بالنموذج	التقويم القائم على حل المشكلات التقارير المناقشة مقياس الأداء المتدرج / سلالم التقدير الاختبارات التحريرية
2.4	تمييز المبادئ الأساسية للأمن السيبراني		لعب الأدوار الأنشطة المتدرجة الخرائط الذهنية البناء المعرفي KWL التعلم الذاتي	التقارير مقياس الأداء المتدرج / سلالم التقدير الاختبارات التحريرية المناقشة
3.0	القيم والاستقلالية والمسؤولية			
3.1	الالتزام بأخلاقيات العالم الرقمي والمواطنة الرقمية.		البناء المعرفي KWL الأنشطة المتدرجة التعلم الذاتي	التقارير المشروعات الاختبارات التحريرية المناقشة

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	**مدخل الى علم الحاسب والاتصالات** ○ مقدمة عن الحاسب الآلي ▪ تعريف الحاسب ▪ ترميز البيانات والأوامر ○ مكونات الحاسب ▪ المعالج ▪ الذاكرة ▪ وحدات التخزين	8

	▪ المدخلات والمخرجات ▪ تصنيفات الأجهزة ○ البرمجيات ▪ نظم التشغيل ▪ البرامج الأساسية ▪ تطبيقات المستخدم ▪ نبذة عن كيفية تطوير البرامج ○ الشبكات والاتصالات ▪ مقدمة عن الشبكات ▪ شبكات الحاسب، الأنترنت، ومواثيقها ▪ شبكات الاتصالات وأنواعها بنية الشبكات: بنية لا تناظرية ((Client/server)، بنية تناظرية (Peer-to-Peer)	
2	**الرقمنة والتعليم** ○ معالجة النصوص ○ معالجة الجداول ○ معالجة الشرائح التقديمية ○ خدمات البريد الالكتروني ○ الخدمات السحابية ▪ أنواع الخدمات السحابة ▪ مساحات التخزين الافتراضية ▪ كيفية مشاركة الملفات ○ وسائل التعلم الرقمية ▪ استخدام محركات البحث للتعلم ▪ المنصات التعليمية الالكترونية (بلاكبورد، مجالات أخرى تذكر لاحقا) المكتبة الرقمية السعودية (واجب)	8
3	**الاتجاهات الحديثة في التقنية الرقمية** ○ الذكاء الاصطناعي ▪ الذكاء الاصطناعي: المجالات والتطبيقات ▪ تعلم الآلة ○ علم البيانات ▪ أساسيات علم البيانات. ▪ البيانات الضخمة. ○ الروبوتات، الطائرات المسيرة (درونز)، والأجهزة ذاتية القيادة. ○ إنترنت الأشياء. الواقع الافتراضي والواقع المعزز.	5
4	**الأمن السيبراني** ○ السلامة السيبرانية ○ الخصوصية الأخلاقيات والقوانين في المجال الرقمي	5
5	**المواطنة الرقمية والاقتصاد الرقمي** ○ المواطنة الرقمية ○ نشأة الاقتصاد الرقمي ○ مفهوم وخصائص الاقتصاد الرقمي ○ رؤية المملكة 2030 وأثر التقنيات الحديثة في الاسهام في الاقتصاد ○ الابتكار أمثله (الصحة، الهندسة، الأعمال). ○ الملكية الفكرية. تأثير المجال الرقمي على الأشخاص، المجتمع، ريادة الأعمال.	4

المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	اختبارات قصيرة	15-2	10
2	واجب	15-2	10
3	مناقشة	15-1	10
4	تكليف بحثي	17	10
5	اختبار نصفي	12-6	20
6	اختبار نهائي	18-17	40

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	• مهارات الحاسب الآلي لطلبة التحضيرية، قسم الحاسب الآلي، عمادة السنة التحضيرية والدراسات المساندة، جامعة الحدود الشمالية، الطبعة الخامسة. 2020. • المهارات الأساسية في تقنية المعلومات، إعداد معهد البحوث والإستشارات بجامعة جدة، خوارزم العلمية للنشر والتوزيع، 2021. الرقم التسلسلي الدولي الموحد 11002269. • امن المعلومات وادارة مخاطر تقنية المعلومات، تأليف مانيش أغروال، أليكس كامبو، إيرك بيرس، ترجمة جعفر بن احمد العلوان، عبد الله بن هبد العزيز التميم. مكتبة الملك فهد الوطنية، 2018.
المراجع المساندة	• مهارات الحاسب الآلي. وحدة مهارات الحاسب الآلي بكلية الحاسبات، جامعة الملك عبد العزيز، خوارزم العلمية للنشر والتوزيع، الطبعة التاسعة، 2021. الرقم التسلسلي الدولي الموحد 66700. • الاقتصاد الرقمي. صفاء عبد الجبار الموسوي، كاظم سعد الأعرجي، زينب هادي نعمه. دار الأيام، 2017. • مقدمة في إدارة تكنولوجيا المعلومات. هشام محمد علوي فخراني. خوارزم العلمية للنشر والتوزيع، الطبعة الأولى، 2017. الرقم التسلسلي الدولي الموحد 11001323.

	• ريادة الأعمال. أ.د. أحمد بن عبدالرحمن الشميمري , أ.د. وفاء بنت ناصر المبيريك. دار العبيكان للنشر، 2019. • حقوق الملكية الفكرية في النظام السعودي. أحمد مخلوف. دار الإجادة، الطبعة الثالثة، 2019. • الأمن السيبراني (المفهوم وتحديات العصر). فارس العمارات, ابراهيم محمد الحمامصة. دار الخليج للنشر والتوزيع،2022. • التعليم الالكتروني وتحدياته المعاصرة. يوسف جابر علاونة، ضياء محمد سمير مسودة، لبنى رسلان جبارة، موسى غطاس، مثقال كعبيه، دار اليازوري العلمية، 2022. • شبكات وامن المعلومات: الشبكات، الانترنت، بروتوكولات الشبكات، التجارة الإلكترونية، فيروسات الحاسب، أمن المعلومات. منال البلقاسي. الاسكندرية: دار التعليم الجامعي, 2019. الرقم التسلسلي الدولي الموحد 26349
المصادر الإلكترونية	نظام بلاك بورد https://lms.nbu.edu.sa/ المكتبة السعودية الرقمية https://portal.sdl.edu.sa/english/ مكتبة الأوراق البحثية لوزارة الاتصالات وتقنية المعلومات https://www.mcit.gov.sa/ar/research-library
أخرى	رؤية المملكة 2030 https://www.vision2030.gov.sa/ar/2030 مبادرة العطاء الرقمي (برعاية وزارة الاتصالات وتقنية المعلومات) https://attaa.sa مبادرة المواطنة الرقمية (برعاية وزارة الاتصالات وتقنية المعلومات) https://dc.thinktech.sa

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	منصة البلاك بورد برامج أوفيس 365
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

طرق التقييم	المقيمون	مجالات التقويم
غير مباشر	الطلاب	**فاعلية التدريس**
غير مباشر	الطلاب	**فاعلية طرق تقييم الطلاب**
غير مباشر	الطلاب	**مصادر التعلم**
مباشر	عضو هيئة التدريس	**مدى تحصيل مخرجات التعلم للمقرر**
		أخرى

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of Electrical Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	University Skills
Course Code:	GNCR100
Program:	Computer Engineering and Networks
Department:	Electrical Engineering
College:	Engineering
Institution:	Northern Border University
Version:	V3
Last Revision Date:	04/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 2nd/ Year 1st) (College requirement for all University Colleges of Engineering, Sciences and IT)					
4. Course general Description:					
يتضمن هذا المقرر مجموعة من المهارات التي ينبغي على الطالب إكتسابها في حياته الجامعية مثل مهارات الاستذكار ومهارات التواصل في البيئة الجامعية ومهارات اعداد العروض والتحدث امام الجمهور وحل المشكلات ومهارات اكتشاف الذات وتسويقها بما يمكنه من تطوير ذاته في النواحي الفكرية والنفسية، والاجتماعية، والوظيفية، والبحثية.					
5. Pre-requirements for this course (if any):					
6. Co-requirements for this course (if any): NONE					
7. Course Main Objective(s):					
يهدف هذا المقرر إلى اكساب الطلاب المعارف، والمهارات الأكاديمية، والبحثية، ومهارات التواصل في البيئة الجامعية، والقيم التي يتأسس عليها العلاقة بين الطلاب وكافة منسوبي الجامعة.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2/ أسبوع	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	يستعرض أدوات التعلم الفعال، وكيفية استخدامها في عملية الاستذكار.		الحوار والمناقشة – الإلقاء – الخرائط الزهنية - التلخيص	المناقشة الاختبارات التحريرية (الموضوعية)
1.2	يحدد أساليب التفكير، وكيفية التواصل مع الاخرين، وطرق اكتشاف الذات.		الحوار والمناقشة- الإلقاء- التعلم بحل المشكلات	المناقشة الاختبارات التحريرية (الموضوعية)
2.0	Skills			
2.1	يوظف مهارات البحث العلمي، في كتابة الأبحاث، التقارير، والواجبات.		التعلم الذاتي، التعلم التعاوني، التعلم بحل المشكلات التطبيقات العملية، التعلم بحل المشكلات، لعب الأدوار	التقارير+ المشروعات + سلالم التقديرRubrics العروض المشروعات + التقديمية + سلالم التقدير Rubrics

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	يتقن مهارات العرض والتقديم، والتواصل مع الجمهور.			
2.3	يطبق مهارات التفكير في التعامل مع المواقف المختلفة.		التعلم بحل المشكلات، التعلم التعاوني	التقارير، دراسة الحالة
3.0	Values, autonomy, and responsibility			
3.1	ويشارك زملاؤه تحمل المسؤولية في حلول بنائه لبعض القضايا.		التعلم التعاوني، التعلم بحل المشكلات	المشروعات + سلالم التقديرRubrics
3.2	ينفذ اعمال تطوعية في بيئة الجامعة والمجتمع		التعلم التعاوني، التعلم بحل المشكلات	المشروعات + التقارير

C. Course Content

No	List of Topics	Contact Hours
1.	• التكيف مع البيئة الجامعية	3
2.	• أدوات التعلم الفعال والاستذكار	3
3.	• أدوات التعلم الفعال والاستذكار	3
4.	• مهارات التواصل في البيئة الجامعية	3
5.	• مهارات البحث العلمي وأخلاقياته	3
6.	• مهارات العرض والتحدث أمام الجمهور	3
7.	مهارات التفكير	3
8.	مهارات اكتشاف الذات	3
9.	المشاركة المجتمعية	3
10.	التفوق في الاختبارات	3
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	اختبار المنتصف (اختبار تحريري)	الأسبوع التاسع	%20
2.	نشاط الاستكشاف المهني	الأسبوع السابع	%10
3.	نشاط مشروع الخدمة المجتمعية	الأسبوع الثاني عشر	%10
4.	تقرير التأمل الذاتي للمرحلة التعليمية	الأسبوع الخامس عشر	%10
5.	مشاركة وتفاعل	مستمر	%10
6.	الاختبار النهائي	الأسبوع الثامن عشر	%40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	مهارات الدراسة الجامعية. جامعة الامام محمد بن سعود الإسلامية (الإصدار الأول). 1441-1440 هـ.
Supportive References	- كتاب المهارات الجامعية. جامعة الملك سعود (الطبعة السادسة) 1444 ه 2023 م. - أنتوني مانتج وآخرون. (2020). المهارات الجامعية (ط1). مواءمة ومراجعة: د. منصور سعيد المالكي وآخرون، ريدنج، المملكة المتحدة للنشر. د. عبد المطلب بن يوسف جابر، د. عبد الرحمن بن عبدالله الخثلان، د. عمر بن عبدالله السويلم، د. محمد عبدالعزيز العوهلي. مهارات الدراسة الجامعية. الظهران: جامعة الملك فهد البترول والمعادن.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector, smart boards
Other equipment (depending on the nature of the specialty)	BlackBoard

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer Reviewer	Indirect methods: using Surveys.
Effectiveness of students assessment	Peer Reviewer	Indirect method: Survey.
Quality of learning resources	Teaching Faculty	Indirect methods: Surveys
The extent to which CLOs have been achieved	Teaching Faculty	Direct method: Course Report (Using a matrix that calculates students' overall performance compare it with a target benchmark.)
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	**Department of** Electrical **Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: ريادة الأعمال
رمز المقرر: HR100
البرنامج: هندسة الحاسب الآلي والشبكات
القسم العلمي: الموارد البشرية
الكلية: إدارة الأعمال
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: 2022
تاريخ آخر مراجعة: 2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☒ إجباري		☐ اختياري		

3. السنة / المستوى الذي يقدم فيه المقرر: السنة الثالثة\ المستوى الخامس

4. الوصف العام للمقرر

يتناول المقرركافة المفاهيم المتعلقة بريادة الأعمال والابتكار، حيث تركز مواضيع المقررعلى أنواع ريادة الأعمال والمنظومة الجزئية والكلية لريادة الأعمال، الى جانب دراسة الإبداع والابتكارودراسة سمات المبدع، وعوامل دعم الإبداع، وعوائقه. كما يتناول المقررصفات ومهارات رائد الأعمال والمدارس الفكرية لسمات رائد الأعمال. إضافة إلى كيفية تحويل الأفكار إلى مشاريع كما يتناول المقررمفهوم المنشآت الصغيرة ونجاح وفشل المؤسسات الصغيرة وكيفية تجنب الفشل، واعداد خطة العمل للمشروع.

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا توجد

6- المتطلبات المتزامنة مع هذا المقرر(إن وجدت)

لا توجد

7. الهدف الرئيس للمقرر

يهدف المقررإلى اكساب الطلبة بأساسيات ريادة الأعمال والابتكار، وكيفية تحويل الأفكار الريادية الى مشاريع تجارية ربحية، بالإضافة الى اعداد النماذج والخطط الأولية لإدارة المشاريع الريادية.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي	2 ساعة أسبوعياً	%100
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد		

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	%100
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	%100

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	يُعرف مفاهيم ريادة الأعمال والإبداع والابتكار والشركات الصغيرة.		1- الحوار والمناقشة 2- الإلقاء 3- الوحدات التعليمية المصغرة Modules 4- العصف الذهني	1-الاختبارات التحريرية الموضوعية كالصواب والخطأ والاختيار من متعدد والتكميل والمزاوجة.
1.2	يشرح كيفية إعداد خطة العمل الأولية (التشغيلية التسويقية، المالية) للمشروع الريادي		1- الحوار والمناقشة 2- الإلقاء 3- الوحدات التعليمية المصغرة Modules 4- العصف الذهني	1-الاختبارات التحريرية الموضوعية كالصواب والخطأ والاختيار من متعدد والتكميل والمزاوجة.
2.0	المهارات			
2.1	يبتكر أفكار ريادية ذات جدوى اقتصادية واجتماعية.		1- التعلم الذاتي 2-تعلم الأقران 3- الوحدات التعليمية المصغرة Modules	ا- سلالم التقدير Rubric 2-دراسة الحالة
2.2	يحول الأفكار الريادية إلى مشاريع تجارية.		1- التعلم الذاتي 2-تعلم الأقران 3- الوحدات التعليمية المصغرة Modules	ا- سلالم التقدير Rubric 2-دراسة الحالة

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
2.3	يصمم الخطط الأولية (تشغيلية، تسويقية، مالية) للمشروع الريادي		1- التعلم الذاتي 2-تعلم الأقران 3- الوحدات التعليمية المصغرة Modules	ا- سلالم التقدير Rubric 2-دراسة الحالة
3.0	القيم والاستقلالية والمسؤولية			
3.1	يبرز الجوانب القيادية، تحمل المسؤولية، والعمل الجماعي عند التعامل مع فريق العمل.		1-تعلم الأقران 2-التعلم الذاتي 3-التعلم التعاوني	ا- سلالم التقدير Rubric
3.2				

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	مدخل الى ريادة الأعمال	4
2	صفات و مهارات رائد الأعمال	3
3	الإبداع والابتكار وريادة الأعمال.	4
4	تحويل الأفكار إلى مشاريع ريادية	4
5	ريادة الأعمال والمنشآت الصغيرة.	4
6	كتابة خطة عمل المشروع الريادي	4
7	التعامل مع بيئة العمل الحر	4
8	مشاريع ريادة الأعمال	3
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	الاختبارات النظرية: اختبار منتصف الفصل الدراسي	العاشر	%30
2	المشاركة: تقييم الأنشطة والواجبات	طوال الفصل الدراسي	%10
3	مناقشة المشروع الجماعي	الثاني عشر	%20
4	الاختبارات النظرية: الاختبار النهائي	السادس عشر	%40

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	الشـــميري، أحمد بن عبد الرحمن المبيريك، والمبيريك، وفاء بنت ناصـــر (2019). ريادة الأعمال. الرياض، المملكة العربية السعودية. العبيكان للنشر
المراجع المساندة	الخشت، محمد عثمان ونخبة من أساتذة الجامعة وباحثيها (2020). ريادة الأعمال. الناشر: جامعة القاهرة
المصادر الإلكترونية	المكتبة الرقمية السعودية
أخرى	

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	1- قاعات محاضرات صفية بما تحتويه من السبورات الذكية وكراسي جلوس..
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	1-جهاز حاسـب آلي مع انترنت عالي السـرعة لعضـو هيئة التدريس ويستخدمه الطلاب للعرض التقديمي للمشاريع 2-جهاز العرض الالكتروني (Data show)
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلبة	غير مباشر.
فاعلية طرق تقييم الطلاب	أعضاء هيئة التدريس وقيادات البرنامج والمراجع النظير.	غير مباشر.
مصادر التعلم	أعضاء هيئة التدريس وقيادات البرنامج.	مباشر وغير مباشر.
مدى تحصيل مخرجات التعلم للمقرر	الطلبة.	مباشر وغير مباشر.
أخرى		

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	Department of Electrical Engineering Council
REFERENCE NO.	Department Council Meeting minutes NO.09 (1445)
DATE	12/02/2024

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY
2007 - ١٤٢٨

Elective University Courses

Return to the main list

من الشمال...إلى الوطن

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2023
TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: مهارات الكتابة الأكاديمية في اللغة العربية.	
رمز المقرر: ARAB103	
البرنامج: Computer Engineering and Networks.	
القسم العلمي: Electrical Engineering.	
الكلية: Engineering.	
المؤسسة: جامعة الحدود الشماليَّة.	
نسخة التوصيف: 2023	
تاريخ آخر مراجعة: 21/4/2024	

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (ساعتان)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة الر ابعة / المستوى الذي يقدم فيه المقرر: (السابع أو الثامن)

4. الوصف العام للمقرر

المقرر يدرس انماط مختلفة من المعارف والقواعد لتقييم فهم المفاهيم العلمية المتصلة بالتخصصات الأكاديمية، التي تمكن الطالب من توثيق وتثبيت المفردات اللغوية والعلوم والمعارف التي تعلمها وتساعده في تنمية قدراته في الفهم، والتحليل والتفكير والنقد.

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

يهدف المقرر إلى تطوير مهارات اللغة العربية في مجال التعليم والتعلم، وتنمية المعارف لإثراء الحصـــيلة اللغوية ومســـايرة التطورات المختلفة والمستجدات من أجل تحقيق الاهداف التعليمية، وابراز قدرة الطالب في مجال تخصصه ومدى الحامه بالمفاهيم والمصطلحات والنظريات التي تحكم مجال التخصص.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي		
2	التعليم الإلكتروني	-	-
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني	-	-
4	التعليم عن بعد	2 ساعة أسبوعيًا(30)	%100

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة

1	محاضرات	30	%50
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية	15	%25
5	أخرى	15	%25
	الإجمالي	60	%100

ب. نواتج التعلم للمقررواستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	**المعرفة والفهم** : بدراسة هذا المقرر سيكون الطالب قادرا على أن:			
1.1	أن يعرف الطالب مفهوم الكتابة الأكاديمية وأنواعها وخصائصها.	س	الحوار والمناقشة، العصف الذهني.	الاختبارات التحريرية (الموضوعية)
1.2	أن يدرك الطالب أنواع الكتابة الأكاديمية واساليبها.	س	الحوار والمناقشة، العصف الذهني.	الاختبارات التحريرية (الموضوعية)
	أن يميز الطالب خصائص الكتابة الأكاديمية.	س	الحوار والمناقشة، العصف الذهني.	الاختبارات التحريرية (الموضوعية والمقالية)
2.0	**المهارات:** بدراسة هذا المقرر سيكون الطالب قادرا على أن:			
2.1	أن يكون الطالب قادرًا على التعبير عن ما لديه من معرفة ومعلومات في مجال تخصصه.	ر	التعليم التعاوني	تقويم الأقران والمناقشة.
2.2	أن يستطيع الإجابة عن الأسئلة المقالية والمطولة والقصيرة والبحث العلمي .	ر	التعليم التعاوني	تقويم الأقران والمناقشة.
...	أن يطبق الطالب المعرفة المكتسبة في هذا المقرر على الحالات والمواقف التي يواجهها في حياته.	ر	التعليم التعاوني	تقويم الأقران والمناقشة.
3.0	**القيم والاستقلالية والمسؤولية:** بدراسة هذا المقرر سيكون الطالب قادرا على أن:			

الرمز	نواتج التعلم	رمز نواتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
3.1	أن يلتزم المتعلم بتحمل التعلم الذاتي المستمر فيما يتعلق بكتابة المهارات الكتابة الأكاديمية.	ت	التعليم التعاوني	تقويم الأقران والمناقشة.
3.2	أن يكون الطالب قادرًا على العمل الجماعي وتحمل المسؤلية والالتزام بالمعايير الأخلاقية وأدب الخلاف والنقاش.	ت	التعليم التعاوني	تقويم الأقران والمناقشة.
...				

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	العلاقة بين اللغة والفكر (طبيعة اللغة، جدلية اللغة والفكر، ما العلاقة بين اللُّغة والفكر، تأثير اللغة على الفكر)	6
2	مفهوم الكتابة (مفهوم الكتابة عامةً، أنواع الكتابة: الإبداعية ، والوظيفية، و الأكاديميَّة).	6
3	الاختبار الفصلي	
4	الكتابة الأكاديميَّة.	6
5	خصائص الكتابة الأكاديمية	6
6	متطلبات الكتابة اللُّغوية	6
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	- إستراتيجة الملاحظة والمشاركة الشفهية.	كل أسبوع	%5

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
2	- إستراتيجية الأبحاث والمشاريع التطبيقية.	مرة واحدة في الفصل الدراسي	%5
3	- إستراتيجية الاختبارات التحريرية: الاختبار الفصلي	منتصف الفصل	%25
4	- إستراتيجية التكليفات والواجبات المنزلية.	مرة واحدة قبل نهاية الفصل	%15
5	- الاختبار النهائي	مرة واحدة في نهاية الفصل	%50

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	مهارات الكتابة إعداد اللجنة العلمية بقسم اللغة العربية وآدابها- كلية الآداب- جامعة الملك سعود.
المراجع المساندة	اللغة والفكر والعالم، محيي الدين محسب، مكتبة لبنان. جدلية اللغة والفكر، محمد محمد داود، دار الغريب للطباعة والنشر، القاهرة. الكتابة الأكاديميَّة: خصائصها ومتطلباتها اللُّغوية، سعد بن علي الشهراني. الكتابة الأكاديميَّة والكتابة المهنية. محمد الديوري . الرباط. دار توبقال للنشر. الكتابة الوظيفية والإبداعية: المجالات، المهارات، الأنشطة، والتقويم، ماهر شعبان عبدالباري، عمان، دار المسيرة للنشر والتوزيع. مهارات الكتابة واستراتيجياتها: رؤية معاصرة. عبدالمحسن سالم العقيلي.
المصادر الإلكترونية	ــــ
أخرى	ــــ

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	**البلاك بورد (تعليم عن بعد)**
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	جهاز عرض البيانات، السبورة الذكية، البرمجيات
تجهيزات أخرى (تبعاً لطبيعة التخصص)	**لا يوجد**

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلاب أعضاء هيئة التدريس بالقسم (المختصون)	مباشر (تقييم الأقران، التقييم الذاتي، تقرير المقرر الفصلي والسنوي، اختبارات دورية) غير مباشر (نقاش وحوار مع الطلاب)
فاعلية طرق تقييم الطلاب	الطلاب أعضاء هيئة التدريس بالقسم (المختصون)	مباشر (تقييم الأقران، التقييم الذاتي، تقرير المقرر الفصلي والسنوي للمقرر، الاختبارات) غير مباشر (نقاش وحوار مع الطلاب)
مصادر التعلم	الطلاب أعضاء هيئة التدريس بالقسم (المختصون)	مباشر (نقاش وحوار مع الطلاب، تقييم الأقران، التقييم الذاتي، اختبارات دورية، الواجبات المنزلية، بحوث) غير مباشر(تصحيح عينة عشوائية من اختبارات الطلاب الدورية من أساتذة مختلفين القسم)
مدى تحصيل مخرجات التعلم للمقرر	الطلاب أعضاء هيئة التدريس بالقسم (المختصون)	مباشر (تقييم الأقران، التقييم الذاتي، تقرير المقرر الفصلي والسنوي) غير مباشر(نقاش وحوار مع الطلاب)
أخرى		

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of** Electrical **Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

2023
TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: التنمية المستدامة Sustainable Development
رمز المقرر: BIO104
البرنامج: هندسة الحاسب الآلي والشبكات
القسم العلمي: علوم الأحياء
الكلية : العلوم
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V4
تاريخ آخر مراجعة: 21/4/2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة الرابعة / المستوى الذي يقدم فيه المقرر: (السابع أو الثامن)

4. الوصف العام للمقرر

يتضمن هذا المقرر المبادئ الاساسية لمفهوم التنمية المستدامة، الاستدامة في الثقافة الإسلامية، الابعاد الاقتصادية والاجتماعية والبيئية للتنمية المستدامة، أهداف التنمية المستدامة ، خطة و مؤشرات التنمية المستدامة في المملكة العربية السعودية (نماذج مختارة من رؤية المملكة 2030).

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

إلمام الطلاب بالمفاهيم الاساسية للتنمية المستدامة وأبعادها الاقتصادية والاجتماعية والبيئية وأهدافها، لخلق ناشئة أكثر استنارة ، مما يؤدي إلى عمل أكثر استدامة من قبل الجميع للمجتمع .

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي	30	%100
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد		

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	%100
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	%100

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	يذكر مفهوم التنمية المستدامة وأبعادها الاجتماعية والاقتصادية والبيئية وأهدافها		الإلقاء- الحوار والمناقشة – العصف الذهني- التعلم القائم على حل المشكلات	-الاختبارات التحريرية (المقالية- الموضوعية- المطابقة) -التقارير -العروض التقديمية -المناقشة - اختبار الكتاب المفتوح
1.2	يحدد مؤشرات التنمية المستدامة في المملكة العربية السعودية		الإلقاء- الحوار والمناقشة – العصف الذهني- التعلم القائم على حل المشكلات	-الاختبارات التحريرية (المقالية- الموضوعية- المطابقة) -التقارير -العروض التقديمية - اختبار الكتاب المفتوح
2.0	المهارات			
2.1	يميز بين الابعاد المختلفة للتنمية المستدامة وارتباطها بتنمية المجتمع		التعلم الذاتي، التعلم التعاوني، التعلم بحل المشكلات	المشروعات + التقارير+ سلالم التقدير Rubrics-المناقشة
3.0	القيم والاستقلالية والمسؤولية			
3.1	يشارك زملاؤه في تحمل المسؤولية لتحقيق أهداف التنمية المستدامة.		التعلم التعاوني، التعلم بحل المشكلات ،	المشروعات ، التقارير المناقشة

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	المفاهيم الاساسية للتنمية المستدامة- نبذة تاريخية - الفرق بين التنمية والتنمية المستدامة- الاستدامة والثقافة الاسلامية- الابعاد الاقتصادية والاجتماعية والبيئية للتنمية للمستدامة.	4
2	أجندة الامم المتحدة وأهداف التنمية المستدامة	2
3	الاهداف المتعلقة بالقضاء على الفقر والجوع لمساعدة جميع المجتمعات على تحقيق نوعية حياة أفضل 1- القضاء علي الفقر 2- القضاء التام على الجوع 3-الصحه الجيدة والرفاه	3
4	الأهداف المتعلقة بالمساواة 5- المساواة بين الجنسين 10- الحد من أوجه عدم المساواة	3
5	الاهداف المتعلقة بالحصول على الخدمات الاساسية 6- المياه النظيفة والنظافة الصحية 7- طاقه نظيفة وبأسعار معقولة	3
6	الاهداف المتعلقة بحصول الجميع على التعليم الشامل والعمل اللائق لدعم الفرص الاقتصادية العادلة والعدالة الإجتماعية 4- التعليم الجيد 8- العمل اللائق ونمو الاقتصاد	3
7	الاهداف المتعلقة باستحداث حلول مبتكرة وبنية تحتية مرنة لتمكين المجتمعات من الإنتاج والاستهلاك بطريقة أكثر استدامة 9-الصناعة والابتكار والهياكل الاساسية 11- مدن ومجتمعات محلية مستدامة 12 - الاستهلاك والإنتاج المسؤول	3
8	الاهداف المتعلقة بالمصادر الطبيعية والحفاظ عليها وتنميتها 13-العمل المناخي 14- الحياة تحت الماء 15- الحياة في البر	3
9	16- السلام والعدل والمؤسسات القوية 17- عقد الشراكات لتحقيق الأهداف	2
10	مؤشرات التنمية المستدامة في المملكة العربية السعودية (نماذج مختارة من رؤية المملكة 2030)	4
	المجموع	**30**

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	اختبار منتصف الفصل	السابع - التاسع	30%
2	المناقشة – العروض التقديمية – التقارير	خلال الفصل	30%
3	الاختبار النهائي	السادس عشر- السابع عشر	40%
...			

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	التنمية المستدامة مفهومها – أبعادها- مؤشراتها. الناشر – المجموعة العربية للتدريب و النشر 2017- د/ مدحت أبو النصر –ياسمين مدحت محمد (المرجع متوفر في المكتبة الإلكترونية السعودية)
المراجع المساندة	1- التنمية المستدامة في الوطن العربي بين الواقع والمأمول. سلسلة دراسات يصدرها مركز الإنتاج الإعلامي جامعة الملك عبد العزيز الإصدار الحادي عشر. نحو مجتمع المعرفة- سلسلة دراسات يصدرها مركز الإنتاج الإعلامي جامعة الملك عبد العزيز 2- -نحو تنمية مستدامة للمملكة العربية السعودية الاستعراض الطوعي الوطني الأول 1439هـ - 2018م
المصادر الإلكترونية	1- المنصة الوطنية الموحدة : بوابة أهداف التنمية المستدامة في المملكة https://www.my.gov.sa/wps/portal/snp/content/SDGPortal 2- منصة أهداف التنمية المستدامة لمنظمة الأمم المتحدة 2-THE 17 GOALS: United nation https://sdgs.un.org/goals
أخرى	التربية من أجل التنمية المستدامة في الميدان اليونسكو - قطاع التربية

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	قاعات دراسية مجهزة
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	أجهزة حاسب – أجهزة عرض بيانات
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلبة- أعضاء هيئة التدريس	مباشر - غير مباشر
فاعلية طرق تقييم الطلاب	قيادات البرنامج – الطلبة	مباشر-غير مباشر
مصادر التعلم	أعضاء هيئة التدريس – الطلاب	مباشر –غير مباشر
مدى تحصيل مخرجات التعلم للمقرر	أعضاء هيئة التدريس- المراجع النظير	مباشر – غير مباشر
أخرى		

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of** E**lectrical Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

2023

TP-153

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAA

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: مهارات التعلم مدى الحياة
رمز المقرر: CUET101
البرنامج: Computer Engineering and Networks
القسم العلمي: Electrical Engineering
الكلية: Engineering
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V4
تاريخ آخر مراجعة 21/4/2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة الر ابعة / المستوى الذي يقدم فيه المقرر: (السابع أو الثامن)

4. الوصف العام للمقرر

يتناول المقررُ التعلمَ مدى الحياة، من حيث ماهيته، وأهميته، ومهارات هذا التعلم، ونماذجه من حيث أسسها النظرية، وأنماطها، وتطبيقاتها العملية. علاوة عن تناول خصائص المتعلم في العصر الرقمي

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

يهدف المقرر إلى تحديد مدلولات التعلم مدى الحياة، ومهاراته ونماذجه، وتنمية مهارات التعلم مدى الحياة لدى طلاب الجامعة؛ وصـــولاً بهم إلى تنمية مسؤولياتهم الذاتية نحو تعلمهم، وتقديرهم قيمة التعلم مدى الحياة .

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي		
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد	30	%100

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	%100
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	%100

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	1.1	تحديد مدلولات التعلم مدى الحياة.	-	الحوار والمناقشة
1.2	1.2	تحديد مهارات التعلم مدى الحياة واستراتيجيات ونماذج تنميتها لدى الطلاب	-	العصف الذهني والاستقصاء
2.0	المهارات			
2.1	التمكن من استراتيجيات التعلم مدى الحياة	-	التعلم التعاوني الإلكتروني،	تقويم الذات ، ملف الإنجاز
2.2	تخطيط نماذج لبرامج التعلم مدى الحياة	-	التعلم بالنموذج – التساؤل الذاتي	ملف الإنجاز ، التقويم القائم على حل المشكلات
3.0	القيم والاستقلالية والمسؤولية			
3.1	تنمية المسؤولية الذاتية للمتعلم نحو تعلمه.	-	المناظرة الأكاديمية، التعلم بالنموذج	تقويم الذات، تقويم الأقران
3.2	تقدير قيمة التعلم مدى الحياة.	-	التساؤل الذاتي، تعلم الأقران	استطلاع الرأي

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	ماهية التعلم مدى الحياة وأهميته.	2
2	التعلم مدى الحياة: المبررات والتحديات.	2
3	خصائص المتعلم في العصر الرقمي.	2
4	مهارات التعلم مدى الحياة: (استراتيجيات اكتسابها، ومجالات توظيفها وتنميتها، ...).	6
5	الأسس النظرية لنماذج التعلم المستمر.	2
6	نماذج التعلم المستمر: (معرفي، مهني، ...)، وأنماطها: (اعتيادي، عن بعد، ...).	8
7	التخطيط والتمويل والتنفيذ والتقويم والتطوير لبرامج التعليم المستمر، وتطويرها: (الأطباء، المحامون، المعلمون، المهندسون، كبار السن، ...).	8
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	مهام تعلم قصيرة (فردية + جماعية)	4 ، 8 ، 12 ، 15	%20
2	عروض تقديمية ومشاركات	طوال الفصل الدراسي	%10
3	اختبار منتصف الفصل (فردي)	الأسبوع الـ 8	%30
4	اختبار نهائي	بعد الأسبوع الـ 15	%40

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	الشاعر، عبد الرحمن. (2018). التعليم المستمر بين النظرية والتطبيق، دار صفاء للطباعة والنشر والتوزيع.
المراجع المساندة	- الأزيرجاوي، علي عبد. (2019). التعليم المستمر جوانب نظرية ونماذج تطبيقية، دار الرضوان للنشر والتوزيع. - بحري، منى يونس؛ الحمد، مسرة خالد. (2022). التعليم المستمر، الدار المنهجية للنشر والتوزيع. - الرواف، هيا. (2022). تعليم الكبار والتعليم المستمر المفهوم الخصائص التطبيقات، ط2، دار تكوين للنشر والتوزيع. - الرواف، هيا؛ العسكر، منى؛ سعيد، إكرام. (2020). تقويم برامج التعليم المستمر نشأته ونماذجه وتطبيقاته، المؤلفون.

	سعيد، إكرام، الرواف، هيا. (2020). تطوير برامج التعليم المستمر في ضوء التدريب المعرفي، مستقبل الكتاب للنشر والتوزيع.
المصادر الإلكترونية	• المنصات الإلكترونية -التعليمية والتدريبية- ذات الصلة بتطبيقات التعلم المستمر • الخدمات التقنية والأوعية الإلكترونية لعمادة شؤون المكتبات. المكتبة الرقمية السعودية.
أخرى	التربية من أجل التنمية المستدامة في الميدان اليونسكو - قطاع التربية

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	قاعات عرض قاعات تدريب قاعات دراسية
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	منصات تعليمية أجهزة عرض بيانات وملحقاتها برمجيات كاميرا وثائقية
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	أعضاء هيئة التدريس (المراجع النظير) قيادة البرنامج الطلاب	– مباشر: (تقييم الأقران، التقييم الذاتي، – تقرير المقرر - نتائج الاستبانات). غير مباشر: (استبانات – استطلاع رأي).
فاعلية طرق تقييم الطلاب	أعضاء هيئة التدريس (المراجع النظير) قيادة البرنامج الطلاب	– مباشر: (تقييم الأقران، التقييم الذاتي، – نتائج الاستبانات. غير مباشر: (استبانات – استطلاع رأي).
مصادر التعلم	أعضاء هيئة التدريس قيادة البرنامج الطلاب	– مباشر: (تقييم الأقران، التقييم الذاتي، – نتائج الاستبانات.

مجالات التقويم	المقيمون	طرق التقييم
		غير مباشـر: (اسـتبانات – اسـتطلاع رأي).
مدى تحصيل مخرجات التعلم للمقرر	أعضاء هيئة التدريس قيادة البرنامج الطلاب	– مباشـر: (الاختبارات ، نتائج الطلاب في المقرر، – نتائج الاختبارات – التقارير الإحصائية. غير مباشـر: (اسـتبانات – اسـتطلاع رأي).
تطوير التدريس	أعضاء هيئة التدريس قيادة البرنامج الطلاب	– مباشـر: (تقييم الأقران، التقييم الذاتي، – نتائج الاستبانات تقرير المقرر. غير مباشـر: (اسـتبانات – اسـتطلاع رأي).

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of** Electrical **Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

2023

TP-153

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: المملكة ودورها الريادي
رمز المقرر: GNCR103
البرنامج: Computer Engineering and Networks
القسم العلمي: Electrical Engineering
الكلية: Engineering
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V2
تاريخ آخر مراجعة: 21/4/2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة الرابعة / المستوى الذي يقدم فيه المقرر: (السابع أو الثامن)

4. الوصف العام للمقرر

يتناول هذا المقرر التطور التاريخي للمملكة العربية السعودية، ومسيرة حكامها في البناء والتنمية سياسيا وحضاريا، ودورهم في خدمة الحرمين الشريفين، وجهودهم في حل القضايا العربية والاسلامية والدولية، وتحقيق رؤية المملكة 2030.

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

يهدف هذا المقرر إلى اكساب الطلاب المعارف المرتبطة بالتاريخ السعودي الحديث، وتعزيز قيم الولاء والانتماء والمواطنة، واستشعار المكانة الرفيعة للملكة العربية السعودية.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي		
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد	30	100%

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	%100
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	%100

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	يعرف الجذور التاريخية والحضارية للمملكة العربية السعودية		المحاضرات المناقشة، خرائط المفاهيم	الأسئلة، الاختبارات
1.2	يلم بجهود المملكة العربية السعودية في خدمة القضايا العربية والإسلامية والدولية		التكليفات والمناقشات	المناقشة، الحوار
1.3	يستعرض إنجازات المملكة العربية السعودية في خدمة الحرمين الشريفين		المحاضرات، العصف الذهني التعلم الذاتي	المناقشة، الحوار
2.0	المهارات			
2.1				
2.2				
3.0	القيم والاستقلالية والمسؤولية			
3.1	اظهار مستوى عالٍ من الانتماء الوطني والقيم الأخلاقية تجاه المملكة العربية السعودية		أوراق العمل، المشاريع الخدمية	مناقشة التكليفات الجماعية
3.2	يشارك زملاؤه تحمل المسؤولية تجاه المكتسبات الحضارية في ضوء رؤية المملكة 2030		أوراق العمل، المشاريع الخدمية	مناقشة التكليفات الجماعية

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	الجذور التاريخية والحضارية للملكة العربية السعودية (مرحلة التأسيس)	2
2	الجذور التاريخية والحضارية للملكة العربية السعودية (مرحلة التوحيد)	2
3	البعد التنظيمي والحضاري للملكة في عهد الملك عبد العزيز آل سعود	2
4	العلاقات الدولية للملكة العربية السعودية في عهد الملك عبد العزيز آل سعود	4
5	مراحل البناء والتطوير في عهد ملوك المملكة (سعود، فيصل، خالد)	4
6	مراحل البناء والتطوير في عهد ملوك المملكة (فهد، عبد الله، سلمان)	4
7	المملكة العربية السعودية وخدمة الحرمين الشريفين	2
8	جهود المملكة العربية السعودية في خدمة القضايا العربية والاسلامية والدولية	4
9	دور المملكة في المجتمع الدولي	2
10	صور من انجازات رؤية المملكة العربية السعودية 2030	4
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	المناقشات، التفاعل الصفي.	مستمر	%10
2	أوراق العمل، والمشاريع.	مستمر	%20
3	الاختبار النصفي		%30
4	الاختبار النهائي		%40
5	اجمالي		%100

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	مقرر الكتروني للمقرر قام بإعداده: أستاذ المقرر.
المراجع المساندة	- العثيمين، عبد الله الصالح: تاريخ المملكة العربية السعودية، (جـــ1، جـــ2)، مكتبة العبيكان، الرياض.

	- الزركلي، خير الدين: شبه الجزيرة العربية، دار العلم للملايين، بيروت 1985 م. - الجهني، عيد مسعود: فيصل بن عبد العزيز، مؤسسة الأنوار، الرياض. - الدعجاني، أحمد: خالد بن عبد العزيز (سيرة مملكة) ط1، الرياض د.ن. - رضا، عادل: فهد بن عبد العزيز الإنسان الملك، أخبار، القاهرة. - البازعي، سعد عبد الرحمن: عبد الله بن عبد العزيز إضاءات في سيرة ملك، مركز توثيق سيرة الملك عبد الله بن عبد العزيز آل سعود، ط3، الرياض 2018. - دار اليوم للصحافة: الملك السابع خادم الحرمين الشريفين الملك سلمان بن عبد العزيز آل سعود، كتب مؤلفين، الرياض 2021. - السلمي، مشعل فهم: دور المملكة العربية السعودية في خدمة قضايا العالم العربي. - الشهيل، عبد الله محمد: التطور التاريخي للدولة السعودية، الرياض، إصدارات النادي الأدبي.
المصادر الإلكترونية	دارة الملك عبد العزيز. https://www.darah.org.sa موقع مؤسسة الملك سعود. https://kingsaudfoundation.business.site موقع مؤسسة الملك فيصل. /https://www.kff.com/ar قاعدة بيانات الملك خالد. https://kkb.kkf.org.sa/arabic/Pages/default.aspx مكتبة الملك فهد الوطنية. https://kfnl.gov.sa/ar/Pages/default.aspx الصفحة الرئيسية لرؤية المملكة 2030 /https://www.vision2030.gov.sa/ar
أخرى	

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	
تجهيزات أخرى (تبعاً لطبيعة التخصص)	**BlackBoard**

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلبة - قيادات البرنامج	غير مباشر (استبانة)

مجالات التقويم	المقيمون	طرق التقييم
فاعلية طرق تقييم الطلاب	المراجع النظير	غير مباشر (استبانة)
مصادر التعلم	الطلاب - أعضاء هيئة التدريس - قيادات البرنامج	غير مباشر (استبانة)
مدى تحصيل مخرجات التعلم للمقرر	أعضاء هيئة التدريس	مباشر (الاختبارات، الواجبات، المشاريع)

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of** Electrical **Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

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TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: اللياقة البدنية وعلوم الرياضة Physical Fitness & Sport Sciences	
رمز المقرر: GNCR104	
البرنامج: Computer Engineering and Networks	
القسم العلمي: Electrical Engineering	
الكلية: Engineering	
المؤسسة: جامعة الحدود الشمالية	
نسخة التوصيف: V2	
تاريخ آخر مراجعة: 21/4/2024	

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة الرابعة / المستوى الذي يقدم فيه المقرر: (السابع أو الثامن)

4. الوصف العام للمقرر

يتناول هذا المقرر المعلومات والسلوكيات في مجال اللياقة البدنية وعلوم الرياضة منها أنواع اللياقة البدنية واهميتها وعناصرها وطرق تنميتها وقياسها واثرها على الأجهزة الحيوية للفرد، كذلك علوم الرياضة المتعلقة بالتغذية الصحية والسمنة والنشاط البدني وطرق التعامل مع الضغوط النفسية.

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

يهدف المقرر الى نشر الثقافة الصحية والنشاط البدني بين طلاب وطالبات الجامعة من خلال تزويدهم بالمعارف والمفاهيم والمهارات والاتجاهات المتعلقة باللياقة البدنية وعلوم الرياضة وتسهم في تحسين نمط الحياة الصحي من خلال معرفة عناصر اللياقة البدنية وطرق تنميتها وقياسها، وعلاقة النشاط البدني بالضغوط النفسية، وكذلك العناصر الغذائية الصحية اللازمة للنشاط البدني.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي	30	100%
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد		

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	%100
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	%100

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز نواتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	يلم بالمعارف والمفاهيم المتعلقة بعلوم الرياضة واللياقة البدنية ومكوناتها	ع1	الحوار والإلقاء، والخرائط الذهنية	العروض التقديمية، التقارير
1.2	يعرف عمل أجهزة الجسم المختلفة والتكيفيات الناتجة عن ممارسة النشاط البدني	ع2	البناء المعرفي KWL، والخرائط الذهنية	الاختبارات الشفهية
2.0	المهارات			
2.1	يطبق القياسات اللازمة لمعرفة مستوى اللياقة البدنية وآلية تنميتها	م2	التطبيقات العملية، التعلم التعاوني،	مقياس الأداء المتدرج / سلالم التقدير
2.2	يباشر عمليا الإسعافات الاولية بالطرق الصحيحة	م1	التعلم القائم على حل المشكلات، التطبيقات العملية	الفحص العملي الموضوعي المنظم، والتقويم المعتمد على الملاحظة المباشرة للمهارات
3.0	القيم والاستقلالية والمسؤولية			
3.1	يتحمل المسؤولية الاجتماعية تجاه دوره في الإسعافات الاولية	ق1	التعلم التعاوني،	المحاكاة / لعب الأدوار
3.2	يجيد التعامل مع الزملاء والأساتذة والمواقف الاسعافية الحرجة	ق4	الحوار والمناقشة، التعلم الذاتي	التقويم المعتمد على الملاحظة المباشرة للمهارات

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	الصحة والنشاط البدني	2
2	أنواع الأنشطة البدنية الهوائية واللاهوائية	4
3	مؤشر ممارسة الأنشطة البدنية	2
4	التكيفات الناتجة عن ممارسة النشاط البدني	2
5	اللياقة البدنية وعناصرها المرتبطة بالصحة	4
6	اللياقة البدنية وعناصرها المرتبطة بالمهارة	2
7	الضغوط النفسية والنشاط البدني	2
8	القوام والتمرينات العلاجية	2
9	التغذية الصحية	4
10	السمنة والنشاط البدني	2
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	اختبار منتصف الفصل تحريري (مقالي + موضوعي)	التاسع	%30
2	مشاريع وتكليفات (بحث + عرض بوربوينت)	خلال الفصل الدراسي	%20
3	اختبار تحريري نهائي (مقالي + موضوعي)	التاسع عشر	%40
4	مشاركة وتفاعل	خلال الفصل الدراسي	%10
5	اجمالي		%100

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	الصحة واللياقة (د. أحمد السنتلي)، دار المتنبي للنشر ، 2021
المراجع المساندة	محيمدات رشيد: اللياقة البدنية (أهميتها - خصائصها - التدريب) 2018م

	كمال عبدالحميد، محمد صبحي حسانين: اللياقة البدنية ومكوناتها ـ الأسس النظرية- الإعداد البدني- طرق القياس 1997م أسامة كامل راتب : علم نفس الرياضة ، دار الفكر العربي ، القاهرة ، 1995م Siedentop, D., & Hans, V. der M. (2023). *Introduction to physical education, fitness, and Sport.* (9th Ed). Human Kinetics Lumpkin, A. (2021). *Introduction to physical education, Exercise Science, and Sport.* (11th Ed). McGraw Hill.
المصادر الإلكترونية	World Health Report. (2002). *Global Recommendations on Physical Activity for Health WHO-GRPAH.* Geneva, World Health Organization https://www.who.int/dietphysicalactivity/factsheet_recommendations/en/ حمو، د. (2012). *علاقة الأنماط الجسمية ببعض الصفات البدنية عند لاعبي الكرة الطائرة*. قسم التربية البدنية والرياضية. كلية العلوم الإنسانية والاجتماعية. جامعة محمد خيضر. على الرابط: http://archives.univ-biskra.dz/bitstream/123456789/4697/1/2.pdf إبراهيم، م. (2004). اللياقة البدنية: الطريق الى الصحة والبطولة والرياضة. سلسلة معالم رياضية https://gymnastics-coach.com/fitness/ What is Stress? The American Institute of Stress> https://www.stress.org/ الإدارة العامة للتثقيف الاكلينيكي. وزارة الصحة. المملكة العربية السعودية https://www.moh.gov.sa/HealthAwareness/EducationalContent/Diseases/Mental/Pages/005.aspx حسين، طه وسلامة حسين. (2006). إستراتيجيات إدارة الضغوط التربوية والنفسية، الطبعة الأولى، دار الفكر للنشر والتوزيع، عمان. file:///C:/Users/aalse/Downloads/6170-14752-1-SM.pdf فوزي، آمال عبدالله (2017) الامن الغذائي وتكنلوجيا الغذاء. الجنادرية للنشر والتوزيع. الرياض World Population Review (2020). *Most Obese Countries*. World Health Review. https://worldpopulationreview.com/country-rankings/most-obese-countries المجلس الاستشاري للمحتوى (2015) أدوات الإسعافات الأولي. الشؤون الصحية بالحرس الوطني. وزارة الحرس الوطني https://ngha.med.sa/Arabic/HealthAwareness/FirstAid/Pages/firstaidkit.aspx https://www.healthline.com
أخرى	https://sagamorepub.com/products/physical-education-and-health https://libguides.usc.edu.au/c.php?g=508891&p=3478051 https://ncert.nic.in/pdf/publication/otherpublications/iehped101.pdf

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	قاعات عرض قاعات دراسية
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	منصات تعليمية أجهزة عرض بيانات وملحقاتها
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلاب	غير مباشر
فاعلية طرق تقييم الطلاب	أعضاء هيئة التدريس	مباشر
مصادر التعلم	الطلاب – أعضاء هيئة التدريس	غير مباشر
مدى تحصيل مخرجات التعلم للمقرر	أعضاء هيئة التدريس	مباشر

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of** Electrical **Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

جامعة الحدود الشمالية
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هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: مهارات التعامل مع ذوي الاعاقة
رمز المقرر:PSY115
البرنامج: هندسة الحاسب لآلي والشبكات
القسم العلمي: الهندسة الكهربائية
الكلية: الهندسة
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V2
تاريخ آخر مراجعة: 21/4/2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)					
2. نوع المقرر					
أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		
3. السنة / المستوى الذي يقدم فيه المقرر: (السنة الخامسة\ المستوى التاسع أو العاشر)					
4. الوصف العام للمقرر					
يتناول هذا المقرر تسليط الضوء على ابرز الجوانب فى مجال الإعاقة من حيث المفهوم، والتصنيف وكيفية التعامل والتواصل مع ذوي الإعاقة ، والتعرف على جهود المملكة في مجال الإعاقة بالإضافة الى لمحة سريعة عن الخدمات المساندة لذوي الإعاقة.					
5- المتطلبات السابقة لهذا المقرر (إن وجد)					
لا يوجد					
6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)					
لا يوجد					
7. الهدف الرئيس للمقرر					
اكساب الطالب المعارف والمهارات والقيم لمهارات التعامل مع ذوي الإعاقة.					

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي		
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي		

م	نمط التعليم	عدد الساعات التدريسية	النسبة
	• التعليم الإلكتروني		
4	التعليم عن بعد	30	%100

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	100%
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	100%

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	ان يعرف الطالب تاريخ الإعاقة ومفهومها وأسبابها وسبل الوقاية منها	ع١	الالقاء- التساؤل الذاتي -التعلم الذاتي	أسئلة شفهية- مناقشات جماعية- اختبار تحريري
1.2	ان يذكر الطالب قوانين وتشريعات ذوي الإعاقة، وخدماتهم المساندة	ع٢		
1.3	ان يذكر الطالب جهود المملكة فى مجال الإعاقة.	ع٣		
2.0	المهارات			
2.1	ان يصنف الطالب فئات ذوي الإعاقة وكيفية التعامل معهم حسب تصنيفاتهم.	م١	البناء المعرفي- التدريس المصغر- التعلم التعاوني	أسئلة شفهية- مناقشات جماعية- اختبار تحريري
2.2	ان يتواصل الطالب مع ذوي الإعاقة بمهارات التعامل المناسبة لإعاقاتهم.	م٢		
3.0	القيم والاستقلالية والمسؤولية			
3.1				

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	مدخل تاريخي ومفاهيمي حول الإعاقة	5

2	مفهوم الإعاقة – أسبابها – الوقاية منها	5
3	قوانين وتشريعات ذوي الإعاقة	5
4	فئات ذوي الإعاقة: خصائصهم ومهارات التعامل معهم	5
5	جهود المملكة العربية السعودية في مجال الإعاقة	5
6	الخدمات المساندة لذوي الإعاقة	5
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	واجبات	حسب التوقيت الدراسي فى الجامعة	١٠
2	مشاركة	خلال الفصل الدراسي	١٠
3	تقديم عروض	الأسبوع السابع	٢٠
4	اختبار فصلي	الأسبوع التاسع	٢٠
5	اختبار نهائي	الأسبوع الثامن عشر	٤٠

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	• الخطيب، جمال، وآخرون. (2021) مقدمة في تعليم الطلبة ذوي الحاجات الخاصة. دار الفكر. عمان. الطبعة التاسعة.
المراجع المساندة	القريوتي،يوسف وآخرون(2006): المدخل إلى التربية الخاصة. دبي: دار القلم • القريطي: سيكولوجية ذوى الاحتياجات الخاصة وتربيتهم.القاهرة: دار الفكر العربي، 2005.
المصادر الإلكترونية	- جمعية سلطان الخيريةwww. Sultancharity.org - هيئة رعاية الشخاص ذوي الاعاقة - مركز الملك سلمان لأبحاث الإعاقة www. Pscdr.sa.org • الدليل لتنظيمي للتربية الخاصة بوزارة التعليم ١٤٣٧هـ
	لا يوجد

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاستبانات - الاختبارات - تقرير المقرر غير مباشر: مناقشة الطلاب
فاعلية طرق تقييم الطلاب	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاختبارات - تقرير المقرر غير مباشر: مناقشة الطلاب
مصادر التعلم	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاستبانات – تقرير المقرر غير مباشر: مناقشة الطلاب
مدى تحصيل مخرجات التعلم للمقرر	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاستبانات –الاختبارات - تقرير المقرر غير مباشر: مناقشة الطلاب
أخرى : تطوير التدريس	أعضاء هيئة التدريس - القسم	مباشر: تقرير المقرر – نتائج الاختبارات – تقييم الأقران

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of** Electrical **Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: التحول الرقمي
رمز المقرر: IS101
البرنامج: هندسة الحاسب لآلي والشبكات
القسم العلمي: الهندسة الكهربائية
الكلية: الهندسة
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V2
تاريخ آخر مراجعة: 21/4/2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة / المستوى الذي يقدم فيه المقرر: (السنة الخامسة\ المستوى التاسع أو العاشر)

4. الوصف العام للمقرر

يتناول المقرر المفاهيم الاساسية للتحول الرقمي وأهدافه ومجالات تطبيقه ودراسة مدى الحاجة له على مستوى الفرد والمؤسسة والحكومة تماشيا مع رؤية المملكة 2030. كما يبسط هذا المقرر المفاهيم الأساسية للتقنيات الناشئة والمبتكرة (مثال: الحوسبة الإدراكية ChatGPT (الذكاء الاصطناعي)، والبلوك تشين، والطباعة الثلاثية، الواقع الافتراضي، والأنظمة الذكية، وشبكات الجيل الخامس، وإنترنت الأشياء، والروبوتات، وعلم البيانات، والأمن السيبراني، وغيرها) مما يعزز قدرة الطالب على إجراء مناقشات حول امكانية دمج واستخدام هذه التقنيات في العديد من المجالات. دعما لهذه المفاهيم، يشرح المقرر أركان واتجاهات وخطوات رحلة التحول الرقمي ويستعرض أبرز تحدياته.

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

أن يصبح الطالب قادرا على دعم التحول الرقمي الذي يساهم في تحقيق التميز في الأداء من خلال توظيف التقنيات الناشئة والمبتكرة، بما يحقق أهداف رؤية المملكة 2030.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي		
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد	2	100%

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	100%
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	100%

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	يعرف مفهوم التحول الرقمي ودوره في تحقيق التميز في الاداء	يحدد من طرف البرنامج	التعلم التعاوني، التعلم الذاتي، العصف الذهني، التلخيص،	المناقشة، الاختبارات التحريرية (المقالية والموضوعية)،
1.2	يستعرض الطالب خطوات رحلة التحول الرقمي وأهدافه ومجالاته وتأثيراته	يحدد من طرف البرنامج	العصف الذهني	
2.0	المهارات			
2.1	يوظف التقنيات الناشئة في حل المشكلات	يحدد من طرف البرنامج	التعلم القائم على حل المشكلات، التعلم الذاتي مقياس الأداء المتدرج / سلالم التقدير، ملف الإنجاز، العروض التقديمية.، التقارير	التعلم القائم على حل المشكلات، التعلم الذاتي، مقياس الأداء المتدرج / سلالم التقدير، ملف الإنجاز، العروض التقديمية.، التقارير

الرمز	نواتج التعلم	رمز نواتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
2.2	يستخدم مفاهيم التحول الرقمي في التواصل الفعال	يحدد من طرف البرنامج	التدريس التبادلي، تعلم الأقران	العروض التقديمية،
3.0	القيم والاستقلالية والمسؤولية			
3.1	يعزز القيم المجتمعية في إطار التحول الرقمي للمحافظة على الخصوصية.	يحدد من طرف البرنامج	التعلم التعاوني، التعلم الذاتي	مقياس الأداء المتدرج / سلالم التقدير، قوائم التدقيق

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	مقدمة عن التحول الرقمي (مفاهيمه وأهميته، الفرق بينه وبين الرقمنة، التحديات التي تواجهها، دور المملكة العربية السعودية في دعم التحول الرقمي).	2
2	مجالات التحول الرقمي (المنتجات، المؤسسات، الصناعة، اجتماعي).	2
3	ركائز التحول الرقمي (القيادة، والتجربة الشاملة، المعلومات، ونماذج التشغيل، والموارد البشرية)	2
4	أركان التحول الرقمي (الأعمال الرقمية، ارتباط المستفيدين، الابداع الرقمي، التقنية، تحليل البيانات، تقنيات الجيل الخامس، تقنيات الجيل الجديد من الانترنت، الانترنت العميق، ذكاء الأعمال).	2
5	اتجاهات التحول الرقمي (التغيير الرقمي، تهيئة المواهب، قنوات تقديم الخدمة، دمج وتقليص الخدمات الرقمية، قيمة البيانات الرقمية، إعادة تهيئة التقنية، التكامل ما بين الأنظمة.	2
6	رحلة التحول الرقمي (دراسة الوضع الراهن، استراتيجية التحول الرقمي، إعادة هندسة الإجراءات، تحليل البنية التحتية التقنية، اختيار البيئة الرقمية، بناء البرمجيات والتطبيقات الذكية، تكامل الخدمات الرقمية، قادة التحول الرقمي، إدارة التغيير للتحول الرقمي، منصات التنفيذ والمراقبة لتحسين رحلة التحول الرقمي) مثال: رحلة التحول الرقمي في المملكة.	6
7	استخدامات التقنيات الناشئة والمبتكرة ومحفزات الابتكار في التحول الرقمي (الذكاء الاصطناعي، الواقع الافتراضي والواقع المعزز، علم البيانات، البلوك تشين والعملات الرقمية المشفرة، الروبوتات، وذكاء الأعمال، الحوسبة السحابية).	8
8	التحديات التي تواجه التحول الرقمي (اختراق الخصوصية، وأمن المعلومات، والتحولات الاجتماعية)	4
9	المسؤولية الأخلاقية في التحول الرقمي.	2
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	اختبارات قصيرة	15-2	10
2	واجب (عرض تقديمي)	15-2	10
3	مناقشة	15-1	10
4	تكليف بحثي	17	10
5	اختبار نصفي	12-6	20
6	اختبار نهائي	18-17	40

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	Akhil Jabbar Meerja, Mamun Bin Ibne Reaz, Ana Maria Madureira, “Emerging Technologies and Applications for a Smart and Sustainable World”, Bentham Science Publishers, 2022. Xiao Guo , Gary O'Brien , and Mike Mason, Digital Transformation Game Plan : 34 Tenets for Masterfully Merging Technology and Business 2019 حسين مصيلحي، "التحول الرقمي - الإطار المستقبلي لنظم وتقنية المعلومات"، نيوبوك، 2020.
المراجع المساندة	Rogers, David L. The digital transformation playbook: Rethink your business for the digital age Columbia University Press, 2016. "الدليل العملي إلى التحول الرقمي"، أنطونيو وايس 2022.
المصادر الإلكترونية	• مواقع التصفح والبحث على الإنترنت Google. • المكتبة الرقمية السعودية: https://sdl.edu.sa/SDLPortal/Publishers.asp • منشورات موقع الحكومة الرقمية السعودي https://dga.gov.sa
أخرى	شرائح العرض الخاصة بالمقرر والمقدمة من قبل منسق المقرر.

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	قاعة الاختبارات
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	جهاز يسمح للطالب الدخول على نظام التعليم الإلكتروني (بلاك بورد)
تجهيزات أخرى (تبعاً لطبيعة التخصص)	نظام التعليم الإلكتروني (بلاك بورد)

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلبة	غير مباشر
فاعلية طرق تقييم الطلاب	المراجع النظير، الطلبة	مباشر وغير مباشر
مصادر التعلم	أعضاء هيئة التدريس، طلبة	غير مباشر
مدى تحصيل مخرجات التعلم للمقرر	أعضاء هيئة التدريس، طلبة	مباشر وغير مباشر
أخرى		

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of** Electrical **Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: القيادة وإدارة التغيير
رمز المقرر:ELP102
البرنامج: هندسة الحاسب لآلي والشبكات
القسم العلمي: الهندسة الكهربائية
الكلية: الهندسة
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V2
تاريخ آخر مراجعة: 21/4/2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة / المستوى الذي يقدم فيه المقرر: (السنة الخامسة\المستوى التاسع أو العاشر)

4. الوصف العام للمقرر

يتناول المقرر ماهية القيادة من حيث أنماطها ونظرياتها، وعلاقتها بإدارة التغيير بمجالاتها المختلفة؛ وأسباب مقاومتها.

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

يهدف هذا المقرر إلى تعريف الطالب بمفاهيم القيادة وأنماطها وبعض النظريات فيها، ومحددات النمط القيادي الفعال، كما يتضمن من إدارة التغيير من حيث المفهوم والمجالات، وتحديد استراتيجيات التغيير وأسباب مقاومته وكيفية الوقاية منها.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي	30	100%
2	التعليم الإلكتروني		
3	التعليم المدمج • التعليم التقليدي		

م	نمط التعليم	عدد الساعات التدريسية	النسبة
	• التعليم الإلكتروني		
4	التعليم عن بعد		

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	100%
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	100%

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز ناتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	يتعرف على ماهية وأنماط القيادة		المحاضر والمناقشة	اختبارات تحريرية الواجبات المنزلية العروض التقديمية
1.2	يستعرض نظريات القيادة		المحاضر والمناقشة	اختبارات تحريرية الواجبات المنزلية العروض التقديمية
1.3	يتعرف على ماهية التغيير ومجالاته		المحاضر والمناقشة	اختبارات تحريرية الواجبات المنزلية العروض التقديمية
2.0	المهارات			
2.1	يشرح أسباب مقاومة التغيير		العصف الذهني	اختبارات تحريرية الواجبات المنزلية المشاركة في المناقشة
2.2	يستنتج العوامل المؤثرة في الحاجة للتغيير.		العصف الذهني	اختبارات تحريرية الواجبات المنزلية المشاركة في المناقشة
3.0	القيم والاستقلالية والمسؤولية			
3.1	يطبق بعض نماذج التغيير لحل المشكلات		الأنشطة الجماعية	الواجبات المنزلية

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	ماهية القيادة	2
2	أنماط القيادة	4
3	نظريات القيادة	6
4	محددات النمط القيادي الفعال	2
5	ماهية التغيير	2
6	العوامل المؤثرة في الحاجة للتغيير	4
7	مجالات التغيير	4
8	مراحل (استراتيجيات) التغيير	2
9	نماذج التغيير	2
10	مهددات نجاح التغيير وطرق الوقاية والعلاج (مقاومة التغيير)	2
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	واجبات منزلية	مستمر	20
2	عروض تقديمية	مستمر	10
3	اختبار تحريري نصفي	الأسبوع السادس	30
4	اختبار تحريري نهائي	نهاية الفصل	40
5	اجمالي		%100

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	• المخلافي، محمد سرحان (2009م) القيادة الفاعلة وإدارة التغيير، الكويت: دار الفلاح للنشر والتوزيع.
المراجع المساندة	• بوعلاق، نوال (2021) قيادة التغيير، الأردن: دار وائل للنشر.
المصادر الإلكترونية	• نجم، عبود نجم (2018م) القيادة الإدارية في القرن الواحد والعشرين، الأردن: دار صفاء للطباعة والنشر.
أخرى	عليان، ربحي مصطفى (2015م) إدارة التغيير، الأردن: دار صفاء للنشر والتوزيع.
	الخدمات التقنية لعمادة شؤون المكتبات – المكتبة الرقمية السعودية
	لا يوجد

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	قاعة دراسية
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	جهاز حاسب آلي يتوفر به برنامج العروض التقديمية (PowerPoint). جهاز عرض البيانات (Data Show).
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاستبانات - الاختبارات - تقرير المقرر غير مباشر: مناقشة الطلاب
فاعلية طرق تقييم الطلاب	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاختبارات - تقرير المقرر غير مباشر: مناقشة الطلاب
مصادر التعلم	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاستبانات – تقرير المقرر غير مباشر: مناقشة الطلاب
مدى تحصيل مخرجات التعلم للمقرر	الطلبة – أعضاء هيئة التدريس - القسم	مباشر: الاستبانات –الاختبارات - تقرير المقرر غير مباشر: مناقشة الطلاب
أخرى : تطوير التدريس	أعضاء هيئة التدريس - القسم	مباشر: تقرير المقرر – نتائج الاختبارات – تقييم الأقران

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	Department of Electrical Engineering Council
REFERENCE NO.	Department Council Meeting minutes NO.0 (1445)
DATE	/4/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

توصيف المقرر الدراسي

(بكالوريوس)

اسم المقرر: **التطوع والمسؤولية المجتمعية** **Social Responsibility&Volunteering**
رمز المقرر:GNCR105
البرنامج: هندسة الحاسب لآلي والشبكات
القسم العلمي: الهندسة الكهربائية
الكلية: الهندسة
المؤسسة: جامعة الحدود الشمالية
نسخة التوصيف: V2
تاريخ آخر مراجعة: 21/4/2024

جدول المحتويات

أ. معلومات عامة عن المقرر الدراسي:

1. التعريف بالمقرر الدراسي

1. الساعات المعتمدة: (2)

2. نوع المقرر

أ-	☒ متطلب جامعة	☐ متطلب كلية	☐ متطلب تخصص	☐ متطلب مسار	☐ أخرى
ب-	☐ إجباري		☒ اختياري		

3. السنة / المستوى الذي يقدم فيه المقرر: (السنة الخامسة\المستوى التاسع أو العاشر)

4. الوصف العام للمقرر

يعتبر هذا المقرر متطلب حر لجميع طلاب وطالبات الجامعة في المستوى الأول، يقدم من اجل تعزيز وتشجيع العمل التطوعي ونشر ثقافة المسؤولية الاجتماعية بين الطلاب والمجتمع وذلك من خلال غرس مفهوم المسؤولية الاجتماعية

5- المتطلبات السابقة لهذا المقرر (إن وجدت)

لا يوجد

6- المتطلبات المتزامنة مع هذا المقرر (إن وجدت)

لا يوجد

7. الهدف الرئيس للمقرر

يهدف هذا المقرر الى تطوير ونشر ثقافة العمل التطوعي وتعميق روح المبادرة والشعور بالمسؤولية لدى طلبة الجامعة وتزويدهم باللوائح والانظمة والضوابط والمهارات وآليات التنفيذ التي تأصل عملية التطوع كعمل فردي ومؤسسي والاثار الإيجابية على مقدم الخدمة ومتلقيها، فيتعلم الطالب من خلال هذا المقرر الأدوار والواجبات التي يقدمها تجاه وطنه ومجتمعه على أسـس علمية وأكاديمية صحيحة، وبأسلوب مؤسسي لتعزيز التنمية المستدامة والمساهمة في دفع عجلة بناء الوطن وتنميته عن طريق الاستثمار في رأس المال البشري.

2. نمط التعليم (اختر كل ما ينطبق)

م	نمط التعليم	عدد الساعات التدريسية	النسبة
1	تعليم التقليدي	30	100%
2	التعليم الإلكتروني		

م	نمط التعليم	عدد الساعات التدريسية	النسبة
3	التعليم المدمج • التعليم التقليدي • التعليم الإلكتروني		
4	التعليم عن بعد		

3. الساعات التدريسية (على مستوى الفصل الدراسي)

م	النشاط	ساعات التعلم	النسبة
1	محاضرات	30	100%
2	معمل أو إستوديو		
3	ميداني		
4	دروس إضافية		
5	أخرى		
	الإجمالي	30	100%

ب. نواتج التعلم للمقرر واستراتيجيات تدريسها وطرق تقييمها:

الرمز	نواتج التعلم	رمز نواتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
1.0	المعرفة والفهم			
1.1	أن يحدد الطالب مبادئ العمل التطوعي واستراتيجياته وفق الإطار المحلي والعالمي		التدريس المباشر مع استخدام وسائل العرض	الواجبات المنزلية والاختبارات
1.2	أن يناقش الطالب مفهوم المسؤولية الاجتماعية والتنمية المستدامة وربطها برؤية المملكة ٢٠٣٠		التدريس المباشر النظري مع استخدام وسائل العرض وطرح النقاشات والأسئلة	الواجبات المنزلية والاختبارات
2.0	المهارات			
2.1	أن يستخدم الطالب مفهوم العمل التطوعي الاحترافي لصناعة مبادرات نوعية لها أثر اجتماعي واقتصادي		التدريس المباشر باستخدام مجموعة من الوسائل التعليمية والاطلاع على شبكة المعلومات	كتابة التقارير والواجبات
2.2	أن يستخدم الطالب مصادر مختلفة للبحث عن حلول لمشكلة أو زيادة وعي أو مساهمة مجتمعية		التدريس المباشر باستخدام مجموعة من الوسائل التعليمية	كتابة التقارير والواجبات

الرمز	نواتج التعلم	رمز نواتج التعلم المرتبط بالبرنامج	استراتيجيات التدريس	طرق التقييم
			والاطلاع على شبكة المعلومات	
3.0	القيم والاستقلالية والمسؤولية			
3.1	أن يتواصل الطالب بشكل فعال مع المستفيدين من الأعمال التطوعية سواء أفراد أو جهات		عمل أبحاث ميدانية تطبيقية	كتابة التقارير والواجبات
3.2	أن يتعاون الطالب مع زملائه في تقديم مبادراتهم الاجتماعية		المشاركة في مجموعات عمل	كتابة التقارير والواجبات

ج. موضوعات المقرر

م	قائمة الموضوعات	الساعات التدريسية المتوقعة
1	**مدخل العمل التطوع** (مقدمة، تعريف، أهمية، أهداف، مجالات، فوائد العمل التطوعي) .	2
2	**فرق العمل التطوعية** (طبيعة ، أنماط، وظائف، أدوار، مراحل، بناء، فرق العمل التطوعي)	2
3	**فلسفة العمل التطوعي** (العمل التطوعي من منظور عالمي، منظور إسلامي، العمل التطوعي في المملكة)	2
4	**تشريعات العمل التطوعي بالمملكة** (المواثيق، الأنظمة، اللوائح التنفيذية للتطوع في المملكة)	2
5	**كفايات العاملين في التطوع** (استقطاب، تدريب، تحديد الكفايات المتطوع وواجباته المجتمعية)	2
6	**منصات العمل التطوعي** (حوكمة، اتمته، تسجيل ساعات التطوع الفردية والمؤسساتية والحكومية)	2
7	**المسؤولية المجتمعية** (مفهوم، أهمية، نشأة، اتجاهات، مبادئ، ابعاد، متطلبات المسؤولية المجتمعية)	4
8	**المسؤولية المجتمعية ودورها التنموي** (المسؤولية المجتمعيّة وأخلاقيّات العمل، آليّات النهوض بالمسؤولية المجتمعيّة، المواصفات الدوليّة للمسؤولية المجتمعيّة.، المسؤولية المجتمعيّة بين العمل الخيري والتخطيط المنهجي، معوّقات انتشار المسؤولية المجتمعيّة)	4
9	**المسؤولية المجتمعية والتنمية المستدامة** (مفهوم ، أبعاد، خصائص، مؤشرات الاستدامة، علاقة المسؤولية المجتمعية بالاستدامة)	4
10	**نماذج لمبادرات تطوّعية وتجارب ناجحة في المسؤوليّة المجتمعيّة**	6
	المجموع	30

د. أنشطة تقييم الطلبة

م	أنشطة التقييم	توقيت التقييم (بالأسبوع)	النسبة من إجمالي درجة التقييم
1	اختبار منتصف الفصل تحريري (مقالي + موضوعي)	التاسع	%30
2	مشاريع وتكليفات (بحث + عرض بوربوينت)	خلال الفصل الدراسي	%20
3	اختبار تحريري نهائي (مقالي + موضوعي)	التاسع عشر	%40
4	مشاركة وتفاعل	خلال الفصل الدراسي	%10
5	اجمالي		%100

أنشطة التقييم (اختبار تحريري، شفهي، عرض تقديمي، مشروع جماعي، ورقة عمل وغيره).

هـ. مصادر التعلم والمرافق:

1. قائمة المراجع ومصادر التعلم:

المرجع الرئيس للمقرر	• هيئة الخبراء. (2020). *وثيقة نظام العمل التطوعي*. مجلس الوزراء بالمملكة العربية السعودية. • نفخة، شنيب زروق. (2020). *العمل التطوعي ورؤية السعودية 2030: النظرية والتطبيق*. مكتبة المتنبي. الطريسي، أحمد ذعار. (2021). *التطوع حياة: دليلك المختصر للعمل التطوعي*. دار الحضارة للنشر والتوزيع.
المراجع المساندة	• الأسرج، حسين عبدالمطلب. (2018). *المسؤولية الاجتماعية للشركات في الدول العربية*. حقوق النشر والتوزيع خاصة للمؤلف. • مجاهد، نهى عادل. (2018). *التعليم والمسئولية المجتمعية والتنمية المستدامة بين الواقع والمأمول*. دار النهضة العربية. • منصة التطوع الصحي. (2020). *لبيه يا وطن: التطوع الصحي*. وزارة الصحة. • منصة العمل التطوعي. (2020). *بنك الفرص التطوعية*. وزارة الموارد البشرية والتنمية الاجتماعية. • الدلقان، عبدالعزيز عبدالمحسن. (2018). *واقع العمل التطوعي في المجال الصحي بالمملكة العربية السعودية*. العبيكان. • مركز رؤية للدراسات الاجتماعية. (2014). *الشباب والعمل التطوعي وخدمة المجتمع السعودي : (أحداث جدة نموذجا)*. سلسلة الدراسات والبحوث. الرياض. • الحزيم، يوسف عثمان. (2014). *قوة التطوع : تطبيقاته السعودية*. مركز الأميرة العنود لتنمية الشباب (وارف). • التويجري، بسمة. (2020). *من المجتمع للمجتمع: دليل لصناع التغيير*. دار الادب العربي للنشر والتوزيع. • العمل الاجتماعي التطوعي = **voluntary social work** : الواقع ... والمأمول / الأستاذ الدكتور أحمد إبراهيم حمزة. 2021. • التويجري، صالح حمد. (2020). *العمل التطوعي: آفاق وتطلعات*. مكتبة العبيكان. جامعة القدس المفتوحة. (2010). *مقرر المسؤولية الاجتماعية*. جامعة القدس المفتوحة. عمان. الأردن.

المصادر الإلكترونية	• https://vision2030.gov.sa/ar/node/12 رؤية المملكة 2030 • https://www.hrsd.gov.sa/ar/knowledge-centre/decisions-and-regulations/regulation-and-procedures/599262 وزارة الموارد البشرية • https://dspace.qou.edu/contents/0306/unit7/index.html جامعة القدس
أخرى	

2. المرافق والتجهيزات المطلوبة:

العناصر	متطلبات المقرر
المرافق النوعية (القاعات الدراسية، المختبرات، قاعات العرض، قاعات المحاكاة ... إلخ)	**قاعات دراسية**
التجهيزات التقنية (جهاز عرض البيانات، السبورة الذكية، البرمجيات)	**جهاز عرض البيانات ، السبورة الذكية**
تجهيزات أخرى (تبعاً لطبيعة التخصص)	

و. تقويم جودة المقرر:

مجالات التقويم	المقيمون	طرق التقييم
فاعلية التدريس	**الطلاب**	**استبيان لتقييم آراء الطلاب**
فاعلية طرق تقييم الطلاب	**أعضاء هيئة التدريس**	**تقييم مستقل داخلي**
مصادر التعلم	**أعضاء هيئة التدريس** **الطلاب**	**استبانات** **استبانات**
مدى تحصيل مخرجات التعلم للمقرر	**أعضاء هيئة التدريس**	**تقرير المقرر**
أخرى		

المقيمون (الطلبة، أعضاء هيئة التدريس، قيادات البرنامج، المراجع النظير، أخرى (يتم تحديدها).

طرق التقييم (مباشر وغير مباشر).

ز. اعتماد التوصيف:

COUNCIL /COMMITTEE	**Department of Electrical Engineering Council**
REFERENCE NO.	**Department Council Meeting minutes NO.0 (1445)**
DATE	**/4/2024**

جامعة الحدود الشمالية
NORTHERN BORDER UNIVERSITY

Attachments

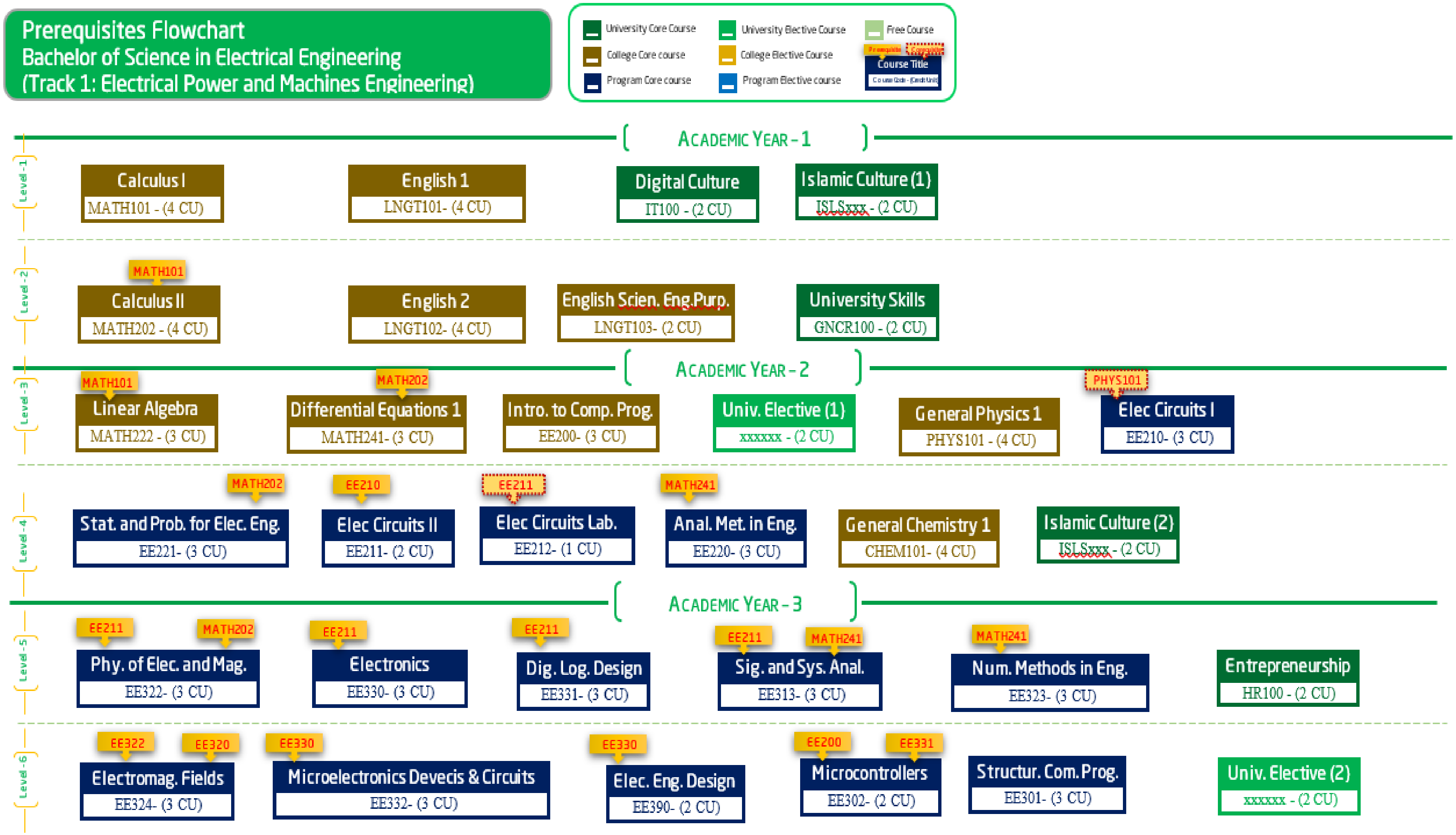
من الشمال...إلى الوطن

فهرس المرفقات

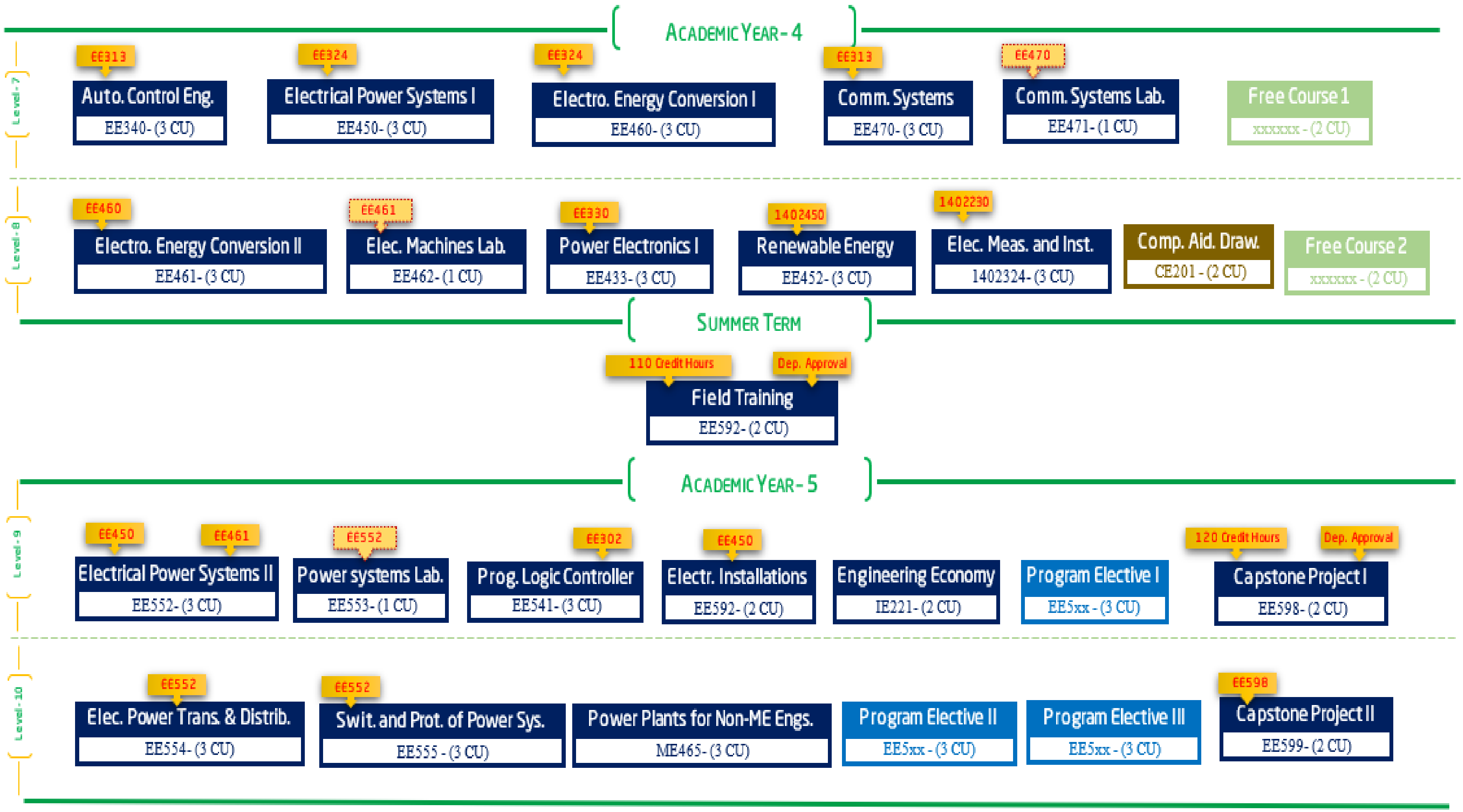
من الشمال...إلى الوطن

Table of Attachments

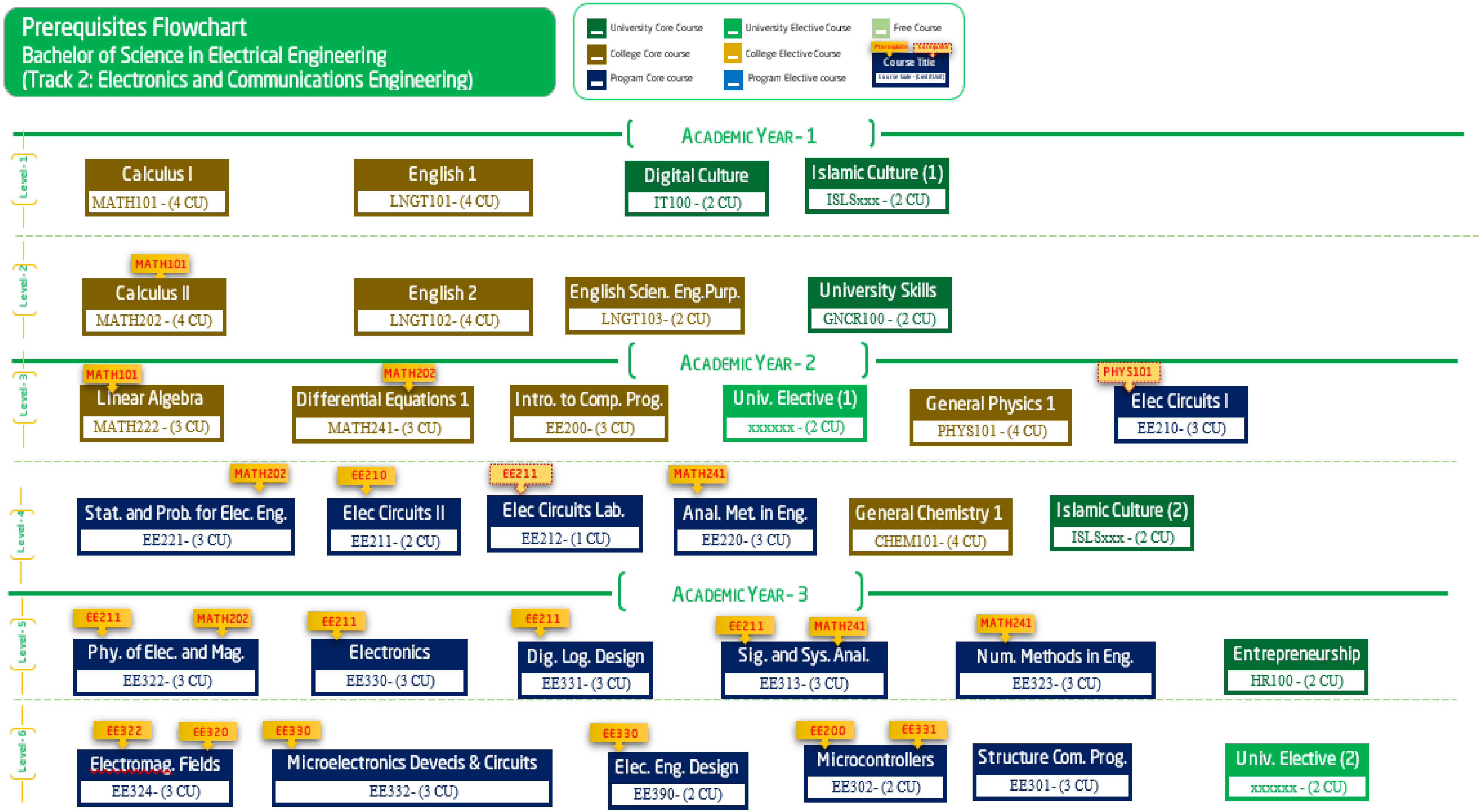
No.	Elements
1	Prerequisites Flowchart
2	Consistency of the Program with the National Qualifications Framework in the Kingdom of Saudi Arabia 1441 H - 2020 G
3	Consistency of the program with the Saudi Standard Classification of Educational Levels and Specializations 1441 H - 2020 G
4	Mission and Objectives of the program with consistent matrices



Prerequisites Flowchart
Bachelor of Science in Electrical Engineering
(Track 1: Electrical Power and Machines Engineering)
University Core Course
University Elective Course
Free Course
College Core course
College Elective Course
Program Core course
Program Elective course
Prerequisite
Corequisite
Course Title
Course Code - (Credit Unit)
ACADEMIC YEAR - 1
Level - 1
Calculus I
MATH101 - (4 CU)
English 1
LNGT101- (4 CU)
Digital Culture
IT100 - (2 CU)
Islamic Culture (1)
ISLSxxx - (2 CU)
Level - 2
MATH101
Calculus II
MATH202 - (4 CU)
English 2
LNGT102- (4 CU)
English Scien. Eng.Purp.
LNGT103- (2 CU)
University Skills
GNCR100 - (2 CU)
ACADEMIC YEAR - 2
Level - 3
MATH101
Linear Algebra
MATH222 - (3 CU)
MATH202
Differential Equations 1
MATH241- (3 CU)
Intro. to Comp. Prog.
EE200- (3 CU)
Univ. Elective (1)
xxxxxx - (2 CU)
General Physics 1
PHYS101 - (4 CU)
PHYS101
Elec Circuits I
EE210- (3 CU)
Level - 4
MATH202
Stat. and Prob. for Elec. Eng.
EE221- (3 CU)
EE210
Elec Circuits II
EE211- (2 CU)
EE211
Elec Circuits Lab.
EE212- (1 CU)
MATH241
Anal. Met. in Eng.
EE220- (3 CU)
General Chemistry 1
CHEM101- (4 CU)
Islamic Culture (2)
ISLSxxx - (2 CU)
ACADEMIC YEAR - 3
Level - 5
EE211
MATH202
Phy. of Elec. and Mag.
EE322- (3 CU)
EE211
Electronics
EE330- (3 CU)
EE211
Dig. Log. Design
EE331- (3 CU)
EE211
MATH241
Sig. and Sys. Anal.
EE313- (3 CU)
MATH241
Num. Methods in Eng.
EE323- (3 CU)
Entrepreneurship
HR100 - (2 CU)
Level - 6
EE322
EE320
Electromag. Fields
EE324- (3 CU)
EE330
Microelectronics Devecis & Circuits
EE332- (3 CU)
EE330
Elec. Eng. Design
EE390- (2 CU)
EE200
EE331
Microcontrollers
EE302- (2 CU)
Structur. Com. Prog.
EE301- (3 CU)
Univ. Elective (2)
xxxxxx - (2 CU)



Academic Year - 4
Level - 7
EE313
Auto. Control Eng.
EE340 - (3 CU)
EE324
Electrical Power Systems I
EE450 - (3 CU)
EE324
Electro. Energy Conversion I
EE460 - (3 CU)
EE313
Comm. Systems
EE470 - (3 CU)
EE470
Comm. Systems Lab.
EE471 - (1 CU)
Free Course 1
xxxxxx - (2 CU)
Level - 8
EE460
Electro. Energy Conversion II
EE461 - (3 CU)
EE461
Elec. Machines Lab.
EE462 - (1 CU)
EE330
Power Electronics I
EE433 - (3 CU)
1402450
Renewable Energy
EE452 - (3 CU)
1402230
Elec. Meas. and Inst.
1402324 - (3 CU)
Comp. Aid. Draw.
CE201 - (2 CU)
Free Course 2
xxxxxx - (2 CU)
Summer Term
110 Credit Hours
Dep. Approval
Field Training
EE592 - (2 CU)
Academic Year - 5
Level - 9
EE450
EE461
Electrical Power Systems II
EE552 - (3 CU)
EE552
Power systems Lab.
EE553 - (1 CU)
EE302
Prog. Logic Controller
EE541 - (3 CU)
EE450
Electr. Installations
EE592 - (2 CU)
Engineering Economy
IE221 - (2 CU)
Program Elective I
EE5xx - (3 CU)
120 Credit Hours
Dep. Approval
Capstone Project I
EE598 - (2 CU)
Level - 10
EE552
Elec. Power Trans. & Distrib.
EE554 - (3 CU)
EE552
Swit. and Prot. of Power Sys.
EE555 - (3 CU)
Power Plants for Non-ME Engs.
ME465 - (3 CU)
Program Elective II
EE5xx - (3 CU)
Program Elective III
EE5xx - (3 CU)
EE598
Capstone Project II
EE599 - (2 CU)


Prerequisites Flowchart
Bachelor of Science in Electrical Engineering
(Track 2: Electronics and Communications Engineering)
University Core Course
University Elective Course
Free Course
College Core course
College Elective Course
Program Core course
Program Elective course
Course Title
Academic Year - 1
Level - 1
Calculus I
MATH101 - (4 CU)
English 1
LNGT101 - (4 CU)
Digital Culture
IT100 - (2 CU)
Islamic Culture (1)
ISLSxxx - (2 CU)
Level - 2
MATH101
Calculus II
MATH202 - (4 CU)
English 2
LNGT102 - (4 CU)
English Scien. Eng. Purp.
LNGT103 - (2 CU)
University Skills
GNCR100 - (2 CU)
Academic Year - 2
Level - 3
MATH101
Linear Algebra
MATH222 - (3 CU)
MATH202
Differential Equations 1
MATH241 - (3 CU)
Intro. to Comp. Prog.
EE200 - (3 CU)
Univ. Elective (1)
xxxxxx - (2 CU)
General Physics 1
PHYS101 - (4 CU)
PHYS101
Elec Circuits I
EE210 - (3 CU)
Level - 4
MATH202
Stat. and Prob. for Elec. Eng.
EE221 - (3 CU)
EE210
Elec Circuits II
EE211 - (2 CU)
EE211
Elec Circuits Lab.
EE212 - (1 CU)
MATH241
Anal. Met. in Eng.
EE220 - (3 CU)
General Chemistry 1
CHEM101 - (4 CU)
Islamic Culture (2)
ISLSxxx - (2 CU)
Academic Year - 3
Level - 5
EE211
MATH202
Phy. of Elec. and Mag.
EE322 - (3 CU)
EE211
Electronics
EE330 - (3 CU)
EE211
Dig. Log. Design
EE331 - (3 CU)
EE211
MATH241
Sig. and Sys. Anal.
EE313 - (3 CU)
MATH241
Num. Methods in Eng.
EE323 - (3 CU)
Entrepreneurship
HR100 - (2 CU)
Level - 6
EE322
EE320
Electromag. Fields
EE324 - (3 CU)
EE330
Microelectronics Deveds & Circuits
EE332 - (3 CU)
EE330
Elec. Eng. Design
EE390 - (2 CU)
EE200
EE331
Microcontrollers
EE302 - (2 CU)
Structure Com. Prog.
EE301 - (3 CU)
Univ. Elective (2)
xxxxxx - (2 CU)

Academic Year - 4

Level - 7

- EE313 — Auto. Control Eng. — EE340-(3 CU)
- EE324 — Electrical Power Systems I — EE450-(3 CU)
- EE301 — Intro. to Artificial intelligence — EE403-(3 CU)
- EE313 — Commu. Systems — EE470-(3 CU)
- EE470 — Com. Systems Lab. — EE471-(1 CU)
- Comp. Aid. Draw. — CE201 - (2 CU)
- Free Course 1 — xxxxxx - (2 CU)

Level - 8

- EE332 — VLSI Circuit design — EE434-(3 CU)
- EE404 — FPGA system Lab. — EE435-(1 CU)
- EE200, EE331 — Microprocessors — EE404-(3 CU)
- EE302, EE404 — Microp. and Microc. Lab. — EE405-(3 CU)
- EE470 — Digital Comm. Systems — EE472-(3 CU)
- EE330 — Engineering Mea. Inst — EE414-(2 CU)
- Free Course 2 — xxxxxx - (2 CU)

Summer Term

- 110 Credit Hours, Dep. Approval — Field Training — EE592-(2 CU)

Academic Year - 5

Level - 9

- EE324 — Antenna Theory — EE573-(3 CU)
- EE573 — Antenna Lab — EE574-(1 CU)
- EE332 — Intro. to Opt. Devi. and Sys. — EE536 -(3 CU)
- EE313 — Digital Signal Processing — EE580-(3 CU)
- Program Elective I — EE25xx - (3 CU)
- 120 Credit Hours, Dep. Approval — Capstone Project I — EE598-(2 CU)

Level - 10

- EE302 — Prog. Logic Controller — EE541-(3 CU)
- EE434 — Intro. to Embedded Systems — EE506-(3 CU)
- Engineering Economy — IE221-(2 CU)
- Program Elective II — EE5xx - (3 CU)
- Program Elective III — EE5xx - (3 CU)
- EE598 — Capstone Project II — EE599-(2 CU)

Consistency of the Program with the National Qualifications Framework in the Kingdom of Saudi Arabia 1441 H - 2020 G

The report on the program's consistency with the National Framework for Qualifications (NQF) includes four areas of comparison:

1. Use qualifications titles that clearly and accurately describe the educational sector, the level of qualification, and the field of study or specialization.
2. The minimum number of credit hours required for the intended qualification according to the number of years to complete the program.
3. Learning Areas/Domains (Knowledge and Understanding - Skills - Values).
4. Consistency of the program learning outcomes (PLOs) with the levels (learning outcomes) of each domain in the National Qualifications Framework.

The following table shows the extent of the program's consistency with the Saudi Framework for Qualifications:

Field of comparison	Benchmark NQF	Program	The extent to which the program is consistent with NQF
Program level and degree title	Level 6 Bachelor	**Level 6** **Bachelor of Science of Electrical Engineering**	The program title describes the level of the degree and the major as introduced in NQF
Credit hours and number of number of years in the program	• At least 120 credits (for 4-year undergraduate programs) • At least 150 credit hours (for 5-year undergraduate programs) At least 3 years' bachelor's degree	**(155)** **Credit Hours** **(5)** **Years**	The Credit hours are consistent with NQF because it falls within the specified range for the number of hours for undergraduate programs in the NQF, which exceeding the minimum of 150 credit hours for **5** years program. And the number of years of the program is 5 that exceeds the minimum 3 years bachelor's degree.
Learning Domains	• Knowledge and Understanding • Skills Values	• Knowledge and Understanding • Skills Values	The learning domains are consistent as the program has the same learning areas mentioned in the NQF.
Learning outcomes	As shown in **Matrix 1**	As shown in **Matrices 2 and 3**	The learning outcomes matrix shows the consistency of all learning outcomes for the level 6 defined in the NQF with the Electrical Engineering program learning outcomes.

Matrix 1. The targeted learning outcomes of the bachelor's program in the NQF

Domains	Code	Learning outcomes for level 6, bachelor's degree
Knowledge and understanding	K1	Broad in-depth integrated body of knowledge and comprehension of the underlying theories, principles, and concepts in one or more disciplines or field of work,
	K2	In-depth knowledge and comprehension of processes, materials, techniques, practices, conventions, and/or terminology,

		K3	A broad range of specialized knowledge and understanding informed by current developments of a discipline, profession, or field of work.
		K4	Knowledge and comprehension of research and inquiry methodologies.
Skills	Cognitive Skills	S1	Apply integrated theories, principles, and concepts in various contexts, related to a discipline, profession, or field of work
		S2	Solve problems in various complex contexts in one or more disciplines or fields of work,
		S3	Use critical thinking and develop creative solutions to current issues and problems, in various complex contexts, in a discipline, profession or field of work,
		S4	Conduct inquiries, investigations, and research for complex issues and problems,
	Practical and Physical Skills	S5	Use and adapt advanced processes, techniques, tools, instruments, and/or materials in dealing with various complex practical activities,
		S6	Carry out various complex practical tasks and procedures related to a discipline, professional practice, or field of work.
	Communication and ICT Skills	S7	Communicate effectively to demonstrate theoretical knowledge comprehension and specialized transfer of knowledge, skills, and complex ideas to a variety of audiences,
		S8	Use mathematical operations and quantitative methods to process data and information in various complex contexts, related to a discipline or field of work,
		S9	Select, use, and adapt various standard and specialized digital technological and ICT tools and applications to process and analyze data and information to support and enhance research and/or projects.
Values, Autonomy and Responsibility	Values and Ethics	V1	Demonstrate commitment to professional and academic values, standards, and ethical codes of conduct, and represent responsible citizenship and coexistence with others
	Autonomy and Responsibility	V2	Effectively plan for and achieve academic and/or professional self- development, assess own learning and performance, and autonomously make decisions regarding self-development and/or tasks based on convincing evidences.
		V3	Autonomously and professionally manage tasks and activities related to the discipline and/or work,
		V4	Collaborate responsibly and constructively on leading diverse teams to perform a wide range of tasks while playing a major role in planning and evaluating joint work,
		V5	Actively participate in advancing the discipline and society.

Matrix 2. The targeted learning outcomes of Electrical Engineering Bachelor's Program

Code	Program Learning Outcomes (PLOs)
Knowledge and understanding	
K1	An ability to demonstrate a coherent and broad body of knowledge in basic sciences, mathematics and concepts in the electrical engineering discipline
Skills	
S1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
S2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
S3	An ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions
S4	An ability to communicate effectively with a range of audiences
Values	
V1	An ability to Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
V2	An ability to Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
V3	An ability to Acquire and apply new knowledge as needed, using appropriate learning strategies

Matrix 3. Matrix of consistency of Electrical Engineering learning outcomes with (NQF)

NQF Learning Outcomes		Program Learning Outcomes																		
		Knowledge and Understanding						Skills								Values, Autonomy and Responsibility				
		K1	K2	K3	K...			S1	S2	S3	S4					V1	V2	V3	V...	
Knowledge and Understanding	K1	✓																		
	K2	✓																		
	K3	✓																		
	K4	✓																		
Skills	S1							✓												
	S2							✓												
	S3								✓											
	S4								✓											
	S5									✓										
	S6									✓										
	S7										✓									
	S8										✓									
	S9										✓									
Values, Autonomy and Responsibility	V1															✓				
	V2																	✓		
	V3															✓				
	V4																✓			
	V5															✓				

Consistency of the Program with the Saudi Standard Classification of Educational Levels and Specializations 1441 H - 2020 G

Table 33. Consistency with the Saudi Standard Classification of Educational Levels and Specializations

<table>
<tr><th></th><th>Name</th><th colspan="2">Code</th></tr>
<tr><td>Broad field</td><td>Engineering, Manufacturing And Construction</td><td colspan="2">(07)</td></tr>
<tr><td>Narrow field</td><td>Engineering And Engineering Trades</td><td colspan="2">(071)</td></tr>
<tr><td>Detailed Field</td><td>Electricity And Energy</td><td colspan="2">(0713)</td></tr>
<tr><td>Specialization Name</td><td>Electrical Engineering</td><td colspan="2">(071301)</td></tr>
<tr><th rowspan="2">Items</th><th rowspan="2">As Required in Saudi Standard Classification of Educational Levels and Specializations</th><th colspan="2">Consistency of the current program</th></tr>
<tr><th>Yes</th><th>No</th></tr>
<tr><td>Definition</td><td>This specialization aims to provide the student with the essential knowledge and skills to design, analyse and develop various electrical systems such as electronic circuits and systems, communication systems, generation and transmission systems of electric forces, automatic control systems and smart systems.</td><td>✓</td><td></td></tr>
<tr><td>Other Specializations Included In The Definition</td><td>• Electrical Power Engineering
• Electrical Engineering and Computers
• Power Engineering and Electrical Machines
• Electrical Machinery and Power Electronics
• Air Conditioning and Refrigeration Engineering</td><td>✓</td><td></td></tr>
<tr><td rowspan="5">Important Courses Under This Specialization</td><td>Principles and analysis of electrical circuits</td><td>✓</td><td></td></tr>
<tr><td>Electromagnetism engineering</td><td>✓</td><td></td></tr>
<tr><td>Signal and systems analysis</td><td>✓</td><td></td></tr>
<tr><td>Microelectronic devices and circuits</td><td>✓</td><td></td></tr>
<tr><td>Communication theory and systems</td><td>✓</td><td></td></tr>
</table>

Mission and Objectives of the program with consistency matrices

Table 34. Consistency of the program mission with the mission of the college and the university

Domains of consistency	Teaching and Learning	Research and Innovation	Community Engagement	Other	Number of words
University mission	We are a regionally serving, comprehensive university committed to educational excellence. Guided by our core values, heritage, and place, we deliver innovative educational programs characterized by outcomes that leverage the human, economic, cultural, and natural resources for the Northern Borders Region and beyond.				
Consistency of the university's mission with consistency areas	✓	✓	✓		43
College mission	To provide high quality engineering programs, distinguished scientific research and contribute to the community service to meet the needs of development and supporting mining fields in the northern border region and throughout the kingdom				
Keywords from the college mission through which consistency is achieved	Teaching and Learning	Research and Innovation	Community Engagement	Other[1]	Number of words
provide high quality engineering programs	✓				66
distinguished scientific research		✓			
contribute to the community service			✓		
Developed program mission	To prepare electrical engineering graduates that compete in the labor market, sustain self-learning and professional development, and contribute to scientific research and community service.				
Keywords from the developed program mission through which consistency is achieved	Teaching and Learning	Research and Innovation	Community Engagement	Other	Number of words
To prepare electrical engineering graduates that compete in the labor market, sustain self-learning and professional development,	✓				24
and contribute to scientific research		✓			
community service			✓		

Table 35. The Program Objectives of the Electrical Engineering Bachelor's Program

Code	Program Objectives (POs)
PO1	Serve competently in the professional career and academia by demonstrating high-quality knowledge and skills in the Electrical Engineering field.
PO2	Display self-learning, research, and critical thinking capability and take initiative in advancing their education and professional standing.
PO3	Function as a team member with the capability for leadership and effective communication.
PO4	Exhibit commitment to social responsibilities, ethical values, and meaningful community contributions.

Table 36. Consistency of the Objectives of the program with the mission of the program

Developed program goals	Domains of consistency with the mission of the developed program			
	Research and innovation	Community engagement	Teaching and learning	Other
PO1			✓	
PO2	✓		✓	
PO3			✓	
PO4		✓		

Table 37. The university objectives of Northern Border University

University objectives		Goals numbers
UG1	Providing excellent education that sharpens intellect and professionalism.	4
UG2	Stimulating research and innovation following the university's research priorities.	
UG3	Developing community partnership.	
UG4	Developing an administrative and financial system that enhances management efficiency and diversifies sources of income.	

Table 38. Matrix of consistency of program outcomes with the Objectives of the university

Program Goals	Matrix of consistency of program goals with the goals of the university			
	UO1	UO2	UO3	UO4
PO1	✓			
PO2		✓		
PO3	✓			
PO4			✓	✓

Table 39. The College goals of College of Engineering

College Goals		Goals numbers
CG1	Provide accredited academic programs in engineering and mining fields to meet the needs of the labor market and the development requirements	6
CG2	Prepare highly qualified and competitive engineers	
CG3	Provide an attractive and supportive work environment for faculty members and researchers	
CG4	Promote scientific research and innovation in engineering and mining fields	
CG5	Strengthen community partnerships and provide distinguished engineering services	
CG6	Improve the facilities, the equipment, and the support services	

Table 40. Matrix of consistency of program outcomes with the goals of the college

Program goals	Matrix of consistency of program outcomes with the goals of the college					
	CG1	CG2	CG3	CG4	CG5	CG6
PO1	✓	✓				
PO2			✓	✓	✓	✓
PO3	✓	✓				
PO4					✓	

Table 41. The Learning Outcomes of Northern Border University Graduates Attributes

Learning Outcomes of Northern Border University Graduates Attributes		
GA1	National identity	Demonstrate high standards of ethical and socially responsible behavior, as well as academic and professional honesty and integrity; contribute to finding solutions to social problems; and commit to being a responsible citizen.
GA2	Self-management Critical thinking	Demonstrate self-management skills, self-learning and critical thinking, the ability to take initiative to self-develop according to specific standards, and ability to present evidence and arguments to make a decision unbiasedly.
GA3	Digital culture	Effectively use information technology, analytical, mathematical, and statistical tools to perform data analysis, suggest solutions, and solve problems using critical thinking.
GA4	Teamwork	Have the ability to lead a team, assume responsibility for performing tasks and developing work, achieve goals effectively, and promote health, psychological and social aspects.
GA5	Entrepreneurship	Identify the function of entrepreneurship and its requirements in the successful, commercial application.
GA6	Communication skills	Effectively communicate both verbally and in writing, using appropriate presentation forms, scholarly language, adequate reasoning for various issues and dealing with beneficiaries.

Table 42. Consistency of the outcomes of the developed program with NBU Graduate Attributes

Developed program goals	Consistency Matrix of the goals of the developed program with NBU Graduates Attributes						
	GA1	GA2		GA3	GA4	GA5	GA6
	National identity	Self-management	Critical thinking	Digital culture	Teamwork	Entrepreneurship	Communication skills
PG1	✓			✓			
PG2			✓				
PG3		✓			✓	✓	✓
PG4		✓					