Ministry of Higher Education and Scientific Research

Supervision and Scientific Evaluation Apparatus

Quality Assurance and Academic Accreditation Department

Academic Program Description of the Department of Electronic Engineering

Academic Year 2025 – 2026

Academic Program Description Form

University Name: University of Ninevah

College/Institute: College of Electronics Engineering

Scientific Department: Department of Electronic Engineering

Academic or Professional Program Name: Bachelor of Science in Electronic Engineering

Final Degree Name: Bachelor of Science in Electronic Engineering

Study System: Annual, with the Bologna system for the first and second classes

Description Preparation Date: 24-5-2025

File Completion Date: 24-5-2026

Signature

Scientific Associate: Asst. Prof. Dr.
Bilal Alaa Al-Deen Jabr

Date

Signature

Head of Department: Asst. Prof. Dr.
Harith Ahmed Mohammed

Date

The file was reviewed by the Quality Assurance and University Performance Unit

Name of the Director of the Quality Assurance and University Performance Unit:

Date

Signature

Approval of the Dean

Prof. Dr. Khalid Khalil Mohammed

1. Program Vision
Effective contribution to the development of the electronic industries in all their specializations, preparing distinguished scientific cadres, and qualifying undergraduate and postgraduate students to meet the needs of society and the labor market.

2. Program Mission
High-quality engineering education that keeps pace with international standards to prepare qualified graduates who serve society and develop the profession; promoting scientific research to produce engineering knowledge that serves reality and supports development; developing leadership skills and critical thinking among students and staff; and contributing to the development of industry and engineering institutions to achieve economic and social progress.

3. Program Objectives
1. Preparing engineers specialized in industrial electronics and medical instrumentation electronics with high qualifications that meet the needs of the labor market.
2. Producing scientific and applied research in the fields of electronic engineering that contributes to solving industrial and service problems in society.
3. Awarding postgraduate degrees in the department's various specializations according to high academic standards.
4. Strengthening the department's role in community service by organizing seminars, conferences and continuing education programs.
5. Engineering ethics: graduating engineers who uphold the ethics of the engineering profession. **These objectives are published electronically on the university website.** **communication of department the of goals and mission** **https://uoninevah.edu.iq/ee/en/visionengineering** •

4. Program Accreditation

The department applied for program accreditation for the academic year 2024/2025. Program accreditation has not been granted yet.

5. Other External Influences

The program complies with the instructions of the Ministry of Higher Education and Scientific Research.

6. Program Structure

Notes *	Percentage	Study Units	Number of Courses	Program Structure
Core course	%7.8	12	4	Institution Requirements
Core course	%23.4	36	8	College Requirements
Core course	%68.8	106	25	Department Requirements
Core	In the third stage			Summer Training
				Other

* Notes may indicate whether the course is core or elective.

7. Program Description

Credit Hours		Course or Module Name	Course or Module Code	Academic Stage
Practical	Theoretical			
-	3	Mathematics I	NVEE206	First / Semester 1
3	3	DC Circuits Analysis	NVEE215	First / Semester 1
-	2	Physical Electronics	NVEE218	First / Semester 1
2	2	Computer science	NVEEEL114	First / Semester 1
-	2	Mechanical engineering principles	NVEE203	First / Semester 1
-	2	Democracy and Human Rights	NV12	First / Semester 1
3	3	AC Circuits Analysis	NVEE216	First / Semester 2
	3	Mathematics II	NVEE207	First / Semester 2
-	2	Physics Of Semiconductor	NVEE219	First / Semester 2
2	2	Digital Techniques	NVEE217	First / Semester 2
3	-	Engineering Drawing	NVEE201	First / Semester 2
	2	English	NVU11	First / Semester 2
Second / Medical Instrumentation Electronics				
-	2	Engineering Analysis I	NVEE208	Second / Semester 1
2	2	Signal Analysis	NVEEELM211	Second / Semester 1
3	2	Electronic I	NVEEELM212	Second / Semester 1

-	3	Digital design	NVEE223	Second / Semester 1
2	2	Electromagnetic fields I	NVEE215	Second / Semester 1
-	2	Human Physiology	NVEEELM 213	Second / Semester 1
2	2	signals and systems	NVEE210	Second / Semester 2
-	2	Engineering Analysis II	NVEE209	Second / Semester 2
-	2	Electronic II	NVEEELM221	Second / Semester 2
2	2	programming	NVEEELM222	Second / Semester 2
	2	Electromagnetics FieldsII	NVEE221	Second / Semester 2
-	2	The Crimes of the Defunt Baath Party	NVU13	Second / Semester 2
				Second / Industrial
-	2	Engineering Analysis I	NVEE208	Second / Semester 1
3	2	Electronic I	NVEEELI212	Second / Semester 1
2	2	DC Machines	NVEEELI213	Second / Semester 1
2	2	Computer Programming	NVEEELI214	Second / Semester 1
-	2	The crimes of the defunct Baath Party	NVU13	Second / Semester 1
-	2	Fundamentals of Electromagnetics	NVEE221	Second / Semester 1
-	2	Engineering Analysis II	NVEE209	Second / Semester 2
2	2	Electronics II	NVEEELI222	Second / Semester 2
2	2	AC Machines	NVEEELI223	Second / Semester 2
2	2	Computer Languages	NVEEELI224	Second / Semester 2
-	3	Digital Design	NVEE223	Second / Semester 2
2	2	Signals and Systems	NVEE210	Second / Semester 2
Third / Medical Instrumentation Electronics				
2	2	Digital Signal Processing I	NVEEELM301	Third / Semester 1
2	2	Power Electronics	NVEEELM302	Third / Semester 1
-	3	Measurements Instruments Systems	NVEEELM303	Third / Semester 1
-	2	Medical Sensors and Transducers	NVEEELM304	Third / Semester 1
2	2	Digital systems design using HDL	NVEEELM305	Third / Semester 1
2	3	Analog Electronics III	NVEEELM306	Third / Semester 1
-	3	Numerical Analysis	NVEEELM307	Third / Semester 1
-	2	Arabic II	NVU17	Third / Semester 1
2	2	Digital Signal Processing II	NVEEELM308	Third / Semester 2
-	3	Probabilty and Statistics	NVEEELM309	Third / Semester 2
-	3	Medical Physics	NVEEELM310	Third / Semester 2
-	2	Communication	NVEEELM311	Third / Semester 2
-	3	Medical Instruments	NVEEELM312	Third / Semester 2
-	3	Medical Electronics Systems	NVEEELM313	Third / Semester 2
-	3	Electro and Analytical Chemistry sciences	NVEEELM314	Third / Semester 2
Third / Industrial				

2	3	Power Converters II	NVEEELI308	Third / Semester 1
2	2	Control Engineering II	NVEEELI309	Third / Semester 1
-	3	Probabilty and Statistics	NVEEELI310	Third / Semester 1
-	2	Communication	NVEEELI311	Third / Semester 1
2	2	Programmable Logic Controllers	NVEEELI312	Third / Semester 1
2	2	Digital Signal Processing	NVEEELI313	Third / Semester 1
2	2	Microprocessors	NVEEELI314	Third / Semester 1
-	4	Modeling and Optimization I	NVEEELI401	Third / Semester 2
2	2	Microcontroller	NVEEELI402	Third / Semester 2
-	3	Switch-Mode Power Supplies	NVEEELI403	Third / Semester 2
-	3	Battery Management Systems	NVEEELI408	Third / Semester 2
-	3	Renewable Energy Sciences	NVEEELI405	Third / Semester 2
2	-	Graduation Project Design	NVEEELI406	Third / Semester 2
-	3	Industrial Electronic	EEEL4301	Fourth
-	3	DATA TRANSMISSION& COMPUTER ETWORKS	EEEL4302	Fourth
-	3	Microprocessor	EEEL4309	Fourth
-	3	Micro Controller	EEEL4303	Fourth
-	3	Microelectronics	EEEL4304	Fourth
-	3	Radiation	EEEL4305	Fourth
-	3	Antenna & Propagation	EEEL4308	Fourth
-	3	Computer aided design	EEEL4306	Fourth
3	1	Engineering Project	EEEL4201	Fourth
6	-	Laboratory	EEEL4307	Fourth

8. Expected Learning Outcomes of the Program
A- Cognitive Objectives

A1. Enabling graduates to acquire knowledge, understanding, and the basic principles and theories in the field of electronic engineering.
A2. Enabling graduates to understand and comprehend modern advanced scientific topics in the precise specialization of electronic engineering.
A3. Enabling graduates to understand the mathematical principles and fundamentals for representing, analyzing and studying systems, and how to design various electronic systems.
A4. Helping students become acquainted with the most important computer software used in solving engineering problems, and to be able to understand the operating principles of electronic systems and how to program them to perform specific practical tasks.

B- Program-Specific Skill Objectives

B1. The ability to design and implement the assembly components of electronic systems.
B2. The ability to design and implement various software, in addition to software related to basic operating systems and information systems, and the ability to use advanced and diverse technologies and employ them in different applications.
B3. The ability to understand the design and operating principles of electronic devices and keep pace with modern technology.
B4. The ability to set appropriate specifications for electronic devices and the basic software required to operate them, in addition to the technical equipment needed to implement automation and e-government processes.

Teaching and Learning Strategies

• Follow-up through the progress of assignments and accuracy in handling them
• Forming small groups of students to solve a specific problem and exchange views with colleagues about it
• Opening discussion on some issues in a way that ensures everyone's participation and gets them used to hearing different opinions

Assessment Methods

1- Semester and final examinations
2- Short daily quizzes
3- Conducting laboratory experiments, writing reports and discussing laboratory results
4- Participation in scientific conferences and class activities that include designing some electronic systems
5- Electronic exams and timed assignments on e-learning platforms

C- Affective and Value Objectives

C1. Developing the student's ability to perform assigned tasks and complete them on time with accuracy and dedication.

C2. Scientific analytical thinking based on fundamental scientific and logical rules.

C3. Enabling the student to engage in fruitful dialogue and discussion on issues related to his specialization.

C4. Exchanging views and giving others the opportunity to clarify different viewpoints on the issues raised.

Assessment Methods

- ✓ Evaluating and correcting students' joint work (basic and applied).
- ✓ Recognizing those with constructive opinions and a scientific approach to solving various problems.
- ✓ Adopting students' opinions and feedback through electronic questionnaires and taking the majority view.

D- General and Transferable Qualifying Skills (other skills related to employability and personal development)

1. The ability to perform scientific and logical analysis based on basic facts or applied experience in employment.
2. The possibility of using advanced technology of all kinds to carry out important applications in the various fields of electronics engineering.
3. The ability to work within a team and cooperate to accomplish a specific task through active participation and exchanging different views to reach the optimal solution.
4. The ability for self-development, keeping up with modern technology and advanced applications, and benefiting from the information and skills acquired in the academic program.

Teaching and Learning Methods

- ✓ Continuous follow-up of the academic program in all its activities.
- ✓ Forming groups of students and involving them in solving a real problem and discussing the proposed solutions.
- ✓ Opening dialogue on some issues and hearing different opinions about the program and its continuous development.
- ✓ Focusing on the nature of the problems addressed by final-year graduation projects, emphasizing applied ones that give students additional experience useful to them later in the field of work upon employment.

Assessment Methods

- ✓ Students' grades upon graduation.
- ✓ Rate of participation in various activities and tasks.
- ✓ Self-assessment and comparison with the assessment of colleagues and professors.
- ✓ Personal interviews with students about to graduate.
- ✓ Interviews with beneficiary bodies and employment companies.

9. Assessment Methods

- Participation in the classroom, in person or online.
- Submitting laboratory reports.
- Evaluating the practical performance of experiments.
- Presenting various activities.
- Daily, semester and final tests, in person and online.

10. Teaching Staff

Specific Specialization	General Specialization	Degree	Academic Title	Full Name and Title	No.
Ph.D.	Electronics & Comm.	Electrical Eng.	Professor	Khalid Khalil Mohammed Jasim	1
Ph.D.	Plasma	Physics Sciences	Professor	Qais Thanoon Najm Abdullah Al-Ahmed Jasim	2
Ph.D.	Microelectronics	Electrical Eng.	Asst. Professor	Ahmed Thanoon Younis Hussein Al-Naqeeb	3
Ph.D.	Communications	Electrical Eng.	Asst. Professor	Mujahid Fahmi Ibrahim Ismail Al-Azzo	4
Ph.D.	Communications	Computer Eng.	Asst. Professor	Aws Zuhair Younis Sulaiman	5
Ph.D.	Power Electronics	Electrical Eng.	Asst. Professor	Harith Ahmed Mohammed Ahmed Al-Badrani	6
Ph.D.	Communications	Electrical Eng.	Asst. Professor	Ahmed Mohammed Ahmed Salama	7
Modern History	Ph.D. History		Hisham Swadi Hashim	Asst. Professor	8
Ph.D.	Microelectronics	Electrical Eng.	Lecturer	Omar Badr Mohammed Khidir Al-Nuaimi	9
Ph.D.	Communications	Computer Eng.	Lecturer	Ihab Isam Dawood Sulaiman Al-Rawji	10
Ph.D.	Computers & Informatics	Computer Eng.	Lecturer	Sahar Lazim Qaddouri Khudhair Al-Dulaimi	11
Ph.D.	Analysis and Processing of Digital Images	Computer Eng.	Lecturer	Sarmad Fakhruddin Ismail Jasim Al-Mawla	12
M.Sc.	Electronics & Comm.	Electrical Eng.	Lecturer	Sinan Khalid Mohammed Hassan Shanshal	13
M.Sc.	Electronics & Comm.	Electrical Eng.	Lecturer	Noor Talal Mahmood Aziz Kaddawi	14

M.Sc.	Electronics & Comm.	Electrical Eng.	Lecturer	Khalid Faza' Mahmood Mohammed	15
M.Sc.	Electronics	Electronic Eng.	Lecturer	Imad Abdulhaleem Abdo Ali Al-Mulla Khidir	16
M.Sc.	Electronics	Electronic Eng.	Lecturer	Abdulhameed Mohammed Jasim Mohammed Al-Jubouri	17
M.Sc.	Solid State	Electrical Eng.	Lecturer	Hamsa Fawaz Thanoon Mohammed Al-Rahhu	18
M.Sc.	Electronics & Comm.	Electrical Eng.	Lecturer	Hiba Abdulkhaliq Hamdoon Abd Al-Sawaf	19
M.Sc.	Power Electronics	Electrical Eng.	Asst. Lecturer	Shawkat Mohammed Younis Mulla Allah	20
M.Sc.	Electronics & Comm.	Electrical Eng.	Asst. Lecturer	Zahraa Siddiq Yahya Ahmed Al-Sayegh	21
M.Sc.	Electronics & Comm.	Electrical Eng.	Asst. Lecturer	Amina Idrees Kanaan Sulaiman Hayu	22
M.Sc.	Computers & Informatics	Computer Eng.	Asst. Lecturer	Asmaa Nabeel Khalil Omar	23
M.Sc.	Power Electronics	Electrical Eng.	Asst. Lecturer	Mohammed Ibrahim Mohammed Ahmed	24
M.Sc.	Electronics	Electronic Eng.	Asst. Lecturer	Humam Maher Abd Shaheen Al-Hamdani	25
M.Sc.	Computers	Computer Eng.	Asst. Lecturer	Younis Sabir Othman Khattab Al-Rifai	26
M.Sc.	Electronics	Electronic Eng.	Asst. Lecturer	Harith Hazim Thanoon Younis	27
M.Sc.	Electronics	Electrical Eng.	Asst. Lecturer	Ya'rub Abdulmuhsin Ahmed Hussein Al-Shalawi	28
M.Sc.	Electronics	Electronic Eng.	Asst. Lecturer	Sinan Mahmood Ayoub Mahmood Al-Rahhu	29
M.Sc.	Thermal Engineering	Mechanical Eng.	Asst. Lecturer	Mohammed Salih Safar Rasool	30
M.Sc.	Computers & Informatics	Electronic Eng.	Asst. Lecturer	Amer Talal Ali Ahmed	31
M.Sc.	Thermal Engineering	Mechanical Eng.	Asst. Lecturer	Hani Mohammed Salih Salman	32
M.Sc.	Electronics & Comm.	Electrical Eng.	Asst. Lecturer	Rasha Waleed Hamad	33
M.Sc.	Electronics & Comm.	Electrical Eng.	Asst. Lecturer	Omar Najeeb Saadi	34
M.Sc.	Power and Machines	Electrical Eng.	Asst. Lecturer	Maysara Abduljabbar Qasim	35
M.Sc.	Power Electronics	Electrical Eng.	Asst. Lecturer	Hisham Mohammed Mahmood	36
M.Sc.	Electronics	Electronic Eng.	Asst. Lecturer	Hajar Khalil Ibrahim Ahmed	37
M.Sc.	Thermal Engineering	Mechanical Eng.	Asst. Lecturer	Mohammed Salih Safar Rasool	38
B.Sc.	Engineering	Engineering	None	Najm Obaid Dhahawi	39
B.Sc.	Engineering	Engineering	None	Khidir Tariq Hussein	40
Higher Diploma	Engineering	Engineering	None	Marwa Isam Ahmed	41
B.Sc.	Engineering	Engineering	None	Adil Ghazi Shareef	42
B.Sc.	Engineering	Engineering	None	Mohammed Muwaffaq Hadi	43
B.Sc.	Engineering	Engineering	None	As'ad Abdulghani Salih	44
B.Sc.	Engineering	Engineering	None	Qasim Khalil Yathrib Waleed	45
B.Sc.	Engineering	Engineering	None	Saifuddin Kamal	46
B.Sc.	Engineering	Engineering	None	Ammar Ahmed Abdullah	47
B.Sc.	Admin. & Economics	Admin. & Economics	None	Hazim Fathallah Lu'lu'a	48
Institute Diploma		Institute	None	Mohammed Younis Ahmed Idrees	49

11. Professional Development

Orientation of New Faculty Members

New faculty members are trained through the teaching-methods courses held by the university, and they are encouraged to attend seminars, lectures and continuing education courses related to their specialization and the educational process.

Professional Development of Faculty Members

The department allows faculty members to continue their postgraduate studies and encourages them to obtain higher academic degrees in the same department or in other universities with similar specializations. Faculty members are also encouraged to apply for postdoctoral research fellowships and training courses abroad. Throughout their careers in the Department of Electronic Engineering, faculty members are also encouraged to participate in courses and events held inside and outside the college to develop their knowledge and teaching skills, including:

• Continuous learning through specialized workshops and professional certificates

• Collaborative research and publication: encouraging faculty members to collaborate on research projects with local and international experts. Publishing research in high-impact journals and participating in conferences not only enhances their academic records but also helps establish a culture of innovation within the department.

• Partnership between the industrial sector and academic institutions, and specialized lectures

12. Admission Criterion

The admission plan adopted for new students in the department's programs naturally follows the central admission plan of the Ministry of Higher Education and Scientific Research, and is implemented by the university and the college. It can be said that the students enrolled in the department's programs represent the highest levels, in terms of their averages, among the applicants to the College of Electronics Engineering, since the principle of selection is based on the preparatory-school average and the student's preference in choosing the study program among the programs of the College of Electronics Engineering. Therefore, the students admitted to the department's programs are distinguished by their academic and intellectual levels and their performance throughout the program.

13. Most Important Sources of Information About the Program
Comprehensive data on the department's programs can be obtained by visiting the official website of the University of Ninevah and browsing the website of the College of Electronics Engineering: www.uoninevah.edu.iq The self-evaluation report and the department's annual guide within the university and college guide.

14. Program Development Plan
Updating the course annually according to the latest relevant scientific books and the requirements of the labor market, in addition to using the Internet to review the course syllabi at other leading international universities in this field.

Curriculum Skills Map

Please tick the boxes corresponding to the individual program learning outcomes being assessed

Required Program Learning Outcomes																		
General and Qualifying Skills (Other transferable skills related to employability and personal development)				Affective and Value Objectives				Program-Specific Skill Objectives				Cognitive Objectives				Core or Elective	Course Name	Course Code	Year / Level
D4	D3	D2	D1	C4	C3	C2	C1	B4	B3	B2	B1	A4	A3	A2	A1				
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※	※	※	※	※	※		※	※	※	※	※	※	※	※	※	Core	DC Circuits Analysis	NVEE215	
※	※		※	※	※	※	※	※	※	※	※		※	※	※	Core	Physical Electronics	NVEE218	
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⁎	⁎		⁎	⁎	⁎	⁎	⁎	⁎	⁎		⁎	⁎	⁎		⁎	Core	Electronics II	NVEEELI222	
	⁎	⁎			⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	Core	AC Machines	NVEEELI223	
⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎		⁎	⁎	⁎	⁎	Core	Computer Languages	NVEEELI224	
	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	Core	Digital Design	NVEE223	

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*	*				*		*	*		*	*	*		*	*	Core	Digital Signal Processing I	NVEEELM301	Third / Medical Electronics
*			*			*		*		*				*	*	Core	Power Electronics	NVEEELM302	
	*	*			*			*			*	*		*	*	Core	Measurements Instruments Systems	NVEEELM303	
*					*					*					*	Core	Medical Sensors and Transducers	NVEEELM304	
*	*				*		*	*		*	*	*		*	*	Core	Digital systems design using HDL	NVEEELM305	
	*	*			*		*		*			*	*		*	Core	Analog Electronics III	NVEEELM306	
	*	*		*		*		*	*			*		*	*	Core	Numerical Analysis	NVEEELM307	
	*					*	*				*				*	Core	Arabic II	NVU17	
			*			*	*		*	*		*		*	*	Core	Digital Signal Processing II	NVEEELM308	
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*			*	*	*	*	*		*			*	*			Core	Medical Physics	NVEEELM310	
			*	*	*		*		*	*	*			*	*	Core	Communication	NVEEELM311	
	*		*		*		*			*		*			*	Core	Medical Instruments	NVEEELM312	
*			*		*		*		*			*			*	Core	Medical Electronics Systems	NVEEELM313	
		*					*		*	*	*		*	*	*	Core	Electro and Analytical Chemistry sciences	NVEEELM314	
		*	*		*		*		*		*	*		*	*	Core	Power Converters II	NVEEELI308	Third / Industrial Electronics
			*			*	*			*	*	*			*	Core	Control Engineering II	NVEEELI309	
*				*					*		*				*	Core	Probabilty and Statistics	NVEEELI310	
			*		*		*		*		*	*		*	*	Core	Communication	NVEEELI311	
		*	*			*				*	*		*		*	Core	Programmable Logic Controllers	NVEEELI312	
*	*				*		*	*		*	*	*		*	*	Core	Digital Signal Processing	NVEEELI313	
		*	*		*		*		*		*	*		*	*	Core	Microprocessors	NVEEELI314	
			*			*	*			*	*	*			*	Core	Modeling and Optimization I	NVEEELI401	
*				*					*		*				*	Core	Microcontroller	NVEEELI402	
			*		*		*		*		*	*		*	*	Core	Switch-Mode Power Supplies	NVEEELI403	
		*	*			*				*	*		*		*	Core	Battery Management Systems	NVEEELI408	
*	*				*		*	*		*	*	*		*	*	Core	Renewable Energy Sciences	NVEEELI405	
*			*			*			*		*	*		*		Core	Graduation Project Design	NVEEELI406	

⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎		⁎	⁎	⁎	⁎		⁎	Core	Industrial Electronic	EEEL4301	**Fourth**
⁎	⁎		⁎	*	⁎	⁎	⁎		⁎	⁎	⁎		⁎	⁎	⁎	Core	DATA TRANSMISSION& COMPUTER ETWORKS	EEEL4302	
⁎		⁎	⁎	*	⁎	⁎	⁎	⁎	⁎	⁎		⁎	⁎		⁎	Core	Microprocessor	EEEL4309	
⁎		⁎	⁎	*	⁎	⁎	⁎	⁎	⁎	⁎		⁎	⁎		⁎	Core	Micro Controller	EEEL4303	
⁎	⁎	⁎	⁎	*	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	Core	Microelectronics	EEEL4304	
⁎	⁎	⁎		*	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	Core	Radiation	EEEL4305	
⁎	⁎	⁎		*	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	Core	Antenna & Propagation	EEEL4308	
⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎		⁎		⁎	⁎	⁎	⁎	Core	Computer aided design	EEEL4306	
⁎	⁎	⁎	⁎	*	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	⁎	Core	Engineering Project	EEEL4201	
⁎	⁎	⁎	⁎	*	⁎	⁎	⁎	⁎	⁎	⁎		⁎	⁎	⁎	⁎	Core	Laboratory	EEEL4307	

Courses Specification

Courses specification

For the Academic Year 2023 - 2024

University of Ninevah

College of Electronics Engineering

Department of Electronic Engineering

Courses specification for first class (First Course)

Module Information					
Module Title	**D.C Circuits Analysis**			**Module Delivery**	
Module Type	**Base**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEE215				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	1	
Administering Department			**College**		
Module Leader	Zahraa Siddiq Yahya		**e-mail**		
Module Leader's Acad. Title	Lecturer assistant		**Module Leader's Qualification**		
Module Tutor	Zahraa Siddiq Yahya		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To identify the basic concepts of DC Electrical Eng. circuits.

	2. To understand how is the calculation of current, voltage, and power. 3. To understand and cover the basic DC circuit analysis methods and theorems.
Module Learning Outcomes	1. Explain the function of each element in DC Electrical circuits. 2. Use the basic circuit analysis methods and theorems to simplified the DC Electrical circuits. 3. Explain the different between transformation methods. 4. Applying the appropriate analysis method to reach the aim in its simplest form.
Indicative Contents	Indicative content includes the following. Part A – BASIC CONCEPTS: Voltage & current; Power & Energy; Dependent and Independent sources; Ohm's laws series & parallel connections; Delta- star connections and transformations. [15 hrs] Part B - D.C. Network Theorems: Source transformation; Linearity & superposition; Thevenin's & Norton's Theorems; Source transportation; source superposition; Nodal analysis; Mesh analysis. [35 hrs]

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	30	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	30	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**60**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Voltage & current
Week 2	Power & Energy
Week 3	Dependent and Independent sources
Week 4	Ohm's laws
Week 5	series & parallel connections
Week 6	Delta- star connections and transformations
Week 7	Kirchhoff's Current & Voltage Laws (KCL), (KVL)
Week 8	Source transformation
Week 9	Linearity & superposition
Week 10	Nodal analysis
Week 11	Mesh analysis
Week 12	Thevenin's Theorem
Week 13	Norton's Theorem
Week 14	Max. power transfer
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**" Engineering Circuit Analysis"** By W. Hayt	Yes
Recommended Texts	**“Introductory Circuit Analysis”** By Boylested	Yes

Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Computer science**	**Module Delivery**	
Module Type	**Core**		☐ **Theory**
Module Code	**NVEEELM114**		☒ **Lecture**
ECTS Credits	**4**		X **Lab**
SWL (hr/sem)	**100**		**Tutorial**
			Practical
			☐ **Seminar**

Module Level	1	**Semester of Delivery**	1
Administering Department	ELM	**College**	NE
Module Leader	Asmaa Nabeel	**e-mail**	**asmaa.khaleel@uoninevah.edu.iq**
Module Leader's Acad. Title	Lecturer Assist	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	4/7/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	**General overview of personal computer architecture** **Computer peripherals, keyboard, screen, mouse, and storage media** **Computer busses, ports, interfaces** **Overview of MSDOS operating system** **MSDOS internal commands** **MSDOS external commands** **Introduction to computer languages** **Overview of windows operating system** **Windows desktop, changing settings, starting programs** **Creating, deleting, copying, moving, searching for files and folders** **Using my computer, my document, and help facility** **Using windows control panel** **Using the windows accessories paint, notepad, word pad, …..etc** **Setup applications to windows, remove applications from windows** **Connecting to the internet, using the windows explorer** **Using the Microsoft Word** **Using the Microsoft Excel** **Using the Matlab**
Module Learning Outcomes	1.Understanding the important components of the computer and its operating system. 2. Understanding the meaning of MSDOS operating system and its commands. 3. Understanding the windows operating system 4. Understanding the Microsoft office (word, power point, excel). 5. Understanding the high and low level languages 6. Learn about how the strings represented in C language. 7. introduction to matlab
Indicative Contents	1. explain the components of computer hardware and software 2.introduction to the types of computers 3. storage media 4. computer ports 5. computer networks and the types of it 6. the internal and external MSDOS commands 7. windows operating system 8. word office program 9.power point office program 10. Excel program 11. Matlab

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	125	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	65	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	190		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	2, 4, 5,6	LO #1, 2, 10 and 11
	Assignments	1	10% (10)	14	LO # 3, 4, 6 and 7
	Projects / Lab.	0	0	0	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	1	20	14	
Summative assessment	**Midterm Exam**	1.5hr	30% (20)	10	LO # 1-4
	Final Exam	3hr	50% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Introduction to** the part of computers in hardware and software ,computer types, storage media
Week 2	**Explain the computer ports , computer networks**
Week 3	**Introduction to MSDOS operating system and the internal commands of it**

Week 4	**External Ms DOS command , file and folder related commands and the editor**
Week 5	Windows operating system
Week 6	Windows orders(change the background, screen saver, resolution), change the status of files, printing files, copy and save of files, backups, Recycle bin ,compressing files, viruses
Week 7	Microsoft office word (creating new word file, bars , types and styles of fonts, copy and select of texts ,save of word file)
Week 8	MS WORD: spell checking, inserting symbols, add borders, change the document setup , insert table, page numbering, insert equations and effects)
Week 9	MS Power point:(how to design professional presentation, change the layout of presentation and background of it, numbering slides, insert charts , insert table and audio)
Week 10	MS Power point(insert an effect to the object in slide, transition between slides , grouping of objects, insert equation, copy ,save and printing the slides then how to start the presentation)
Week 11	MS EXCEL (getting started with excel, how to create a spreadsheet, copy and rename the work book, entering and deleting of data in sheet, insert and delete of rows& columns, selecting cells, adding border to sheet)
Week 12	MS EXCEL:how to write a formule in sheet, functions, summation of data in row or column ,average function, max& min functions, count& counta, round function, save and print the spread sheet
Week 13	Overview of High &Low level languages
Week 14	**Matlab**
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1-15	The application of each part of the covered drawing subject theoretically and according to the weekly sequence of the curriculum in the AutoCAD laboratory **Note: By two hours a week**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1.“**Computer Science”**	No
Recommended Texts	**2.''MATLAB Handbook”**	No
Websites	https://www.tutorialsmate.com/2021/12/parts-of-computer https://www.koenig-solutions.com/matlab-programming	

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	Mathmatics1	**Module Delivery**	
Module Type	Base	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEE206**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	1	**Semester of Delivery**	1
Administering Department	Electronic Eng. Dep.	**College**	Electronics Engineering
Module Leader	Hani M. S. Salman	**e-mail**	hani.mohamed@uoninevah.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSc
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives Module Aims	4. Gain proficiency in differentiating trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function. 5. Master differentiation techniques for various types of functions. 6. To learn how to sketch curves and to deal with the transcendental functions. 7. To increase the skills related to differentiation applications. 8. Develop a strong foundation in Integration of trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function.

	9. Understand the concept of Application of the definite integral, including finding volumes of revolution, lengths of curves, and surface areas of revolution. 10. To learn the methods of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions. 11. Apply calculus principles to solve real-world engineering problems, developing problem-solving skills and the ability to apply calculus concepts to practical situations.
Module Learning Outcomes Module Learning Outcomes	1. Understand the concept of differentiation as a rate of change and slope of the curve. 2. Understand the basic differentiation rules, chain rule, implicit differentiation, higher order differentiation, partial differentiation, Differentiation of trigonometric functions and Hyperbolic Functions. 3. Learn the applications of differentiation. 4. Solve Maximum and Minimum problems. 5. Learn how to Plot the Curve. 6. Learn Transcendental functions: graphs, and derivative. 7. Understand the concept of integration: types of integrals. definite integrals, infinite Integrals. Integration of trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function. 8. Apply definite integration to as areas between curves, volumes of revolution, length of the curve and surface area of revolution. 9. Learn Methods of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions. 10. Develop critical thinking and problem-solving skills by applying calculus.
Indicative Contents Indicative Contents	Indicative content includes the following. <u>Part A – Differentiation:</u> Definitions and notations, basic differentiation rules, chain rule, implicit differentiation, higher order differentiation, partial differentiation, Differentiation of trigonometric functions and Hyperbolic Functions: . Applications of differentiation – slope tangents and normal, rate of change, velocity and acceleration, maxima and minima and inflexion points, and Curve plotting. [16 hrs] Transcendental Functions – definitions, properties, graphs, derivative. [4 hrs] <u>Part B – Integration:</u> Definitions and notations, types of integrals: definite integrals, infinite Integrals. Integration of trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function. [12 hrs]

	Application of the definite integral – areas between curves, volumes of revolution, length of the curve and surface area of revolution. [12 hrs] Methods Of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions. [16 hrs]

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	This module's major aim is to foster student engagement, improve critical thinking abilities, and promote collaborative learning. Interactive seminars, interesting tutorials, and exercises encourage active participation, allowing students to hone their critical thinking skills and apply engineering mathematics principles to problem solving. Furthermore, students collaborate on engineering mathematics issues, examine real-world scenarios, and explore the practical applications of the principles acquired through group activities, projects, and conversations. This method not only increases students' comprehension of engineering mathematical concepts, but it also fosters cooperation, communication, and key interpersonal skills that will be useful in their future engineering activities.

Student Workload (SWL) Student Workload (SWL) calculated for 15 weeks			
Structured SWL (h/sem) Structured SWL during the semester	62	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	88	**Unstructured SWL (h/w)** Unstructured SWL per week	5.9
Total SWL (h/sem) Total SWL during the semester	**150**		

Module Evaluation Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	30% (30)	5 and 10	LO #1 #2 #3 and #4, #7, #8
	Assignments	1	10% (10)	12	LO #7 - #9
	Projects / Lab.	-	-	-	-
	Report	-	-	-	-
	Midterm Exam	2hr	10% (10)	7	LO #1 - #6

Summative assessment	**Final Exam**	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Introduction – Differentiation definitions and notations, review of basic differentiation rules, chain rule, and Implicit differentiation.
Week 2	Partial differentiation and higher order differentiation.
Week 3	Differentiation of trigonometric functions and Hyperbolic Functions. Applications of differentiation; slope, tangents and normal.
Week 4	Rate of change, velocity and acceleration, maxima and minima, inflexion points and Curve plotting
Week 5	Transcendental Functions – definitions, properties, and graphs, derivative.
Week 6	Definitions and notations of integration, Types of integrals: definite integrals and infinite integrals. Integration of trigonometric function.
Week 7	Integration of inverse trigonometric function, hyperbolic function. Mid-term Exam
Week 8	Integration of inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function.
Week 9	Application of the definite integral – areas between curves, volumes of revolution, length of the curve and surface area of revolution.
Week 10	
Week 11	
Week 12	Methods Of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions.
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	G. B. Thomas Jr., M. D. Weir, J. Hass, and F. R. Giordano, "Thomas' Calculus," 12th ed., Pearson, 2019.	Yes
Recommended Texts		
Websites	https://www.coursera.org/learn/introduction-to-calculus#syllabus https://www.edx.org/learn/calculus https://www.khanacademy.org/math/calculus-1	

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Physical Electronics**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEE218			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	1	**Semester of Delivery**	1	
Administering Department	Electronic	**College**	Ninevah university	
Module Leader	Hamsa Fawaz Thanoon	**e-mail**	hamsa.thanoon@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc	
Module Tutor		**e-mail**	E-mail	
Peer Reviewer Name		**e-mail**	E-mail	
Scientific Committee Approval Date	04/07/2023	**Version Number**	1.0	

Relation with other Modules

Prerequisite module		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	1. To develop problem solving skills and understanding of Atomic Structure 2. To understand Energy band structure of metal, insulator, and semiconductor.

	3. To understand Properties of intrinsic P and N type semiconductors. 4. To understand Electrical conduction in intrinsic semiconductor. 5. To understand Properties of extrinsic semiconductors. 6. To understand Electrical conduction in extrinsic semiconductor
Module Learning Outcomes	1. Recognize how semiconductors works in electronics circuits. 2. List the various terms associated with electronics circuits. 3. Summarize what is meant by a basic of semiconductors. 4. Discuss the reaction and involvement of semiconductors in generate the currents. 5. Describe mobility of electrons and conductivity in metals. 6. Define Ohm's law. 7. Identify the pure semiconductors. 8. Identify the impure semiconductors 9. Discuss the impure semiconductors N and P types 10. Explain the type of electronic emission.
Indicative Contents	Indicative content includes the following. Part A - Energy Bands in Solids Describe the structure of an atom ◆ Discuss insulators, conductors, and semiconductors and how they differ. [9 hrs] Revision problem classes [3 hrs] Part B - Transport Phenomena in Semiconductor Describe how current is produced in a semiconductor ◆ Describe the properties of n-type and p-type semiconductors. [30 hrs]

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.

Student Workload (SWL)

Structured SWL (h/sem)	111	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	65	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**176**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10	[2,4,5,6]	LO (#1- #12)
	Assignments	2	10	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	20% (20)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Energy Bands in Solids
Week 2	Fermi-Dirac distribution function
Week 3	Properties of intrinsic P and N type semiconductors
Week 4	Mobility and conductivity
Week 5	Electrical conduction in intrinsic semiconductor
Week 6	Hall Effect
Week 7	Generation and recombination of charges
Week 8	Diffusion current continuity equation
Week 9	Injection minority carrier charges
Week 10	N-type semiconductor
Week 11	Solved problems
Week 12	P-type semiconductor
Week 13	Solved problems
Week 14	Photo-conductivity
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1.“NTEGRATEDELECTRONICS"ByMILLMAN&HALKIES 2. “SEMICONDUCTOR DEVICES & CIRCUITS" ،JOHN WILEY & SONS	Yes
Recommended Texts	1. (Floyed) 2. Chapter 15	Yes

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Mechanical Engineering Principle**			**Module Delivery**
Module Type	**Base**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	NVEE203			
ECTS Credits	6			
SWL (hr/sem)	**150**			
Module Level	1	**Semester of Delivery**	1	
Administering Department	Type Dept. Code	**College**	Type College Code	
Module Leader		**e-mail**		
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.	
Module Tutor		**e-mail**		
Peer Reviewer Name	Name	**e-mail**	E-mail	
Scientific Committee Approval Date	2/07/2023	**Version Number**	1.0	

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Students will be able to: 1. Students will be able to: 2. Knowing the different methods of making calculations related to forces and their effects on two- and three-dimensional systems 3. Clarify that the subject represents a very important introduction to other subjects for the later stages of the student's study and building a scientific base for the student to ensure the possibility of understanding the relevant subjects in the later stages. 4. The student will learn different applications of commonly used Mechanical machinery. 5. The student will learn strong basics of Mechanical Engineering fundamentals.
Module Learning Outcomes	1. Have understood and overcome any misconceptions about basic concepts in physics (force, energy, work etc). 2. Restate existing problem solving skills in a form more suitable for engineering applications. 3. Interpret basic engineering applications of mechanics in more detail. 4. Acquire four basic thinking skills: 1. Perceive, or resolve, contradictions involving their preconceptions about mechanics. 2. Organize the basic ideas of mechanics in a form suitable for problem solving. 3. Apply basic principles in mechanics to realistic engineering situations. 4. Solve realistic engineering problems.
Indicative Contents	**Indicative content includes the following:-** **Statics – Introduction [25 hrs]** ○ Vectors ○ Newton's Laws ○ Fundamental Units ○ Types of force ○ Parallelogram law ○ Resultant forces ○ Moments and couples ○ Moment of couples ○ Eequilibriums ○ Free body diagram ○ Coplanar system ○ Friction: Nature of friction; Theory of friction; Coefficient of friction **Dynamics – Introduction [20 hrs]** ○ Basic concepts ○ Newton's Laws ○ Formulation and solution of problems ○ Kinematics of Particles

	○ Rectilinear motion ○ Curvilinear motion ○ Relative motion ○ Kinetics of Particles ○ Newton's second Law ○ Work and energy -

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	25	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	20	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	45		

Module Evaluation

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	5% (5)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	5% (5)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	0	0%		
	Report	0	0%	0	
Summative assessment	**Midterm Exam**	3hr	30% (30)	10	LO # 1-7

	Final Exam	3hr	60% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Force system; Units system;
Week 2	Parallelogram law; Forces + components
Week 3	Resultant of coplanar forces
Week 4	Components of force in space
Week 5	Moment of a force
Week 6	Moment of a force
Week 7	Moment of a force
Week 8	Free body diagram; Coplanar system
Week 9	Friction: Nature of friction; Theory of friction
Week 10	Coefficient of friction
Week 11	Coefficient of friction
Week 12	Coefficient of friction
Week 13	Normal and tangential components of acceleration
Week 14	Normal and tangential components of acceleration
Week 15	
Week 16	Normal and tangential components of acceleration

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1. Engineering Mechanics (statics) By: J.L. MERIAM 2. Engineering Mechanics (Dynamics) By: J.L. MERIAM	Yes
Recommended Texts	➢	No
Websites		

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition

Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	**Democracy and Human Rights**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NV12**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	1 1	**Semester of Delivery**	1
Administering Department	Dept. of Electronic	**College**	EE
Module Leader	Husham swadi hashim	**e-mail**	Husham.hashim@uoninevah.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	PHD
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	1 – Explaining the concepts of human rights and democracy. 2 – Showing the importance of human rights in our public life at all levels (academic, professional, social, etc.). 3 – Showing the importance of creating a conscious understanding of the term democracy within systems of government and its impact on political stability. 4 – The need to understand the close link between rights and building a democratic society that guarantees the freedom of its members and safeguards their interests. 5 – The need to emphasize that building a true concept of human rights and a democratic society can only be achieved by enacting laws that guarantee this, and the importance of these laws in building a stable society that guarantees all its members their rights within a democratic political system.
Module Learning Outcomes Module Learning Outcomes	1 – Consolidating the values of freedom and equality on the foundations of real participation in building society. 2 – Working to build a stable rights-based environment through applying the laws within a democratic society. 3 – And striving to provide the foundations for protecting individuals within democratic societies.
Indicative Contents Indicative Contents	Part One – The Historical Development of Human Rights: First – Primitive societies: - The prehistoric stage - Eastern civilizations (Mesopotamia and Pharaonic civilization as a model) - Western civilizations (Greek and Roman as a model) Second – The divine laws: - Judaism - Christianity - Islam (in more detail) Third – The development of human rights in positive laws: The social contract theory - - The World Wars and their impact on human rights - International organization Part Two – Human Rights: Definition and Types: First – Delimitation and definition - Right in Islamic jurisprudence - Right in legal jurisprudence

	- Definition of human rights Second – Divisions of human rights (studied in detail and compared between law and Islamic Sharia) Collective rights (the right to self-determination, the right to development, the right to a suitable environment, the human right to live in peace) - Individual rights (economic and cultural rights, civil and political rights, rights attached to the person) - Part Three – Guarantees of Respect for and Protection of Human Rights: First – Guarantees in Islamic Sharia Second – Guarantees at the national level: Third – Guarantees at the international level: Syllabus of the Democracy course First course – includes the subject of public freedoms between Sharia and law: Second course – includes the subject of state administration systems between Sharia and law: Public freedoms (between Sharia and law) First – Introduction: Second – Definition of public freedoms: - Linguistic origin - Historical origin - Legal basis - Sharia basis Third – Foundations of public freedoms: - Justice - Equality - Freedom Fourth – Descriptive public freedoms: - Freedom of opinion - Freedom of thought - Freedom of the media

	- Equality Fifth – Islamic Sharia and public freedoms: - The position of Islam on women (inheritance, marriage, holding public office) - The position of Islam on freedom of belief State Administration Systems First – On defining political systems - The idea of the political system - Legitimacy of political systems - Types of political systems Second – On the democratic system - A foundational introduction - Definition of democracy - Pillars and foundations of the democratic system Third – Models of democracy: - Direct democracy

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Following the direct teaching method by presenting and explaining the material and using teaching aids to explain it, clarifying the mechanisms of the scientific concept of the terms democracy and human rights.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	16	**Structured SWL (h/w)** Structured SWL per week	1
Unstructured SWL (h/sem) Unstructured SWL during the semester	9	**Unstructured SWL (h/w)** Unstructured SWL per week	0.5
Total SWL (h/sem) Total SWL during the semester	25		

Module Evaluation Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	The historical development of human rights
Week 2	The divine laws
Week 3	Development of human rights in positive laws
Week 4	Human rights: definition and types
Week 5	Guarantees of respect for and protection of human rights
Week 6	Guarantees in Sharia and at the national and international levels
Week 7	Mid-term Exam
Week 8	The concept of democracy
Week 9	Public freedoms between Sharia and law
Week 10	Definition of public freedoms and foundations of freedoms
Week 11	Islamic Sharia and public freedoms
Week 12	State administration systems
Week 13	Democracy: a foundational introduction
Week 14	Pillars and foundations of the democratic system
Week 15	Models of democracy
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts		No
Websites		

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C – Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Courses specification for first class (Second Course)

Module Information					
Module Title	**Digital Techniques**			**Module Delivery**	
Module Type	**Base**			☒ **Theory**	
Module Code	**NVEE217**			☒ **Lecture**	
ECTS Credits	**5**			☐ **Lab**	
SWL (hr/sem)	**125**			☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	1		**Semester of Delivery**	2	
Administering Department			**College**	Type College Code	
Module Leader	(Younis Saber Othman), (Noor Alhuda Saad Abbas)		**e-mail**		
Module Leader's Acad. Title	Lecturer Assistant		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		

Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	4/7/2023	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To learn new number systems and how to convert between them 2. To identify and learn the logic gates and Boolean algebra 3. How to minimize the Boolean functions using Boolean algebra and Karnaugh maps 4. To understand, draw, and identify the combinational logic circuits using the discrete logic 5. To understand, draw, and identify the combinational logic circuits using the MSI integrated circuits 6. To use the 3-varaiables and 4-varaiables Karnaugh map for Boolean minimization
Module Learning Outcomes	Students will be able to: 1. Learning new number systems and how to convert between them 2. Identify the logic gates and learn the Boolean algebra 3. Minimize the Boolean functions 4. Understand, draw, and identify the combinational logic circuits using the discrete logic and MSI integrated circuits 5. Identify and use the 3-varaiables and 4-varaiables Karnaugh map
Indicative Contents	**Indicative content includes the following:-** **NUMBER SYSTEMS:- [10 Hrs]** Decimal number system; Binary; Octal and hexadecimal number systems; Conversion from one number to another number system; Addition; Subtraction; Multiplication and division using different number system; Representation of binary number insignia-magnitude; Sign 1's Complement and align 2's complement notation; Rules for addition and subtraction with complement Representation; BCD; EBCDIC; ASCII; Extended ASCII; Gray and other codes. **LOGIC GATES AND BOOLEAN ALGEBRA:- [10 Hrs]** AND; OR; NOT; NAND; NOR; Ex-OR logic gates; Positive and negative logic; Fundamental concepts of Boolean algebra; De-murrage's laws; Principles of duality; Simplification of Boolean expressions; Canonical and standard forms for Boolean function; SOP and POS, forms; Realization of Boolean functions using only NAND and NOR gates. **BOOLEAN FUNCTION MINIMIZATION:- [10 Hrs]** Objectives of the minimization procedures; Karnaugh map method; The 3-Variable Karnaugh Map; The 4-Variable Karnaugh Map; Karnaugh Map SOP Minimization; Don't care conditions; Karnaugh Map POS Minimization; Converting Between POS and SOP Using the Karnaugh Map. **COMBINATIONAL LOGIC CIRCUITS USING DISCRETE LOGIC GATES:- [5 Hrs]** Parity generator and checker; Code converters; Majority circuits; magnitude comparator.

	COMBINATIONAL LOGIC CIRCUIT USING MSI INTEGRATED CIRCUITS:- [10 Hrs] Encoder; priority encoder; decoder; Multiplexer and demultiplexer circuits; Implementation of Boolean functions using decoder and Multiplexer; BCD to 7-segment decoder; Common anode and common cathode 7-segment displays; Random access memory; Read only memory and erasable programmable ROMS

Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	45	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	45	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	90		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	1-14	LO #1-14
	Assignments	1	5% (5)	6	LO # 1-6
	Projects / Lab.	10 Lab	10% (10)	5-14	LO # 5-14
	Report	3	5% (5)	5-14	LO # 5-14
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-10
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered

Week 1	**NUMBER SYSTEMS:-** Decimal number system; Binary; Octal and hexadecimal number systems; Conversion from one number to another number system; Addition; Subtraction; Multiplication and division using different number system; Representation of binary number insignia-magnitude; Sign 1's Complement and align 2's complement notation; Rules for addition and subtraction with complement Representation; BCD; EBCDIC; ASCII; Extended ASCII; Gray and other codes.
Week 2	
Week 3	
Week 4	**LOGIC GATES AND BOOLEAN ALGEBRA:-** AND; OR; NOT; NAND; NOR; Ex-OR logic gates; Positive and negative logic; Fundamental concepts of Boolean algebra; De-murrage's laws; Principles of duality; Simplification of Boolean expressions; Canonical and standard forms for Boolean function; SOP and POS, forms; Realization of Boolean functions using only NAND and NOR gates.
Week 5	
Week 6	
Week 7	**BOOLEAN FUNCTION MINIMIZATION:-** Objectives of the minimization procedures; Karnaugh map method; The 3-Variable Karnaugh Map; The 4-Variable Karnaugh Map; Karnaugh Map SOP Minimization; Don't care conditions; Karnaugh Map POS Minimization; Converting Between POS and SOP Using the Karnaugh Map.
Week 8	
Week 9	
Week 10	
Week 11	**COMBINATIONAL LOGIC CIRCUITS USING DISCRETE LOGIC GATES:-** Parity generator and checker; Code converters; Majority circuits; magnitude comparator.
Week 12	
Week 13	**COMBINATIONAL LOGIC CIRCUIT USING MSI INTEGRATED CIRCUITS:-** Encoder; priority encoder; decoder; Multiplexer and demultiplexer circuits; Implementation of Boolean functions using decoder and Multiplexer; BCD to 7-segment decoder; Common anode and common cathode 7-segment displays; Random access memory; Read only memory and erasable programmable ROMS
Week 14	
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 5-14	Introduction to KL-31001 DIGITAL LOGIC LAB Exp. 1: Logic Gates Exp. 2: NAND, NOR, XOR Gates Exp. 3: AND-OR-INVERTER(A-O-I) Circuits Exp. 4: Bit Parity Generator Circuits Exp. 5: Comparator Circuits Exp. 6: Decoder Exp. 7: Encoder Exp. 8: Multiplexer Exp. 9: Demultiplexer

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**Digital Fundamentals** | Eleventh Edition Global Edition | by Thomas L. Floyd | Pearson Education 2015	PDF
Recommended Texts	**Logic and Computer Design Fundamentals** | Fifth Edition Global Edition | by Morris Mano • Charles R. Kime • Tom Martin | Pearson Education 2016	PDF
Websites	(Telegram Group and Google classroom)	

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**A.C circuits Analysis**	**Module Delivery**	
Module Type	**Base**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEE216		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	1	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Zahraa Siddiq Yahya	**e-mail**	
Module Leader's Acad. Title	Lecturer assistant	**Module Leader's Qualification**	
Module Tutor	Zahraa Siddiq Yahya	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	12. To identify the basic concepts of energy storage elements. 13. To identify the basic of Alternating Current AC. 14. To understand and cover the basic AC circuit analysis methods and theorems.

Module Learning Outcomes	11. Explain the function of each element in AC Electrical circuits. 12. Use the basic circuit analysis methods to simplified the AC Electrical circuits. 13. Applying the appropriate analysis method to reach the aim in its simplest form.
Indicative Contents	Indicative content includes the following. Part A – energy storage elements: The capacitor; The Inductor; Analysis of RC-transient circuits; Analysis of RL-transient circuits; RLC transient circuits. [15 hrs] Part B - A.C. circuit analysis: the basic of Alternating Current AC; The Phasor equivalent circuit; series & parallel connections and equivalent impedance; Methods of Ac-circuit Analysis; superposition; Nodal & Mesh analysis; Thevenin's Theorem; Norton's Theorem; Power factor and average power in the sinusoidal Ac-circuits; Complex power; Series & parallel resonance. [35 hrs]

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Structured SWL (h/sem)	30	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	30	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**60**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	The capacitor & The inductor
Week 2	Analysis of RC & RL -transient circuits
Week 3	Analysis of RLC transient circuits
Week 4	The basic of Alternating Current AC
Week 5	The Phasor equivalent circuit
Week 6	series & parallel connections and equivalent impedance
Week 7	Methods of Ac-circuit Analysis
Week 8	superposition
Week 9	Nodal & Mesh analysis
Week 10	Thevenin's Theorem
Week 11	Norton's Theorem
Week 12	Power factor and average power in the sinusoidal Ac-circuits
Week 13	Complex power
Week 14	Series & parallel resonance
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**" Engineering Circuit Analysis"** By W. Hayt	Yes
Recommended Texts	**"Introductory Circuit Analysis"** By Boylested	Yes

Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	**Engineering Drawing**	**Module Delivery**	
Module Type	Core	☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	NVEE201		
ECTS Credits	5		
SWL (hr/sem)	125		

Module Level	1	**Semester of Delivery**	2
Administering Department		**College**	
Module Leader	Noor Yassar	**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives Module Aims	Students will be able to: 6. Drawing engineering shapes manually and clearly, including the effective use of the computer-aided drawing program (AutoCAD). 7. Develop a solid understanding of the basic principles of engineering drawing, Included the ability to work with concepts, analytically, and

	visualize them and a functional understanding of how these ideas will manifest in the real world. 8. Determine the strategies to be used and the assumptions to be made. 9. Use both manual and computer approaches in drawing figures. 10. Develop the ability to use engineering tools flexibly and creatively. 11. Develop an integrated understanding of the AutoCAD module. 12. Developing their ability to communicate scientific ideas. 13. Develop expertise in experimental methodologies.
Module Learning Outcomes Module Learning Outcomes	14. Understand and apply the basics of drawing types of lines. 15. Define, explain and apply engineering drawing operations. 16. Understand the basics of drawing an ogee curves 17. Understand and apply the basic idea of central projection theory. 18. Explanation of the central and parallel projection theory to understand the projection process. 19. Explain Different Views are Front View (FV), Top View (TV) and Side View (SV) FV is a view projected on VP. TV is a view projected on HP. SV is a view projected on PP. 20. Ability to draw using AutoCAD.
Indicative Contents Indicative Contents	**Introduction to engineering drawing and its tools** Introduction and introducing students to the subject of engineering drawing, which includes Identification of engineering tools and how to use them. **Engineering shapes and the arcs , lamina. , Dimensions:** - Various engineering operations: - - Drawing a straight line parallel to a known straight line - The division of the rectum into two halves - Angle division is known. - Drawing a straight line parallel to a known straight line from a point that does not belong to the known straight line. - Draw a tangent to a circle from a point that does not belong to it. - Draw a tangent to two contiguous circles from the outside. - Draw a tangent to two contiguous circles from the inside **Multi view projection** - Perpendicular Projection Theory of Objects: - Types of projections resulting from vertical projection and approved in the projection of various engineering objects - Front view - Side view. - Top view **Using AutoCAD** - Apply everything that has been explained in the manual engineering drawing on the AutoCAD program and drawing the three-dimensional models

Learning and Teaching Strategies Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Student Workload (SWL) calculated for 15 weeks

Structured SWL (h/sem) Structured SWL during the semester	45	**Structured SWL (h/w)** Structured SWL per week	3
Unstructured SWL (h/sem) Unstructured SWL during the semester	55	**Unstructured SWL (h/w)** Unstructured SWL per week	3.7
Total SWL (h/sem) Total SWL during the semester	**100**		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	20% (20)	5 and 10	LO #1, 2, 10 and 11
	Assignments	3	10% (10)	2 and 12	LO # 3, 4, 6 and 7
	Projects / Lab.	3	10% (10)	Continuous	All
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	Introduction and introducing students to the subject of engineering drawing, which includes identification of engineering tools and how to use them.
Week 2	Teach students how to apply and draw the following engineering operations:

	Drawing a straight line parallel to a known straight line, the division of the rectum into two halves, angle division and drawing a straight line parallel to a known straight line.
Week 3	Teach students how to draw a tangent to two contiguous circles from the outside, Draw a tangent to two contiguous circles from the inside
Week 4	Draw a tangent to one circle from the inside and the other from the outside and draw a tangent to a circle passing through a straight line.
Week 5	Multi view projection Perpendicular Projection Theory of Objects: • Types of projection in drawing and its practical importance
Week 6	Types of projections resulting from vertical projection and approved in the projection of various engineering objects: Front view, Side view ,Top view
Week 7	Mid-term Exam + Introduction to AutoCAD
Week 8	Apply everything that has been explained in the manual engineering drawing on the AutoCAD program and drawing the three-dimensional models
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Weekly Lab Syllabus

	Material Covered
Week 1-15	The application of each part of the covered drawing subject theoretically and according to the weekly sequence of the curriculum in the AutoCAD laboratory

Learning and Teaching Resources

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	EGINEERING DRAWING AND GRAPHIC TECHNOLOGY", Fourteenth Edition, By: THOMAS E.FRENCH, CHARLES .VIERCK, ROBERT J.FOSTER,McGRAW-HILL	Yes

Recommended Texts	➢ William D.CallisterJr.&David D.Rethwisch.(2010)"Material Science and Engineering An introduction", eightEdition.	No
Websites	ENGINEERING DRAWING Any edition	

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	**MathematicsII**	**Module Delivery**	
Module Type	**Base**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEE 207**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	1	**Semester of Delivery**	1
Administering Department	Electronic Eng. Dep.	**College**	Electronics Engineering
Module Leader	Hani M. S. Salman	**e-mail**	hani.mohamed@uoninevah.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSc
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	NEEM1211	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives Module Aims	1. To obtain a good knowledge of dealing with complex numbers. 2. Establish a strong foundation in matrices and their operations, determinants, and inverse matrices. This includes covering definitions, notations, properties, types, and basic operations on matrices, enabling effective application in problem-solving. 3. enhancing students' proficiency in matrix-based solutions for linear systems of equations using Cramer's rule, the inverse method, and the Gauss elimination method 4. To provide the students with the knowledge to deal with vectors and their mathematical operations. 5. To Learn about the polar coordinates, and the graphs of polar equations. 6. Apply calculus principles to solve real-world engineering problems, developing problem-solving skills and the ability to apply calculus concepts to practical situations.
Module Learning Outcomes Module Learning Outcomes	21. Comprehend and utilize complex numbers within the Argand diagram, and 22. master complex number operations (Addition, subtraction, product, quotient, power, and roots) and De Moivre's Theorem. 23. Understand the concept of linear algebra and matrices. 24. Identify the types of matrices such as square matrices, zero matrix and identity. 25. Perform the common matrix operations such as addition, subtraction, scalar multiplication, and multiplication. 26. Find the transpose of a matrix. 27. Compute the determinants. 28. Compute the inverse of the matrix. 29. Identify whether the matrix is invertible or singular. 30. Relate a matrix to a homogenous system of linear equation. 31. Solve a system of linear equations by matrices: using Cramer's rule. 32. Solve a system of linear equations by matrices: using the inverse method. 33. Solve a system of linear equations by matrices: using Gauss Elimination Method. 34. Identify the rank of the matrix and its relation to the solution of linear equations. 35. Find the eigenvalues and eigenvectors of a matrix. 36. Represent a vector in space. 37. Compute dot and cross products in vectors. 38. Understand the meaning of del operator, gradient, divergence, and curl and to compute the del operation, gradient, divergence, and curl. 39. Learn about the vector functions.

	40. Convert from Cartesian to Polar coordinates and vice versa. 41. Sketch in polar system. 42. Utilize mathematical reasoning and critical thinking skills to analyze and interpret mathematical concepts and their applications in Electronics engineering. 43. Develop proficiency in mathematical problem-solving, both independently and collaboratively, and communicate solutions effectively.
Indicative Contents Indicative Contents	Indicative content includes the following. <u>Part A – Review of Complex Numbers:</u> The Argand diagram, Addition, Subtraction; Product, Quotient, power and roots, and Demoiver's Theorem. [4hrs] <u>Part B – Matrices and Determinants:</u> Matrices and Determinants: Definitions and notations, Properties, types of matrices, basic operations on matrices, computation of the determinants of matrices, properties of determinants. [8 hrs] Inverse of the Matrices. [4 hrs] Solution of the system of linear equations-solution of the system of linear equation using Cramer's rule, solution of the system of linear equation using the inverse method. [12 hrs] Revision problem classes [4 hrs] solution of the system of linear equation using Gauss Elimination Method. [4 hrs] Eigenvalues and eigenvector. [4 hrs] <u>Part C – Review of Vectors:</u> Representation of vectors in space (i;j;k), unit vectors, Scalar product, and Vector product. [8 hrs] <u>Part D – Vector Calculus:</u> Vectors – del operator, Parametric Equations of Lines in Space, the distance from a Point to a line in Space, plane equation in space, the Distance from the Point to a Plane, Angles Between Planes, vector function versus Scalar function, del operator, Gradient, Divergence and Curl. [12 hrs] <u>Part E – Polar Coordinates:</u> Polar coordinates – polar coordinate system, transformation between polar and Cartesian coordinates, graphs of polar equations. [4 hrs]

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	This module's major aim is to foster student engagement, improve critical thinking abilities, and promote collaborative learning. Interactive seminars, interesting tutorials, and exercises encourage active participation, allowing students to hone their critical thinking skills and apply engineering mathematics principles to problem solving. Furthermore, students collaborate on engineering mathematics issues, examine real-world scenarios, and explore the practical applications of the principles acquired through group activities, projects, and conversations. This method not only increases students' comprehension of engineering mathematical concepts, but it also fosters cooperation, communication, and key interpersonal skills that will be useful in their future engineering activities.

Student Workload (SWL)

Student Workload (SWL) calculated for 15 weeks

Structured SWL (h/sem) Structured SWL during the semester	62	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	88	**Unstructured SWL (h/w)** Unstructured SWL per week	5.9
Total SWL (h/sem) Total SWL during the semester	**150**		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	30% (30)	6 and 14	LO #1 - #11, #16- #19
	Assignments	1	10% (10)	13	LO #12-#15
	Projects / Lab.	-	-	-	-
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #11
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	The Argand diagram, Addition, Subtraction; Product, Quotient, power and roots, and Demoiver's Theorem.
Week 2	Matrices and Determinants: Definitions and notations, Properties, types of matrices, basic operations on matrices, computation of the determinants of matrices, properties of determinants.
Week 3	
Week 4	Inverse of the Matrices.
Week 5	Solution of the system of linear equations-solution of the system of linear equation using Cramer's rule.
Week 6	solution of the system of linear equation using the inverse method.
Week 7	solution of the system of linear equation using Gauss Elimination Method.
Week 8	Revision problem classes, Mid-term Exam
Week 9	Eigenvalues and eigenvector. [4 hrs]
Week 10	Representation of vectors in space (i;j;k), unit vectors, Scalar product, and Vector product.
Week 11	
Week 12	Vectors – del operator, Parametric Equations of Lines in Space, the distance from a Point to a line in Space, plane equation in space, the Distance from the Point to a Plane, Angles Between Planes, vector function versus Scalar function, del operator, Gradient, Divergence and Curl.
Week 13	
Week 14	
Week 15	Polar coordinates – polar coordinate system, transformation between polar and Cartesian coordinates, graphs of polar equations.

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**"Higher Engineering Mathematics", 7th edition by John Bird**	No
	G. B. Thomas Jr., M. D. Weir, J. Hass, and F. R. Giordano, "Thomas' Calculus," 12th ed., Pearson, 2019.	Yes
Recommended Texts	**"Introduction to Linear Algebra". 4th edition by Strang, Gilbert** **"Linear Algebra for Everyone". 2020 by Strang, Gilbert**	No

	Zill, D. G., Wright, W. S., & Cullen, M. R. (2011). Advanced Engineering Mathematics. Jones & Bartlett Publishers.	
Websites	https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010 https://www.khanacademy.org/math/linear-algebra https://www.ohio.edu/mechanical-faculty/williams/html/PDF/MatricesLinearAlgebra.pdf	

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Physical of semiconductors**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEE219			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	1	**Semester of Delivery**	2	
Administering Department	EI	**College**	NE	
Module Leader	Hamsa Fawaz Thanoon	**e-mail**	hamsa.thanoon@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc	
Module Tutor		**e-mail**	E-mail	
Peer Reviewer Name		**e-mail**	E-mail	
Scientific Committee Approval Date	04/07/2023	**Version Number**	1.0	

Relation with other Modules

Prerequisite module		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	1. To develop problem solving skills and understanding of Atomic Structure

	2. To understand Energy band structure of metal, insulator, and semiconductor. 3. To understand Properties of intrinsic P and N type semiconductors. 4. To understand Electrical conduction in intrinsic semiconductor. 5. To understand Properties of extrinsic semiconductors. 6. To understand Electrical conduction in extrinsic semiconductor
Module Learning Outcomes	1. Recognize how semiconductors works in electronics circuits. 2. List the various terms associated with electronics circuits. 3. Summarize what is meant by a basic of semiconductors. 4. Discuss the reaction and involvement of semiconductors in generate the currents. 5. Describe mobility of electrons and conductivity in metals. 6. Define Ohm's law. 7. Identify the pure semiconductors. 8. Identify the impure semiconductors 9. Discuss the impure semiconductors N and P types 10. Explain the type of electronic emission.
Indicative Contents	Indicative content includes the following. Part A - Energy Bands in Solids Describe the structure of an atom ◆ Discuss insulators, conductors, and semiconductors and how they differ. [9 hrs] Revision problem classes [3 hrs] Part B - Transport Phenomena in Semiconductor Describe how current is produced in a semiconductor ◆ Describe the properties of n-type and p-type semiconductors. [30 hrs]

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.

Student Workload (SWL)

Structured SWL (h/sem)	111	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	65	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**176**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10	[2,4,5,6]	LO (#1- #12)
	Assignments	2	10	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	20% (20)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	PN junction in equilibrium
Week 2	Volt Ampere characteristics; Temperature dependence
Week 3	diffusion capacitance
Week 4	Non-linear properties; Ideal diode; Basic theory and analysis of simple diode circuit; DC load line; Small signal analysis and concept of dynamic resistance; AC load line
Week 5	Diode capacitance ;Temperature effects of diode
Week 6	Different types of diodes (Zener; schottckey);
Week 7	(Varactor diode; Tunnel and negative resistance diodes).
Week 8	Circuit analysis of half wave and full wave rectifiers
Week 9	Bridge rectifier; Ripple and form factor calculations
Week 10	Types of filters; C filters , L filter ,L .C. filter, PIE filter; Analysis of filter and calculation of ripple and regulation.
Week 11	Solved problems
Week 12	Clipping and Clam Ping Circuit:
Week 13	Transistors: PNP; NPN
Week 14	The BJT as an Amplifier
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1: " SOLID STATE DIVICES" ،PHI; 4TH EDITION ،1995.By STREETMAN ، 2: "SEMICONDUCTOR DEVICES & CIRCUITS" ،JOHN WILEY & SONS ،1992.By : M.S. TYAGI 3: " ELECTRONICS DEVICES & CIRCUITS THEORY" ،HI; By BOYLSTED & NASHELSKY	Yes
Recommended Texts	3. (Floyed) 4. Chapter 15	Yes

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	**English**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVU11**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	1 1	**Semester of Delivery**	2
Administering Department	Dept. of Computer and Information	**College**	College of Electronics Engineering
Module Leader	Noor Mothafar Hamid	**e-mail**	noorm.hame@duoninevah.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	MA
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	7. To develop skills, reading, writing and understanding of English language through the application of teaching techniques.

	8. To understand scientific subjects and technical terms through reading and comprehension. 9. This course deals with the basic concepts of scientific subjects. 10. This course handles how to write simple research and how to make a successful presentation. 11. To understand the scientific language in English.
Module Learning Outcomes Module Learning Outcomes	5. Recognize parts of speech and tenses in English language. 6. List the various terms associated with scientific texts. 7. Summarize what is meant by a basic electric circuit. 8. Discuss Electric currents, series and parallel circuits. 9. Describe electrical power, charge, and current. 10. Discuss computers, communication and the future of computers.. 11. Identify the basic circuit elements and their applications. 12. Explain energy types and forms. 13. Discuss the various properties of radio waves and vacuum tubes. 14. Explain modulation. 15. Discuss Electromagnetism.
Indicative Contents Indicative Contents	Indicative content includes the following. 1.parts of speech _verb _ noun _ pronoun 2.Tenses _Past _Present _future 3.Electric currents and circuit _AC/DC _parallel, serious _Grounding, fuse, short circuit 4.Radio waves and vacuum tubes 5. Electromagnetism. 6. The future of computers, communication applications. _fiber optics. 7. Induction. _Electric generator _Electric transformer _self-induction

	_servomechanism 8. Incandescent lamp. 9. Energy. _types of energy _forms of energy 10. Introduction to electron and electricity. 11.Electricity and electronics.

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation by reading, writing and comprehension in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, presentation, interactive tutorials, by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	33	**Structured SWL (h/w)** Structured SWL per week	2
Unstructured SWL (h/sem) Unstructured SWL during the semester	17	**Unstructured SWL (h/w)** Unstructured SWL per week	1.4
Total SWL (h/sem) Total SWL during the semester	50		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	4,6	LO #1, 2, 3,4 ,5and 6
	Assignments	2	5% (5)	9, 12	LO # 7,8,9,10,and 11
	Presentation	1	10% (10)	Continuous	
	Report	1	5% (5)	13	LO # 6,10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Parts of speech
Week 2	Tenses
Week 3	Electric currents and circuit
Week 4	Radio waves and vacuum tubes
Week 5	The future of computers, communication applications.
Week 6	Induction -Electric generator -Electric transformer
Week 7	Mid-term Exam
Week 8	Induction -Self-induction -Servomechanism
Week 9	Incandescent lamp.
Week 10	Energy. -types of energy -forms of energy
Week 11	Introduction to electron and electricity.
Week 12	Electricity and electronics
Week 13	The cathode ray tube
Week 14	Propagation
Week 15	Modulation
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	English in electrical engineering and electronics. The language of electrical and electronic engineering in English.	Yes

Recommended Texts	English for electrical engineering and computing.	No
Websites	https://www.askoxford.com/betterwriting/succesfulcv/application/?view=uk	

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C – Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Courses specification for Second class Medical Engineering (First Course)

Module Information		
Module Title	Engineering analysisI	**Module Delivery**
Module Type	Base	

Module Code	NVEE208	☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
ECTS Credits	6	
SWL (hr/sem)	150	

Module Level	2	**Semester of Delivery**	1
Administering Department	Electronics dept	**College**	Electronics engineering college
Module Leader	Dr. Omar B Mohammed	**e-mail**	omar.mohammed@uoninevah.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules

Prerequisite module	Mathematics II	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	This course covers the following topics: Multiple Integrals, Vectors Functions, Numerical Analysis, Statistics and Probability. Those areas of mathematics which are most important in connection with practical problems for modeling different areas of science, computer can be easily utilized to find the properties of such systems.
Module Learning Outcomes	Upon successful completion, students will: 1. Improve their problem-solving skills. 2. Apply that knowledge toward practical problems in different areas of science. 3. Utilize the computer capabilities to solve such problems using proper methods. 4. Learn how to deal with geometry in 3D; find areas and volumes. 5. Solve ordinary and differential equations numerically. 6. Learn the importance of probability and statistics in everyday use.
Indicative Contents	Vectors Functions Multiple Integrals Numerical Analysis Statistics Probability

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)		**Structured SWL (h/w)**	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)**	
Total SWL (h/sem)			

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**				
	Final Exam				
Total assessment					

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Vectors: Vector in space, dot and cross product. Lines and planes in space. Vector valued functions and motion in space: position, velocity and acceleration, tangential vectors, curvature and normal vector.
Week 2	
Week 3	
Week 4	
Week 5	Multiple Integrals: Double Integral in rectangular coordinates, areas and volumes. Double Integral in Polar Coordinates, areas and volumes. Triple Integrals in rectangular, cylindrical, and spherical coordinates, volumes.
Week 6	
Week 7	
Week 8	
Week 9	Numerical Analysis: Solution of non-linear equations by iteration; bisection and Newton-Raphson. Numerical Integration; trapezoidal rule. Numerical solution of 1st order ordinary differential equations; Euler's method.
Week 10	
Week 11	
Week 12	
Week 13	Statistics and Probability:
Week 14	

Week 15	Definitions, mutually exclusive and conditional probability, permutations and combinations Probability distribution: binomial, normal and Poisson distributions.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics By KREYSIK	Yes
Recommended Texts	Calculus By Finney& Thomas	Yes
Websites		

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	Signal Analysis	**Module Delivery**	
Module Type	Core	**Theory** **☒ Lecture** **Lab** **☐ Tutorial** **☐X Practical** **☐ Seminar**	
Module Code	NVEEELM211		
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level	1	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	25/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	Student will be able to: 15. identify signals concepts . 16. understand the classification of signals . 17. understand the different operations on signals. 18. perform Fourier and Laplace transformations of signals.

Module Learning Outcomes	44. Definition of the signal concept. 45. Introduction of mathematical models. 46. Explain Continuous time signals. Discrete time signals. 47. Categorize the signals. 48. Achieve operations on signals. 49. Introduction of basic signals. 50. Define convolution operation between two signals. 51. Introduction of frequency domain and Fourier analysis. 52. Laplace Transformation.
Indicative Contents	Indicative content includes the following. Introduction to signals: - Definition and mathematical models. - Categorization of signals. - Operation on signals. - Basic types of signals. Convolution operation: - Introduction of convolution. - Convolution properties. Signal transformation: - Fourier series and transform. - Laplace Transform.

Learning and Teaching Strategies	
Strategies	To make students interesting with both types of signals: continuous and discrete. Also with classifications of signals and operations on them. To make them familiar with time and frequency domain and analysis of a signal . Also to make them familiar with different types of transforms of signals. Also to make them have an experience with solving different problems and examples .

Student Workload (SWL)			
Structured SWL (h/sem)	64	**Structured SWL (h/w)**	4

Unstructured SWL (h/sem)	86	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**150**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Basic definitions. Mathematical models.
Week 2	Continuous time signals
Week 3	Discrete time signals
Week 4	Signal classifications
Week 5	Energy and power of signals
Week 6	Basic operations on continuous signals.
Week 7	Basic operations on discrete signals.

Week 8	Time domain representation of continuous signals; sinusoidal and complex exponential signals
Week 9	singularity function signals
Week 10	Convolution definition and operation
Week 11	Convolution properties
Week 12	Frequency domain representation of continuous signals. Spectra and bandwidth of the signal
Week 13	Fourier series representations of periodic signals.
Week 14	Fourier transform representations of non periodic signals.
Week 15	Laplace Transform of continuous signals. Laplace properties.

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	**Signals and Systems. Simon S. Haykin**	Yes
Recommended Texts	**Signals and linear Systems. G. E. Carlson**	

Grading Scheme

Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Electronic I**		**Module Delivery**	
Module Type	**core**			☐ **Theory**
Module Code	**NVEEELM212**			☒ **Lecture**
ECTS Credits	**5**			☐ **Lab**
SWL (hr/sem)	**125**			☒ **Tutorial**
				☒ **Practical**
				☐ **Seminar**
Module Level	1	**Semester of Delivery**		1
Administering Department	Electronics	**College**	Electronic Engineering college	
Module Leader		**e-mail**		
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**		PhD
Module Tutor		**e-mail**		
Peer Reviewer Name	Name	**e-mail**	Ahmad.younis@uoninevah,edu,iq	
Scientific Committee Approval Date	12/06/2023	**Version Number**	1.0	

Relation with other Modules

Prerequisite module	NEEI2212	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	12. To understand the basic analysis of bipolar transistor amplifier 13. To be familiar with the dc and ac analysis of transistor amplifier 14. To understand the dc and ac analysis of FET amplifier 15. To illustrate and to understand the frequency response of amplifier 16. To understand the basic concept of feedback concept 17. To be able to deal with different feedback amplifier topologies 18. To study the advantages of negative feedback on amplifier performance 19. To be familiar with feedback amplifier ac analysis 20. To understand the construction and ideal characteristic of operational amplifier 21. To study and analyze op-amp equivalent circuit 22. To be familiar with basic op-amp applications 23. To start with studying power electronic devices
Module Learning Outcomes	16. Understand and apply the basic theory and operation of transistor amplifiers 17. Define and explain the frequency response of bipolar transistor amplifier 18. Understand the basic concept of negative feedback 19. Understand and analyze the feedback amplifier 20. Understanding the operation of ideal operational amplifier 21. Dealing with dc and ac op-amp equivalent circuit 22. Understanding the basic application of op-amp 23. Power electronic devices principle overview

Indicative Contents	**Transistor and FET amplifier analysis:** Small signal model analysis, low frequency and high frequency analysis, hybrid model, hybrid -Pi model analysis. **Amplifier with negative feedback:** Basic concept, feedback analysis, feedback configurations, Feedback effects on gain , bandwidth, input and output resistances **Operational amplifier:** Ideal Op-amp equivalent circuit; Operational Amplifier Specification; Circuit analysis of an Op-amp; Closed loop Op-amp Circuit (Inverting and Non-Inverting Circuit). **Op-amp Applications:** Summation & subtraction Circuit, Differential circuit Buffer circu Ideal and practical Integrator circuits, ideal and practical Differentiator circuits, Examples. **Power electronic devices:** UJT Construction, Operation and characterises; Thyrsistor Equivalent Circuit ; Thyrsistor Characteristics and operation ; Application of the devices.

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	74	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	101	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	175		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Small signal model analysis
Week 2	Low and high frequency response of transistor amplifier
Week 3	Hybrid and hybrid-Pie equivalent circuit analysis
Week 4	Negative feedback concept and analysis
Week 5	Advantages of negative feedback on amplifier
Week 6	Amplifier feedback topologies
Week 7	Feedback effect on amplifier gain, bandwidth, and on input-output resistances
Week 8	operational amplifier construction and operation
Week 9	ideal and practical op-amp equivalent circuit

Week 10	Inverting and non inverting closed loop amplifier
Week 11	Integration and differentiation active circuits
Week 12	Summation and subtraction op-amp circuits
Week 13	UJT transistor construction
Week 14	Thyristor equivalent circuit and characteristics
Week 15	Subject review
Week 16	**Subject review**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	**Practical experiments in transistor amplifier frequency response at lo and high frequency** **To measure the effect of feedback on amplifier performance** **To measure the performance of different op-amp circuits.**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Electronic Devices By Millmann Electronic Devices By Floyd	yes
Recommended Texts	**SOLID STATE DIVICES", PHI; 4TH EDITION**, 1995.By STREETMAN, **SEMICONDUCTOR DEVICES & CIRCUITS", JOHN WILEY & SONS, 1992**.By : M.S. TYAGI	Yes
Websites	Electronic circuits	

Grading Scheme

Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.

(50 - 100)	**B -** Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	Digital Design		**Module Delivery**	
Module Type	**Core**		☒ **Theory**	
Module Code	**NVEE223**		☒ **Lecture**	
ECTS Credits	4		☐ **Lab**	
SWL (hr/sem)	100		☒ **Tutorial**	
			☐ **Practical**	
			☐ **Seminar**	
Module Level	2	**Semester of Delivery**	1	
Administering Department	Electronic Eng. Dep.	**College**	Electronics Engineering	
Module Leader	Amer Talal Ali	**e-mail**		
Module Leader's Acad. Title	Lecturer assistant	**Module Leader's Qualification**		
Module Tutor	Amer Talal Ali	**e-mail**		
Peer Reviewer Name	Name	**e-mail**		
Scientific Committee Approval Date	01/06/2023	**Version Number**		

Relation with other Modules

Relation with Other Modules

Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives Module Aims	19. To understand Advanced Minimization techniques for large number of bits to simplify the large designs. 20. Understand how to Design an Arithmetic and Logic unit. 21. Understand how to Design using programmable logic device. 22. To understand the sequential Logic Circuits. 23. To understand how to Design synchronous and asynchronous counters. 24. To understand the Design of Registers.
Module Learning Outcomes Module Learning Outcomes	1. Using Advanced Minimization techniques for large number of bits to simplify the large designs. 2. Design an Arithmetic and Logic unit. 3. Design using programmable logic device. 4. Design sequential Logic Circuits synchronous and asynchronous. 5. Design Registers. 6. Design synchronous and asynchronous counters.
Indicative Contents Indicative Contents	Indicative content includes the following. Part A – minimization techniques for large number of bits [14 hrs] Part B – Initialization to design and Design an Arithmetic and Logic unit. [14 hrs] Part C – Design using programmable logic device. [6 hrs] Part D – sequential Logic Circuits. [18 hrs]

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking and digital designing skills. This will be achieved through classes and interactive tutorials.

Student Workload (SWL) Student Workload (SWL) calculated for 15 weeks			
Structured SWL (h/sem) Structured SWL during the semester	60	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	60	**Unstructured SWL (h/w)** Unstructured SWL per week	4
Total SWL (h/sem) Total SWL during the semester	**120**		

Module Evaluation Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
	Midterm Exam	1.5 hr	10% (10)	10	LO #(1-8)

Summative assessment	**Final Exam**	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Introduction to Digital Design
Week 2	The 5-Variable Karnaugh Map; The 5-Variable Karnaugh Map with don't care conditions
Week 3	Map Entered variable Karnaugh Map
Week 4	ADDITIONAL MINIMAZATION TECNHNIQUES: Tabular method; Quine-McCluskey
Week 5	Design using multiplexer: - Shannon Expansion
Week 6	top-down desigin of combainaonal CIRCUITS: - Gate Level: Adders; Subtractor
Week 7	Design an Arithmetic and Logic unit
Week 8	memory and type of memories
Week 9	Design using programmable logic device (PLD): - PROM; PAL; PLA;
Week 10	sequential LOGIC: - Type of flip-flops; Timing Diagram; Basic concepts of counters; Binary counters; BCD counters; Up down counter
Week 11	sequential LOGIC: -Design of counters using state diagrams and tables;
Week 12	sequential LOGIC: -Mealy and Moore Circuits;
Week 13	synchrous CIRCUITS: Shift left and right register; Registers with parallel load; Serial –in arallel-out (SIPO) and parallel-in-serial-out (PISO).
Week 14	synchrous CIRCUITS: Shift Registers; Twisted Ring Counter; Maximum Length Shift Counter.
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	"Digital and analog communication" 2001 By L. W. Couch Sixth Edition	Yes
Recommended Texts	- Digital Communications Fifth Edition, 2008, John G. Proakis, and Masoud Salehi. Introduction to Communication Systems" 1992 By F. Stremler. -ELEMENTS OF INFORMATION THEORY" 2006 By THOMAS M. COVER and JOY A. THOMAS -Digital Communication, 2004 by Abbas Kattoush.	Yes
Websites		

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	Electromagnetic Fields I	**Module Delivery**	
Module Type	Core	☐ **Theory**	
Module Code	NVEE215	☒ **Lecture**	
ECTS Credits	4	☐ **Lab**	
SWL (hr/sem)	100	☒ **Tutorial**	
		☐ **Practical**	
		☐ **Seminar**	

Module Level	2	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	SINAN KHALID SHANSHAL	**e-mail**	**sinan.mohammed@uoninevah.edu.iq**
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	02/07/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	To develop knowledge of the laws governing the behavior of electric fields, and to relate the laws governing the fields to applications in a range of electrical and electronic engineering application.
Module Learning Outcomes	On completion of the course the students should be able: • to have detailed knowledge of the physical background and terminology of the electrostatic field theory for electrical engineering problems • to understand the electrostatic field behavior • to select and use appropriate theoretical models for analysis, problem solving and finding solutions related to the electrostatic fields • to understand how laws of electrostatic can be applied to problems arising in engineering.
Indicative Contents	Electric charge and the electric field Electric flux density and Gauss's Law Electric potential Electric field in matter and boundary conditions Capacitance

Learning and Teaching Strategies	
Strategies	Through the presentation of a theoretical explanation with the aid of white board and 'Data Show', to illustrate syllabus (examples and exercises) and using text books.

Student Workload (SWL)			
Structured SWL (h/sem)	45	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	?	**Unstructured SWL (h/w)**	1

Total SWL (h/sem)	?

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	15% (10)	5,8,10,12	LO #1-5, 9 and 11
	Assignments	4	15% (10)	6,9,11,13	LO # 1-5, 6, 10 and 12
	Projects	0	0% (0)		
	Report	0	0% (0)		
Summative assessment	Midterm Exam	1.5hr	20% (20)	10	LO # 1-8
	Final Exam	3hr	50% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Review of Vector Calculus
Week 2	Review of Vector Calculus
Week 3	Experimental law of coulomb; Electric field intensity;
Week 4	Field of a continuous and volume charge distributions; line charge and sheet charge;
Week 5	Field of a continuous and volume charge distributions; line charge and sheet charge;
Week 6	Electric flux density; Gauss's law;
Week 7	Application of Gauss's law; some symmetrical charge distributions.
Week 8	Energy expended in moving a point charge in an electric field;
Week 9	Definition of potential difference and potential;
Week 10	Potential field of a point charge and system of charges; Potential gradient.
Week 11	Conductor Properties and boundary conditions;
Week 12	Nature of Dielectric Materials; Boundary Conditions for Perfect dielectric Materials;
Week 13	Capacitance; Several Capacitance Examples.
Week 14	Poisson and Laplace 's equations; Examples of the solution of Laplace equation
Week 15	Examples of the solution of Laplace equation; Examples of the solution of Poisson's equation.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1-ENGINEERING ELECTROSTATICES, Mc- Graw Hill, By WILLAIM H. HAYT. 2-Elements of engineering electrostatic, Prentice Hall, By Matthew N. O. SADIKU	No
Recommended Texts	1-Electrostatics (Schaum's Outlines), McGraw-Hill Education By Edminister, Joseph_ Nahvi, Mahmood.	No
Websites		

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information					
Module Title	Human Physiology			**Module Delivery**	
Module Type	Support			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELM 213				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Electronics dept		**College**	Electronics engineering college	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	This subject introduces engineering students to human anatomy and physiology, with direct application of the knowledge to considerations for designing and manufacturing medical devices and equipment to assist in overcoming physical disabilities.
Module Learning Outcomes	Upon completion this unit, the student should be able to: 1. Demonstrate correct usage of the terminology used to describe anatomical structures. 2. Describe the organization of cells and tissues. 3. Describe the principles relating to the structure of connective tissues, skeletal muscle, bones and joints. 4. Describe the principles of excitable tissues. 5. Describe the structure and function of the human eye and ear and the mechanisms of vision and hearing. 6. Describe the principles of sensorimotor control. 7. Describe cardiac mechanics and cardiac biophysics. 8. Describe the application of technologies and techniques for investigating the structure and function of the body.
Indicative Contents	Anatomical terminology. The structure and appearance of cells and tissues. The appearance of bone and cartilage, the organization of dense connective tissues. Skeletal muscle structure and function. Principles of excitable tissues. The structure and function of sensory systems, including the eye and vision and the ear and hearing. Principles of sensory motor control. Cardiac mechanics and cardiac biophysics. Technologies, quantitative measurements and experimental techniques used to investigate the structure and function of different tissues, organs and organ systems.

Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)		**Structured SWL (h/w)**	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)**	
Total SWL (h/sem)			

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**				
	Final Exam				
Total assessment					

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Cells and their function
Week 2	Tissues, glands & membranes
Week 3	Muscle tissue
Week 4	The skeleton
Week 5	Nervous system

Week 6	Sensory
Week 7	Respiration
Week 8	The eye
Week 9	The joints
Week 10	The skin
Week 11	Digestive system
Week 12	The urinary system and body fluids
Week 13	The heart
Week 14	Blood
Week 15	Blood vessels Blood clotting
Week 16	Preparatory week before the final exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts		
Recommended Texts		
Websites		

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Courses specification for Second class Medical Engineering (Second Course)

Module Information					
Module Title	Signals and Systems			**Module Delivery**	
Module Type	Core			☐ **Theory**	
Module Code	NEEM210			☒ **Lecture**	
ECTS Credits	6			☐ **Lab**	
SWL (hr/sem)	150			☐ **Tutorial**	
				☐**X Practical**	
				☐ **Seminar**	
Module Level	1		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/06/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Student will be able to: 25. identify systems concepts . 26. understand the properties of systems . 27. understand the mathematical relation between input and output of a system. 28. deal with Fourier and Laplace analysis of systems. 29. perform z-transform of discrete signals .
Module Learning Outcomes	53. Definition of the system concept. 54. Introduction of mathematical models. 55. Explain Continuous time systems. Discrete time systems. 56. Introduction of frequency response of systems. 57. Definition of filters. 58. Explain Ideal filters, Non ideal filters, and Butterworth filter design. 59. Define Z-transform of discrete signals. 60. Analyze of continuous system using Laplace Transform. System transfer function. 61. Definition of transfer function of a discrete system.
Indicative Contents	Indicative content includes the following. Introduction to systems: - Definition and mathematical models. - Properties of systems. Transformation used with continuous systems - Fourier transforms. - Filters. - Laplace transform. Z-transform: - Introduction of z- transform of discrete time signal. - Z-transform used with discrete systems.

	Convolution used for - Continuous systems. - Discrete systems

Learning and Teaching Strategies	
Strategies	To make students interesting with both types of systems: continuous and discrete. Also with properties of systems and operations . To make them familiar with time and frequency domain and analysis of a system. Also to make them familiar with different types of transforms of systems. Also to make them have an experience with solving different problems and examples.

Student Workload (SWL)			
Structured SWL (h/sem)	62	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	88	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**150**		

Module Evaluation				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Basic definitions. Mathematical models.
Week 2	Continuous time systems.
Week 3	Discrete time systems.
Week 4	System properties.
Weeks 5	Mathematical system representation in time domain: Convolution representation.
Week 6	Convolution properties.
Week 7	System description by linear constant coefficient differential equations.
Week 8	Frequency domain analysis of continuous system.
Week 9	Frequency response of a system.
Week 10	Frequency response of electrical circuits.
Week 11	Ffilters. Distortion less transmission.
Week 12	Ideal filters. Non ideal filters. Butterworth filter design.

Week 13	Analysis of continuous system using Laplace Transform.
Week 14	System transfer function.
Week 15	Analysis of discrete system using z-Transform. System transfer function.

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**Signals and Systems. Simon S. Haykin**	Yes
Recommended Texts	**Signals and linear Systems. G. E. Carlson**	

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	Engineering Analysis II		**Module Delivery**	
Module Type	Core		☐ **Theory**	
Module Code	NVEE209		☒ **Lecture**	
ECTS Credits	3		☐ **Lab**	
SWL (hr/sem)	75		☒ **Tutorial**	
			☐ **Practical**	
			☐ **Seminar**	
Module Level	2	**Semester of Delivery**	2	
Administering Department	Electronics dept	**College**	Electronics engineering college	
Module Leader	Dr. Omar B Mohammed	**e-mail**	omar.mohammed@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date		**Version Number**		

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	This course covers the following topics: ordinary differential equations, sequences and series, solution of differential equations by power series, and matrix analysis. Those areas of mathematics which are most important in connection with practical problems for modeling different areas of science, computer can be easily utilized to find the properties of such systems.
Module Learning Outcomes	Upon successful completion, students will: 7. Improve their problem-solving skills. 8. Apply that knowledge toward practical problems in different areas of science. 9. Utilize the computer capabilities to solve such problems using proper methods. 10. Learn how to represent any function as a power series, then use computer to solve it. 11. Learn the importance of differential equations for modeling almost any system, and how to solve it to find the properties of that system. 12. Learn the linear algebra and its importance in science.
Indicative Contents	Ordinary Differential Equations. Sequences and Series. Solution of Differential Equations by Power Series. Matrix Analysis.

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)		**Structured SWL (h/w)**	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)**	

Total SWL (h/sem)			

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**				
	Final Exam				
Total assessment					

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Ordinary Differential Equations: 1. First order (variables separable, homogeneous, linear and exact). 2. Second order homogeneous. 3. Second order nonhomogeneous; indeterminant coefficients, variation of parameters.
Week 2	
Week 3	
Week 4	
Week 5	Infinite Sequences and Series: 1. Limit laws, indeterminate forms and L'hospital rule. 2. Infinite series; convergence test. 3. Power series; Taylor and Maclaurin series.
Week 6	
Week 7	
Week 8	
Week 9	Solution of Differential Equations by Power Series: Power series method, Legendre's equation; Legendre s polynomials.
Week 10	
Week 11	
Week 12	
Week 13	Matrix Analysis: 1. Review of matrix theory, solving system of equations; Cramer's rule, inverse of the matrix method, Gauss elimination. 2. Eigen values and eigen vectors. 3. Diagonalization of matrices
Week 14	
Week 15	

	4. Application of matrices to electric circuits.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics By KREYSIK	Yes
Recommended Texts	Calculus By Finney& Thomas	Yes
Websites		

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Electronic II**	**Module Delivery**	
Module Type	**Core**	☐ **Theory**	
Module Code	**NVEEELM221**	☒ **Lecture**	
ECTS Credits	**6**	☐ **Lab**	
SWL (hr/sem)	**150**	☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	1	**Semester of Delivery**	2
Administering Department	Electronics	**College**	Electronic Engineering college
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	Ahmad.younis@uoninevah,edu,iq
Scientific Committee Approval Date	12/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	Electronic I	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	24. To understand the basic theory and operation of bipolar transistor 25. To be familiar with current mechanism in an npn and pnp transistors 26. To concentrate transistor physical and electrical characteristics 27. To illustrate and design different dc biasing circuits 28. To understand the biasing stability conditions 29. To be able to deal with the mathematical behavior of transistor model 30. To understand small signal analysis of transistor amplifier 31. To deal with different transistor amplifier configuration 32. To be able to deal with the frequency response of transistor amplifier 33. To understand the basic operation of field effect transistor and MOS device 34. To understand the dc and ac behavior of FET and MOS amplifiers
Module Learning Outcomes	24. Understand and apply the basic theory and operation of transistor amplifiers 25. Define and explain the electrical characteristic of bipolar transistor 26. Understand the basic structure of npn and pnp transistors 27. Understand and analyze the electrical transistor model 28. Understanding the dc and ac analysis of transistor amplifier 29. Dealing with dc biasing and ac amplifiers 30. Understanding the effect of frequency on amplifier response 31. Familiar with other FET and MOS circuits

Indicative Contents	**Bipolar junction transistors,** Transistor construction, transistor operation, NPN & PNP Bipolar Transistor; Current Flow Mechanism in Transistor Junctions; Transistor configurations; Current Gain Calculation [Alpha] and [Beta]; Transistor input/ output characteri DC Load line ; Operating point; Different DC circuit biasing. Bias circuit, voltage divider circu bias with feedback **DC biasing,** Operating point, fixed bias circuit, emitter bias circuit, voltage divider circuit, dc bias with feed **Biasing stability** Stability factor analysis due to temperature variation (Effect of Ico, Vbe and Beta); Temperat compensation using diode biasing. **Small signal analysis,** Small signal equivalent circuit for CB, CE and CC configuration; Input/Output resistance; Calculation of current and voltage Gain in small signal amplifier; Graphical Analysis for vol gain; Hybrid parameters to analyze transistor circuits. **Field Effect Transistor (FET) and MOS transistor :** **FET biasing configurations, Depletion and Enhanced mode operation,** Introduction to the theory and operations of JFFT & MOSFET; FET Transistor configura Transistors transfer characteristics; Amplifier Circuit Biasing; transistor Equivalent circuit; signal analysis of FET transistor. **FREQUENCY RESPONSE:** Definition and Concepts; Gain in decibel; Bode plot for the gain; The effect of the Coupling capacitor; Low frequency analysis due to the R-C Coupled amplifier in BJTs; the Effect of emit bypass capacitor**;** Calculation of the Low cut-off frequency. Transistor amplifier at high frequer Hybrid PIE equivalent circuit at high frequency; High frequency behavior of CB & CE amplifi High cut-off frequency; Gain Band-Width products for the above circuits; FET at high frequenc CD and CS amplifier at high frequency; .

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	88	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	76	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	164		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Transistor construction and operation
Week 2	Bipolar transistor current flow mechanism
Week 3	Transistor configurations, current gain calculation, and input and output resistances
Week 4	Dc biasing circuits, operating point calculation
Week 5	Biasing stability, stability factor calculation
Week 6	Temperature compensation using diode biasing
Week 7	Small signal equivalent circuit for CB, CC, CE configurations
Week 8	Calculation of voltage and current gains
Week 9	Hybrid model ac analysis of transistor amplifier
Week 10	FET and MOS transistors operation

Week 11	FET biasing configurations
Week 12	Depletion and enhancement mode operation
Week 13	Definition and analysis of amplifier frequency response
Week 14	Low frequency and high frequency analysis
Week 15	Hybrid-Pie equivalent circuit at high frequency
Week 16	**Subject review**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1-15	**Practical experiments in transistor amplifiers to measure the current and voltage gains.** **To measure the input and output amplifier resistances** **To measure the amplifier frequency response.**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**Textbook1:INTEGRATEDELECTRONICS"MCGRA WHILL;9THREPRINT,1995**.ByMILLMAN&HALKIES **2: " ELECTRONICS DEVICES AND COMPONENTS", PITMAN,** 1995 By MOTTERSHED,. ,	yes
Recommended Texts	**3: " SOLID STATE DIVICES", PHI; 4TH EDITION**, 1995.By STREETMAN, **4" SEMICONDUCTOR DEVICES & CIRCUITS", JOHN WILEY & SONS, 1992**.By : M.S. TYAGI	Yes
Websites	Electronic circuits	

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	Programming	**Module Delivery**	
Module Type	Core	☒ **Theory**	
Module Code	NVEEELM222	☒ **Lecture**	
ECTS Credits	6	☒ **Lab**	
SWL (hr/sem)	150	☐ **Tutorial**	
		☐ **Practical**	
		☐ **Seminar**	

Module Level	UGx11 2	**Semester of Delivery**	2
Administering Department	Dept. of Electronic Eng. (Med. Ele)	**College**	College of Electronic Engineering
Module Leader	Qais Thanon	**e-mail**	Qais.najim@uoninevah.edu.iq
Module Leader's Acad. Title	Porf.	**Module Leader's Qualification**	Ph. D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	20/06/2023	**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives Module Aims	1. Learning about the algorithms types and how building the algorithms. 2. Learning how to command computers to perform tasks using C++ language (Programming/coding). 3. Become acquainted with the designed programming including sequencing, condition and iteration. 4. Learn about the 1d and 2d arrays in C++ language. 5. Learn about the functions in C++ language. 6. Learn about the strings in C++ language.
Module Learning Outcomes Module Learning Outcomes	1. Understanding the meaning of the algorithms in programming languages. 2. Understanding the basics concepts of C language programming such as variables, data types, operators, control 3. Understanding the utilities of each one of sequencing, condition, and loops, and basic input/output operations. 4. Understanding how represent the data in 1d arrays and 2d arrays. 5. Learn about how the strings represented in C language. 6. Learn about divide any problem in sub-program and execute this problem by using function. 7. In advance practical experience by working on programming exercises and projects.
Indicative Contents Indicative Contents	Indicative content includes the following. • Visualization via flowchart and Pseudocode [4 hrs] • Keyworks, identifier, format specifier, and naming variables and constants [8 hrs] • Use standard libraries to take input and display output [8 hrs] • Operators in C++ programming [10 hrs] • Priorities in C++ programming [4 hrs] • Math functions [4 hrs] • Conditional operations [8 hrs] • Iterations (Loop operators) [10 hrs] • Arrays [10 hrs] • Functions [8 hours] • Review classes and problem solving [8 hrs]

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	The main strategy being focused on is developing conceptual programming thinking, meanwhile refining and expanding their mathematical thinking skills. This will be achieved through classes, online lectures, interactive tutorials. Additionally, working on complex projects that challenge students' skills and require to apply advanced concepts. Such projects would help students exploring various aspects of C++ programming and gain hands-on experience in solving complex problems. some sampling activities that are interesting to the students.

Student Workload (SWL)			
Student Workload (SWL) calculated for 15 weeks			
Structured SWL (h/sem) Structured SWL during the semester	77	**Structured SWL (h/w)** Structured SWL per week	5.1
Unstructured SWL (h/sem) Unstructured SWL during the semester	73	**Unstructured SWL (h/w)** Unstructured SWL per week	4.8
Total SWL (h/sem) Total SWL during the semester	**150**		

Module Evaluation					
Module Evaluation					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Weekly Theoretical Syllabus	
Week	**Material Covered**
Week 1	Introduction to computer languages and the structure of C program
Week 2	Flowchart and Pseudo-code
Week 3	Introduction to C++ programming: Declare variables and constants
Week 4	Take input and print output
Week 5	Assignment and Increment ,Decrement, Arithmetic, Logical, and Bitwise operators
Week 6	Standard math functions in math header <math.h>

Week 7	Priorities of operators in C++ programming
Week 8	Relational and conditional operators
Week 9	Mid-term Exam
Week 10	If statement versus switch case statement
Week 11	Examples of structured programming (sequencing and condition)
Week 12	Loop operators (For, while, do-while)
Week 13	Arrays
Week 14	Functions
Week 15	String of characters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Weekly Lab Syllabus

Week	Material Covered
Week 1-2	Learn the C++ language program complier.
Week 3-4	Declare variables and constants and <iostream.h> including standard functions
Week 5-6	Arithmetic, logical, and bitwise operators
Week 7-8	Math header for math functions <math.h> and Assignment and increment & decrement operators
Week 9-10	Relational and conditional operators and Loop operators
Week 11-12	Examples about the Arrays
Week 13-14	Examples about Functions and string

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	C Programming Absolute Beginner's Guide, 3rd Edition 2014. BY: Greg Perry and Dean Miller.	Yes
Recommended Texts	C How to Program with an introduction to C++, 8th Edition 2016. *BY: Paul Deitel and Harvey Deitel.* Global Edition contribution by Piyali Sengupta	No
Websites	1- https://www.programiz.com/c-programming 2- https://www.coursera.org/specializations/c-programming	

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Module Information		
Module Title	Electromagnetic Fields II	**Module Delivery**

Module Type	**Core**	☐ **Theory**
Module Code	NVEE221	☒ **Lecture**
ECTS Credits	**6**	☐ **Lab**
SWL (hr/sem)	**150**	☒ **Tutorial** ☐ **Practical** ☐ **Seminar**

Module Level	2	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	SINAN KHALID SHANSHAL	**e-mail**	**sinan.mohammed@uoninevah.edu.iq**
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	02/07/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	To develop knowledge of the laws governing the behavior of magnetic and electro-magnetic fields, and to relate the laws governing the fields to applications in a range of electrical and electronic engineering application.
Module Learning Outcomes	On completion of the course the students should be able: • to have detailed knowledge of the physical background and terminology of the electromagnetic field theory for electrical engineering problems • to understand the electromagnetic field behavior • to select and use appropriate theoretical models for analysis, problem solving and finding solutions related to the electrostatic, magnetostatic and electromagnetic fields • to understand how laws of electromagnetism can be applied to problems arising in engineering.
Indicative Contents	Magnetic field and Ampere's Law Magnetic flux and Gauss's Law for magnetic fields Faraday's Law Inductance Maxwell's equations Applications of Electromagnetics

Learning and Teaching Strategies	
Strategies	Through the presentation of a theoretical explanation with the aid of white board and 'Data Show', to illustrate syllabus (examples and exercises) and using text books.

Student Workload (SWL)			
Structured SWL (h/sem)	45	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	?	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	?		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	15% (10)	5,8,10,12	LO #1-5,6-7, 9 and 11
	Assignments	4	15% (10)	6,9,11,13	LO # 1-5, 6, 10 and 12
	Projects	0	0% (0)		
	Report	0	0% (0)		
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-8
	Final Exam	3hr	50% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Review of Vector Calculus
Week 2	Review of Vector Calculus
Week 3	Boit – Savart law
Week 4	Amperes law; Magnetic Flux & Magnetic Flux Density
Week 5	Inductance
Week 6	Force on Moving Charge; Force on Differential Current. Elements
Week 7	Force and Torque on a Closed Circuit
Week 8	Magnetization and Permeability; Magnetic Boundary Conditions; Magnetic Circuit.
Week 9	Faraday's Law;
Week 10	Maxwell's Equations
Week 11	Example of Maxwell's Equations
Week 12	Wave Equations; Wave Propagation in Lossy Dielectrics
Week 13	Plane Waves in Lossless Dielectrics; Plane Waves in Free Space
Week 14	Plane Waves in Good Conductors;
Week 15	Power and the Poynting Vector.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1-ENGINEERING ELECTROMAGNETICES, Mc- Graw Hill, By WILLAIM H. HAYT. 2-Elements of engineering electromagnetic, Prentice Hall, By Matthew N. O. SADIKU	No
Recommended Texts	1-Electromagnetics (Schaum's Outlines), McGraw-Hill Education, By Edminister, Joseph_ Nahvi, Mahmood.	No
Websites		

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	English	**Module Delivery**	
Module Type	Support	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVU11		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGx11 1	**Semester of Delivery**	1
Administering Department		**College**	NV
Module Leader		**e-mail**	
Module Leader's Acad. Title	Noor Mothafar Hamid	**Module Leader's Qualification**	MS.D.
Module Tutor	Name (if available)	**e-mail**	noorm.hame@duoninevah.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	35. To develop skills, reading, writing and understanding of English language through the application of teaching techniques. 36. To understand scientific subjects and technical terms through reading and comprehension.

	37. This course deals with the basic concepts of scientific subjects. 38. This course handles how to write simple research and how to make a successful presentation. 39. To understand the scientific language in English.
Module Learning Outcomes Module Learning Outcomes	32. Recognize parts of speech and tenses in English language. 33. List the various terms associated with scientific texts. 34. Summarize what is meant by a basic electric circuit. 35. Discuss Electric currents, series and parallel circuits. 36. Describe electrical power, charge, and current. 37. Discuss computers, communication and the future of computers.. 38. Identify the basic circuit elements and their applications. 39. Explain energy types and forms. 40. Discuss the various properties of radio waves and vacuum tubes. 41. Explain modulation. 42. Discuss Electromagnetism.
Indicative Contents Indicative Contents	Indicative content includes the following. 1.parts of speech _verb _ noun _ pronoun 2.Tenses _Past _Present _future 3.Electric currents and circuit _AC/DC _parallel, serious _Grounding, fuse, short circuit 4.Radio waves and vacuum tubes 5. Electromagnetism. 6. The future of computers, communication applications. _fiber optics. 7. Induction. _Electric generator _Electric transformer _self-induction _servomechanism

	8. Incandescent lamp. 9. Energy. _types of energy _forms of energy 10. Introduction to electron and electricity. 11.Electricity and electronics.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation by reading, writing and comprehension in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, presentation, interactive tutorials, by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	30	**Structured SWL (h/w)** Structured SWL per week	2
Unstructured SWL (h/sem) Unstructured SWL during the semester	70	**Unstructured SWL (h/w)** Unstructured SWL per week	5
Total SWL (h/sem) Total SWL during the semester	100		

Module Evaluation Module Evaluation					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	4,6	LO #1, 2, 3,4 ,5and 6

	Assignments	2	10% (10)	9, 12	LO # 7,8,9,10,11and 12
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 13,14
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
Week	**Material Covered**
Week 1	Parts of speech
Week 2	Tenses
Week 3	Electric currents and circuit
Week 4	Radio waves and vacuum tubes
Week 5	The future of computers, communication applications.
Week 6	Induction -Electric generator -Electric transformer
Week 7	Mid-term Exam
Week 8	Induction -Self-induction -Servomechanism
Week 9	Incandescent lamp.
Week 10	Energy. -types of energy -forms of energy
Week 11	Introduction to electron and electricity.
Week 12	Electricity and electronics
Week 13	The cathode ray tube
Week 14	Propagation
Week 15	Modulation

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) Weekly Lab Syllabus	
Week	**Material Covered**
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	English in electrical engineering and electronics. The language of electrical and electronic engineering in English.	Yes
Recommended Texts	English for electrical engineering and computing.	No
Websites	https://www.askoxford.com/betterwriting/succesfulcv/application/?view=uk	

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C – Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Courses specification for Second class Industrial Electronic Engineering (Second Course)

Module Information		
Module Title	**DC Machines**	**Module Delivery**
Module Type	**Core**	☒ **Theory**

Module Code	**NEEI2313**			☐ **Lecture** ☒ **Lab** ☒**Tutorial** ☐ **Practical** ☐ **Seminar**
ECTS Credits	**6**			
SWL (hr/sem)	**114**			
Module Level	2 2	**Semester of Delivery**	1	
Administering Department	Electronic Dept.	**College**	Electronics collage	
Module Leader		**e-mail**		
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date		**Version Number**		

Relation with other Modules			
Prerequisite module	DC Circuit Analysis	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	40. Understanding DC Machine Principles 41. Analyzing DC Machine Behavior 42. Control Strategies 43. System Integration 44. Practical Applications 45. Problem-Solving Skills 46. Laboratory Skills 47. Teamwork and Communication 48. Professional Development
Module Learning Outcomes	43. Understand how voltage is induced in a rotating loop 44. Understand how curved pole faces contribute to a constant flux, and thus 45. more constant output voltages. 46. Understand how curved pole faces contribute to a constant flux, and thus more constant output voltages. 47. Understand the power flow diagram for de machines 48. Know the types of de motors in general use. 49. Understand the equivalent circuit of a de motor. 50. Understand how to derive the torque-speed characteristics of separately excited, shunt, series, and compounded de motors. 51. Understand how to control the speed of different types of de motors. 52. Understand the special characteristics of series de motors, and the applications. 53. Understand the methods of starting dc motors safely. 54. Understand the equivalent circuit of a dc generator. 55. Understand the purpose of a transformer in a power system. 56. Understand how real transformers approximate the operation of an ideal transformer. 57. Be able to explain how copper losses, leakage flux, hysteresis, and eddy currents are modeled in transformer equivalent circuits.
Indicative Contents	Introduction - A Simple Rotating Loop between Curved Pole Faces. The Voltage Induced in a Rotating Loop / Getting DC Voltage Out of the Rotating Loop / The Induced Torque in the rotating loop.(12 hrs.).
	Commutation and Armature Construction in Real DC Machine. .(8 hrs.).
	Power Flow and Losses in DC Machines. .(6 hrs.).
	Introduction to DC Motors. The Equivalent Circuit of a DC Motor. The Magnetization Curve of a DC Machine. Separately Excited and Shunt DC Motors.(10 hrs.).
	Permanent-Magnet DC Motor. The Series DC Motor. The Compounded DC Motor. .(6 hrs.).
	Motor Starters. Solid-State Speed Controllers. .(12 hrs.).

	DC Motor Efficiency Calculations. .(4 hrs.).
	Mid-term Exam. .(3 hrs.).
	Introduction to DC Generators. The Separately Excited Generator. .(12 hrs.).
	The Shunt DC Generator. The Series DC Generator.(4 hrs.).
	The Cumulatively Compounded DC Generator. The Differentially Compounded DC Generator. .(4 hrs.).
	Types and Construction of Transformers. The Ideal Transformer. .(10 hrs.).
	Theory of Operation of Real Single-Phase Transformers. The Equivalent Circuit of a Transformer. .(18 hrs.).
	Transformer Voltage Regulation and Efficiency. .(12 hrs.).
	Instrument Transformers. .(4 hrs.).

Learning and Teaching Strategies	
Strategies	Visual Aids Problem-Solving Exercises Real-World Applications Group Projects Simulations and Virtual Labs Multimedia Resources Real-Life Examples

Student Workload (SWL)			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	40	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	114		

Module Evaluation					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	16	

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	**Material Covered**
Week 1	Introduction - A Simple Rotating Loop between Curved Pole Faces. The Voltage Induced in a Rotating Loop / Getting DC Voltage Out of the Rotating Loop / The Induced Torque in the rotating loop.
Week 2	Commutation and Armature Construction in Real DC Machine.
Week 3	Power Flow and Losses in DC Machines.
Week 4	Introduction to DC Motors. The Equivalent Circuit of a DC Motor. The Magnetization Curve of a DC Machine. Separately Excited and Shunt DC Motors
Week 5	Permanent-Magnet DC Motor. The Series DC Motor. The Compounded DC Motor.
Week 6	Motor Starters. Solid-State Speed Controllers.
Week 7	DC Motor Efficiency Calculations.
Week 8	Mid-term Exam.
Week 9	Introduction to DC Generators. The Separately Excited Generator.
Week 10	The Shunt DC Generator. The Series DC Generator
Week 11	The Cumulatively Compounded DC Generator. The Differentially Compounded DC Generator.
Week 12	Types and Construction of Transformers. The Ideal Transformer.
Week 13	Theory of Operation of Real Single-Phase Transformers. The Equivalent Circuit of a Transformer.
Week 14	Transformer Voltage Regulation and Efficiency.
Week 15	Instrument Transformers.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Electrical Machinery Fundamentals" edited by Stephen J. Chapman.	NO
Recommended Texts	electrical machines and transformer by: Ancieron and Macneiil	NO
Websites	https://www.coursera.org	

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information					
Module Title	**Electronic I**			**Module Delivery**	
Module Type	**core**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI212**				
ECTS Credits	**7**				
SWL (hr/sem)	**164**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Electronics	**College**	Electronic Engineering college	
Module Leader			**e-mail**		
Module Leader's Acad. Title		Assistant Prof.	**Module Leader's Qualification**		PhD
Module Tutor			**e-mail**		
Peer Reviewer Name		Name	**e-mail**	Ahmad.younis@uoninevah,edu,iq	
Scientific Committee Approval Date		12/06/2023	**Version Number**		1.0

Relation with other Modules

Prerequisite module	NEEI1223	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	49. To understand the basic theory and operation of bipolar transistor 50. To be familiar with current mechanism in an npn and pnp transistors 51. To concentrate transistor physical and electrical characteristics 52. To illustrate and design different dc biasing circuits 53. To understand the biasing stability conditions 54. To be able to deal with the mathematical behavior of transistor model 55. To understand small signal analysis of transistor amplifier 56. To deal with different transistor amplifier configuration 57. To be able to deal with the frequency response of transistor amplifier 58. To understand the basic operation of field effect transistor and MOS device 59. To understand the dc and ac behavior of FET and MOS amplifiers
Module Learning Outcomes	58. Understand and apply the basic theory and operation of transistor amplifiers 59. Define and explain the electrical characteristic of bipolar transistor 60. Understand the basic structure of npn and pnp transistors 61. Understand and analyze the electrical transistor model 62. Understanding the dc and ac analysis of transistor amplifier 63. Dealing with dc biasing and ac amplifiers 64. Understanding the effect of frequency on amplifier response 65. Familiar with other FET and MOS circuits

Indicative Contents	**Bipolar junction transistors,** Transistor construction, transistor operation, NPN & PNP Bipolar Transistor; Current Flow Mechanism in Transistor Junctions; Transistor configurations; Current Gain Calculation [Alpha] and [Beta]; Transistor inpu output characteristics; DC Load line ; Operating point; Different DC circuit biasing. Bi circuit, voltage divider circuit, dc bias with feedback **DC biasing,** Operating point, fixed bias circuit, emitter bias circuit, voltage divider circuit, dc bias v feedback. **Biasing stability** Stability factor analysis due to temperature variation (Effect of Ico, Vbe and Beta); Temperature compensation using diode biasing. **Small signal analysis,** Small signal equivalent circuit for CB, CE and CC configuration; Input/Output resistance; Calcu of current and voltage Gain in small signal amplifier; Graphical Analysis for voltage gain; Hybric parameters to analyze transistor circuits. **Field Effect Transistor (FET) and MOS transistor :** **FET biasing configurations, Depletion and Enhanced mode operation,** Introduction to the theory and operations of JFFT & MOSFET; FET Tran configurations; Transistors transfer characteristics; Amplifier Circuit Biasing; tran Equivalent circuit; Small signal analysis of FET transistor. **FREQUENCY RESPONSE:** Definition and Concepts; Gain in decibel; Bode plot for the gain; The effect of the Coup capacitor; Low frequency analysis due to the R-C Coupled amplifier in BJTs; the Effect emitter bypass capacitor**;** Calculation of the Low cut-off frequency. Transistor amplifier high frequencies; Hybrid PIE equivalent circuit at high frequency; High frequency beha of CB & CE amplifier; High cut-off frequency; Gain Band-Width products for the abov circuits; FET at high frequencies; CD and CS amplifier at high frequency; .

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their

	critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	88	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	76	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	164		

Module Evaluation

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Transistor construction and operation
Week 2	Bipolar transistor current flow mechanism
Week 3	Transistor configurations, current gain calculation, and input and output resistances
Week 4	Dc biasing circuits, operating point calculation
Week 5	Biasing stability, stability factor calculation

Week 6	Temperature compensation using diode biasing
Week 7	Small signal equivalent circuit for CB, CC, CE configurations
Week 8	Calculation of voltage and current gains
Week 9	Hybrid model ac analysis of transistor amplifier
Week 10	FET and MOS transistors operation
Week 11	FET biasing configurations
Week 12	Depletion and enhancement mode operation
Week 13	Definition and analysis of amplifier frequency response
Week 14	Low frequency and high frequency analysis
Week 15	Hybrid-Pie equivalent circuit at high frequency
Week 16	**Subject review**

Delivery Plan (Weekly Lab. Syllabus)

Week	**Material Covered**
Week 1-15	**Practical experiments in transistor amplifiers to measure the current and voltage gains.** **To measure the input and output amplifier resistances** **To measure the amplifier frequency response.**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	**Textbook1:INTEGRATEDELECTRONICS"MCGRAWHILL;9THREPRINT,1995.ByMILLMAN&HALKIES** **2: " ELECTRONICS DEVICES AND COMPONENTS", PITMAN,** 1995 By MOTTERSHED,. ,	yes
Recommended Texts	**3: " SOLID STATE DIVICES", PHI; 4TH EDITION**, 1995.By STREETMAN, **4" SEMICONDUCTOR DEVICES & CIRCUITS", JOHN WILEY & SONS, 1992**.By : M.S. TYAGI	Yes
Websites	Electronic circuits	

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Fundementals of Electromagnatics**			**Module Delivery**	
Module Type	**Base**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELI221				
ECTS Credits	4				
SWL (hr/sem)	45				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	SINAN KHALID SHANSHAL		**e-mail**	**sinan.mohammed@uonineveh.edu.iq**	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M. Sc.	
Module Tutor			**e-mail**		

Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	02/07/2023	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	To develop knowledge of the laws governing the behavior of electric and electro-magnetic fields, and to relate the laws governing the fields to applications in a range of electrical and electronic engineering application.
Module Learning Outcomes	On completion of the course the students should be able: • to have detailed knowledge of the physical background and terminology of the electromagnetic field theory for electrical engineering problems • to understand the electromagnetic field behavior • to select and use appropriate theoretical models for analysis, problem solving and finding solutions related to the electrostatic, magnetostatic and electromagnetic fields • to understand how laws of electromagnetism can be applied to problems arising in engineering and biomedical sciences.
Indicative Contents	Electric charge and the electric field Electric flux density and Gauss's Law Electric scalar potential Electric field in matter and boundary conditions Capacitance Magnetic field and Ampere's Law Magnetic flux and Gauss's Law for magnetic fields Faraday's Law Inductance Maxwell's equations Applications of Electromagnetics

Learning and Teaching Strategies	
Strategies	Through the presentation of a theoretical explanation with the aid of white board and 'Data Show', to illustrate syllabus (examples and exercises) and using text books.

Student Workload (SWL)			
Structured SWL (h/sem)	45	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	?	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	?		

Module Evaluation

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	15% (10)	5,8,10,12	LO #1-5, 9 and 11
	Assignments	4	15% (10)	6,9,11,13	LO # 1-5, 6, 10 and 12
	Projects	0	0% (0)		
	Report	0	0% (0)		
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-8
	Final Exam	3hr	50% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Review of Vector Calculus
Week 2	Review of Vector Calculus
Week 3	Experimental law of coulomb; Electric field intensity;
Week 4	Field of a continuous and volume charge distributions; line charge and sheet charge;
Week 5	Electric flux law density; Gauss's law; Application of Gauss's law; Some symmetrical charge distributions.
Week 6	Energy expended in moving a point charge in an electric field
Week 7	Definition of potential difference and potential
Week 8	Potential field of a point charge and system of charges; Potential gradient;
Week 9	Boit – Savart law
Week 10	Amperes law
Week 11	Magnetic Flux and Magnetic Flux Density
Week 12	Force on Differential Current Elements; Force and Torque on a Closed Circuit;
Week 13	Faraday's Law; Maxwell's Equations
Week 14	Example of Maxwell's Equations
Week 15	Wave Equations.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)	
Week	**Material Covered**
Week 1-15	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1-ENGINEERING ELECTROMAGNETICES, Mc- Graw Hill, By WILLAIM H. HAYT. 2-Elements of engineering electromagnetic, Prentice Hall, By Matthew N. O. SADIKU	No
Recommended Texts	1-Electromagnetics (Schaum's Outlines), McGraw-Hill Education, By Edminister, Joseph_ Nahvi, Mahmood.	No
Websites		

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	Engineering analysisI	**Module Delivery**	
Module Type	Base	☐ **Theory**	
Module Code	NVEE208	☒ **Lecture**	
ECTS Credits	6	☐ **Lab**	
SWL (hr/sem)	150	☒ **Tutorial**	
		☐ **Practical**	
		☐ **Seminar**	
Module Level	2	**Semester of Delivery**	1
Administering Department	Electronics dept	**College**	Electronics engineering college
Module Leader	Dr. Omar B Mohammed	**e-mail**	omar.mohammed@uoninevah.edu.iq

Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules

Prerequisite module	Mathematics II	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	This course covers the following topics: Multiple Integrals, Vectors Functions, Numerical Analysis, Statistics and Probability. Those areas of mathematics which are most important in connection with practical problems for modeling different areas of science, computer can be easily utilized to find the properties of such systems.

Module Learning Outcomes	Upon successful completion, students will: 13. Improve their problem-solving skills. 14. Apply that knowledge toward practical problems in different areas of science. 15. Utilize the computer capabilities to solve such problems using proper methods. 16. Learn how to deal with geometry in 3D; find areas and volumes. 17. Solve ordinary and differential equations numerically. 18. Learn the importance of probability and statistics in everyday use.
Indicative Contents	Vectors Functions Multiple Integrals Numerical Analysis Statistics Probability

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)		**Structured SWL (h/w)**	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)**	
Total SWL (h/sem)			

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.				
	Report				

Summative assessment	**Midterm Exam**				
	Final Exam				
Total assessment					

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Vectors: Vector in space, dot and cross product. Lines and planes in space. Vector valued functions and motion in space: position, velocity and acceleration, tangential vectors, curvature and normal vector.
Week 2	
Week 3	
Week 4	
Week 5	Multiple Integrals: Double Integral in rectangular coordinates, areas and volumes. Double Integral in Polar Coordinates, areas and volumes. Triple Integrals in rectangular, cylindrical, and spherical coordinates, volumes.
Week 6	
Week 7	
Week 8	
Week 9	Numerical Analysis: Solution of non-linear equations by iteration; bisection and Newton-Raphson. Numerical Integration; trapezoidal rule. Numerical solution of 1st order ordinary differential equations; Euler's method.
Week 10	
Week 11	
Week 12	
Week 13	Statistics and Probability: Definitions, mutually exclusive and conditional probability, permutations and combinations Probability distribution: binomial, normal and Poisson distributions.
Week 14	
Week 15	
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics By KREYSIK	Yes
Recommended Texts	Calculus By Finney& Thomas	Yes
Websites		

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information			
Module Information			
Module Title	Compute Programming	**Module Delivery**	
Module Type	**Core**	☒ **Theory**	
Module Code	NVEEELI214	☒ **Lecture**	
ECTS Credits	**5**	☒ **Lab**	
SWL (hr/sem)	**150**	☐ **Tutorial**	
		☐ **Practical**	
		☐ **Seminar**	
Module Level	UGx11 2	**Semester of Delivery**	2

Administering Department	Dept. of Electronic Eng. (Med. Ele)	**College**	College of Electronic Engineering
Module Leader	Qais Thanon	**e-mail**	Qais.najim@uoninevah.edu.iq
Module Leader's Acad. Title	Porf.	**Module Leader's Qualification**	Ph. D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	20/06/2023	**Version Number**	1.0

Relation with other Modules			
Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives Module Aims	1. Learning about the algorithms types and how building the algorithms. 2. Learning how to command computers to perform tasks using C++ language (Programming/coding). 3. Become acquainted with the designed programming including sequencing, condition and iteration. 4. Learn about the 1d and 2d arrays in C++ language. 5. Learn about the functions in C++ language. 6. Learn about the strings in C++ language.
Module Learning Outcomes Module Learning Outcomes	8. Understanding the meaning of the algorithms in programming languages. 9. Understanding the basics concepts of C language programming such as variables, data types, operators, control 10. Understanding the utilities of each one of sequencing, condition, and loops, and basic input/output operations. 11. Understanding how represent the data in 1d arrays and 2d arrays. 12. Learn about how the strings represented in C language.

	13. Learn about divide any problem in sub-program and execute this problem by using function. 14. In advance practical experience by working on programming exercises and projects.
Indicative Contents Indicative Contents	Indicative content includes the following. • Visualization via flowchart and Pseudocode [4 hrs] • Keyworks, identifier, format specifier, and naming variables and constants [8 hrs] • Use standard libraries to take input and display output [8 hrs] • Operators in C++ programming [10 hrs] • Priorities in C++ programming [4 hrs] • Math functions [4 hrs] • Conditional operations [8 hrs] • Iterations (Loop operators) [10 hrs] • Arrays [10 hrs] • Functions [8 hours] • Review classes and problem solving [8 hrs]

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	The main strategy being focused on is developing conceptual programming thinking, meanwhile refining and expanding their mathematical thinking skills. This will be achieved through classes, online lectures, interactive tutorials. Additionally, working on complex projects that challenge students' skills and require to apply advanced concepts. Such projects would help students exploring various aspects of C++ programming and gain hands-on experience in solving complex problems. some sampling activities that are interesting to the students.

Student Workload (SWL)

weeks Student Workload (SWL) calculated for 15

Structured SWL (h/sem) Structured SWL during the semester	77	**Structured SWL (h/w)** Structured SWL per week	5.1
Unstructured SWL (h/sem) Unstructured SWL during the semester	73	**Unstructured SWL (h/w)** Unstructured SWL per week	4.8
Total SWL (h/sem) Total SWL during the semester	**150**		

Module Evaluation

Module Evaluation

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome

Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Weekly Theoretical Syllabus	
Week	**Material Covered**
Week 1	Introduction to computer languages and the structure of C program
Week 2	Flowchart and Pseudo-code
Week 3	Introduction to C++ programming: Declare variables and constants
Week 4	Take input and print output
Week 5	Assignment and Increment ,Decrement, Arithmetic, Logical, and Bitwise operators
Week 6	Standard math functions in math header <math.h>
Week 7	Priorities of operators in C++ programming
Week 8	Relational and conditional operators
Week 9	Mid-term Exam
Week 10	If statement versus switch case statement
Week 11	Examples of structured programming (sequencing and condition)
Week 12	Loop operators (For, while, do-while)
Week 13	Arrays
Week 14	Functions
Week 15	String of characters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
Weekly Lab Syllabus

Week	Material Covered
Week 1-2	Learn the C++ language program complier.
Week 3-4	Declare variables and constants and <iostream.h> including standard functions
Week 5-6	Arithmetic, logical, and bitwise operators
Week 7-8	Math header for math functions <math.h> and Assignment and increment & decrement operators
Week 9-10	Relational and conditional operators and Loop operators
Week 11-12	Examples about the Arrays
Week 13-14	Examples about Functions and string

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	C Programming Absolute Beginner's Guide, 3rd Edition 2014. BY: Greg Perry and Dean Miller.	Yes
Recommended Texts	C How to Program with an introduction to C++, 8th Edition 2016. *BY: Paul Deitel and Harvey Deitel.* Global Edition contribution by Piyali Sengupta	No
Websites	1- https://www.programiz.com/c-programming 2- https://www.coursera.org/specializations/c-programming	

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Courses specification for Second class Industrial Engineering (Second Course)

Module Information		
Module Title	**AC Machines**	**Module Delivery**
Module Type	**Support or related learning activity**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒**Tutorial**
Module Code	**NVEEELI223**	
ECTS Credits	**6**	
SWL (hr/sem)	**175**	

		☐ **Practical** ☐ **Seminar**		
Module Level	2	**Semester of Delivery**	2	
Administering Department	Electronic Dept.	**College**	Electronics Collage	
Module Leader		**e-mail**		
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date		**Version Number**		

Relation with other Modules			
Prerequisite module	DC Machine	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	60. Understanding AC Machine Principles 61. Analyzing AC Machine Behavior 62. Control Strategies 63. System Integration 64. Practical Applications

	65. Problem-Solving Skills 66. Laboratory Skills 67. Teamwork and Communication 68. Professional Development
Module Learning Outcomes	66. Understand how voltage is induced in a rotating loop 67. Understand how curved pole faces contribute to a constant flux, and thus 68. more constant output voltages. 69. Understand how curved pole faces contribute to a constant flux, and thus more constant output voltages. 70. Understand the power flow diagram for Ac machines 71. Know the types of Ac machines in general use. 72. Understand the equivalent circuit of a three phase induction motor. 73. Understand how to derive the Torque speed characteristic of three phase induction motor. 74. Understand how to control the speed of different types of AC motors. 75. Understand the starting torque, condition for maximum torque, condition for maximum starting torque of the Ac motors. 76. Understand the methods of starting AC motors safely. 77. Understand the equivalent circuit of a AC generator. 78. Understand of Single phase Induction motor . Construction , theories of operation, torque speed characteristic, Equivalent circuit. 79. Understand how Test of single phase induction motor, no load test, blocked rotor test, power flow diagram, applications. 80. Understand how Three phase synchronous generator, Construction, Equivalent circuit, applications. 81. Understand how Single phase synchronous motors, Reluctance motor, Construction of reluctances motor, applications. 82. Understand how Hysteresis motor, Construction of Hysteresis motor, application.

	83. Be able to explain how copper losses, leakage flux, hysteresis, and eddy currents are modeled in Ac machines circuits.
Indicative Contents	Introduction - The module further develops students' understanding of electrical machines by introducing the operational principles and characteristics of AC machines, three phase circuits and complex power. It introduces the principles, operation and design of common power electronic converter circuits.(12 hrs.)
	Commutation and Armature Construction in Real Tree phase induction motor.(8 hrs.)
	Introduction of The Equivalent Circuit of a Tree phase induction motor. (10 hrs.).
	Power Flow and Losses in Tree phase induction motor. (6 hrs.)
	Torque speed characteristic, starting torque, condition for maximum torque, condition for maximum starting torque.(12 hrs.)
	Test of three phase induction motor, no load test, blocked rotor test, power flow diagram, applications.(12 hrs.)
	Mid-term Exam. .(3 hrs.).
	Single phase Induction motor.(4 hrs.).
	Introduction of Single phase Induction motor . Construction , theories of operation, torque speed characteristic, Equivalent circuit, (12 hrs.).
	Test of single phase induction motor, no load test, blocked rotor test, power flow diagram, applications.(12 hrs.).
	Three phase synchronous generator, Construction, Equivalent circuit, applications. (12 hrs.).
	Single phase synchronous motors, Reluctance motor, Construction of eluctance motor, applications.(10 hrs.).
	Hysteresis motor, Construction of Hysteresis motor , application .(9 hrs.).
	AC Commutator machine,Universal motor.(12 hrs.).

Learning and Teaching Strategies	
Strategies	Visual Aids Problem-Solving Exercises Real-World Applications Group Projects Simulations and Virtual Labs

	Multimedia Resources Real-Life Examples

Student Workload (SWL)			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	101	**Unstructured SWL (h/w)**	4.64
Total SWL (h/sem)	175		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction - The module further develops students' understanding of electrical machines by introducing the operational principles and characteristics of AC machines, three phase circuits and complex power.
Week 2	Commutation and Armature Construction in AC Machine.
Week 3	Introduction of The Equivalent Circuit of a Tree phase induction motor.

Week 4	Power Flow and Losses in Tree phase induction motor.
Week 5	Torque speed characteristic, starting torque, condition for maximum torque, condition for maximum starting torque in Tree phase induction motor.
Week 6	Test of three phase induction motor, no load test, blocked rotor test. **, applications**
Week 7	Mid-term Exam.
Week 8	Introduction of Single phase Induction motor. Construction, theories of operation.
Week 9	Torque speed characteristic, Equivalent circuit, of single phase induction motor.
Week 10	power flow diagram of single phase induction motor & applications.
Week 11	Test of single phase induction motor, no load test, blocked rotor test of Single phase Induction motor.
Week 12	Three phase synchronous generator, Construction, Equivalent circuit, applications.
Week 13	Single phase synchronous motors, Reluctance motor, Construction of reluctances motor, applications.
Week 14	Hysteresis motor, Construction of Hysteresis motor , application
Week 15	AC Commutator machine, Universal motor
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Electrical Machinery Fundamentals" edited by Stephen J. Chapman.	NO
Recommended Texts	electrical machines and transformer by: Ancieron and Macneiil	NO
Websites	https://www.coursera.org	

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded

	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	**Electronics II**	**Module Delivery**	
Module Type	**core**	☐ **Theory**	
Module Code	**NVEEELI222**	☒ **Lecture**	
ECTS Credits	**7**	☐ **Lab**	
SWL (hr/sem)	**175**	☒ **Tutorial**	
		☒ **Practical**	
		☐ **Seminar**	

Module Level	1	**Semester of Delivery**	1
Administering Department	Electronics	**College**	Electronic Engineering college
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	Ahmad.younis@uoninevah,edu,iq
Scientific Committee Approval Date	12/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	NEEI2212	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	69. To understand the basic analysis of bipolar transistor amplifier 70. To be familiar with the dc and ac analysis of transistor amplifier 71. To understand the dc and ac analysis of FET amplifier 72. To illustrate and to understand the frequency response of amplifier 73. To understand the basic concept of feedback concept 74. To be able to deal with different feedback amplifier topologies 75. To study the advantages of negative feedback on amplifier performance 76. To be familiar with feedback amplifier ac analysis 77. To understand the construction and ideal characteristic of operational amplifier 78. To study and analyze op-amp equivalent circuit 79. To be familiar with basic op-amp applications 80. To start with studying power electronic devices
Module Learning Outcomes	84. Understand and apply the basic theory and operation of transistor amplifiers 85. Define and explain the frequency response of bipolar transistor amplifier 86. Understand the basic concept of negative feedback 87. Understand and analyze the feedback amplifier 88. Understanding the operation of ideal operational amplifier 89. Dealing with dc and ac op-amp equivalent circuit 90. Understanding the basic application of op-amp 91. Power electronic devices principle overview

Indicative Contents	**Transistor and FET amplifier analysis:** Small signal model analysis, low frequency and high frequency analysis, hybrid model, hybrid -Pi model analysis. **Amplifier with negative feedback:** Basic concept, feedback analysis, feedback configurations, Feedback effects on gain , bandwidth, input and output resistances **Operational amplifier:** Ideal Op-amp equivalent circuit; Operational Amplifier Specification; Circuit analysis of an Op-amp; Closed loop Op-amp Circuit (Inverting and Non-Inverting Circuit). **Op-amp Applications:** Summation & subtraction Circuit, Differential circuit Buffer circu Ideal and practical Integrator circuits, ideal and practical Differentiator circuits, Examples. **Power electronic devices:** UJT Construction, Operation and characterises; Thyrsistor Equivalent Circuit ; Thyrsistor Characteristics and operation ; Application of the devices.

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	74	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	101	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	175		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Small signal model analysis
Week 2	Low and high frequency response of transistor amplifier
Week 3	Hybrid and hybrid-Pie equivalent circuit analysis
Week 4	Negative feedback concept and analysis
Week 5	Advantages of negative feedback on amplifier
Week 6	Amplifier feedback topologies
Week 7	Feedback effect on amplifier gain, bandwidth, and on input-output resistances
Week 8	operational amplifier construction and operation
Week 9	ideal and practical op-amp equivalent circuit

Week 10	Inverting and non inverting closed loop amplifier
Week 11	Integration and differentiation active circuits
Week 12	Summation and subtraction op-amp circuits
Week 13	UJT transistor construction
Week 14	Thyristor equivalent circuit and characteristics
Week 15	Subject review
Week 16	**Subject review**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	**Practical experiments in transistor amplifier frequency response at lo and high frequency** **To measure the effect of feedback on amplifier performance** **To measure the performance of different op-amp circuits.**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Electronic Devices By Millmann Electronic Devices By Floyd	yes
Recommended Texts	**SOLID STATE DIVICES", PHI; 4TH EDITION**, 1995.By STREETMAN, **SEMICONDUCTOR DEVICES & CIRCUITS", JOHN WILEY & SONS, 1992**.By : M.S. TYAGI	Yes
Websites	Electronic circuits	

Grading Scheme

Group	**Grade**	Rating	**Marks (%)**	**Definition**

Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Information

Module Title	Digital Design		**Module Delivery**	
Module Type	**Base**		☒ **Theory**	
Module Code	**NVEE223**		☒ **Lecture**	
ECTS Credits	3		☐ **Lab**	
SWL (hr/sem)	60		☒ **Tutorial**	
			☐ **Practical**	
			☐ **Seminar**	
Module Level	2	**Semester of Delivery**	1	
Administering Department	Electronic Eng. Dep.	**College**	Electronics Engineering	
Module Leader	Amer Talal Ali	**e-mail**		
Module Leader's Acad. Title	Lecturer assistant	**Module Leader's Qualification**		
Module Tutor	Amer Talal Ali	**e-mail**		
Peer Reviewer Name	Name	**e-mail**		

Scientific Committee Approval Date	01/06/2023	**Version Number**	

Relation with other Modules Relation with Other Modules			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives Module Aims	30. To understand Advanced Minimization techniques for large number of bits to simplify the large designs. 31. Understand how to Design an Arithmetic and Logic unit. 32. Understand how to Design using programmable logic device. 33. To understand the sequential Logic Circuits. 34. To understand how to Design synchronous and asynchronous counters. 35. To understand the Design of Registers.
Module Learning Outcomes Module Learning Outcomes	1. Using Advanced Minimization techniques for large number of bits to simplify the large designs. 2. Design an Arithmetic and Logic unit. 3. Design using programmable logic device. 4. Design sequential Logic Circuits synchronous and asynchronous. 5. Design Registers. 6. Design synchronous and asynchronous counters.

Indicative Contents Indicative Contents	Indicative content includes the following. Part A – minimization techniques for large number of bits [14 hrs] Part B – Initialization to design and Design an Arithmetic and Logic unit. [14 hrs] Part C – Design using programmable logic device. [6 hrs] Part D – sequential Logic Circuits. [18 hrs]

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking and digital designing skills. This will be achieved through classes and interactive tutorials.

Student Workload (SWL) Student Workload (SWL) calculated for 15 weeks			
Structured SWL (h/sem) Structured SWL during the semester	60	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	60	**Unstructured SWL (h/w)** Unstructured SWL per week	4
Total SWL (h/sem) Total SWL during the semester	**120**		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	Introduction to Digital Design
Week 2	The 5-Variable Karnaugh Map; The 5-Variable Karnaugh Map with don't care conditions
Week 3	Map Entered variable Karnaugh Map
Week 4	ADDITIONAL MINIMAZATION TECNHNIQUES: Tabular method; Quine-McCluskey
Week 5	Design using multiplexer: - Shannon Expansion
Week 6	top-down desigin of combainaonal CIRCUITS: - Gate Level: Adders; Subtractor
Week 7	Design an Arithmetic and Logic unit

Week 8	memory and type of memories
Week 9	Design using programmable logic device (PLD): - PROM; PAL; PLA;
Week 10	sequential LOGIC: - Type of flip-flops; Timing Diagram; Basic concepts of counters; Binary counters; BCD counters; Up down counter
Week 11	sequential LOGIC: -Design of counters using state diagrams and tables;
Week 12	sequential LOGIC: -Mealy and Moore Circuits;
Week 13	synchrous CIRCUITS: Shift left and right register; Registers with parallel load; Serial –in arallel-out (SIPO) and parallel-in-serial-out (PISO).
Week 14	synchrous CIRCUITS: Shift Registers; Twisted Ring Counter; Maximum Length Shift Counter.
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	"Digital and analog communication" 2001 By L. W. Couch Sixth Edition	Yes
Recommended Texts	- Digital Communications Fifth Edition, 2008, John G. Proakis, and Masoud Salehi. Introduction to Communication Systems" 1992 By F. Stremler. -ELEMENTS OF INFORMATION THEORY" 2006 By THOMAS M. COVER and JOY A. THOMAS -Digital Communication, 2004 by Abbas Kattoush.	Yes
Websites		

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks %	Definition

Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	Signals and Systems			**Module Delivery**	
Module Type	Core			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐**X Practical** ☐ **Seminar**	
Module Code	NVEE210				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGx11 1	**Semester of Delivery**		4
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	

Scientific Committee Approval Date	25/06/2023	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Student will be able to: 36. identify systems concepts . 37. understand the properties of systems . 38. understand the mathematical relation between input and output of a system. 39. deal with Fourier and Laplace analysis of systems. 40. perform z-transform of discrete signals .
Module Learning Outcomes	62. Definition of the system concept. 63. Introduction of mathematical models. 64. Explain Continuous time systems. Discrete time systems. 65. Introduction of frequency response of systems. 66. Definition of filters. 67. Explain Ideal filters, Non ideal filters, and Butterworth filter design. 68. Define Z-transform of discrete signals. 69. Analyze of continuous system using Laplace Transform. System transfer function. 70. Definition of transfer function of a discrete system.
Indicative Contents	Indicative content includes the following. Introduction to systems: - Definition and mathematical models. - Properties of systems. Transformation used with continuous systems - Fourier transforms.

	- Filters. - Laplace transform. Z-transform: - Introduction of z- transform of discrete time signal. - Z-transform used with discrete systems. Convolution used for - Continuous systems. - Discrete systems

Learning and Teaching Strategies	
Strategies	To make students interesting with both types of systems: continuous and discrete. Also with properties of systems and operations . To make them familiar with time and frequency domain and analysis of a system. Also to make them familiar with different types of transforms of systems. Also to make them have an experience with solving different problems and examples.

Student Workload (SWL)			
Structured SWL (h/sem)	62	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	88	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**150**		

Module Evaluation					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11

	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Basic definitions. Mathematical models.
Week 2	Continuous time systems.
Week 3	Discrete time systems.
Week 4	System properties.
Weeks 5	Mathematical system representation in time domain: Convolution representation.
Week 6	Convolution properties.
Week 7	System description by linear constant coefficient differential equations.
Week 8	Frequency domain analysis of continuous system.
Week 9	Frequency response of a system.
Week 10	Frequency response of electrical circuits.
Week 11	Ffilters. Distortion less transmission.
Week 12	Ideal filters. Non ideal filters. Butterworth filter design.
Week 13	Analysis of continuous system using Laplace Transform.
Week 14	System transfer function.
Week 15	Analysis of discrete system using z-Transform. System transfer function.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**Signals and Systems. Simon S. Haykin**	Yes
Recommended Texts	**Signals and linear Systems. G. E. Carlson**	

Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

Module Title	Engineering Analysis II	**Module Delivery**	
Module Type	Core	☐ **Theory**	
Module Code	NVEE209	☒ **Lecture**	
ECTS Credits	3	☐ **Lab**	
SWL (hr/sem)	75	☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	

Module Level	2	**Semester of Delivery**	2
Administering Department	Electronics dept	**College**	Electronics engineering college
Module Leader	Dr. Omar B Mohammed	**e-mail**	omar.mohammed@uoninevah.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	This course covers the following topics: ordinary differential equations, sequences and series, solution of differential equations by power series, and matrix analysis. Those areas of mathematics which are most important in connection with practical problems for modeling different areas of science, computer can be easily utilized to find the properties of such systems.
Module Learning Outcomes	Upon successful completion, students will: 19. Improve their problem-solving skills. 20. Apply that knowledge toward practical problems in different areas of science. 21. Utilize the computer capabilities to solve such problems using proper methods. 22. Learn how to represent any function as a power series, then use computer to solve it. 23. Learn the importance of differential equations for modeling almost any system, and how to solve it to find the properties of that system. 24. Learn the linear algebra and its importance in science.
Indicative Contents	Ordinary Differential Equations. Sequences and Series. Solution of Differential Equations by Power Series.

	Matrix Analysis.

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)		**Structured SWL (h/w)**	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)**	
Total SWL (h/sem)			

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**				
	Final Exam				
Total assessment					

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Ordinary Differential Equations:
Week 2	

Week 3	4. First order (variables separable, homogeneous, linear and exact). 5. Second order homogeneous. 6. Second order nonhomogeneous; indeterminant coefficients, variation of parameters.
Week 4	
Week 5	Infinite Sequences and Series: 4. Limit laws, indeterminate forms and L'hospital rule. 5. Infinite series; convergence test. 6. Power series; Taylor and Maclaurin series.
Week 6	
Week 7	
Week 8	
Week 9	Solution of Differential Equations by Power Series: Power series method, Legendre's equation; Legendre s polynomials.
Week 10	
Week 11	
Week 12	
Week 13	Matrix Analysis: 5. Review of matrix theory, solving system of equations; Cramer's rule, inverse of the matrix method, Gauss elimination. 6. Eigen values and eigen vectors. 7. Diagonalization of matrices 8. Application of matrices to electric circuits.
Week 14	
Week 15	
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics By KREYSIK	Yes
Recommended Texts	Calculus By Finney& Thomas	Yes
Websites		

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.

Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Courses specification for Third class Medical Engineering (First Course)

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information			
Module Title	**Digital Signal Processing I**	**Module Delivery**	
Module Type	Core	**Theory** ☒ **Lecture** ☒ **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	NVEEELM301		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	1 UGIII /Level 3	**Semester of Delivery**	5
Administering Department	Dept. of Electronic Engineering	**College**	College of Electronics Engineering-EE

Module Leader	Noor Talal Gadawe	**e-mail**	noor.gadawe@uoninevah.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	M.Sc
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	Signal and system	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives Module Aims	41. To identify the component of digital signal processing system. 42. To understand continuous, discrete, periodic and non-periodic signals. 43. To understand the transformation of signals and the difference between them. 44. To analyze spectrum of signals.
Module Learning Outcomes Module Learning Outcomes	71. Explain the function of each block in DSP system. 72. Covert signals from continues to discrete form and then reconstruction. 73. Find impulse response, unit step response and difference equation 74. Define discrete Fourier series. 75. How can find the spectrum for periodic and non-periodic signals 76. Explain the differences between transformation method. 77. Find and explain the equation of the transfer function in frequency domain 78. Define z-transform, region of convergence and the relationship between frequency and z-domain. 79. Find poles, zeros and the stability of transfer functions.
Indicative Contents	Indicative content includes the following.

Indicative Contents	**Theoretical Content [30 hrs]** Review of discrete-time signals and systems; classification and properties of signals and systems. [6 hrs] DSP system components, sampling, quantization, coding, signal reconstruction, and aliasing. [6 hrs] Difference equations, impulse response, convolution, and correlation. [6 hrs] DTFT, IDTFT, frequency response, magnitude spectrum, and phase spectrum. [6 hrs] DFT, IDFT, FFT, and computational complexity. [6 hrs] **Laboratory Content [30 hrs]** Practical laboratory exercises using MATLAB or equivalent software covering signal generation, sampling, reconstruction, convolution, correlation, DTFT, DFT, FFT[30 hrs] Total Indicative Content: 60 hrs

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Student Workload (SWL) calculated for 15 weeks

Structured SWL (h/sem) Structured SWL during the semester	63	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	37	**Unstructured SWL (h/w)** Unstructured SWL per week	2.47
Total SWL (h/sem) Total SWL during the semester	**100**		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #3 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #2-#3 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	REVIEW OF DISCRETE SIGNALS AND SYSTEMS
Week 2	INTRODUCTION OF DIGITAL SIGNAL PROCESSING
Week 3	Properties of discrete-time signals (periodicity, symmetry).
Week 4	Properties of discrete-time systems (linearity, time-invariance, causality, stability).
Week 5	Block diagram of DSP system
Week 6	Difference equations and impulse response
Week 7	FREQUENCY-DOMAIN REPRESENTATION OF DISCRETE-TIME SIGNALS AND SYSTEMS
Week 8	Discrete-Time Fourier Transform
Week 9	DTFT Properties and IDTFT
Week 10	Transfer function in frequency domain
Week 11	Mid term
Week 12	DFT_N points transform and IDFT_N points
Week 13	Fast Fourier Transform and IFFT
Week 14	Fast Fourier Transform Properties and transfer function
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) Weekly Lab Syllabus	
	Material Covered
Week 1	Lab 1: Review
Week 2	Lab 2: introduction of discrete time signals part 1
Week 3	Lab 3: introduction of discrete time signals part 2
Week 4	Lab 4: sampling and reconstruction of analog signals part1
Week 5	Lab 5: sampling and reconstruction of analog signals part2
Week 6	Lab 6: convolution and correlationpart1
Week 7	Lab 7: convolution and correlationpart2
Week 8	Lab 8: discrete Fourier transform part1
Week 9	Lab 9: discrete Fourier transform part2
Week 10	Lab 10: fast Fourier transform part1
Week 11	Lab 11: fast Fourier transform part2

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Emmanuel and Barrie, "Digital Signal Processing practical Approach,"	Yes
Recommended Texts	1- 3.Li Tan and Jean Jiang, "Digital Signal Processing Fundamentals and Applications" 2- John G. Proakis, "Digital Signal Processing– Fourth Edition	Yes

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Power Electronics**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELM302**		
ECTS Credits	4		
SWL (hr/sem)	60		
Module Level	3-1	**Semester of Delivery**	5
Administering Department	Electronic Engineering	**College**	College of Electronics Engineering-EE
Module Leader	Dr. Harith Al-Badrani	**e-mail**	harith.mohammed@uoninevah.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Dr.-Ing.
Module Tutor	Dr. Harith Al-Badrani	**e-mail**	harith.mohammed@uoninevah.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	Sep 01, 2025	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	45. Introduce the undergraduate students to the principle of semiconductor switch-based conversion in power electronics. 46. The analysis of power components and important factors when dealing with nonsinusoidal quantities. 47. Focus on the features and benefits of power electronics circuits and apricate its importance in modern electrical engineering systems such as energy processing and conditioning. 48. To introduce the features and characteristics the common power switching devices. 49. To introduce the single-phase and three-phase phase-controlled power converter circuits. 50. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design.
Module Learning Outcomes	80. By the completion of the course, the students should be able to: 81. Define the scope, tools types and applications of power converters. 82. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 83. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 84. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 85. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 86. Describe and Analyze the single-phase and three-phase SCR-AC controller circuits with R and RL loads.
Indicative Contents	Indicative content includes the following. <u>Part A – Introduction, definitions and tools</u> Power Electronics: definitions, approach and applications. Figures of Merits: Ripple factor, Total harmonic distortion, Form factor, Power factor (non-sinusoidal waveform), conversion efficiency. Review of circuit analysis tools.

	Quizzes Part B- Semiconductor Switching Devices Scope of power electronics, power converter specification. Power Semiconductor Devices: Thyristor families, V-I characteristics of SCR, Triac, GTO, Diac, Source of thyristor triggering, turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings. Power transistor devices: Basic structure and V-I characteristics of power MOSFET, IGBT, SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings. Part C- Phase-controlled AC-DC converters Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger . Thyristor commutation techniques: Natural commutation, Force commutation, Voltage / Current commutation.

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**100**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
	Quizzes	2	20% (20)	[3,6,9,12]	LO (#1- #12)

Formative assessment	**Assignments**	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction: Definitions, Power and Energy, Types of Conversion, Power Electronics Approach. The role of switch in power converter, Energy recovery.
Week 2	Power Computations: Mean, RMS, Figures of Merits
Week 3	Power Diodes: Steady-state characteristics, basic parameters and ratings, transient characteristics, Special Diodes.
Week 4	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 5	Source of thyristor triggering, turn On\ turn Off characteristic and Gate triggering requirements.
Week 6	Power transistor devices: Basic structure and V-I characteristics of power IGBT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings.
Week 7	Power transistor devices: Basic structure and V-I characteristics of power MOSFET.
Week 8	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 9	Half-wave diode rectifiers: R-load, RL-Load, freewheeling diode and capacitor filter.
Week 10	Full-Wave diode rectifier R, RL load and freewheeling diode.
Week 11	Controlled Full-Wave rectifier R, RL load and freewheeling diode.
Week 12	Three-phase three-pulse rectifier
Week 13	Six-pulse diode rectifier with R and highly inductive load
Week 14	Analysis of six-pulse diode rectifier with RLE load

Week 15	Preparatory week before the final Exam.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	No
Websites	https://classroom.google.com	

Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information					
Module Title	Measurement instruments principles			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	NEEM3313			☒ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	1 3		**Semester of Delivery**	1	
Administering Department	Dept. of Electronic Eng. (Med. Ele)		**College**	College of Electronic Engineering	
Module Leader	Amenah.E.Kanaan		**e-mail**	Amenah.kanaan@uoninevah.edu.iq	
Module Leader's Acad. Title	Assistance Lecturer		**Module Leader's Qualification**	MS.c	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/06/2023		**Version Number**	1.0	

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives Module Aims	• To educate the fundamental concepts and characteristics of measurement and errors. • To impart the knowledge on the functional aspects of measuring instruments. • To educate the fundamental working of sensors and transducers and their applications. • To infer the importance of various bridge circuits used with measuring instruments. • • To summarize the overall measurement and instrumentation with the knowledge on digital instrumentation principles..
Module Learning Outcomes Module Learning Outcomes	• Ability to understand the fundamental art of measurement in engineering. • Ability to understand the structural elements of various instruments. • Ability to understand about various transducers and their characteristics by experiments. • Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.
Indicative Contents Indicative Contents	Indicative content includes the following. • CONCEPTS OF MEASUREMENTS. • MEASUREMENT OF PARAMETERS IN ELECTRICAL SYSTEMS. • TRANSDUCERS FOR MEASUREMENT OF NON- ELECTRICAL PARAMETERS. • AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS. • DIGITAL INSTRUMENTATION

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	The main strategy being focused on is developing conceptual programming thinking, meanwhile refining and expanding their mathematical thinking skills. This will be achieved through classes, online lectures, interactive tutorials. Additionally, working on complex projects that challenge students' skills and require to apply advanced concepts. Such projects would help students exploring various aspects of C++ programming and gain hands-on experience in solving complex problems. some sampling activities that are interesting to the students.

Student Workload (SWL) Student Workload (SWL) calculated for 15 weeks			
Structured SWL (h/sem) Structured SWL during the semester	77	**Structured SWL (h/w)** Structured SWL per week	5.1
Unstructured SWL (h/sem) Unstructured SWL during the semester	73	**Unstructured SWL (h/w)** Unstructured SWL per week	4.8

Total SWL (h/sem) Total SWL during the semester	**150**

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	Introduction to computer languages and the structure of C program
Week 2	Flowchart and Pseudo-code
Week 3	Introduction to C++ programming: Declare variables and constants
Week 4	Take input and print output
Week 5	Assignment and Increment ,Decrement, Arithmetic, Logical, and Bitwise operators
Week 6	Standard math functions in math header <math.h>
Week 7	Priorities of operators in C++ programming
Week 8	Relational and conditional operators
Week 9	Mid-term Exam
Week 10	If statement versus switch case statement
Week 11	Examples of structured programming (sequencing and condition)
Week 12	Loop operators (For, while, do-while)
Week 13	Arrays

Week 14	Functions
Week 15	String of characters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Weekly Lab Syllabus

	Material Covered
Week 1-2	
Week 3-4	
Week 5-6	
Week 7-8	
Week 9-10	
Week 11-12	
Week 13-14	

Learning and Teaching Resources

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	C Programming Absolute Beginner's Guide, 3rd Edition 2014. BY: Greg Perry and Dean Miller.	Yes
Recommended Texts	C How to Program with an introduction to C++, 8th Edition 2016. *BY: Paul Deitel and Harvey Deitel.* Global Edition contribution by Piyali Sengupta	No
Websites	1- https://www.programiz.com/c-programming 2- https://www.coursera.org/specializations/c-programming	

Grading Scheme

Grading Scheme

Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Description of Medical Sensors and Transducers

Module Description

Module Information

Module Information					
Module Title	Medical Sensors and Transducers			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	3				
SWL (hr/sem)	45				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		Dept. of Biomedical Engineering- BME	**College**		College of Electronics Engineering-EE
Module Leader	Hisham Mohammed Mahmood		**e-mail**		hisham.mahmood@uoninevah.edu.iq
Module Leader's Acad. Title		Assistance Lecturer	**Module Leader's Qualification**		MS.c
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		@uoninevah.edu.iq
Scientific Committee Approval Date		Jun 01, 2023	**Version Number**		1.0

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	1- Analyze errors and uncertainty of experimental results obtained from biomedical sensors. 2- Understand requirements, calibration, characteristics, and

	parameters of biomedical sensors. 3- Design with confidence signal conditioning systems required for processing the sensors responses. 4- Understand the operating principle, types, parameters, signal conditioning, and applications of resistive, reactance variation and self-generating sensors. 5- Understand the operating principle of different types of optical sensors and their features. 6- Understand the operation, models, and parameters of ultrasound transducers. 7- Understand the design, main building blocks, features, and calibration of intelligent sensors.

Module Learning Outcomes Module Learning Outcomes	1. Define biomedical sensors, biosensors, and biomedical transducers. 2. Classify the biomedical sensors. Acquire knowledge about sensor data processing and feature extraction. 3. Recognize the requirements of biomedical sensors. 4. Explain the Static and dynamic characteristics of biomedical sensors. 5. Explain the requirements of signal conditioning circuits suitable for biomedical sensors. 6. Identify design principles of conditioning circuits. 7. Identify the different types of resistive, reactance variation and self- 8. generating sensors. 9. Explain the operating principle, parameters, calibration and applications. of resistive, reactance variation and self-generating sensors. 10. Identify the different types of optical sensors. 11. Reveal the advantages of optical sensors. 12. Classify ultrasound transducers. 13. Recognize the main parts of ultrasound transducers. 14. List the main features of intelligent sensors.
Indicative Contents Indicative Contents	Indicative Contents including the following: • General definition, Characteristics, Principles and requirements Electrodes, definition, electronic CCT, types **[5 hrs.]** • Transducers, properties, types Resistive transducers , Thermometric transducer and medical application **[5 hrs.]** • Semester Examination 1 . **[2 hrs.]** • Photoelectric transducers and medical application , Photomultiplier scintillation counter and their applications, seminars , **[3 hrs.]** • Piezoelectric and ultrasound transducers and medical applications Semester Examination 2 **[8 hrs.]**

	• Chemical transducers and medical applications/ seminars **[5 hrs.]** • Pressure measurement transducers **[3 hrs.]** • Motion and force sensors and medical applications/seminars **[5 hrs.]** Semester Examination 3 **[5 hrs.]** • Preparatory week before the final Exam **[4 hrs.]**

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Active learning, where students should be active and involved in the learning process inside the classroom, will be emphasized in the delivery of this course. ➢ Different active learning methods/approaches such as: Engaged Learning, Project-Based Learning, Cooperative Learning, Problem-based Learning, Structured Problem-solving, will be used. ➢ The teaching method that will be used in this course will be composed of a series of mini lectures interrupted with frequent discussions and brainstorming exercises. PowerPoint presentations will be prepared for the course materials. Use software packages for design and simulation of signal conditioning circuits implemented using these sensors.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	45	**Structured SWL (h/w)** Structured SWL per week	3
Unstructured SWL (h/sem) Unstructured SWL during the semester	75	**Unstructured SWL (h/w)** Unstructured SWL per week	3
Total SWL (h/sem) Total SWL during the semester	125		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	6, 9, 11	LO #1, 3, 4, 7, and 13
	Assignments	2	15% (15)	2, 12	LO # 2, 5, 6 and 11
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	-	-
Summative assessment	**Midterm Exam**	3 hrs	10% (10)	8	LO # 1-9
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Sensors and Signal Conditioning, Ramon Pallas-Areny and John G. Webster, John Wiley & Sons, 2001,2nd Edition	No
Recommended Texts	Biosensors: An Introduction , Eggins, Brian, John Wiley & Sons, 1996,1st Edition	No
Websites	https://www.multisim.com/	

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	General definition, Characteristics, Principles and requirements
Week 2	Electrodes, definition, electronic CCT, types
Week 3	Transducers, properties, types
Week 4	Resistive transducers
Week 5	Thermometric transducer and medical application

Week 6	Semester Examination 1
Week 7	Photoelectric transducers and medical application
Week 8	Photomultiplier
Week 9	scintillation counter and their applications, seminars
Week 10	Piezoelectric and ultrasound transducers and medical applications
Week 11	Semester Examination 2
Week 12	Chemical transducers and medical applications/ seminars
Week 13	Pressure measurement transducers
Week 14	Motion and force sensors and medical applications/seminars
Week 15	Semester Examination 3
Week 16	**Preparatory week before the final Exam**

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A –** Excellent	Excellent	90 – 100	Outstanding Performance
	B - Very Good	Very Good	80 – 89	Above average with some errors
	C – Good	Good	70 – 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 – 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description Form

Module Information Module Information					
Module Title	**Digital Systems Design Using HDL**			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVU18				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Dept. of Elctronic	**College**		College of Electronics Engineering-EE
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Rasha Waleed Hamad		**e-mail**		rasha.hamad@uoninevah.edu.iq
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		Jun 01, 2023	**Version Number**		1.0

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives Module Aims	1. This course will provide the students with the basic knowledge of Electronic circuit design

	2. The focus is on sequential circuits and combinational circuits 3. It provides basic knowledge in Electronic circuits and discusses the role of AI in modern Very Large Scale Integration (VLSI), the Ethical Challenges in design.
Module Learning Outcomes Module Learning Outcomes	1. Provide the students with the basic knowledge of Electronic circuit design using VHDL. 2. Learn the student the simulation of Electronic circuit design using VHDL and synthesise on an FPGA 3. Provides basic knowledge in design circuits and discusses the role of design in modern applications, the Ethical Challenges in design and the Future of circuits at very high speeds. 4. Identify basic Network component architecture type systems and security types 5. Explain the VHDL language component & high-accuracy FPGA slice 6. Discuss the role of VHDL language in different Branches like Robotics and Automation Technologies, etc.
Indicative Contents Indicative Contents	An Introduction to Electronic Circuit Design Using VHDL(2h). - Overview of Circuit Design - Structural Organisation of Design - Language overview type VHDL structuer and designe (2h) - Part types in language - Code view - Example of codes ISE v14.1 editor program (2h) - identify and solve common hardware and software problems Introduction to sequential circuits in VHDL. and Role of VHDL in Modern Very High Speed Language (6h) - Definition of code - application of code in the editor - Adaptive Learning Application and Tools of VHDL(3h) - VHDL Applications in Various Industries - Like VLSI, Robotics and Automation Technologies….etc AI and Society and Ethical Challenges (3h) - The effects of Electronic Circuit Design Using VHDL in modern hardware design and application - Future of speed in hardware design

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, seminars and Practical testing

Student Workload (SWL)			
Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	3*15+3=48	**Structured SWL (h/w)** Structured SWL per week	48/15=3.2
Unstructured SWL (h/sem) Unstructured SWL during the semester	48-75=27	**Unstructured SWL (h/w)** Unstructured SWL per week	27/15=1.8
Total SWL (h/sem) Total SWL during the semester	**75**		

Module Evaluation					
Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15% (20)	2,3, 11,12 and 13	LO #1, #2 ,#3,#14, and #15
	Assignments	2	10% (10)	15	LO #1 - #7
	Projects / Lab.	1	10% (10)	continuous	ALL
	Report	1	5% (10)	continuous	ALL
Summative assessment	**Midterm Exam**	1hr	10% (10)	11	LO #1 - #7
	Final Exam	3hr	50% (50)	15	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)	
Weekly Theoretical Syllabus	
	Material Covered
Week 1	Electronic Circuit Design Using VHDL: What is a Circuit Design? Types of Circuit.
Week 2	Identify the language (Cont.): Network Basics. Understanding Design Threads
Week 3	HDL Programming, VHDL has a rich and interesting history. VHDL acronym.
Week 4	Tools Needed for VHDL Development: VHDL is a language used to implement hardware. A Field Programmable Gate Array (FPGA)

Week 5	VHDL code writing, compiling, simulation and synthesis. All major FPGA manufacturers have a set of software and hardware tools. synthesis can be accomplished using a free-license version of any major FPGA manufacturer's software tool (e.g. Xilinx ISE Design Suite)
Week 6	Four main parts of VHDL descriptionTechniques and Approaches.
Week 7	VHDL WITH ISE14.1(Integrated Synthesis Environment)
Week 8	VHDL Data Objects & Data Types.(signals, variables, and constants).
Week 9	Boolean, Integer, Natural & array
Week 10	VHDL Operators, Concatenation operators, Assignment operators, Logical operators, Arithmetic operators, Relational operators, Shift operators.
Week 11	Programming in VHDL Language (Concurrent Statement)
Week 12	Application and Tools of VHDL Language(Cont.): Robotics and Automation Technologies
Week 13	Programming in VHDL Language (Sequential Statement)
Week 14	CASE Statement & WAIT Statement
Week 15	Review

Delivery Plan (Weekly Lab. Syllabus) Weekly Lab Syllabus	
Week 1	**Material Covered**
Week 2	Introduction of VHDL lab.
Week 3	Installation of ISEv14.1 in pc.
Week 4	Overview of ISEv14.1 and management of data.
Week 5	Network synthesises with physical topology
Week 6	Applied the basic principle of CCT
Week 7	Result review with references
Week 8	Applied complex CCT in VHDL
Week 9	Combinational CCT in VHDL
Week 10	Mid Exam
Week 11	Introduction to AI Finite State Automata (FSA)
Week 12	Introduction to Hierarchical design
Week 13	Training and test for Hierarchical design
Week 14	Review

Learning and Teaching Resources

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1. PEDRONI, Volnei A. *Circuit design with VHDL*. MIT press, 2020. 2. HARR, Randolph E.; STANCULESCU, Alec G. (ed.). *Applications of VHDL to circuit design*. Springer Science & Business Media, 1991.	No
Recommended Texts	1 COELHO, David R. *The VHDL handbook*. Springer Science & Business Media, 2012.	No
Websites		

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Analog Electronics

Module Description

Module Information Module Information

Module Title	Analog Electronics	Module Delivery
Module Type	Support	☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	NVEEELM306, NVEEELI306	
ECTS Credits	6	
SWL (hr/sem)	150	

Module Level	UGI	**Semester of Delivery**	1
Administering Department	Dept. of Electronic Engineering	**College**	College of Electronics Engineering-EE
Module Leader	Noor Alhuda Saad AlJammas	**e-mail**	noor.abbas@uoninevah.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	MS.c
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	Medical Electronics Systems	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	1. Provide knowledge of the fundamental principles of analog electronic circuits. 2. Develop understanding of the operation and applications of transistors, and operational amplifiers. 3. Introduce analysis and design of analog circuits including amplifiers, filters, oscillators, and power stages. 4. Familiarize students with practical applications of analog electronics in engineering systems.
Module Learning Outcomes	1. Explain the working principles of analog electronic devices and amplifiers. 2. Analyze negative feedback amplifiers and their properties.

Module Learning Outcomes	3. Design and simulate basic op-amp circuits including filters and oscillators. 4. Apply knowledge of power amplifiers, converters, and multivibrators. 5. Evaluate performance parameters of analog circuits. 6. Demonstrate problem-solving skills in analog electronic design.
Indicative Contents Indicative Contents	1. Negative Feedback Amplifiers: concept, properties, connection types. 2. Operational Amplifier Applications: inverting, non-inverting, summing, differentiator, integrator, comparator, precision rectifiers, sample-and-hold. 3. Filters: RC active filter design and approximations. 4. Oscillators: Barkhausen's criteria, Nyquist stability, phase shift, Colpitts, Hartley, Crystal oscillators. 5. Power Amplifiers: Class A, B, AB, C, transformer-coupled, push-pull, complementary symmetry. 6. Comparators and Converters: introduction to A/D, D/A, and sample-and-hold circuits. 7. Multivibrators: astable, monostable, bistable, 555 timer applications.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	1. **Lectures** – to explain fundamental principles and circuit operation. 2. **Problem**-solving sessions – to practice circuit analysis and design. 3. **Tutorials** – for clarifying concepts and solving exercises. 4. **Laboratory demonstrations** – to connect theory with practice. 5. **Assignments and projects** – to encourage independent learning.

Student Workload (SWL) Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	63	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	87	**Unstructured SWL (h/w)** Unstructured SWL per week	5.8
Total SWL (h/sem) Total SWL during the semester	150		

Module Evaluation Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	6, 9, 11	LO #1, 3, 4, 7, and 13
	Assignments	2	15% (15)	2, 12	LO # 2, 5, 6 and 11
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	-	-
Summative assessment	**Midterm Exam**	3 hrs	10% (10)	8	LO # 1-9
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	**Matrices:** Introduction to Analog Electronics.
Week 2	Negative Feedback Concept and Properties.
Week 3	Feedback Connection Types.
Week 4	Op-Amp Basics – inverting and non-inverting applications.
Week 5	Advanced Op-Amp Circuits (integrator, differentiator, comparator).
Week 6	Precision applications: rectifiers, sample-and-hold.
Week 7	Mid-term Exam
Week 8	Active Filter Design and Approximations.
Week 9	Oscillators – principles and stability criteria.
Week 10	Phase shift, Colpitts and Hartley oscillators.
Week 11	Crystal oscillator design.
Week 12	Power amplifiers – Class A, B, AB operation.
Week 13	Transformer-coupled and push-pull amplifiers.
Week 14	Complementary symmetry and Class C amplifiers.
Week 15	Multivibrators and 555 Timer circuits.
Week 16	General review + discussion of exam questions.

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1. Integrated Electronics by Millman. 2. Microelectronics circuit Analysis by Donald A Neamen. 3. Microelectronics Jacob Millman.	No
Recommended Texts		
Websites		

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Numerical Analysis I

Module Description

Module Information Module Information					
Module Title	Numerical Analysis I			**Module Delivery**	
Module Type	support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	3				
SWL (hr/sem)	48				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	Electronic Engineering		**College**	College of Electronics Engineering-EE	
Module Leader	Amer Talal Ali		**e-mail**	amer.ali@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecture Assistant		**Module Leader's Qualification**	MS.C	
Module Tutor	Amer Talal Ali		**e-mail**	amer.ali@uoninevah.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	Sep 01, 2025		**Version Number**	1.0	

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	1. Get students familiar with the basics of numerical analysis as a fundamental science computing tool and an applied math tool. 2. Acquire skills to design, analyze, and apply numerical algorithms to solve mathematical problems that occur in engineering, computer science, physics, and other fields. 3. Give concrete experience in the use of numerical techniques to obtain approximations to solutions of equations, systems of equations, interpolation, differentiation, integration, and differential equations. 4. Develop a critical understanding of the accuracy, efficiency, and stability of numerical methods, their sources of error, and error control. 5. Use theoretical study in conjunction with practical exercises and projects to develop problem-solving skills, analytical thinking skills, and independent learning.
Module Learning Outcomes Module Learning Outcomes	Knowledge and understanding. 1. State the basic concepts of numerical methods and their application in science and engineering. 2. Determine the primary causes of numerical error (round-off and truncation) and determine how each affects calculational accuracy. 3. Compare and contrast various root-finding algorithms, interpolation algorithms, numerical differentiation and integration algorithms, as well as differential equation solutions. Skills (Cognitive & Practical) 4. Use suitable numerical methods to find approximations of mathematical problems whose analytical solutions may be hard or inaccessible. 5. Test the efficiency, accuracy, and stability of numerical algorithms across classes of problems. 6. Evaluate and compute computational solutions, and test solutions by comparing them to theory. Transferable Skills 7. Show abilities in problem solving in both creation and resolution of applied numerical problems. 8. Work in teams and on your own to design, test, and present numerical solutions. 9. Provide effective ways of communicating technical findings using written reports, code documentation, and presentations.
Indicative Contents Indicative Contents	1. Introduction to Numerical Analysis Role and importance of numerical methods Sources of error and error propagation

	Convergence and stability 2. Solution of Nonlinear Equations Bisection, Fixed-Point, Newton-Raphson, Secant methods 3. Systems of Linear Equations Gaussian elimination, LU decomposition Iterative methods: Jacobi, Gauss-Seidel, SOR 4. Interpolation and Polynomial Approximation Lagrange interpolation, Newton divided differences Spline interpolation 5. Numerical Differentiation Difference formulas (forward, backward, central) Error analysis 6. Numerical Integration Trapezoidal and Simpson's rules Composite rules, Gaussian quadrature 7. Initial Value Problems for ODEs Euler's method, Improved Euler, Runge-Kutta methods 8. Advanced Topics (optional) Boundary value problems and PDE introduction Applications in science and engineering

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Lectures: Present basic theories, principles, and examples. Tutorials: Support ideas through interactive problem solving. Independent Study: Motivate reading and practicing. Group Projects: Facilitate collaboration and problem-solving within an applied situation. Formative Feedback: It is given through quizzes and assignments.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	48	**Structured SWL (h/w)** Structured SWL per week	3
Unstructured SWL (h/sem) Unstructured SWL during the semester	52	**Unstructured SWL (h/w)** Unstructured SWL per week	3
Total SWL (h/sem) Total SWL during the semester	100		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	20% (20)	4,7,11	LO #1-7
	Assignments	3	10% (10)	2,6,12	LO # 8-9
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	-	LO # 7-9
Summative assessment	**Midterm Exam**	3 hrs	10% (10)	9	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	LO # 1-7
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	**Introduction to Numerical Analysis** Role and importance of numerical methods in science and engineering. Sources of error: round-off error.
Week 2	Sources of error: truncation error and error propagation. Concepts of convergence, stability, and computational complexity.
Week 3	**Solution of Nonlinear Equations** Bisection method, fixed-point iteration.
Week 4	Newton-Raphson and Secant methods.
Week 5	Convergence analysis and error estimation.
Week 6	**Systems of Linear Equations** Direct methods: Gaussian elimination, LU decomposition.
Week 7	Iterative methods: Jacobi, Gauss-Seidel, Successive Over-Relaxation (SOR).
Week 8	Condition number and stability considerations.
Week 9	**Mid-term Exam**
Week 10	**Interpolation and Polynomial Approximation** Lagrange interpolation.
Week 11	Newton divided differences.
Week 12	Spline interpolation and curve fitting.
Week 13	**Introduction in Numerical Differentiation**

Week 14	**Introduction in Numerical Integration**
Week 15	**Initial Value Problems for Ordinary Differential Equations (ODEs)**
Week 16	**Perpetration of Final Exam**

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	- Thomas's Calculus 12th edition	Yes
Recommended Texts	- Numerical Analysis, 10th Edition -- Richard L_ Burden, J_ Douglas Faires, Annette M_ Burden -- 2016 - Numerical Methods for Engineers 7th Edition -- Steven C_ Chapra, Raymond P_ Canale -- 7_ ed, New York, NY, c 2015	No
Websites	https://www.geeksforgeeks.org/search/?gq=numerical+analysis https://www.tutorialspoint.com/index.htm	

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information					
Module Title	**Arabic Language 2**			**Module Delivery**	
Module Type	**Base**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVU17**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1 2		**Semester of Delivery**	2	
Administering Department			**College**	Electronics Engineering	
Module Leader	Abdullah Mohammed Qader		**e-mail**		
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	Feb. 01, 2025		**Version Number**	1.0	

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	This module aims to enhance language skills, develop thinking, and enable students to know the basic rules of the Arabic language, as well as enable them to deliver speeches and speak correct language free of grammatical errors. .
Module Learning Outcomes Module Learning Outcomes	The student is expected to be able to: 1 - Distinguish where to write the tied taa (taa marbuta) and the open taa (taa mabsuta), and write words correctly. 2 - Apply the rules of numbers and their specifiers in different linguistic structures. 3 - Differentiate between the letters Dhad and Dha in pronunciation and writing, and use each in its correct place. 4 - Distinguish the cases of the subjunctive and jussive moods of the present-tense verb, and apply the subjunctive and jussive particles correctly. 5 - Recognize verbal and semantic embellishments, extract them from texts, and explain their rhetorical effect. 6 - Comprehend the linguistic and literary principles drawn from the Holy Quran and the purified Prophetic Sunnah, and employ them in understanding texts. 7 - Recognize the most prominent topics and characteristics of Arabic literature, and analyze literary texts at a basic level. 8 - Employ grammatical, spelling and rhetorical rules correctly in reading and writing. 9 - Acquire skills of linguistic and critical analysis of various texts. 10 - Use Standard Arabic properly in oral and written expression.
Indicative Contents Indicative Contents	Indicative content includes the following: Studying the noun in terms of its bare and augmented forms; recognizing verbal and semantic embellishments in the science of Badi' (rhetorical embellishment); studying the rules of the subjunctive and jussive moods of the present-tense verb; distinguishing between Dhad and Dha in pronunciation and writing; studying single numbers, compound numbers, the decades, conjoined numbers and ordinal numbers; in addition to explaining the rules for writing the tied taa and the open taa and their applications in correct linguistic usage, using examples and practical exercises to consolidate these topics.

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Following the direct teaching method by presenting and explaining the material and using teaching aids to explain it, clarifying the mechanisms of the scientific concept of the Arabic language.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	28	**Structured SWL (h/w)** Structured SWL per week	2
Unstructured SWL (h/sem) Unstructured SWL during the semester	19	**Unstructured SWL (h/w)** Unstructured SWL per week	

Total SWL (h/sem) Total SWL during the semester	50

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 10	LO #1 ,#4, #5, #6, #7 #9, #10, #11, #12
	Classwork	2	10% (10)	9	LO #1 ,#2, #3, #5, #6 #7, #9, #10
	discussion panel.	1 1	10% (10)0% (10)	6	LO # ,7 LO # 4
	Report	1	10% (10)	14	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1 , #3, #5, #6 #7, #9
	Final Exam	2hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	The Holy Quran and the Prophetic Sunnah
Week 2	Arabic literature
Week 3	Stages of compiling the language
Week 4	The extended alif and the shortened alif
Week 5	The noun in terms of masculine and feminine
Week 6	The noun in terms of bare and augmented forms
Week 7	Science of Badi': verbal embellishments
Week 8	Semantic embellishments
Week 9	The subjunctive mood of the present-tense verb
Week 10	The jussive mood of the present-tense verb
Week 11	Dhad and Dha
Week 12	Numbers (single numbers)

Week 13	Numbers (compound numbers)
Week 14	The decades, conjoined numbers and ordinal numbers
Week 15	The tied taa and the open taa
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Weekly Lab Syllabus

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	

Learning and Teaching Resources

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	The Holy Quran Musnad Abi Ya'la Diwan of Al-Sayyab Diwan of Al-Mutanabbi Al-Sarf Al-Wadih (Clear Morphology), Abduljabbar Alwan Al-Nayla Al-Tuhfa Al-Saniyya fi Sharh Al-Muqaddima Al-Ajurrumiyya, Muhammad Muhyiddin Abdul-Hamid Al-Balagha Al-Wadiha (Clear Rhetoric), Ali Al-Jarim and Mustafa Amin	Yes

Recommended Texts		No
Websites		

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Courses specification for Third class Medical Engineering (Second Course)

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information		
Module Title	**Digital Signal Processing II**	**Module Delivery**
Module Type	Core	**Theory**

Module Code	NVEEELM308			☒ **Lecture** ☒ **Lab** **Tutorial** **Practical** **Seminar**	
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1 UGIII /Level 3		**Semester of Delivery**	6	
Administering Department	Dept. of Electronic Engineering		**College**	College of Electronics Engineering-EE	
Module Leader	Noor Talal Gadawe		**e-mail**	noor.gadawe@uoninevah.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	M.Sc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules

Relation with Other Modules

Prerequisite module	Signal and system	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives Module Aims	51. To identify the component of digital signal processing system. 52. To understand continuous, discrete, periodic and non-periodic signals. 53. To understand the transformation of signals and the difference between them. 54. To analyze spectrum of signals.
Module Learning Outcomes	87. Explain the function of each block in DSP system. 88. Covert signals from continues to discrete form and then reconstruction.

Module Learning Outcomes	89. Find impulse response, unit step response and difference equation 90. Define discrete Fourier series. 91. How can find the spectrum for periodic and non-periodic signals 92. Explain the differences between transformation method. 93. Find and explain the equation of the transfer function in frequency domain 94. Define z-transform, region of convergence and the relationship between frequency and z-domain. 95. Find poles, zeros and the stability of transfer functions.
Indicative Contents Indicative Contents	Indicative content includes the following. **Theoretical Content [30 hrs]** Review of discrete-time signals and systems; classification and properties of signals and systems. [6 hrs] DSP system components, sampling, quantization, coding, signal reconstruction, and aliasing. [6 hrs] Difference equations, impulse response, convolution, and correlation. [6 hrs] DTFT, IDTFT, frequency response, magnitude spectrum, and phase spectrum. [6 hrs] DFT, IDFT, FFT, and computational complexity. [6 hrs] **Laboratory Content [30 hrs]** Practical laboratory exercises using MATLAB or equivalent software covering signal generation, sampling, reconstruction, convolution, correlation, DTFT, DFT, FFT[30 hrs] Total Indicative Content: 60 hrs

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) Student Workload (SWL) calculated for 15 weeks			
Structured SWL (h/sem) Structured SWL during the semester	63	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2.47

Unstructured SWL during the semester		Unstructured SWL per week	
Total SWL (h/sem) Total SWL during the semester	**100**		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #3 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #2-#3 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	INTRODUCTION of Z Transform
Week 2	Z-transform Properties
Week 3	Poles , zeros and stability of transfer function
Week 4	Inverse Z-transform
Week 5	Introduction of digital filters
Week 6	Linear phase FIR filters
Week 7	Design FIR filters part1
Week 8	Design FIR filters part2
Week 9	Design FIR filters part3
Week 10	Realization FIR filters

Week 11	Mid term
Week 12	Design IIR filters part1
Week 13	Design IIR filters part2
Week 14	Adaptive Filter
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) Weekly Lab Syllabus	
	Material Covered
Week 1	Lab 1: Review
Week 2	Lab 2: introduction of Ztransform
Week 3	Lab 1: electrical first order system part1
Week 4	Lab 2: electrical first order system part2
Week 5	Lab 3: synthesis of simple audio signals part1
Week 6	Lab 4: synthesis of simple audio signals part2
Week 7	Lab 6: FIR filter part1
Week 8	Lab 7: FIR filter part2
Week 9	Lab 8: IIR filter part1
Week 10	Lab 9: IIR filter part
Week 11	Lab 1: electrical first order system part1

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Emmanuel and Barrie, "Digital Signal Processing practical Approach,"	Yes
Recommended Texts	3- 3.Li Tan and Jean Jiang, "Digital Signal Processing Fundamentals and Applications" 4- John G. Proakis, "Digital Signal Processing– Fourth Edition	Yes

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**

Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Probability and Statistics

Module Description

Module Information					
Module Information					
Module Title	Probability and Statistics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELM309				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	**Semester of Delivery**		2
Administering Department			**College**		
Module Leader	SINAN KHALID SHANSHAL		**e-mail**	**sinan.mohammed@uoninevah.edu.iq**	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**		

Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	02/07/2023	**Version Number**	1.0

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	This module aims to provide students with a foundational understanding of probability theory and statistical methods, explicitly focusing on their applications within engineering and data-driven disciplines. It bridges theoretical mathematical concepts with practical analytical skills required to model uncertainty, analyze experimental data, and make informed engineering decisions.
Module Learning Outcomes Module Learning Outcomes	*By the end of this course, students will be able to:* 1. **Analyze** and summarize real-world data using descriptive statistical techniques. 2. **Apply** fundamental rules of probability to evaluate the likelihood of complex events. 3. **Model** random phenomena using appropriate discrete and continuous probability distributions. 4. **Construct** and interpret confidence intervals and hypothesis tests to make data-driven decisions. 5. **Evaluate** relationships between variables using linear regression and correlation analysis. 6.
Indicative Contents Indicative Contents	Foundations of Probability & Set Theory Conditional Probability and Independence Bayes' Theorem and Combinatorics

	Discrete Random Variables Continuous Random Variables Joint and Marginal Distributions Linear Regression and Correlation

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	Through the presentation of a theoretical explanation with the aid of white board and 'Data Show', to illustrate syllabus (examples and exercises) and using text books.

Student Workload (SWL) Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	47	**Structured SWL (h/w)** Structured SWL per week	3
Unstructured SWL (h/sem) Unstructured SWL during the semester	78	**Unstructured SWL (h/w)** Unstructured SWL per week	5
Total SWL (h/sem) Total SWL during the semester	125		

Module Evaluation Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	4,8,10,13	LO #5-8, 10 and 13
	Assignments	4	6% (6)	2,4,11,13	LO #2-4, 11 and 13
	Class Works	2	10% (10)		ALL
	Report	1	4% (4)		ALL
Summative assessment	**Midterm Exam**	1.5hr	10% (10)	10	LO # 1-8
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Set Theory, Sample Spaces, and Events
Week 2	Probability Axioms & Probability Tables
Week 3	Conditional Probability and Independence
Week 4	Total Probability & Bayes' Theorem
Week 5	Discrete Random Variables
Week 6	Continuous Random Variables
Week 7	Theoretical Mean and Variance
Week 8	Systems and Component Reliability
Week 9	Midterm Exam + Comprehensive Review
Week 10	Jointly Distributed Random Variables and Independence
Week 11	Conditional Distributions; Operations: Expectation, Variance, Covariance, Correlation
Week 12	Introduction to Statics
Week 13	A Simple Linear Probabilistic Model
Week 14	The Method of Least Squares; An Analysis of Variance for Linear Regression
Week 15	- Preparatory week before the final Exam
Week 16	

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	- Sheldon M. Ross, INTRODUCTION TO PROBABILITY AND STATISTICS FOR ENGINEERS AND SCIENTISTS - Jay Devore, Probability and Statistics for Engineering and the Sciences	
Recommended Texts	- Richard A. Johnson, Probability and Statistics for Engineers	
Websites		

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	Communication principles			**Module Delivery**	
Module Type	Base			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELM311				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		4	**Semester of Delivery**		6
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Ehab Isam Dawood Al-Rawachy-		**e-mail**	**Ehab.dawood@uoninevah.edu.iq**	
Module Leader's Acad. Title		Lectural	**Module Leader's Qualification**		Ph.D.

Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	The aim of this module is to help students to understand principles of communications engineering. In this course, they can start to learn the fundamental of communication. This basis starts with detailed knowledge of transmission lines and Analogue communications; the latter includes amplitude modulations and angle modulation. The module develops an analytical approach to communication system design to give students a basis of understanding a communication's background and they can continue to an advance communications engineering of the next course.

Module Learning Outcomes	Students will be able to: 1. Explain the theory of Transmission line and their equivalent circuit's representation. 2. Realize the difference between matching and mismatching scenario in of Transmission line. 3. Understand the difference between the lossless and lossy transmission lines cases. Using zigzag diagram to show the incident and the reflected waves, plot the voltage and the current at the load. 4. Use the smith chart to find and approximated values and compare it with the calculations. 5. Solve the mismatch case in a transmission line using stubs. 6. Understand the analogue modulations theory, the importance and their types. 7. Explain the AM transmitters, equations, plot the spectrum of the generated AM signal and the development of each AM type. 8. Explain the AM receivers, equations and the development of each type. 9. Explain the FM transmitters, generation of the FM signal using direct and indirect methods. 10. explain the narrow band and wide band FM signal and plot their spectrum. 11. Explain the FM receivers, equations and the development of each type. 12. Introduction to digital modulations 13. Understand the analogue to digital conversion (A/D); Sampling theorem, Quantization and Coding. 14. Understand the Digital modulations theory and explain the Amplitude shift keying (ASK) 15. Understand the Frequency shift keying (FSK) and the phase shift keying (PSK) 16. Preparatory week before the final Exam.
Indicative Contents	**Indicative content includes the following:-** **Transmission lines:** Equivalent circuit, characteristic impedance, phase velocity, reflection coefficient, standing waves, quarter – wave transformer, smith chart calculation a matching. **Amplitude Modulation** ; Equation for AM, modulation index, spectrum of AM, DSB transmission with and without carriers, VSB transmission, DSB amplitude modulators, Envelope detectors, Balanced Modulator, SSB signal generation and Demodulation schemes. **Frequency modulation**: Equations for FM, modulation Index, spectrum calculation for sinu waveform and Bessels function table, phase modulation, relationship between FM and PM, frequency modulators (Armstrong method) Types of noise in AM and FM systems. **Digital Modulation**: A/D convertors process, ASK, FSK, PSK

Learning and Teaching Strategies	
Strategies	To make students familiar with the principles of Communications, the effect of transmission line to the communication system. Students will be familiar with the theory of Analogue Communication systems. students can use their

	acquired knowledge in the class and apply it at the laboratory to do an experiment easier. Also, they can collect their reading and analyze it based on their theory behind.

Student Workload (SWL)

Structured SWL (h/sem)		**Structured SWL (h/w)**	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)**	
Total SWL (h/sem)			

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	5% (20)	3, 6, 10,13	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	5, 8	LO # 3, 4, 6 and 7
	Report	1	5% (10)	13	
Summative assessment	**Midterm Exam**	1:30 hr	10% (10)	8	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**<u>The Transmission Line:</u>** Introduction To a communications System, a detailed Introduction to transmission line. derivation of lossless transmission line, Study the zig-zag diagram. Study A Lossy Transmission Lines with NO Refection (Matching case), Study the Interference and Standing Waves Patterns. Study the Complex Reflection coefficient (***KR***) for Lossless TL, introduction Impedance Matching
Week 2	
Week 3	
Week 4	

Week 5	**Smith Chart** An introduction to Smith Chart Learn how to use it. Learning of a Quarter Wave Transformer for Complex Load, Parallel Matching Using Single Stub.
Week 6	
Week 7	
Week 8	Mid Exam
Week 9	**Analogue Modulations:** **Amplitude Modulation:** introduction to a modulation, Explain the AM transmitters, equations, the modulation index and it's effect on the Am signal. Explain the AM receivers, equations **Angle Modulation:** Understand the importance of an Angle modulations and their types, Explain the FM transmitters, generation of the FM signal using direct and indirect methods Learn the importance of FM modulation index and it's effect on the Fm signal. Explain the FM receivers, equations and the development of each type.
Week 10	
Week 11	
Week 12	
Week 13	**Analogue to Digital Convertor A/D:** Sampling theorem, Quantization and Coding **Digital Modulation:** introduction to a modulation, Explain the ASK, FSK and PSK.
Week 14	
Week 15	
Week 16	**Final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Fundamental of applied electromagnetic b fawaz T. vilaby Arabic book "Communication Principles" by Dr. Sami AbdulMawjood, Dr.Khalil Hasan Said Mariyee, and Dr. Bayez Alslevani) Introduction to Communication System By Stremler Introduction to Analog and Digital Communication System By Haykin	
Recommended Texts	Communication Systems Engineering 2nd-5th Editions by Praokis	
Websites		

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.

	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Electro and Analytical Chemistry Science**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELM314**			
ECTS Credits	**4**			
SWL (hr/sem)	**60**			
Module Level	3-1		**Semester of Delivery**	5
Administering Department	Electronic Engineering		**College**	College of Electronics Engineering-EE
Module Leader	Dr. Hayfa Al-Badrani		**e-mail**	ahmedhayfa4@gamil.com
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Dr.
Module Tutor	Dr. Hayfa Al-Badrani		**e-mail**	ahmedhayfa4@gamil.com
Peer Reviewer Name	Name		**e-mail**	E-mail
Scientific Committee Approval Date	Sep 01, 2025		**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	55. Introduce the undergraduate students to the principle of modern analytical chemistry. 56. Stoichiometric calculations, gram atomic weight, rram molecular weight, gram formula weight. 57. Focus on the features and benefits of chemical reagents, organic reagents, important applications of organic reagents in analysis. 58. To introduce the features and characteristics of inorganic reagents, Use of inorganic reagents in analysis. 59. To introduce the Types of Instrumental Techniques, Spectroscopic Techniques, Electrochemical Techniques, Chromatographic Techniques. 60. To relate the Electrochemistry, Basic principles of electrochemistry, Electrochemical analysis.
Module Learning Outcomes	By the completion of the course, the students should be able to: 96. Modern analytical chemistry. 97. Stoichiometric Calculations, Gram atomic weight, Gram molecular weight, Gram formula weight. 98. Mole Concept, concentrations of solutions. 99. Molarity Concentration, Normality Concentration. 100. Chemical Reagent, Organic reagents, important applications of organic reagents in analysis. 101. Inorganic reagents, Use of inorganic reagents in analysis. 102. Instrumental analysis, Principles of Instrumentation. 103. Terms associated with Instrumentation, Classification of Instrumental Techniques 104. Types of Instrumental Techniques, Spectroscopic Techniques, Electrochemical Techniques, Chromatographic Techniques. 105. Electrochemistry, Basic principles of electrochemistry, Electrochemical analysis. 106. Basic concepts of oxidation and reduction, Electrolyte and

	electrodes, Redox reaction types. 107. Electrolyte and electrodes, Electrochemical cell, Types of Electrochemical Cells, Electrochemical potential.
Indicative Contents	Indicative content includes the following. Part A – Introduction, definitions and tools Introduction: Definitions of Analytical Chemistry. Solution, Classification of solutions, Classification of solutions according to amount of solute. Modern analytical chemistry. Stoichiometric Calculations, Gram atomic weight, Gram molecular weight, Gram formula weight. Part B- Mole Concept Mole Concept, concentrations of solutions. Molarity Concentration, Normality Concentration. Chemical Reagent, Organic reagents, important applications of organic reagents in analysis. Inorganic reagents, Use of inorganic reagents in analysis. Instrumental analysis, Principles of Instrumentation. Terms associated with Instrumentation, Classification of Instrumental Techniques. Part C- Types of Instrumental Techniques Types of Instrumental Techniques, Spectroscopic Techniques, Electrochemical Techniques, Chromatographic Techniques. Electrochemistry, Basic principles of electrochemistry, Electrochemical analysis. Basic concepts of oxidation and reduction, Electrolyte and electrodes, Redox reaction types. Electrolyte and electrodes, Electrochemical cell, Types of Electrochemical Cells, Electrochemical potential.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)

Structured SWL (h/sem)	53	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	47	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**100**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction: Definitions Analytical chemistry.
Week 2	Solution, Classification of solutions, Classification of solutions according to amount of solute.
Week 3	Modern analytical chemistry.
Week 4	Stoichiometric Calculations, Gram atomic weight, Gram molecular weight, Gram formula weight.
Week 5	Mole Concept, concentrations of solutions.
Week 6	Molarity Concentration, Normality Concentration.
Week 7	Chemical Reagent, Organic reagents, important applications of organic reagents in analysis.
Week 8	Inorganic reagents, Use of inorganic reagents in analysis.
Week 9	Instrumental analysis, Principles of Instrumentation.
Week 10	Terms associated with Instrumentation, Classification of Instrumental Techniques
Week 11	Types of Instrumental Techniques, Spectroscopic Techniques, Electrochemical Techniques, Chromatographic Techniques.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts		No
Recommended Texts		No
Websites	https://classroom.google.com	

Week 12	Electrochemistry, Basic principles of electrochemistry, Electrochemical analysis.
Week 13	Basic concepts of oxidation and reduction, Electrolyte and electrodes, Redox reaction types.
Week 14	Electrolyte and electrodes, Electrochemical cells, Types of Electrochemical Cells, Electrochemical potential.
Week 15	Preparatory week before the final Exam.

Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Medical Electronics

Module Description

Module Information Module Information					
Module Title	**Medical Electronics**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEE206**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		Dept. of Electronic Engineering	**College**		College of Electronics Engineering-EE
Module Leader	Noor Alhuda Saad AlJammas		**e-mail**		noor.abbas@uoninevah.edu.iq
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		MS.c
Module Tutor	Name (if available)		**e-mail**		E-mail
Peer Reviewer Name		Name	**e-mail**		E-mail
Scientific Committee Approval Date			**Version Number**		1.0

Relation with other Modules Relation with Other Modules			
Prerequisite module	Medical Physics	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	5. Develop understanding of the bioelectrical signals generated by the human body and methods for their measurement.

	6. Provide knowledge of the design and function of basic medical electronic circuits and instrumentation. 7. Introduce applications of medical electronic devices in diagnosis, monitoring, and therapy.
Module Learning Outcomes Module Learning Outcomes	1. **Explain** the concepts of energy, work, and power in the human body and analyze mechanisms of energy conversion. 2. **Describe** the electrical properties of the nervous system and interpret bioelectrical signals such as ECG, EEG, EMG, and ERG. 3. **Identify and evaluate** the main components of biomedical instrumentation, including electrodes, amplifiers, filters, and telemetry systems. 4. **Apply** the principles of sound in medicine, particularly the use of ultrasound for imaging, motion measurement, and therapy. 5. **Discuss** the medical applications of visible, ultraviolet, infrared light, and lasers. 6. **Analyze** the effects and applications of electricity and magnetism in medical diagnostics and therapy. 7. **Explain and assess** the physics of diagnostic X-rays, including beam production, imaging techniques, and patient dose considerations. 8. **Demonstrate understanding** of nuclear medicine, including sources of radioactivity, basic instrumentation, and imaging technologies. 9. **Evaluate** the biological effects of ionizing radiation and **apply** radiation protection principles in diagnostic radiology, therapy, and nuclear medicine. 10. **Utilize** computer-based systems in medicine for monitoring, medical record retrieval, equipment control, image analysis, and pattern recognition.
Indicative Contents Indicative Contents	1. Energy, Work & Power of the Body: energy conversion, energy changes, work and power, heat losses. 2. Electricity within the Body: nervous system, neuron potential, EMG, ECG, EEG, ERG, magnetic signals of heart and brain. 3. Biomedical Instrumentation: bio-potentials, electrodes, amplifiers, filters, design considerations, display and recording, interference, biotelemetry systems. 4. Sound in Medicine: body as a drum, ultrasound imaging, ultrasound for motion measurement, therapeutic effects. 5. Light in Medicine: visible, ultraviolet, and infrared light applications; medical lasers. 6. Applications of Electricity & Magnetism in Medicine: electrical shock, high-frequency and low-frequency electricity, magnetism in medicine. 7. Physics of Diagnostic X-ray: X-ray production, radiation exposure to patients, X-ray imaging and slices. 8. Physics of Nuclear Medicine: radioactivity, radioactive sources, instrumentation, nuclear imaging devices, clinical applications. 9. Radiation Protection in Medicine: biological effects of ionizing radiation, radiation protection instruments, protection in diagnostic radiology, radiotherapy, and nuclear medicine. 10. Computers in Medicine: patient monitoring, medical record retrieval, control of life-support equipment, image analysis, pattern recognition.

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	6. **Lectures** – to explain fundamental principles and circuit operation. 7. **Problem**-solving sessions – to practice circuit analysis and design. 8. **Tutorials** – for clarifying concepts and solving exercises. 9. **Laboratory demonstrations** – to connect theory with practice. 10. **Assignments and projects** – to encourage independent learning.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	63	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	87	**Unstructured SWL (h/w)** Unstructured SWL per week	5.8
Total SWL (h/sem) Total SWL during the semester	150		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	6, 9, 11	LO #1, 3, 4, 7, and 13
	Assignments	2	15% (15)	2, 12	LO # 2, 5, 6 and 11
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	-	-
Summative assessment	**Midterm Exam**	3 hrs	10% (10)	8	LO # 1-9
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Introduction to medical physics: definition, scope, and importance in medicine
Week 2	Energy, work & power in the body: energy conversion, energy changes, heat losses
Week 3	Electricity within the body: nervous system, neurons, electrical potentials
Week 4	Bioelectrical signals: ECG, EEG, EMG, ERG, magnetic signals of heart and brain
Week 5	Biomedical instrumentation: bio-potentials, electrodes, amplifiers, filters
Week 6	Instrumentation applications: design considerations, recording, interference, biotelemetry
Week 7	Mid-term Exam
Week 8	Sound in medicine: body as a drum, ultrasound principles, imaging of the body
Week 9	Ultrasound applications: motion measurement, therapeutic and physiological effects
Week 10	Light in medicine: visible, ultraviolet, infrared applications; medical lasers
Week 11	Applications of electricity & magnetism: electrical shock, low & high frequency, medical uses of magnetism.
Week 12	Diagnostic X-rays: production, interaction with tissues, patient exposure, imaging slices
Week 13	Nuclear medicine: radioactivity, sources, instrumentation, imaging devices
Week 14	Radiation protection: biological effects, radiation protection in diagnostic radiology, therapy, nuclear medicine
Week 15	Computers in medicine: patient monitoring, record retrieval, life-support control, image analysis
Week 16	General review + discussion of exam questions.

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	4. *Medical Instrumentation: Application and Design* – John G. Webster. 5. *Introduction to Biomedical Engineering* – John Enderle & Joseph Bronzino. 6. *Biomedical Digital Signal Processing* – Willis J. Tompkins.	No

	7. *Biomedical Signal Analysis* – Rangaraj M. Rangayyan	
Recommended Texts		
Websites		

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** – Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C – Good	Good	70 - 79	Sound work with notable errors
	D – Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E – Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Module Description of Medical Physics

Module Description

Module Information Module Information		
Module Title	Medical Physics	**Module Delivery**
Module Type	C	☒ **Theory** ☐ **Lecture** ☐ **Lab**
Module Code	NVEEELM310	
ECTS Credits	4	

SWL (hr/sem)	100	☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGIII	**Semester of Delivery**	1
Administering Department	Dept. of Electronic Engineering	**College**	College of Electronics Engineering-EE
Module Leader	Omar B Mohammed	**e-mail**	omar.mohammed@uoninevah.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	1. To link physical principles with physiological functions in the human body. 2. To understand the electrical, mechanical, and optical properties of biological tissues. 3. To become familiar with the applications of medical devices based on these principles

Module Learning Outcomes Module Learning Outcomes	1. Explain the fundamental physical principles underlying biological systems and medical devices. 2. Analyze the electrical, mechanical, and optical properties of biological tissues. 3. Interpret and describe physiological functions using physical models and laws. 4. Identify and explain the physical basis of diagnostic and therapeutic medical technologies (e.g., ECG, EEG, Ultrasound, X-ray, Nuclear Medicine). 5. Apply physics concepts to understand the operation and limitations of medical devices. 6. Evaluate the effects of electric, magnetic, acoustic, and optical fields on the human body. 7. Demonstrate awareness of radiation principles, radiation therapy basics, and safety measures. 8. Integrate theoretical knowledge with practical applications in medical physics
Indicative Contents Indicative Contents	8. Introduction to Medical Physics 9. Physical Properties of Tissues and Fluids 10. Biomechanics and Motion in the Human Body 11. Stress, Strain, and Blood Circulation 12. Bioelectrical Signals (ECG, EEG, EMG) 13. Electrical Properties of Membranes and Tissues 14. Electric and Magnetic Fields in Medicine 15. Sound and Hearing in the Human Body 16. Ultrasound Principles and Applications 17. Optical Physics of the Eye and Medical Lenses 18. X-rays and Tissue Interaction 19. Nuclear Medicine and Radioisotopes 20. Basics of Radiation Therapy and Protection 21. Physics-Based Medical Devices 22. Course Review and Exam Preparation

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	1. **Lectures** – to explain fundamental principles and theories. 2. **Interactive discussions** – to engage students and clarify concepts. 3. **Problem-solving sessions** – to apply physics in medical contexts. 4. **Laboratory demonstrations** – to connect theory with practice. 5. **Case studies** – to analyze real medical applications. 6. **Multimedia presentations** – to visualize medical devices and processes. 7. **Self-study and reading assignments** – to encourage independent learning.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	48	**Structured SWL (h/w)** Structured SWL per week	3
Unstructured SWL (h/sem) Unstructured SWL during the semester	52	**Unstructured SWL (h/w)** Unstructured SWL per week	3.25
Total SWL (h/sem) Total SWL during the semester	100		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	6, 9, 11	LO #1, 3, 4, 7, and 13
	Assignments	2	15% (15)	2, 12	LO # 2, 5, 6 and 11
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	-	-
Summative assessment	**Midterm Exam**	1.5 hrs	10% (10)	8	LO # 1-9
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	**Matrices:** Introduction to medical physics – definition and importance in medical devices.
Week 2	Physical properties of tissues and biological fluids (density, conductivity, elasticity).
Week 3	Laws of motion applied to the human body (joints, muscular movement).
Week 4	Stress and strain in biological tissues – blood circulation as a hydrodynamic tube.
Week 5	Bioelectrical signals (ECG, EEG, EMG – theoretical introduction).
Week 6	Electrical properties of membranes and tissues – membrane potential.
Week 7	Mid-term Exam
Week 8	Electric and magnetic fields and their effects on the body – simple medical applications.
Week 9	Sound in the human body – hearing, biological frequencies.
Week 10	Ultrasound – principles and simple diagnostic/therapeutic applications
Week 11	Optical physics – the eye as an optical system, medical lenses (glasses, contact lenses).
Week 12	X-rays – physical principles and interaction with tissues.
Week 13	Nuclear medicine – radioisotopes and simple radiological imaging.
Week 14	Radiation therapy – basic principles and radiation protection.
Week 15	Medical devices based on physics (ECG, Ultrasound, medical lasers).
Week 16	General review + discussion of exam questions.

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	8. Physics of the Body by John R. Cameron and James G. Skofronick 9. Physics of the Human Body by Irving P. Herman	No
Recommended Texts		
Websites		

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Courses specification for Third class Industrial Electronics Engineering

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information		
Module Title	**Arabic Language 2**	**Module Delivery**
Module Type	**Base**	☒ **Theory** ☐ **Lecture**
Module Code	**NVU17**	

ECTS Credits	**2**	☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	**50**		

Module Level	1 2	**Semester of Delivery**	2
Administering Department		**College**	Electronics Engineering
Module Leader	Abdullah Mohammed Qader	**e-mail**	
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSc
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	Feb. 01, 2025	**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	This module aims to enhance language skills, develop thinking, and enable students to know the basic rules of the Arabic language, as well as enable them to deliver speeches and speak correct language free of grammatical errors. .
Module Learning Outcomes Module Learning Outcomes	The student is expected to be able to: 1 - Distinguish where to write the tied taa (taa marbuta) and the open taa (taa mabsuta), and write words correctly. 2 - Apply the rules of numbers and their specifiers in different linguistic structures. 3 - Differentiate between the letters Dhad and Dha in pronunciation and writing, and use each in its correct place. 4 - Distinguish the cases of the subjunctive and jussive moods of the present-tense verb, and apply the subjunctive and jussive particles correctly. 5 - Recognize verbal and semantic embellishments, extract them from texts, and explain their rhetorical effect. 6 - Comprehend the linguistic and literary principles drawn from the Holy Quran and the purified Prophetic Sunnah, and employ them in understanding texts. 7 - Recognize the most prominent topics and characteristics of Arabic literature, and analyze literary texts at a basic level. 8 - Employ grammatical, spelling and rhetorical rules correctly in reading and writing. 9 - Acquire skills of linguistic and critical analysis of various texts. 10 - Use Standard Arabic properly in oral and written expression.

Indicative Contents Indicative Contents	Indicative content includes the following: Studying the noun in terms of its bare and augmented forms; recognizing verbal and semantic embellishments in the science of Badi' (rhetorical embellishment); studying the rules of the subjunctive and jussive moods of the present-tense verb; distinguishing between Dhad and Dha in pronunciation and writing; studying single numbers, compound numbers, the decades, conjoined numbers and ordinal numbers; in addition to explaining the rules for writing the tied taa and the open taa and their applications in correct linguistic usage, using examples and practical exercises to consolidate these topics.

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Following the direct teaching method by presenting and explaining the material and using teaching aids to explain it, clarifying the mechanisms of the scientific concept of the Arabic language.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	28	**Structured SWL (h/w)** Structured SWL per week	2
Unstructured SWL (h/sem) Unstructured SWL during the semester	19	**Unstructured SWL (h/w)** Unstructured SWL per week	
Total SWL (h/sem) Total SWL during the semester	50		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 10	LO #1 ,#4, #5, #6, #7 #9, #10, #11, #12
	Classwork	2	10% (10)	9	LO #1 ,#2, #3, #5, #6 #7, #9, #10

	discussion panel.	1	1	10% (10)	10% (10)	6	LO # ,7 LO # 4
	Report	1		10% (10)		14	All
Summative assessment	**Midterm Exam**	2 hr		10% (10)		7	LO #1 , #3, #5, #6 #7, #9
	Final Exam	2hr		50% (50)		15	All
Total assessment				100% (100 Marks)			

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	The Holy Quran and the Prophetic Sunnah
Week 2	Arabic literature
Week 3	Stages of compiling the language
Week 4	The extended alif and the shortened alif
Week 5	The noun in terms of masculine and feminine
Week 6	The noun in terms of bare and augmented forms
Week 7	Science of Badi': verbal embellishments
Week 8	Semantic embellishments
Week 9	The subjunctive mood of the present-tense verb
Week 10	The jussive mood of the present-tense verb
Week 11	Dhad and Dha
Week 12	Numbers (single numbers)
Week 13	Numbers (compound numbers)
Week 14	The decades, conjoined numbers and ordinal numbers
Week 15	The tied taa and the open taa
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Weekly Lab Syllabus

	Material Covered
Week 1	
Week 2	

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	The Holy Quran Musnad Abi Ya'la Diwan of Al-Sayyab Diwan of Al-Mutanabbi Al-Sarf Al-Wadih (Clear Morphology), Abduljabbar Alwan Al-Nayla Al-Tuhfa Al-Saniyya fi Sharh Al-Muqaddima Al-Ajurrumiyya, Muhammad Muhyiddin Abdul-Hamid Al-Balagha Al-Wadiha (Clear Rhetoric), Ali Al-Jarim and Mustafa Amin	Yes
Recommended Texts		No
Websites		

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors

	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	Communication principles			**Module Delivery**	
Module Type	Base			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELI311				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		4	**Semester of Delivery**		6
Administering Department		Type Dept. Code	**College**	Electronics Engineering college	
Module Leader	Dr. Ehab Isam Dawood Al-Rawachy-		**e-mail**	**Ehab.dawood@uoninevah.edu.iq**	
Module Leader's Acad. Title		Lectural	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules

Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	The aim of this module is to help students to understand principles of communications engineering. In this course, they can start to learn the fundamental of communication. This basis starts with detailed knowledge of transmission lines and Analogue communications; the latter includes amplitude modulations and angle modulation. The module develops an analytical approach to communication system design to give students a basis of understanding a communication's background and they can continue to an advance communications engineering of the next course.
Module Learning Outcomes	Students will be able to: 17. Explain the theory of Transmission line and their equivalent circuit's representation. 18. Realize the difference between matching and mismatching scenario in of Transmission line. 19. Understand the difference between the lossless and lossy transmission lines cases. Using zigzag diagram to show the incident and the reflected waves, plot the voltage and the current at the load. 20. Use the smith chart to find and approximated values and compare it with the calculations. 21. Solve the mismatch case in a transmission line using stubs. 22. Understand the analogue modulations theory, the importance and their types. 23. Explain the AM transmitters, equations, plot the spectrum of the generated AM signal and the development of each AM type. 24. Explain the AM receivers, equations and the development of each type. 25. Explain the FM transmitters, generation of the FM signal using direct and indirect methods. 26. explain the narrow band and wide band FM signal and plot their spectrum. 27. Explain the FM receivers, equations and the development of each type. 28. Introduction to digital modulations 29. Understand the analogue to digital conversion (A/D); Sampling theorem, Quantization and Coding. 30. Understand the Digital modulations theory and explain the Amplitude shift keying (ASK) 31. Understand the Frequency shift keying (FSK) and the phase shift keying (PSK)

Indicative Contents	**Indicative content includes the following: -** **Transmission lines:** Equivalent circuit, characteristic impedance, phase velocity, reflection coefficient, standing waves, quarter – wave transformer, smith chart calculation a matching. **Amplitude Modulation**; Equation for AM, modulation index, spectrum of AM, DSB transmission with and without carriers, VSB transmission, DSB amplitude modulators, Envelope detectors, Balanced Modulator, SSB signal generation and Demodulation schemes. **Frequency modulation**: Equations for FM, modulation Index, spectrum calculation for sinu waveform and Bessels function table, phase modulation, relationship between FM and PM, frequency modulators (Armstrong method) Types of noise in AM and FM systems. **Digital Modulation**: A/D convertors process, ASK, FSK, PSK

Learning and Teaching Strategies	
Strategies	To make students familiar with the principles of Communications, the effect of transmission line to the communication system. Students will be familiar with the theory of Analogue Communication systems. Students can use their acquired knowledge in the class and apply it at the laboratory to do an experiment easier. Also, they can collect their reading and analyze it based on their theory behind.

Student Workload (SWL)			
Structured SWL (h/sem)	32	**Structured SWL (h/w)**	75
Unstructured SWL (h/sem)	43	**Unstructured SWL (h/w)**	
Total SWL (h/sem)	3		

Module Evaluation

		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	5% (20)	3, 6, 10,13	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	5, 8	LO # 3, 4, 6 and 7

	Report	1	5% (10)	13	
Summative assessment	**Midterm Exam**	1:30 hr	10% (10)	8	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**<u>The Transmission Line:</u>** Introduction To a communications System, a detailed Introduction to transmission line. derivation of lossless transmission line, Study the zig-zag diagram. Study A Lossy Transmission Lines with NO Refection (Matching case), Study the Interference and Standing Waves Patterns. Study the Complex Reflection coefficient (***KR***) for Lossless TL, introduction Impedance Matching
Week 2	
Week 3	
Week 4	
Week 5	**<u>Smith Chart</u>** An introduction to Smith Chart Learn how to use it. Learning of a Quarter Wave Transformer for Complex Load, Parallel Matching Using Single Stub.
Week 6	
Week 7	
Week 8	Mid Exam
Week 9	**<u>Analogue Modulations:</u>** **<u>Amplitude Modulation:</u>** introduction to a modulation, Explain the AM transmitters, equations, the modulation index and it's effect on the Am signal. Explain the AM receivers, equations **<u>Angle Modulation:</u>** Understand the importance of an Angle modulations and their types, Explain the FM transmitters, generation of the FM signal using direct and indirect methods Learn the importance of FM modulation index and it's effect on the Fm signal. Explain the FM receivers, equations and the development of each type.
Week 10	
Week 11	
Week 12	
Week 13	**<u>Analogue to Digital Convertor A/D:</u>** Sampling theorem, Quantization and Coding **<u>Digital Modulation:</u>** introduction to a modulation, Explain the ASK, FSK and PSK.
Week 14	
Week 15	
Week 16	**Final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**

Required Texts	Fundamental of applied electromagnetic b fawaz T. vilaby Introduction to Communication System By Stremler Introduction to Analog and Digital Communication System By Haykin	
Recommended Texts	Communication Systems Engineering 2nd-5th Editions by Praokis	
Websites		

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance.
	B - Very Good	Very Good	80 - 89	Above average with some errors.
	C - Good	Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work is required, but credit is given.
	F – Fail	Fail	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information		
Module Title	**CONTROL ENGINEERING I**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture**
Module Code	**NEEI3312**	

ECTS Credits	6		☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**		
SWL (hr/sem)	100				
Module Level	UGI		**Semester of Delivery**	Five	
Administering Department	NEE		**College**	College of Electronics Engineering- EE	
Module Leader	Shawkat mohammed younus		**e-mail**	shawkat.younus@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PHD	
Module Tutor			**e-mail**	E	
Peer Reviewer Name			**e-mail**	@uoninevah.edu.iq	
Scientific Committee Approval Date	/ 6 /2023		**Version Number**	1.0	

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	The aim of this course: 1) Develop a strong mathematical background: a) Understand and apply fundamental mathematical concepts relevant to control systems. b) Acquire proficiency in algebra, calculus, and linear algebra necessary for control system analysis. 2) Explore control system configurations: a) Examine various control system architectures and their applications. b) Understand the principles and characteristics of open loop and closed-loop control systems.

	3) Master block diagram reduction techniques: a) Learn systematic methods to simplify complex block diagrams. b) Apply reduction techniques to analyze and design control systems efficiently. 4) Understand signal flow graphs: a) Gain proficiency in representing control systems using signal flow graphs. b) Analyze and interpret the behavior of control systems through signal flow graph analysis. 5) Analyze the time response of control systems: a) Study the time-domain behavior of control systems. b) Analyze and interpret transient and steady-state responses of control systems. 6) Investigate stability of control systems: a) Understand the concept of stability in control systems. b) Analyze stability using various techniques such as Routh-Hurwitz criterion. 7) Perform root locus analysis: a) Learn the fundamentals of root locus analysis. b) Apply root locus techniques to analyze the behavior and stability of control systems. 8) Integrate theoretical concepts with practical applications: a) Apply the acquired knowledge to practical control system problems. b) Use simulation tools and software to implement and analyze control system designs.
Module Learning Outcomes Module Learning Outcomes	Upon successful completion of the module on Control Systems Fundamentals and Analysis, students will be able to: 1- Demonstrate a solid understanding of mathematical concepts relevant to control systems, including Laplace transform, algebra, calculus, and linear algebra, and apply them effectively in control system analysis. 2- Identify and explain various control system configurations, such as open-loop and closed-loop systems, and evaluate their advantages and limitations in different applications. 3- Apply block diagram reduction techniques to simplify complex control system diagrams and analyze the overall system behavior. 4- Construct and analyze signal flow graphs to represent and evaluate the behavior of control systems. 5- Analyze the time response of control systems, including transient and steady-state responses, and interpret the results in terms of system stability and performance. 6- Assess the stability of control systems using different methods, such as the Routh-Hurwitz criterion, and determine the stability margins of the system. 7- Perform root locus analysis to analyze and design control systems, and understand the impact of system parameters on stability and performance.

	8- Apply theoretical concepts and analytical techniques to practical control system problems. 9- Utilize simulation tools and software to implement and analyze control system designs, and interpret simulation results to validate theoretical predictions.
Indicative Contents Indicative Contents	1- Mathematical Background: a. Review of algebraic concepts and manipulations. b. Calculus techniques relevant to control systems, such as differentiation and integration. c. Linear algebra and matrix operations in control system analysis. 2- Control System Configurations: a. Open loop and closed-loop control systems. b. Feedback and feedforward control architectures. c. Advantages and limitations of different control system configurations. 3- Block Diagram Reduction: a. Block diagram representation of control systems b. Reduction techniques, including series, parallel, and feedback connections c. Simplification methods for complex block diagrams 4- Signal Flow Graphs: a. Representation of control systems using signal flow graphs. b. Mason's gain formula for analyzing signal flow graphs. c. Determination of overall transfer function from a signal flow graph. 5- Time Response: a. Analysis of transient and steady state responses of control systems. b. Time-domain specifications, such as rise time, settling time, and overshoot. c. Effects of system parameters on time response characteristics. 6- Stability of Control Systems: a. Concepts of stability and instability in control systems. b. Routh-Hurwitz stability criterion. 7- Root Locus Analysis: a. Root locus plots and their interpretation. b. Root locus design techniques for improving system performance and stability.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	1- Interactive Lectures: • Incorporate interactive elements within lectures, such as asking questions, conducting polls, or initiating discussions. • Encourage students to actively participate by sharing their insights, answering questions, and engaging in debates related to the lecture topics. 2- Problem-Based Learning:

	• Present real-world control system problems and challenges that require frequency response analysis. • Divide students into groups and assign them specific problems to solve, allowing them to apply the concepts learned and critically analyze different approaches. 3- Case Studies and Examples: • Provide case studies and examples that demonstrate the practical applications of the response analysis. • Encourage students to analyze and discuss these case studies, applying their critical thinking skills to identify the underlying control system challenges and propose solutions. 4- Hands-on Experiments and Simulations: • Conduct hands-on experiments or simulations using software tools (e.g., MATLAB/Simulink) to explore the system response analysis. • Guide students through the process of setting up experiments, collecting data, and analyzing the response characteristics. 5- Group Projects: • Assign group projects that require students to analyze, and optimize control systems. • Encourage collaboration and critical thinking within the groups, promoting discussions on design decisions, trade-offs, and system performance. 6- Problem-Solving Sessions: • Conduct problem-solving sessions where students can bring their questions or challenges related to the system response analysis. • Guide students in analyzing the problems, identifying relevant concepts, and developing systematic problem-solving strategies.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	70	**Structured SWL (h/w)** Structured SWL per week	5
Unstructured SWL (h/sem) Unstructured SWL during the semester	27	**Unstructured SWL (h/w)** Unstructured SWL per week	1.9
Total SWL (h/sem) Total SWL during the semester	100		

Module Evaluation

Module Evaluation

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

	Projects	1	10% (10)	13	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
Week	**Material Covered**
Week 1	Introduction to Control Engineering. (Contents, definitions and basic concepts)
Week 2	Mathematical Background (Laplace Transform, Partial Fraction Expansion and Inverse Laplace)
Week 3	Control System Basics (Control System Configurations, Analysis and Design Objectives, Understanding the Transfer Function (of SISO and MIMO) and the characteristic equation)
Week 4	Block diagram reduction (Typical Elements of Block Diagrams, Common topologies of reduction, Block Diagram Reduction via Familiar Forms, Block Diagram Reduction via Moving Blocks to Create Familiar Forms).
Week 5	Signal flow graph (SFG)- Part 1 Basic Elements of an SFG, SFG Algebra.
Week 6	Signal flow graph (SFG)- Part 2 (Mason Gain Rule).
Week 7	Signal flow graph (SFG)- Part 3 (Finding the system's transfer function using Mason rule)
Week 8	Time response- Part 1 (time response of continuous-data systems, typical test signals for the time response, The unit-step response and time-domain specifications)
Week 9	Time response- Part 2 (Steady-State Error of Linear Continuous-Data Control Systems).
Week 10	Time response- Part 3 (Transient response of 1st order systems, 2nd and higher order Systems)
Week 11	Stability of control Systems (Routh Hurwitz Stability Criterion, basic Routh table)
Week 12	Stability of control Systems

	(Routh special cases)
Week 13	Root Locus Analysis- Part 1 (Define a root locus, State the properties of a root locus)
Week 14	Root Locus Analysis- Part 2 (Root locus plot, General rules of constructing)
Week 15	Root Locus Analysis- Part 3 (Root locus plot refining)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Weekly Lab Syllabus

	Material Covered
Week 1,2	Lab 1: Introduction to the control engineering by Using Matlab Programming.
Week 3,4	Lab 2: Study of finding the Transfer Function By Matlab Programming.
Week 5,6	Lab 3: Study of plotting the block diagram reduction By Matlab Programming.
Week 7,8	Lab 4: Study of applying the Mason rule using Matlab Programming
Week 9,	Lab 5: Study of finding the transient response of 1st order.
Week 10,11	Lab 6: Study of finding the transient response of 2nd order system.
Week 12	Lab 7: Study of finding the steady state error.
Week 13	Lab 8: Plotting of the root locus.
Week 14	Lab 9: Pre-test preparation.

Learning and Teaching Resources

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	N. Nise “Control Systems Engineering”,.	Yes
Recommended Texts	B. Kuo, “Automatic Control System,” 2010, 9th edition	No
Recommended Texts	K. Ogata, “Modern Control Engineering,” 2010, 5th edition	No
Websites	https://www.youtube.com/@MATLAB/playlists	

Grading Scheme

Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Description Form

Module Information				
Module Information				
Module Title	**CONTROL ENGINEERING II**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NEEI3322**			
ECTS Credits	**6**			
SWL (hr/sem)	**100**			
Module Level	1 UGI		**Semester of Delivery**	Six
Administering Department	NEE		**College**	College of Electronics Engineering-EE
Module Leader	Shawkat mohammed younus		**e-mail**	shawkat.younus@uoninevah.edu.iq
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	PHD
Module Tutor			**e-mail**	

Peer Reviewer Name		**e-mail**	@uoninevah.edu.iq
Scientific Committee Approval Date	/ 6 /2023	**Version Number**	

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	The aim of this course is to give the students the ability to analyze any control system by using different methods. This includes the analyses of the transient response, steady state response and most importantly the stability. In addition, they will have the ability to represent systems using different methods such as the transfer function and state space then choose the most related one. By the end of this course, students will be able to make full analysis for control systems and be ready for the design of the control systems in the next year.
Module Learning Outcomes Module Learning Outcomes	92. Recognize the principles of Analog control system analysis. 93. Summarize what is meant by root locus analysis. 94. Control system design by root locus method. 95. List the various terms associated with frequency response. 96. Summarize what is meant by frequency response analysis. 97. Discuss the reaction and involvement of gain and phase shift in frequency response analysis. 98. Study the methods used to describe the frequency response. 99. Define the Bode plot, its analysis, rules, and sketching steps. 100. Discuss the Bode plot Analytical method and its plotting steps. 101. Discuss the Frequency domain specifications. 102. Explain the stability criteria, find the gain margin, and phase margin and the design by the frequency method.. 103. Define the PID controller, its analysis, rules, and sketching steps. 104. Study the methods used to tuning the PID controller. 105. Recognize the principles of Digital control system analysis.

Indicative Contents Indicative Contents	Indicative content includes the following. 1. Introduction to Control Systems and Design ❖ Overview of control systems and their importance. ❖ Introduction to frequency response analysis and its relevance. ❖ Basic concepts of transfer functions and Laplace transforms. 2. Frequency Response Characteristics. ❖ Magnitude response: gain, resonant frequencies and bandwidth. ❖ Phase response: phase shift, phase margin, phase crossover frequency. ❖ Gain/Phase margins: definition, significance, interpretation. 3. Bode plots ❖ Introduction to Bode plots as a graphical representation of frequency response. ❖ Construction of Bode plots from transfer functions. ❖ Interpreting Bode plots for gain, phase, and stability analysis. 4. Frequency Response Analysis Techniques ❖ Analytical methods: evaluating frequency response using algebraic manipulation. ❖ Numerical methods: using MATLAB for frequency response analysis. ❖ Experimental methods: measuring frequency response using experimental setupsStability Analysis using Frequency Response 5. Stability Analysis using Frequency Response ❖ Stability criteria based on frequency response: gain and phase margins, stability bounds ❖ Relationship between frequency response and stability analysis. 6. Introduction to PID Controller ❖ Basic concepts of PID controller ❖ Tuning methods: Open and Close methods. 7. Introduction to Digital control system. ❖ Basic concepts of transfer functions and Z transforms

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	7- Interactive Lectures: • Incorporate interactive elements within lectures, such as asking questions, conducting polls, or initiating discussions. • Encourage students to actively participate by sharing their insights, answering questions, and engaging in debates related to the lecture topics. 8- Problem-Based Learning: • Present real-world control system problems and challenges that require frequency response analysis. • Divide students into groups and assign them specific problems to solve, allowing them to apply the concepts learned and critically analyze different approaches. 9- Case Studies and Examples:

	• Provide case studies and examples that demonstrate the practical applications of frequency response analysis. • Encourage students to analyze and discuss these case studies, applying their critical thinking skills to identify the underlying control system challenges and propose solutions. 10- Hands-on Experiments and Simulations: • Conduct hands-on experiments or simulations using software tools (e.g., MATLAB/Simulink) to explore frequency response analysis. • Guide students through the process of setting up experiments, collecting data, and analyzing the frequency response characteristics. 11- Group Projects: • Assign group projects that require students to analyze, and optimize control systems using frequency response techniques. • Encourage collaboration and critical thinking within the groups, promoting discussions on design decisions, trade-offs, and system performance. 12- Problem-Solving Sessions: • Conduct problem-solving sessions where students can bring their questions or challenges related to frequency response analysis. • Guide students in analyzing the problems, identifying relevant concepts, and developing systematic problem-solving strategies.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	70	**Structured SWL (h/w)** Structured SWL per week	5
Unstructured SWL (h/sem) Unstructured SWL during the semester	27	**Unstructured SWL (h/w)** Unstructured SWL per week	1.9
Total SWL (h/sem) Total SWL during the semester	100		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	CONTROL SYSTEM ANALYSIS BY THE ROOT-LOCUS METHOD: part 1
Week 2	CONTROL SYSTEM ANALYSIS BY THE ROOT-LOCUS METHOD: part 2
Week 3	CONTROL SYSTEM DESIGN BY THE ROOT-LOCUS METHOD: part 1
Week 4	CONTROL SYSTEM DESIGN BY THE ROOT-LOCUS METHOD: part 2
Week 5	CONTROL SYSTEM ANALYSIS BY THE FREQUENCY RESPONSE (BODE PLOT): part1
Week 6	CONTROL SYSTEM ANALYSIS BY THE FREQUENCY RESPONSE (BODE PLOT): part2
Week 7	CONTROL SYSTEM ANALYSIS BY THE FREQUENCY RESPONSE (BODE PLOT): part2
Week 8	CONT ROL SYSTEM DESIGN BY FREQUENCY RESPONSE: part 1
Week 9	CONT ROL SYSTEM DESIGN BY FREQUENCY RESPONSE: part 2
Week 10	PID CONTROLLER DESIGN: part1
Week 11	PID CONTROLLER DESIGN: part2
Week 12	CONTROL SYSTEM DESIGN IN STATE-SPACE :part1
Week 13	CONTROL SYSTEM DESIGN IN STATE-SPACE :part2
Week 14	DIGITAL CONTROL SYSTEMS: part1
Week 15	DIGITAL CONTROL SYSTEMS: part2
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) Weekly Lab Syllabus	
	Material Covered
Week 1,2	Lab 1: Control system design by root locus method Using Matlab Programming.
Week 3,4	Lab 2: Introduction to frequency response by Using Matlab Programming.
Week 5,6	Lab 3: Study of plotting the Bode plot By Matlab Programming.

Week 7,8	Lab 4: Study of finding Gain Margin and Phase Margin using Matlab Programming
Week 9,10	Lab 5: Control system design by frequency response method Using Matlab Programming
Week 11	Lab 6: Study of finding Gain of PID controller by Matlab Programming part:1
Week 12	Lab 7: Study of finding Gain of PID controller by Matlab Programming part:2
Week 13	Lab 8: Study of finding Gain of PID controller by Matlab Programming part:3
Week 14	Lab 9: Pre-test preparation.

Learning and Teaching Resources

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	N. Nise "Control Systems Engineering"	Yes
Recommended Texts	B. Kuo, "Automatic Control System," 2010, 9th edition	No
Recommended Texts	K. Ogata, "Modern Control Engineering," 2010, 5th edition	No
Websites	https://www.youtube.com/@MATLAB/playlists	

Grading Scheme

Grading Scheme

Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C – Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information					
Module Title	**Digital Signal Processing**			**Module Delivery**	
Module Type	Core			**Theory** **☒ Lecture** **☒ Lab** **Tutorial** **Practical** **Seminar**	
Module Code	NVEEELI313				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1 UGIII /Level 3		**Semester of Delivery**	6	
Administering Department	Dept. of Electronic Engineering		**College**	College of Electronics Engineering-EE	
Module Leader	Noor Talal Gadawe		**e-mail**	noor.gadawe@uoninevah.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	M.Sc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules Relation with Other Modules			
Prerequisite module	Signal and system	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	

Module Aims	61. To identify the component of digital signal processing system. 62. To understand continuous, discrete, periodic and non-periodic signals. 63. To understand the transformation of signals and the difference between them. 64. To analyze spectrum of signals.
Module Learning Outcomes Module Learning Outcomes	108. Explain the function of each block in DSP system. 109. Covert signals from continues to discrete form and then reconstruction. 110. Find impulse response, unit step response and difference equation 111. Define discrete Fourier series. 112. How can find the spectrum for periodic and non-periodic signals 113. Explain the differences between transformation method. 114. Find and explain the equation of the transfer function in frequency domain 115. Define z-transform, region of convergence and the relationship between frequency and z-domain. 116. Find poles, zeros and the stability of transfer functions.
Indicative Contents Indicative Contents	Indicative content includes the following. **Theoretical Content [30 hrs]** Review of discrete-time signals and systems; classification and properties of signals and systems. [6 hrs] DSP system components, sampling, quantization, coding, signal reconstruction, and aliasing. [6 hrs] Difference equations, impulse response, convolution, and correlation. [6 hrs] DTFT, IDTFT, frequency response, magnitude spectrum, and phase spectrum. [6 hrs] DFT, IDFT, FFT, and computational complexity. [6 hrs] **Laboratory Content [30 hrs]** Practical laboratory exercises using MATLAB or equivalent software covering signal generation, sampling, reconstruction, convolution, correlation, DTFT, DFT, FFT[30 hrs] Total Indicative Content: 60 hrs

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Student Workload (SWL) calculated for 15 weeks			
Structured SWL (h/sem) Structured SWL during the semester	63	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	37	**Unstructured SWL (h/w)** Unstructured SWL per week	2.47
Total SWL (h/sem) Total SWL during the semester	**100**		

Module Evaluation					
Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #3 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #2-#3 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Weekly Theoretical Syllabus	
	Material Covered
Week 1	REVIEW OF DISCRETE SIGNALS AND SYSTEMS
Week 2	INTRODUCTION OF DIGITAL SIGNAL PROCESSING
Week 3	Properties of discrete-time signals (periodicity, symmetry).
Week 4	Properties of discrete-time systems (linearity, time-invariance, causality, stability).

Week 5	Block diagram of DSP system
Week 6	Difference equations and impulse response
Week 7	FREQUENCY-DOMAIN REPRESENTATION OF DISCRETE-TIME SIGNALS AND SYSTEMS
Week 8	Discrete-Time Fourier Transform
Week 9	DTFT Properties and IDTFT
Week 10	Mid term
Week 11	Fast Fourier Transform and IFFT
Week 12	Review of the Z-transform and its properties.
Week 13	The Z-plane, poles, and zeros.
Week 14	The inverse Z-transform and system analysis.
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Weekly Lab Syllabus

	Material Covered
Week 1	Lab 1: Review
Week 2	Lab 2: introduction of discrete time signals part 1
Week 3	Lab 3: introduction of discrete time signals part 2
Week 4	Lab 4: sampling and reconstruction of analog signals part1
Week 5	Lab 5: sampling and reconstruction of analog signals part2
Week 6	Lab 6: convolution and correlationpart1
Week 7	Lab 7: convolution and correlationpart2
Week 8	Lab 8: discrete Fourier transform part1
Week 9	Lab 9: discrete Fourier transform part2
Week 10	Lab 10: fast Fourier transform part1
Week 11	Lab 11: fast Fourier transform part2

Learning and Teaching Resources

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Emmanuel and Barrie, “Digital Signal Processing practical Approach,”	Yes

Recommended Texts	5- 3.Li Tan and Jean Jiang, "Digital Signal Processing Fundamentals and Applications" 6- John G. Proakis, "Digital Signal Processing– Fourth Edition	Yes

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Description Form

Module Information Module Information		
Module Title	Measurement instruments principles	**Module Delivery**
Module Type	**Core**	☒ **Theory**
Module Code	NVEEELM313	☒ **Lecture**
ECTS Credits	**6**	☐ **Lab**
SWL (hr/sem)	**150**	☐ **Tutorial** ☐ **Practical** ☐ **Seminar**

Module Level	1 3	**Semester of Delivery**	1
Administering Department	Dept. of Electronic Eng. (Med. Ele)	**College**	College of Electronic Engineering
Module Leader	Amenah.E.Kanaan	**e-mail**	Amenah.kanaan@uoninevah.edu.iq
Module Leader's Acad. Title	Assistance Lecturer	**Module Leader's Qualification**	MS.c
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	20/06/2023	**Version Number**	1.0

Relation with other Modules

Relation with Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives Module Aims	• To educate the fundamental concepts and characteristics of measurement and errors. • To impart the knowledge on the functional aspects of measuring instruments. • To educate the fundamental working of sensors and transducers and their applications. • To infer the importance of various bridge circuits used with measuring instruments. • • To summarize the overall measurement and instrumentation with the knowledge on digital instrumentation principles..
Module Learning Outcomes Module Learning Outcomes	• Ability to understand the fundamental art of measurement in engineering. • Ability to understand the structural elements of various instruments. • Ability to understand about various transducers and their characteristics by experiments. • Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.
Indicative Contents Indicative Contents	Indicative content includes the following. • CONCEPTS OF MEASUREMENTS. • MEASUREMENT OF PARAMETERS IN ELECTRICAL SYSTEMS.

	• TRANSDUCERS FOR MEASUREMENT OF NON- ELECTRICAL PARAMETERS. • AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS. • DIGITAL INSTRUMENTATION

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Electronic Measurements and Instrumentation involves with the measurement of various parameters related to the operation and use of electronic instruments. Measurements play a very important role in all engineering field. As a facilitator we have to strengthen the theoretical concepts by providing a platform for the students to analyze and design various instruments used for measurements. To improve the knowledge of measurements, analyzing and designing is the greatest challenge at the undergraduate level.

Student Workload (SWL)

Student Workload (SWL) calculated for 15 weeks

Structured SWL (h/sem) Structured SWL during the semester	49	**Structured SWL (h/w)** Structured SWL per week	5.1
Unstructured SWL (h/sem) Unstructured SWL during the semester	101	**Unstructured SWL (h/w)** Unstructured SWL per week	4.8
Total SWL (h/sem) Total SWL during the semester	**150**		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Introduction of instruments
Week 2	Error of instrument
Week 3	Statistical evaluation of measurement data.
Week 4	Statistical evaluation of measurement data.
Week 5	Classification of instruments
Week 6	Classification of instruments
Week 7	AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS
Week 8	AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS
Week 9	Electronic instrument(ammeter, voltmeter)
Week 10	Electronic instrument(Ohmmeter)
Week 11	Digital voltmeter structure and design
Week 12	Digital voltmeter structure and design
Week 13	DIGITAL INSTRUMENTATION
Week 14	DIGITAL INSTRUMENTATION
Week 15	review
Week 16	First course exam

Delivery Plan (Weekly Lab. Syllabus) Weekly Lab Syllabus	
	Material Covered
Week 1-2	
Week 3-4	
Week 5-6	
Week 7-8	
Week 9-10	
Week 11-12	
Week 13-14	

Learning and Teaching Resources Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**Electrical and Electronic Measurement By Ahmed A.Montaser and Karam A. sharshar**	Yes
Recommended Texts	**1-Electronic Instrumentation and Measurement Techniques" ByWillliam David Cooper and Albert D. Helfrick.** **2-Principles of Measurement systems By John P. Bentley**	No
Websites	1- 2-	

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Microprocessors

Module Description

Module Information Module Information					
Module Title	**Microprocessors**			**Module Delivery**	
Module Type	support			☒ **Theory**	
Module Code				☐ **Lecture**	
ECTS Credits	3			☒ **Lab**	
SWL (hr/sem)	64			☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	Electronic Engineering		**College**	College of Electronics Engineering- EE	
Module Leader	Amer Talal Ali		**e-mail**	amer.ali@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecture Assistant		**Module Leader's Qualification**	MS.C	
Module Tutor	Amer Talal Ali		**e-mail**	amer.ali@uoninevah.edu.iq	

Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	Sep 01, 2025	**Version Number**	1.0

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	1. Introduce the fundamental principles of microprocessor architecture and internal organization. 2. Provide a clear understanding of Central Processing Unit (CPU) operation and bus system architecture. 3. Train students in low-level programming using Assembly Language. 4. Study memory management concepts, segmentation, and addressing modes. 5. Prepare students to keep pace with modern microprocessors and embedded computer system advancements.

Module Learning Outcomes Module Learning Outcomes	**1. Knowledge and Understanding:** • Identify the internal functional components of a microprocessor (e.g., Intel 8086). • Explain the role of internal registers, control unit, timing systems, and the ALU. • Understand the instruction execution lifecycle and system bus cycles. **2. Intellectual Skills:** • Analyze assembly language code and predict the outcome of instruction execution. • Formulate algorithms to solve low-level mathematical and logical problems. • Debug and troubleshoot hardware-level software errors effectively. **3. Practical and Professional Skills:** • Write, assemble, and execute Assembly language. **4. General and Transferable Skills:** • Demonstrate effective teamwork during laboratory sessions and group projects. • Write technical reports documenting practical laboratory experiments. • Apply logical reasoning and engineering problem-solving methodologies.
Indicative Contents Indicative Contents	1. Overview of digital systems and microprocessor architecture. 2. Intel 8086 Microprocessor Architecture (Execution Unit & Bus Interface Unit). 3. Memory Segmentation and Logical/Physical Address calculation. 4. Addressing Modes and Assembly Language Instruction Set. 5. Assembly Language Programming (Data Transfer, Arithmetic, Logical operations). 6. Program Flow Control (Jumps, Loops, Procedures/Subroutines). 6. Hardware Specifications, Pin Configuration, and Memory Interfacing.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	1. **interactive Lectures:** Slide presentations combined with whiteboard demonstrations to clarify theoretical and architectural concepts. 2. **Practical Laboratory Sessions:** Weekly hands-on sessions using software emulators and writing reports. 3. **Problem-Based Learning:** Assigning homework problems and programming challenges that require analytical thinking. 4. **Technical Discussions:** Encouraging active student participation through code reviews and alternative solution discussions.

Student Workload (SWL) Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	48	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	52	**Unstructured SWL (h/w)** Unstructured SWL per week	3
Total SWL (h/sem) Total SWL during the semester	100		

Module Evaluation Module Evaluation					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	4,7,11	LO #1-4
	Assignments	2	5% (5)	2, 12	LO # 1-4

	Projects / Lab.	1	10% (10)	15	LO #1-2
	Report	10	10% (10)	2-14	LO # 3-4
Summative assessment	**Midterm Exam**	3 hrs	10% (10)	8	LO # 1-4
	Final Exam	3 hrs	50% (50)	16	LO # 1-4
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
Week	**Material Covered**
Week 1	**Introduction to Microprocessors and Historical Evolution**
Week 2	**8086 Architecture: EU (Execution Unit) & BIU (Bus Interface Unit)** Writing and Executing Basic Data Transfer Programs
Week 3	**Register Organization and Memory Segmentation** Register Tracking and Memory Inspection during Execution.
Week 4	**Addressing Modes: Immediate, Register, and Direct Modes** Implementing Direct and Indirect Addressing Exercises
Week 5	**Addressing Modes: Register Indirect, Based, and Indexed Modes** Advanced Memory Pointer and Array Indexing Lab
Week 6	**Instruction Set: Data Transfer Instructions (MOV, PUSH, POP, LEA)** Memory Manipulation and Data Transfer Programs
Week 7	**Instruction Set: Arithmetic Instructions (ADD, SUB, MUL, DIV)** Coding Arithmetic Algorithms and Flag Evaluation
Week 8	**Mid-term Exam**
Week 9	**Instruction Set: Logical & Shift Instructions (AND, OR, XOR, SHL, SHR)** **Bit Manipulation and Data Masking Exercises**
Week 10	**Program Control: Unconditional and Conditional Branching (JMP, Jxx)** Decision-Making and Number Comparison Programs
Week 11	**Iteration & Subroutines: LOOP Instruction, CALL, RET, and Stack** Implementing Loops, Procedures, and Stack Operations
Week 12	**Instruction Set: string instructions** Implementing string instructions
Week 13	**Interrupt Processing Structure (Software & Hardware Interrupts)** Utilizing System Interrupts.
Week 14	**Hardware Pin Configuration and Bus Timing Diagrams**
Week 15	**Lab project**
Week 16	**Perpetration of Final Exam**

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	- *Brey, Barry B., The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit Extensions, 8th Edition, Pearson.*	Yes
Recommended Texts	- Ray, A. K., & Bhurchandi, K. M., *Advanced Microprocessors and Peripherals*, McGraw-Hill. - Hall, Douglas V., *Microprocessors and Interfacing: Programming and Hardware*, McGraw-Hill.	No
Websites	https://www.geeksforgeeks.org/search/?gq=microprocessor https://www.tutorialspoint.com/microprocessor/microprocessor_8086_overview.htm	

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria

Fail Group **(0 – 49)**	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Numerical Analysis I

Module Description

Module Information Module Information				
Module Title	**Numerical Analysis I**		**Module Delivery**	
Module Type	support		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code				
ECTS Credits	5			
SWL (hr/sem)	150			
Module Level	UGI		**Semester of Delivery**	1
Administering Department	Electronic Engineering		**College**	College of Electronics Engineering-EE
Module Leader	Amer Talal Ali		**e-mail**	amer.ali@uoninevah.edu.iq
Module Leader's Acad. Title	Lecture Assistant		**Module Leader's Qualification**	
Module Tutor	Amer Talal Ali		**e-mail**	amer.ali@uoninevah.edu.iq
Peer Reviewer Name			**e-mail**	
Scientific Committee Approval Date	Sep 01, 2025		**Version Number**	1.0

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	1. Get students familiar with the basics of numerical analysis as a fundamental science computing tool and an applied math tool. 2. Acquire skills to design, analyze, and apply numerical algorithms to solve mathematical problems that occur in engineering, computer science, physics, and other fields. 3. Give concrete experience in the use of numerical techniques to obtain approximations to solutions of equations, systems of equations, interpolation, differentiation, integration, and differential equations. 4. Develop a critical understanding of the accuracy, efficiency, and stability of numerical methods, their sources of error, and error control. 5. Use theoretical study in conjunction with practical exercises and projects to develop problem-solving skills, analytical thinking skills, and independent learning.

Module Learning Outcomes Module Learning Outcomes	Knowledge and understanding. 1. State the basic concepts of numerical methods and their application in science and engineering. 2. Determine the primary causes of numerical error (round-off and truncation) and determine how each affects calculational accuracy. 3. Compare and contrast various root-finding algorithms, interpolation algorithms, numerical differentiation and integration algorithms, as well as differential equation solutions. Skills (Cognitive & Practical) 4. Use suitable numerical methods to find approximations of mathematical problems whose analytical solutions may be hard or inaccessible. 5. Test the efficiency, accuracy, and stability of numerical algorithms across classes of problems. 6. Evaluate and compute computational solutions, and test solutions by comparing them to theory. Transferable Skills 7. Show abilities in problem solving in both creation and resolution of applied numerical problems. 8. Work in teams and on your own to design, test, and present numerical solutions. 9. Provide effective ways of communicating technical findings using written reports, code documentation, and presentations.
Indicative Contents Indicative Contents	1. Introduction to Numerical Analysis Role and importance of numerical methods Sources of error and error propagation Convergence and stability 2. Solution of Nonlinear Equations Bisection, Fixed-Point, Newton-Raphson, Secant methods 3. Systems of Linear Equations Gaussian elimination, LU decomposition Iterative methods: Jacobi, Gauss-Seidel, SOR 4. Interpolation and Polynomial Approximation Lagrange interpolation, Newton divided differences Spline interpolation 5. Numerical Differentiation Difference formulas (forward, backward, central) Error analysis 6. Numerical Integration Trapezoidal and Simpson’s rules Composite rules, Gaussian quadrature 7. Initial Value Problems for ODEs

	Euler's method, Improved Euler, Runge-Kutta methods 8. Advanced Topics (optional) Boundary value problems and PDE introduction Applications in science and engineering

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	Lectures: Present basic theories, principles, and examples. Tutorials: Support ideas through interactive problem solving. Independent Study: Motivate reading and practicing. Group Projects: Facilitate collaboration and problem-solving within an applied situation. Formative Feedback: It is given through quizzes and assignments.

Student Workload (SWL) Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	64	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	86	**Unstructured SWL (h/w)** Unstructured SWL per week	5.3
Total SWL (h/sem) Total SWL during the semester	150		

Module Evaluation Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	4,7,11	LO #1-7
	Assignments	2	15% (15)	2, 12	LO # 8-9
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	-	LO # 7-9
Summative assessment	**Midterm Exam**	3 hrs	10% (10)	9	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	LO # 1-7
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	**Introduction to Numerical Analysis** Role and importance of numerical methods in science and engineering. Sources of error: round-off error.
Week 2	Sources of error: truncation error and error propagation. Concepts of convergence, stability, and computational complexity.
Week 3	**Solution of Nonlinear Equations** Bisection method, fixed-point iteration.
Week 4	Newton-Raphson and Secant methods.
Week 5	Convergence analysis and error estimation.
Week 6	**Systems of Linear Equations** Direct methods: Gaussian elimination, LU decomposition.
Week 7	Iterative methods: Jacobi, Gauss-Seidel, Successive Over-Relaxation (SOR).
Week 8	Condition number and stability considerations.
Week 9	**Mid-term Exam**
Week 10	**Interpolation and Polynomial Approximation** Lagrange interpolation. Newton divided differences.
Week 11	Spline interpolation and curve fitting.
Week 12	**Introduction in Numerical Differentiation**
Week 13	**Introduction in Numerical Integration**
Week 14	**Initial Value Problems for Ordinary Differential Equations (ODEs)**
Week 15	**Introduction in Advanced Topics**
Week 16	**Perpetration of Final Exam**

Learning and Teaching Resources Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	- Thomas's Calculus 12th edition	Yes
Recommended Texts	- Numerical Analysis, 10th Edition -- Richard L_ Burden, J_ Douglas Faires, Annette M_ Burden -- 2016	No

	- Numerical Methods for Engineers 7th Edition -- Steven C_ Chapra, Raymond P_ Canale -- 7_ ed, New York, NY, c 2015	
Websites	https://www.geeksforgeeks.org/search/?gq=numerical+analysis https://www.tutorialspoint.com/index.htm	

Grading Scheme Grading Scheme				
Group	**Grade**	Rating	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Module Description of Programmable Logic Controllers (Delta PLC)

Module Description

Module Information Module Information		
Module Title	**Programmable Logic Controllers (Delta PLC)**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture**
Module Code	NVEEELI312	

ECTS Credits	**6**			☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
SWL (hr/sem)	**150**				
Module Level		UGIII	**Semester of Delivery**		2
Administering Department		Dept. of Electronic Engineering	**College**	College of Electronics Engineering-EE	
Module Leader	Harith Hazim Thannoon		**e-mail**	harith.thannoon@uoninevah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Phd
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules

Relation with Other Modules

Prerequisite module		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims, Learning Outcomes and Indicative Contents

Module Aims Module Aims	The module aims to introduce students to the principles, hardware and programming of Programmable Logic Controllers (PLCs) used in industrial automation, with practical emphasis on Delta DVP-series PLCs. It provides students with the knowledge of PLC architecture and the scan cycle, digital and analog signals, sinking and sourcing I/O wiring, and the WPLSoft/ISPSoft programming environment. The module develops the skills needed to write ladder diagram programs using bit logic, timers, counters, data handling and sequential (step ladder) instructions, and to apply them to real industrial applications such as motor control, star–delta starting, counting systems, traffic lights, sensor interfacing and PLC communication with HMIs and drives.
Module Learning Outcomes Module Learning Outcomes	1. Explain the architecture, operating principle and scan cycle of PLC-based industrial control systems. 2. Distinguish between digital and analog signals and apply the number systems used in PLCs.

	3. Identify the hardware, specifications and model coding of Delta DVP-series PLCs. 4. Wire the power supply, sinking/sourcing inputs and relay/transistor outputs correctly and safely. 5. Use the WPLSoft/ISPSoft environment to create, download, simulate and monitor PLC programs. 6. Write ladder diagram programs using basic bit instructions, latching and interlocking. 7. Apply timers and counters to solve practical control problems. 8. Use data-handling, comparison and edge-detection instructions in PLC programs. 9. Design motor control circuits (start/stop, forward/reverse and star–delta) with protection. 10. Develop sequential control programs using step ladder (SFC) techniques. 11. Interface sensors, actuators and analog I/O modules with the PLC. 12. Configure PLC communication (RS-232/RS-485, Modbus) with HMIs and AC drives, and troubleshoot PLC systems.
Indicative Contents Indicative Contents	**1. Fundamentals of PLC Systems** • Introduction to industrial control systems. • Relay logic versus PLC-based control. • PLC components: CPU, memory, I/O modules and power supply. • The PLC scan cycle. • Digital and analog signals; number systems used in PLCs (binary, octal, BCD). **2. Delta DVP PLC Hardware and Wiring** • Delta DVP-ES2 series, model coding and specifications. • Front panel: indicators, RUN/STOP switch and communication ports. • Power supply wiring and safety. • Sinking and sourcing input connections. • Relay and transistor outputs; protection of inductive loads. • Field devices: push buttons, limit switches, proximity sensors and contactors. **3. Programming Environment** • WPLSoft and ISPSoft software. • Communication settings and program download. • Online monitoring and debugging. • PLC memory devices (X, Y, M, S, T, C, D) and special relays. **4. Ladder Diagram Programming** • Basic instructions: LD, LDI, AND, ANI, OR, ORI, OUT, END. • Latching (SET/RST), seal-in circuits and interlocking. • Timers: on-delay, off-delay and flashing circuits. • Counters: up/down and high-speed counters.

	• Data handling and comparison: MOV, CMP, ZCP and arithmetic instructions. • Edge detection: LDP, LDF, PLS and PLF. **5. Industrial Applications** • Motor control: start/stop with protection, forward/reverse and star–delta starting. • Counting systems (e.g. car-park counting). • Sequential control using step ladder (SFC) and traffic light control. • Analog I/O modules and sensor interfacing. • PLC communication: RS-485/Modbus with HMIs and AC drives. • Troubleshooting and an integrated industrial control project.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	11. **Lectures** – to explain PLC principles, hardware and programming concepts. 12. **Laboratory sessions** – hands-on wiring and programming of Delta DVP PLC training kits. 13. **Software simulation** – writing, simulating and monitoring programs in WPLSoft/ISPSoft. 14. **Tutorials and problem-solving** – solving industrial control problems in ladder logic. 15. **Mini-projects** – designing and implementing an integrated industrial control application. 16. **Assignments** – to encourage independent learning.

Student Workload (SWL) Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	63	**Structured SWL (h/w)** Structured SWL per week	4
Unstructured SWL (h/sem) Unstructured SWL during the semester	87	**Unstructured SWL (h/w)** Unstructured SWL per week	5.8
Total SWL (h/sem) Total SWL during the semester	150		

Module Evaluation Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	4, 9, 13	LO #1-4, 7 and 10
	Assignments	2	10% (10)	6, 11	LO #6, 8 and 9
	Projects / Lab.	10	15% (15)	Continuous	LO #4-11
	Report	1	5% (5)	14	LO #13
Summative assessment	**Midterm Exam**	3 hrs	10% (10)	7	LO #1-6
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Introduction to industrial control systems and PLCs. Relay logic vs. PLC. PLC architecture (CPU, memory, I/O, power supply) and the scan cycle.
Week 2	Digital and analog signals. Number systems for PLCs (binary, octal, BCD). Discrete I/O modules.
Week 3	Delta DVP-ES2 PLC: model coding, specifications and front panel. Power supply wiring; sinking and sourcing inputs.
Week 4	Relay and transistor outputs and load protection. Field devices: push buttons, limit switches, proximity sensors and contactors.
Week 5	WPLSoft/ISPSoft environment: creating a project, communication settings, download and online monitoring. Memory devices X, Y, M, S, T, C, D.
Week 6	Ladder diagram fundamentals: basic instructions, seal-in (start/stop) circuits, SET/RST latching and interlocking.
Week 7	Mid-term Exam
Week 8	Timers: on-delay and off-delay applications, flashing lamp. Special relays (M1000, M1002, M1013).
Week 9	Counters: up/down and high-speed counters. Counting applications (e.g. car-park counting).
Week 10	Motor control: start/stop with overload protection, forward/reverse and star–delta starter.
Week 11	Data handling and comparison instructions (MOV, CMP, ZCP, arithmetic). Edge detection (LDP, LDF, PLS, PLF).
Week 12	Sequential control using step ladder (SFC). Traffic light control application.
Week 13	Analog I/O modules and sensor interfacing; scaling of analog signals.
Week 14	PLC communication: RS-232/RS-485 and Modbus with HMIs and AC drives. Troubleshooting PLC systems.

Week 15	Integrated project presentation + general review and discussion of exam questions.

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Text book 1: F. D. Petruzella, Programmable Logic Controllers, 5th ed., McGraw-Hill. Delta Electronics, DVP-ES2/EX2 Operation Manual, and DVP-PLC Application Manual (Programming).	No
Recommended Texts	W. Bolton, Programmable Logic Controllers, 6th ed., Newnes. J. W. Webb and R. A. Reis, Programmable Logic Controllers: Principles and Applications, 5th ed., Prentice Hall.	No
Websites	Delta Electronics Download Center (manuals and WPLSoft/ISPSoft): https://downloadcenter.deltaww.com Delta Industrial Automation: https://www.deltaww.com	

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Power Converter I

Module Description

Module Information Module Information					
Module Title	Power Converter I			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEE206				
ECTS Credits	4				
SWL (hr/sem)	150				
Module Level	UGI		**Semester of Delivery**	5	
Administering Department	Electronic Engineering Dept.		**College**	College of Electronics Engineering-EE	
Module Leader	Dr. Harith Al-Badrani		**e-mail**	Harith.mohammed@uoninevah.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	Jun 01, 2023		**Version Number**	1.0	

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	1. Introduce the undergraduate students to the principle of semiconductor switch-based conversion in power electronics. 2. The analysis of power components and important factors when dealing with non-sinusoidal quantities. 3. Focus on the features and benefits of power electronics circuits and apricate its importance in modern electrical engineering systems such as energy processing and conditioning. 4. To introduce the features and characteristics the common power switching devices. 5. To introduce the single-phase and three-phase phase-uncontrolled and controlled power converter circuits. 6. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design.
Module Learning Outcomes Module Learning Outcomes	By the completion of the course, the students should be able to: 7. Define the scope, tool types and applications of power converters. 8. Calculating the assessment of the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 9. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 10. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 11. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 12. Describe and analyze the single-phase and three-phase SCR-AC controller circuits with R and RL loads.
Indicative Contents Indicative Contents	Indicative content includes the following. Part A – Introduction, definitions and tools Power Electronics: definitions, approach and applications. Figures of Merits: Ripple factor, Total harmonic distortion, Form factor, Power factor (non-sinusoidal waveform), conversion efficiency. Review of circuit analysis tools. Quizzes Part B- Semiconductor Switching Devices Scope of power electronics, power converter specification. Power Semiconductor Devices: Thyristor families, V-I characteristics of SCR, Triac, GTO, Diac, Source of thyristor triggering, turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings.

	Power transistor devices: Basic structure and V-I characteristics of power MOSFET, IGBT, SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings. Part C- Phase-controlled AC-DC converters Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of freewheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger . Thyristor commutation techniques: Natural commutation, Force commutation, Voltage / Current commutation.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL) Student Workload (SWL)			
Structured SWL (h/sem) Structured SWL during the semester	46	**Structured SWL (h/w)** Structured SWL per week	3
Unstructured SWL (h/sem) Unstructured SWL during the semester	76	**Unstructured SWL (h/w)** Unstructured SWL per week	4
Total SWL (h/sem) Total SWL during the semester	150		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	Introduction: Definitions, Power and Energy, Types of Conversion, Power Electronics Approach. The role of switch in power converter, Energy recovery.
Week 2	Power Computations: Mean, RMS, Figures of Merits
Week 3	Power Diodes: Steady-state characteristics, basic parameters and ratings, transient characteristics, Special Diodes.
Week 4	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 5	Source of thyristor triggering, turn On\ turn Off characteristic and Gate triggering requirements.
Week 6	Power transistor devices: Basic structure and V-I characteristics of power IGBT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings.
Week 7	Power transistor devices: Basic structure and V-I characteristics of power MOSFET.
Week 8	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 9	Half-wave diode rectifiers: R-load, RL-Load, freewheeling diode and capacitor filter.
Week 10	Full-Wave diode rectifier R, RL load and freewheeling diode.
Week 11	Controlled Full-Wave rectifier R, RL load and freewheeling diode.
Week 12	Three-phase three-pulse rectifier
Week 13	Six-pulse diode rectifier with R and highly inductive load
Week 14	Analysis of six-pulse diode rectifier with RLE load

Week 15	- Preparatory week before the final Exam.

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	- Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. - McGraw Hill (2010)	No
Recommended Texts	- -Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 - Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 - POWER CONVERTER CIRCUITS By Shepherd and Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	No
Websites	https://classroom.google.com	

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Power Converters II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI308**				
ECTS Credits	5				
SWL (hr/sem)	78				
Module Level	3-2		**Semester of Delivery**	6	
Administering Department	Electronic Engineering		**College**	College of Electronics Engineering-EE	
Module Leader	Dr. Harith Al-Badrani		**e-mail**	harith.mohammed@uoninevah.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Dr.-Ing.	
Module Tutor	Dr. Harith Al-Badrani		**e-mail**	harith.mohammed@uoninevah.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	Sep 01, 2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	65. Introduce the undergraduate students to the principle of single-phase inverter. 66. Introduce the undergraduate students to the principle of single-phase inverter with inductive loads. 67. Introduce the undergraduate students to the principle of three-phase inverter. 68. Introduce the undergraduate students to the principle of three-phase inverter with inductive loads. 69. Introduce the undergraduate students to the principle of multilevel inverter.
Module Learning Outcomes	117. Principle of single-phase half- bridge voltage source inverter. 118. Harmonic analysis of the output voltage of single-phase half-bridge voltage source inverter. 119. Principle of single-phase half- bridge voltage source inverter with inductive load. 120. Harmonic analysis of the output voltage of single-phase half-bridge voltage source inverter with inductive load. 121. Principle of single-phase full- bridge voltage source inverter. 122. Harmonic analysis of the output voltage of single-phase full-bridge voltage source inverter. 123. Principle of single-phase full- bridge voltage source inverter with inductive load. 124. Harmonic analysis of the output voltage of single-phase full-bridge voltage source inverter with inductive load. 125. Principle of three-phase 180° conduction mode voltage source inverter. 126. Principle of three-phase 180° conduction mode voltage source inverter with inductive load. 127. Principle of three-phase 120° conduction mode voltage source inverter. 128. Principle of three-phase 120° conduction mode voltage source inverter with inductive load. 129. Principle of multilevel voltage source inverter.
Indicative Contents	Indicative content includes the following. <u>Part A – Half-bridge inverters</u> Introduction: Definitions, DC to AC converters. Principle of single-phase half- bridge voltage source inverter. Harmonic analysis of the output voltage of single-phase half- bridge voltage source inverter.

	Principle of single-phase half- bridge voltage source inverter with inductive load. Harmonic analysis of the output voltage of single-phase half- bridge voltage source inverter with inductive load. Quizzes Part B- Full-bridge inverters Principle of single-phase full- bridge voltage source inverter. Harmonic analysis of the output voltage of single-phase full- bridge voltage source inverter. Principle of single-phase full- bridge voltage source inverter with inductive load. Harmonic analysis of the output voltage of single-phase full- bridge voltage source inverter with inductive load. Part C- Three-phase inverters Principle of three-phase 180° conduction mode voltage source inverter. Principle of three-phase 180° conduction mode voltage source inverter with inductive load. Principle of three-phase 120° conduction mode voltage source inverter. Principle of three-phase 120° conduction mode voltage source inverter with inductive load. Principle of multilevel voltage source inverter.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	47	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	**125**		

Module Evaluation				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction: Definitions, DC to AC converters.
Week 2	Principle of single-phase half- bridge voltage source inverter.
Week 3	Harmonic analysis of the output voltage of single-phase half- bridge voltage source inverter.
Week 4	Principle of single-phase half- bridge voltage source inverter with inductive load.
Week 5	Harmonic analysis of the output voltage of single-phase half- bridge voltage source inverter with inductive load.
Week 6	Principle of single-phase full- bridge voltage source inverter.
Week 7	Harmonic analysis of the output voltage of single-phase full- bridge voltage source inverter.
Week 8	Principle of single-phase full- bridge voltage source inverter with inductive load.
Week 9	Harmonic analysis of the output voltage of single-phase full- bridge voltage source inverter with inductive load.
Week 10	Principle of three-phase 180° conduction mode voltage source inverter.
Week 11	Principle of three-phase 180° conduction mode voltage source inverter with inductive load.
Week 12	Principle of three-phase 120° conduction mode voltage source inverter.
Week 13	Principle of three-phase 120° conduction mode voltage source inverter with inductive load.
Week 14	Principle of multilevel voltage source inverter.

Week 15	Preparatory week before the final Exam.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	No
Websites	https://classroom.google.com	

Grading Scheme				
Group	**Grade**	Rating	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Description of Probability and Statistics

Module Description

Module Information Module Information					
Module Title	Probability and Statistics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELI310				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	2	
Administering Department			**College**		
Module Leader	SINAN KHALID SHANSHAL		**e-mail**	**sinan.mohammed@uoninevah.edu.iq**	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	02/07/2023		**Version Number**	1.0	

Relation with other Modules Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Aims Module Aims	This module aims to provide students with a foundational understanding of probability theory and statistical methods, explicitly focusing on their applications within engineering and data-driven disciplines. It bridges theoretical mathematical concepts with practical analytical skills required to model uncertainty, analyze experimental data, and make informed engineering decisions.
Module Learning Outcomes Module Learning Outcomes	*By the end of this course, students will be able to:* 13. **Analyze** and summarize real-world data using descriptive statistical techniques. 14. **Apply** fundamental rules of probability to evaluate the likelihood of complex events. 15. **Model** random phenomena using appropriate discrete and continuous probability distributions. 16. **Construct** and interpret confidence intervals and hypothesis tests to make data-driven decisions. 17. **Evaluate** relationships between variables using linear regression and correlation analysis. 18.
Indicative Contents Indicative Contents	Foundations of Probability & Set Theory Conditional Probability and Independence Bayes' Theorem and Combinatorics Discrete Random Variables Continuous Random Variables Joint and Marginal Distributions Linear Regression and Correlation

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	Through the presentation of a theoretical explanation with the aid of white board and 'Data Show', to illustrate syllabus (examples and exercises) and using text books.

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	47	**Structured SWL (h/w)** Structured SWL per week	3
Unstructured SWL (h/sem) Unstructured SWL during the semester	78	**Unstructured SWL (h/w)** Unstructured SWL per week	5
Total SWL (h/sem) Total SWL during the semester	125		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	4,8,10,13	LO #5-8, 10 and 13
	Assignments	4	6% (6)	2,4,11,13	LO #2-4, 11 and 13
	Class Works	2	10% (10)		ALL
	Report	1	4% (4)		ALL
Summative assessment	**Midterm Exam**	1.5hr	10% (10)	10	LO # 1-8
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Weekly Theoretical Syllabus

	Material Covered
Week 1	Set Theory, Sample Spaces, and Events
Week 2	Probability Axioms & Probability Tables
Week 3	Conditional Probability and Independence
Week 4	Total Probability & Bayes' Theorem
Week 5	Discrete Random Variables
Week 6	Continuous Random Variables
Week 7	Theoretical Mean and Variance

Week 8	Systems and Component Reliability
Week 9	Midterm Exam + Comprehensive Review
Week 10	Jointly Distributed Random Variables and Independence
Week 11	Conditional Distributions; Operations: Expectation, Variance, Covariance, Correlation
Week 12	Introduction to Statics
Week 13	A Simple Linear Probabilistic Model
Week 14	The Method of Least Squares; An Analysis of Variance for Linear Regression
Week 15	- Preparatory week before the final Exam
Week 16	

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	- Sheldon M. Ross, INTRODUCTION TO PROBABILITY AND STATISTICS FOR ENGINEERS AND SCIENTISTS - Jay Devore, Probability and Statistics for Engineering and the Sciences	
Recommended Texts	- Richard A. Johnson, Probability and Statistics for Engineers	
Websites		

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX** – Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM Limbs Anatomy

Module Description Form

Module Information				
Module Information				
Module Title	**Digital Systems Design Using HDL**		**Module Delivery**	
Module Type	Basic		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVU18			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	UGII	**Semester of Delivery**	4	
Administering Department	Dept. of Elctronic	**College**	College of Electronics Engineering-EE	
Module Leader		**e-mail**		
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor	Rasha Waleed Hamad	**e-mail**	rasha.hamad@uoninevah.edu.iq	
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date	Jun 01, 2023	**Version Number**	1.0	

Relation with other Modules

Relation with Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives Module Aims	4. This course will provide the students with the basic knowledge of Electronic circuit design 5. The focus is on sequential circuits and combinational circuits 6. It provides basic knowledge in Electronic circuits and discusses the role of AI in modern Very Large Scale Integration (VLSI), the Ethical Challenges in design.
Module Learning Outcomes Module Learning Outcomes	1. Provide the students with the basic knowledge of Electronic circuit design using VHDL. 2. Learn the student the simulation of Electronic circuit design using VHDL and synthesise on an FPGA 3. Provides basic knowledge in design circuits and discusses the role of design in modern applications, the Ethical Challenges in design and the Future of circuits at very high speeds. 4. Identify basic Network component architecture type systems and security types 5. Explain the VHDL language component & high-accuracy FPGA slice 6. Discuss the role of VHDL language in different Branches like Robotics and Automation Technologies, etc.
Indicative Contents Indicative Contents	An Introduction to Electronic Circuit Design Using VHDL(2h). - Overview of Circuit Design - Structural Organisation of Design - Language overview type VHDL structuer and designe (2h) - Part types in language - Code view - Example of codes ISE v14.1 editor program (2h) - identify and solve common hardware and software problems Introduction to sequential circuits in VHDL. and Role of VHDL in Modern Very High Speed Language (6h) - Definition of code - application of code in the editor

	- Adaptive Learning Application and Tools of VHDL(3h) - VHDL Applications in Various Industries - Like VLSI, Robotics and Automation Technologies….etc AI and Society and Ethical Challenges (3h) - The effects of Electronic Circuit Design Using VHDL in modern hardware design and application - Future of speed in hardware design

Learning and Teaching Strategies

Learning and Teaching Strategies

Strategies	Assessment is based on hand-in assignments, written exam, Quizzes, seminars and Practical testing

Student Workload (SWL)

Student Workload (SWL)

Structured SWL (h/sem) Structured SWL during the semester	3*15+3=48	**Structured SWL (h/w)** Structured SWL per week	48/15=3.2
Unstructured SWL (h/sem) Unstructured SWL during the semester	48-75=27	**Unstructured SWL (h/w)** Unstructured SWL per week	27/15=1.8
Total SWL (h/sem) Total SWL during the semester	**75**		

Module Evaluation

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	15% (20)	2,3, 11,12 and 13	LO #1, #2 ,#3,#14, and #15
	Assignments	2	10% (10)	15	LO #1 - #7
	Projects / Lab.	1	10% (10)	continuous	ALL
	Report	1	5% (10)	continuous	ALL
Summative assessment	**Midterm Exam**	1hr	10% (10)	11	LO #1 - #7
	Final Exam	3hr	50% (50)	15	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) Weekly Theoretical Syllabus	
	Material Covered
Week 1	Electronic Circuit Design Using VHDL: What is a Circuit Design? Types of Circuit.
Week 2	Identify the language (Cont.): Network Basics. Understanding Design Threads
Week 3	HDL Programming, VHDL has a rich and interesting history. VHDL acronym.
Week 4	Tools Needed for VHDL Development: VHDL is a language used to implement hardware. A Field Programmable Gate Array (FPGA)
Week 5	VHDL code writing, compiling, simulation and synthesis. All major FPGA manufacturers have a set of software and hardware tools. synthesis can be accomplished using a free-license version of any major FPGA manufacturer's software tool (e.g. Xilinx ISE Design Suite)
Week 6	Four main parts of VHDL descriptionTechniques and Approaches.
Week 7	VHDL WITH ISE14.1(Integrated Synthesis Environment)
Week 8	VHDL Data Objects & Data Types.(signals, variables, and constants).
Week 9	Boolean, Integer, Natural & array
Week 10	VHDL Operators, Concatenation operators, Assignment operators, Logical operators, Arithmetic operators, Relational operators, Shift operators.
Week 11	Programming in VHDL Language (Concurrent Statement)
Week 12	Application and Tools of VHDL Language(Cont.): Robotics and Automation Technologies
Week 13	Programming in VHDL Language (Sequential Statement)
Week 14	CASE Statement & WAIT Statement
Week 15	Review

Delivery Plan (Weekly Lab. Syllabus) Weekly Lab Syllabus	
Week 1	**Material Covered**
Week 2	Introduction of VHDL lab.
Week 3	Installation of ISEv14.1 in pc.
Week 4	Overview of ISEv14.1 and management of data.
Week 5	Network synthesises with physical topology
Week 6	Applied the basic principle of CCT
Week 7	Result review with references
Week 8	Applied complex CCT in VHDL

Week 9	Combinational CCT in VHDL
Week 10	Mid Exam
Week 11	Introduction to AI Finite State Automata (FSA)
Week 12	Introduction to Hierarchical design
Week 13	Training and test for Hierarchical design
Week 14	Review

Learning and Teaching Resources

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1. PEDRONI, Volnei A. *Circuit design with VHDL*. MIT press, 2020. 2. HARR, Randolph E.; STANCULESCU, Alec G. (ed.). *Applications of VHDL to circuit design*. Springer Science & Business Media, 1991.	No
Recommended Texts	1 COELHO, David R. *The VHDL handbook*. Springer Science & Business Media, 2012.	No
Websites		

Grading Scheme

Grading Scheme

Group	Grade	Rating	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Fail (Under Treatment)	(45-49)	More work required but credit awarded
	F – Fail	Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Courses Table for Fourth Class

Electronic Engineering Deparatement								
Undergraduate Fourth Class								
Code	Subject	Hours/Week						Units
		First Term			Second Term			
		Th	Pr.	Tut	Th	Pr	Tut	
EE4301	Industrial Electronic	2	-	1	2	-	1	4

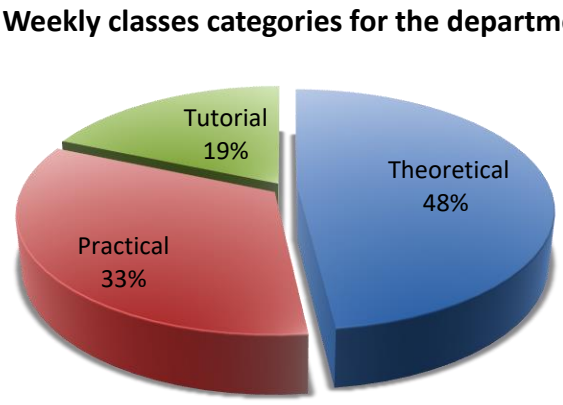
EE4302	Data Transmission&ComputerNetwork	2	-	1	2	-	1	4
EE4303	MicroController(*)	2	-	1				2
EE4309	Microprocessor II(*)				2	-	1	2
EE4304	Microelectronics	2	-	-	2	-	-	4
EE4308	Antenna &Propogation(*)				2	-	1	2
EE4305	Radiation(*)	2	-	1				2
EE4306	Computer aided design	2	-	1	2	-	1	4
EE4201	Engineering Project	1	3	-	1	3	-	4
EE4307	Laboratory	-	6	-	-	6	-	4
Total		13	9	5	13	9	5	32
		27			27			

Theoretical : 13 Hour/Week

Total Practical :9 Hour/Week

Total Tutorial :5 Hour/Week

Total Units :32



Fourth Year

- **Course Number: EE4301**
- **Course Name: Industrial Electronic**
- **Credit Hours: (4,2,1,0) (Units, Theory, Tutorial, Practical)**

Course Content: This course cover the power semiconductor devices, Phase control converters, Thyristor commutation techniques, Inverters, PWM and speed control.

- **Course Number: EE4302**
- **Course Name: Data Transmission and Computer Networks**
- **Credit Hours: (4,2,1,0) (Units, Theory, Tutorial, Practical)**

Course Content: Definitions and standards, Transmission media, OSI and TCP/IP models, Connecting devices. Data link control and data link protocols, LAN technologies, WLAN standards and devices, WAN and Wireless WAN.

- **Course Number: EE4309**
- **Course Name: Microprocessor II**
- **Credit Hours: (2,2,1,0) (Units, Theory, Tutorial, Practical)**

Course Content: Introduction to Advanced Microprocessors, The 80386 and 80486 Microprocessor, Assembly language and Programming,

- **Course Number: EE4303**
- **Course Name: Microcontroller**
- **Credit Hours: (2,2,1,0) (Units, Theory, Tutorial, Practical)**

Course Content: Microprocessors and Microcontrollers, The MCS-51 Architecture, Basic Assembly Language Programming Concept, An MCS-51 Microcontroller Design

- **Course Number: EE4304**
- **Course Name: Microelectronics**
- **Credit Hours: (6,3,0,0) (Units, Theory, Tutorial, Practical)**

Course Content: The microelectronics course covers the area of integrated circuit design. The fabrication of electronic devices, and design and analysis of analog and digital integrated circuits.

- **Course Number: EE4305**
- **Course Name: Radiation**
- **Credit Hours: (2,2,1,0) (Units, Theory, Tutorial, Practical)**

Course Content: Give the students an overview of microwave technology and introduction to Microwave devices.

- **Course Number: EE4308**
- **Course Name: Antenna and Propagation**
- **Credit Hours: (2,2,1,0) (Units, Theory, Tutorial, Practical)**
- **Course Content:**Antenna Theory (Principles of radiation and equivalent circuit)
, Dipole antenna, Array antenna, Reflector Antenna (Parabolic antenna), Ground wave propagation (Direct and Reflected), IonsphericPropagation ,Radar theory (Circuits and equations)

- **Course Number: EE4306**
- **Course Name: Computer aided design**
- **Credit Hours: (4,2,1,0) (Units, Theory, Tutorial, Practical)**

Course Content: This course covers the following topics: Numerical solution for Linear and nonlinear circuit ,DC and AC matrix analysis ,two port analysis ,graph theory , Simulation ,State variable analysis, Sensitivity, Optimization, CAD for integrated circuits, Genetic Algorithm .

- **Course Number: EE4201**
- **Course Name: Engineering Project**
- **Credit Hours: (4,1,0,3) (Units, Theory, Tutorial, Practical)**

Course Content: Collaboration team work in research environment is expected including extensive interaction with other students. Each group should submit a written report and should attend the final oral examination.

- **Course Number: EE4307**
- **Course Name: Laboratory**
- **Credit Hours: (4,0,0,6) (Units, Theory, Tutorial, Practical)**

Course Content: The principle objective is to ensure that the student have the ability to integrate concepts and achieve the practical works for the different topics he attend in the theoretical classes. Each student should submit a written technical report for each experiment.

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Class	**Fourth**			**Theory :**	**2Hrs/wk**
Subject	**Data Transmission & Computer Networks**			**Tutorial**	**1 Hrs/wk**
Code	**EE4302**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction and Definitions: Data Communication، Networks، Protocols، Standards، and Standard organizations.	**3**
BASIC CONCEPTS:- Line configuration، Topology، Categories of networks.	**6**
Transmission Media: Electromagnetic spectrum.,Guided media: Unshielded Twisted Pair (UTP) Cable., Shielded Twisted Pair (STP) Cable., Coaxial Cable., Optical Fiber., Unguided media: Radio Transmission., Microwave Transmission., Satellite Microwave**.**	**9**
Interfaces and Modems: Data transmission: parallel، serial، synchronous and asynchronous.,DTE-DCE interface and standards., Modems.	**6**
The OSIand TCP/IP Models	**6**
Networking and Internetworking Devices: Networking devices: NICs، Hubs، Repeaters، Bridges and Switches.,Internetworking devices: Router and Gateways.	**6**
Data Link Control: Link Discipline، Flow control، Error control.	**6**
Data Link Protocols: Asynchronous protocols، Synchronous protocols.	**3**
Local area Network (LAN): Ethernet ,Token Bus, project 802, Token Ring, FDDI.	**12**
TCP/IP Modeland Protocols	**9**
Wireless LAN (WLAN): Introduction and history of (WLANs)، Standardization and frequency bands، IEEE 802.11 standard، WIFI، WIMAX، Bluetooth.	**9**
Wide Area Network (WAN)	**6**
Wireless WAN	**6**
Internet Working and Internet	**3**
Total	**90**

Text book:
1: "Introduction to Data Comm. And Networking"، ByPehrouzForouzan.

2: "Computer Networks and Internets"،Douglas ByE. Comer (4th edition)

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Class	Fourth			Theory :	2 Hrs/wk
Subject	Industrial Electronic			Tutorial	1 Hrs/wk
Code	EE4301	Unit	4	Practical	Hrs/wk

Article	Hrs
Introduction : Scope of power electronics , power converter specification . **Power Semiconductor Devices :**Thyristor families , V-I characteristics of SCR , Triac , GTO , Diac , Source of thyristor triggering , turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings.	**12**
Power Transistor devices: Basic structure and V-I characteristics of power MOSFET,IGBT,SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings.	**12**
Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger	**18**
ThyristorCommutation Techniques: Natural commutation , Force commutation ,Voltage / Current commutation , DC chopper , Principle of Voltage control , analysis of Morgan chopper circuit , Johns chopper circuit, regenerative chopper circuit .	**15**
Inverters : Single phase series and parallel inverters , classification of CSI and VSI inverters , single phase and three phase inverter circuit , methods of voltage controlled inverter circuits , comparison of thyristor and transistor, based inverters, application to speed control of AC motors , uninterrupted power supply , induction melting , heating furnaces .	**15**
Industrial Applications: DC Motor Control, Induction Motor Control, Pulse width Modulation & Speed Control, Static Relays & Contactors.	**12**
Total	**90**

Text book:
1: Power Electronics by: Muhammad Rashid

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Microprocessor II**			**Tutorial**	**1 Hrs/wk**
Code	**EE4309**	**Unit**	**2**	**Practical**	**Hrs/wk**

Article	Hrs
• **Introduction to Advanced Microprocessors :** Overview of 80186,80286 , 80386 , 80486 Architecture , Descriptor table , Privilege levels , paging . Detail study of Pentium , Pentium MMX architecture , Pentium II , Memory and Microprocessor , The Programming Model , Real mode and protected mode Memory addressing , Data formats .	**12**
• **The 80386 and 80486 Microprocessor :** Architecture – Real mode and Protected mode , 80386 Memory Management , Memory segmentation , Memory paying Mechanism , On chip cache organization .	**12**
Assembly language and Programming concepts : The instruction set , Addressing modes , Data movement instructions , Arithmetic and logic instructions , programming the Microprocessor .	**12**
• **Interfacing and Applications :** Memory interfacing , Basic **I /O** interfacing .	**9**
Total	**45**

Text book:
1: "The 80386-80486 and Pentium processor" By Walter A. Tribel;
2: "The Intel Microprocessors " By Barry B. Bery
3: "The 8051 micro-controller" By I. Scott Mackenzie.

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Class	Fourth			Theory :	2 Hrs/wk
Subject	Microcontroller			Tutorial	1 Hrs/wk
Code	EE4303	Unit	2	Practical	Hrs/wk

Article	Hrs
Microprocessors and Microcontrollers : Comparing Microprocessors and Microcontrollers , The Z80 and MCS 51 , Microcontroller survey .	6
Microprocessor & Micro Controller : Comparing Microprocessors and Microcontrollers, , Micro Controller survey.	9
The MCS-51Architecture : Introduction, MCS-51 family microcontrollers hardware, Input/output pin, ports and circuits, External memory interfacing, counter, timer, serial data input/output, Interrupts.	9
Basic Assembly Language Programming Concept : Addressing mode, External data, move, Code memory read – only data moves, Push and Pop opcodes, Data Exchanges, Logical operations, Arithmetic operations, Branching Instructions, Interrupts and Returns.	12
An MCS-51 Microcontroller Design : Microcontroller Specification, External memory and Memory space Decoding, Expanding I/O , Memory map I/O , Memory address decoding, Testing the Design, Lookup table for the 8051, Serial data Transmission.	9
Total	45

Text book:
1: “The 80386-80486 and Pentium processor” By Walter A. Tribel;
2: “The Intel Microprocessors “ By Barry B. Bery
3: “The 8051 micro-controller” By I. Scott Mackenzie.

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Class	**Fourth**			**Theory :**	**3 Hrs/wk**
Subject	**Microelectronics**			**Tutorial**	**Hrs/wk**
Code	**EE4304**	**Unit**	**6**	**Practical**	**Hrs/wk**

Article	Hrs
Semiconductor Fundamental : Energy band model of solid, intrinsic and extrinsic semiconductor, free carrier density in semiconductor, carrier concentration and Fermi level. Carrier transport and recombination, carrier diffusion, the drift current, Hall effect. MIS, MOS, Schottky barriers, magnetic effect, bipolar junction, p-n junction, FET.	**6**
IC fabrication processes : Crystal growth, diffusion, doping, evaporations, and photo masking, Ion implementation, Thin and thick film fabrication, sputtering, mounting, package, and hybrid integrated circuits**.**	**12**
LSI and VLSI Design and Application : Discrete device design, bipolar transistor fundamental, technology, and miniaturization. Linear I.C's: fabrication, and general consideration. Current sources,. LSI oriented bipolar technology. Logic Families based on bipolar transistor (RTL, DTL, TTL, ECL, TRL, I^2L). TTL gate circuit analysis. Metal-Semiconductor junction, Metal-Oxide Semiconductor junction. FET theory and analysis.	**18**
MOS Transistor Fundamentals and MOS I.C Technology :MOS capacitor, static characteristics of the MOS transistor, MOS device fabrication. MOSFET's. Logic circuits based on MOSFET, PMOS, NMOS, CMOS,DMOS, SOS, VMOS. NMOS inverter and gate circuit analysis. CMOS inverter and gate circuit analysis. Charge-coupled devices and non-volatile memory devices, software applications.	**18**
ASIC Design methodologies and system design consideration	**9**
LCA, Standard cell, Gate array, Structured array]	**9**
Full-Custom and Semi-Custom Design :Design motivations; design either discrete component, full-custom and semi-custom design approaches**.**	**9**
Field programmable gate arrays FPGA and Field programmable analog arrays FPGA	**9**
Total	**90**

Text book:
1: Microelectronic By Millmann
2:Pprinciple of CMOS VLSI Design By Neil Weste and KarmranEshrahian

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Radiation**			**Tutorial**	**1 Hrs/wk**
Code	**EE4305**	**Unit**	**2**	**Practical**	**Hrs/wk**

Article	Hrs
Various applications of Microwaves, Review of Maxwell's Equations	**3**
Review of Electromagnetic Theory: (Plane wave incidence on boundaries, Reflection &transmission)	**3**
Waveguide Theory	**3**
Rectangular Waveguides	**3**
Circular Waveguides	**3**
S-parameters and the scattering Matrix	**3**
Tee junctions & Magic Tee	**3**
Attenuators, Directional couplers	**3**
Propagation into Ferrites, Ferrites Devices	**3**
Active Microwave Device, Two cavity Klystron	**3**
Velocity Modulation, Power and Efficiency	**3**
The Reflex Klystron, Power and frequency characteristics, Magnetron	**3**
Passive Microwave Devices, Detector Diodes, power sensing diode,	**3**
Varactor diodes, PIN diodes, BARITE & IMPATT diodes	**3**
Microwave Transistor circuit	**3**
Total	**90**

Text book:
1: "Microwave Circuits and devices" by Liao
2: Microwave Engineering" by Pozar

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Antenna and Propagation**			**Tutorial**	**1 Hrs/wk**
Code	**EE4308**	**Unit**	**2**	**Practical**	**Hrs/wk**

Article	Hrs
Antenna Theory (Principles of radiation and equivalent circuit)	**3**
Antenna Parameters (Gain, Directivity, Bandwidth, Beam width, and Radiation Pattern)	**3**
Radiation Intensity and Power Density of Antennas	**3**
Monopole antenna	**3**
Dipole antenna	**3**
Array antenna	**3**
Reflector Antenna (Parabolic antenna)	**3**
Microstrip antenna	**3**
Free space propagation	**3**
Friis Transmission Formula	**3**
Ground wave propagation (Direct and Reflected)	**3**
Ionspheric Propagation	**3**
Radar theory (Circuits and equations)	**3**
Satellite communication	**3**
Mobile and 2-Ray model	**3**
Total	**90**

Text book:
1: "Microwave Circuits and devices" by Liao
2: Microwave Engineering" by Pozar

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Class	**Fourth**			**Theory :**	**2 Hrs/wk**
Subject	**Computer Aided design**			**Tutorial**	**1 Hrs/wk**
Code	**EE4306**	**Unit**	**4**	**Practical**	**Hrs/wk**

Article	Hrs
Introduction Linear circuits, A.C circuits, A.C circuits matrix analysis, two port analysis, graph theory. Numerical solution for nonlinear network simple search algorithm convergence properties, secant method.	**12**
Simulation Algorithms , stability and accuracy in Eulers methods , higher-order , Runge-kutto Algorithms.	**15**
State variable analysis Generation of state equation from topological data , finding a tree, solution of state equations.	**18**
Sensitivity analysis Sensitivity measures , sensitivity calculation tolerance analysis.	**9**
Optimization Gradient algorithms , numerical solution of gradient algorithm , stability , search methods.	**12**
C.A.D for integrated circuits Layout algorithm routing algorithm , testability analysis.	**15**
Genetic algorithms Application of GA in electronics.	**9**
Total	**90**

Text book:
1: Computer Assisted Network and System Analysis by: by Mastacusa

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Class	**Fourth**			**Theory :**	**1 Hrs/wk**
Subject	**ENGINEERING PROJECT**			**Tutorial**	**Hrs/wk**
Code	**EE4201**	**Unit**	**4**	**Practical**	**3Hrs/wk**

Article	Hrs
Collaborative team work of the nature in a research environment is expected, including extensive interaction with other students. Each student should submit a written technical report and should attend the final oral examination . The students apply verbal written and oral technical skills to document the design process .	
Total	**120**

Text book:
1:

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Class	Fourth			Theory :	Hrs/wk
Subject	Laboratory			Tutorial	Hrs/wk
Code	EE4307	Unit	4	Practical	6Hrs/wk

Article	Hrs
The principle objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment.	
Total	180

Text book:
1:

Courses specification for the first and second stages according to the Bologna system, and the third and fourth stages according to the annual system

Courses specification for second, third, and fourth class

For the Academic Year 2023 - 2024

University of Ninevah

College of Electronics Engineering

Department of Electronic Engineering