Academic Program Description Form

University Name: Al-Nahrain University

Faculty/Institute: College of Sciences

Scientific Department: Department of Mathematics and Computer Applications

Academic or Professional Program Name: Bachelors

Final Certificate Name: Bachelor in Mathematics and Computer Applications

Academic System: Semester

Description Preparation Date: 2024

File Completion Date: 18 / 11 / 2024

Signature:

Head of Department Name:

Prof. Dr. Fadhel Subhi Fadhel

Date: 18 / 11 / 2024

Signature:

Scientific Associate Name:

Assist. Prof. Dr. Manaf Adnan Saleh

Date: 25 / 11 / 2024

The file is checked by: Orooba Nadhim Harbi

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Lect. Dr. Orooba Nadhim Harbi

Date: 25 / 11 / 2024

Signature:

Approval of the Dean

Prof. Dr. Asmaa Hadi Mohammed

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة النهرين
كلية العلوم
مكتب العميد
Dean's office
Republic of Iraq
Ministry of Higher Education and Scientific Research
Al-Nahrain University / College of Science

First Stage

Course Description Form

Module Information معلومات المادة الدراسية			
Module Title	**Calculus (I)**		**Module Delivery**
Module Type	**Core**		• ☐ Theory • ☒ Lecture • ☒ Lab • ☒ Tutorial • ☐ Practical • ☐ Seminar
Module Code	**MATH1101**		
ECTS Credits	**8**		
SWL (hr/sem)	**200**		
Module Level		**Semester of Delivery**	1
Administering Department	Mathematics and Computer Applications	**College**	College of Sciences
Module Leader	Ibtisam Kamil Hanan	**e-mail**	ibtisam.kamil@nahrainuniv.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	me	**e-mail**	E-mail
Scientific Committee Approval Date	1/9/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	The aim of this course is for student to gain proficiency in computations. In calculus, we use two main tools for analyzing and describing the behavior of functions: limits and derivatives. Students will use these tools to solve application problems in a variety of

	setting ranging from physics and chemistry to business and economics.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. To determine the solution set of inequalities involving absolute value, 2. To determine domain, range and operation of some one variable functions and the graphs. 3. To determine limit and continuity of one variable functions. 4. To determine derivate of one variable functions. 5. To determine the solution of problems involving the derivate of one variable function. 6. To determine inverse function and its derivative. 7. To learn about application of derivatives.
Indicative Contents **المحتويات الإرشادية**	1. Real number, inequalities, absolute value, Cartesian coordinate system, function and its graph, operation on function, trigonometry function. 2. Definition, theorems of limit, trigonometry function limit, limit on infinity, infinite limit, continuity function, 3. Definition and rule of derivate, derivate of trigonometry function, chain rule, higher order derivate, implicit derivate, related rate, basic concept of differential, 4. Maximum and minimum, monotonicity and concavity, graphing one variable function, mean value theorem for derivate. 7. Natural logarithm function, inverse function and its derivate, natural exponential function, general exponential function, general logarithm function, hyperbolic function and its inverse.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	The module will be presented to the students through a specified series of lectures, supported by problem solving practice carried out in interactive tutorials. These tutorials will be supported by practice and directed study outside the classroom. Formative assessment takes place throughout the module during tutorials and feedback is given during these tutorials.

Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	94	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	6
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	106	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	7.0666666667
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	200		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	The Rate of Change of Function: Coordinates, Increments and Distance, Slope of the straight line, Equations of straight lines, Circle, Equation of circle.
Week 2	Inequalities, Intervals, Absolute value, Properties of Absolute values.
Week 3	Functions and graphs: Odd function, Even function, Domain, Range, Composition function, Shift Formula, Axes intercept points, Symmetry, Asymptotes.
Week 4	Limits and continuity **:**Theorems of limits, One sided and two-sided limits.
Week 5	Mid Term Exam + Limit at infinity, Oblique asymptote.
Week 6	Sandwich theorem, Continuous functions.
Week 7	The slope of the curve and derivatives: Formal differentiation, Rules of derivatives (with proofs)
Week 8	Implicit differentiation, Second and higher order derivatives, Chain rule, Extended Chain rule.
Week 9	Parametric equations, Derivatives of the Parametric Equations, L'Hopital's rule (First Form), L'Hopital's rule (Stronger Form).
Week 10	Mid Term Exam + Transcendental Functions: Properties and derivatives (with proofs) for Trigonometric functions.
Week 11	Properties and derivatives (with proofs) for Inverse of trigonometric functions.
Week 12	Properties and derivatives (with proofs) for Logarithmic, exponential functions and The exponent function a^x
Week 13	Properties and derivatives (with proofs) for (Hyperbolic functions and Inverse of Hyperbolic Functions)

Week 14	Applications of Derivatives: Curve sketching, Maxima and minima problems
Week 15	Related rate, Roll's and mean value theorems, Velocity and acceleration.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Introducing Simple Mathematical Expressions
Week 2	Lab 2: Names for Common Constant in MATLAB
Week 3	Lab 3: Using variables in MATLAB
Week 4	Lab 4: Using Built-in Functions in MATLAB
Week 5	Lab 5: Plotting Functions
Week 6	Lab 6: Calculating Limit
Week 7	Lab 7: Computing Derivative
Week 8	Lab 8: L'Hopital's Rule
Week 9	Lab 9: Transcendental Functions ,Convert angle from radians to degree
Week 10	Lab 10: Inverse of trigonometric functions.
Week 11	Lab 11: Exponentials and Logarithms
Week 12	Lab 12: Hyperbolic Functions and their inverse
Week 13	Lab 13: Velocity and acceleration
Week 14	Lab 14: Concavity and Inflection Points
Week 15	Lab 15: Finding Minima and Maxima

اساتذة المختبر

1-ا.م.د. ابتسام كامل حنان 2- م.م. حنين عبد الكريم أمين 3- م.م.رقية سعدي هاشم 4- م.م.فرح لطيف جوي

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by Thomas	Yes
Recommended Texts	Calculus Labs for MATLAB	No
Websites	www.mathhandbook.com	

Grading Scheme **مخطط الدرجات**				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	**امتياز**	90 - 100	Outstanding Performance
	B - Very Good	**جيد جدا**	80 - 89	Above average with some errors

	C - Good	**جيد**	70 - 79	Sound work with notable errors
	D - Satisfactory	**متوسط**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**مقبول**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**راسب (قيد المعالجة)**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(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.

Course Description Form

Module Information معلومات المادة الدراسية			
Module Title	**Calculus (II)**		**Module Delivery**
Module Type	**Core**		• ☐Theory • ☒ Lecture • ☒ Lab • ☒ Tutorial • ☐Practical • ☐ Seminar
Module Code	**MATH1203**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		
Module Level		**Semester of Delivery**	2
Administering Department	Mathematics and Computer Applications	**College**	College of Sciences
Module Leader	Ibtisam Kamil Hanan	**e-mail**	ibtisam.kamil@nahrainuniv.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	me	**e-mail**	E-mail
Scientific Committee Approval Date	01/09/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH1101	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this course is to introduce the concept of integration, study various techniques of integration, test improper integrals for convergence and illustrate some applications of integration. Student will gain proficiency to use integration to solve real world problems such as area and volumes problems.

Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	After completing the course, students have the ability ○ To determine proper integral of one variable functions. ○ To determine integral involving the fundamental theorem of Calculus and method of substitution. ○ To determine the solution of problems involving the integral of one variable function. ○ To compute integral involving transcendental functions. ○ To compute integral with advanced integration techniques. ○ To demonstrate ability to think critically by recognizing patterns and determining and using appropriate techniques for solving a variety of integration problems. ○ To solve indeterminate forms and improper integral problems. ○ To calculate the length of a plane curve and solving area and volume application problems. ○ To sketch the graph of a polar equation and the area problems in the polar coordinate system. ○ To demonstrate an intuitive and computational understanding for integral applications by solving a variety of problems from physics, engineering and mathematics.
Indicative Contents **المحتويات الإرشادية**	1. Proper integral, Fundamental Theorem of Calculus, basic rules of integration. 2. Methods of integrations, method of substitution, partial integration method, trigonometry integral and integral of rational function with partial fraction. 3. Improper integrals, test for convergence and divergence of improper integrals. 4. Application of Definite Integrals, Mean value theorem of integration, Area, solid revolution volume and Arc length. 5. polar coordinates**.**
Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	The module will be presented to the students through a specified series of lectures, supported by problem solving practice carried out in interactive tutorials. These tutorials will be supported by practice and directed study outside the classroom. Formative assessment takes place throughout the module during tutorials and feedback is given during these tutorials.

Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	94	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	6
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	81	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	5.4

Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	175

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Indefinite integrals, Definite integrals, The fundamental theorems of integrals, Basic Integration Formulas.
Week 2	Integration by substitution
Week 3	Integration of certain powers of trigonometric and hyperbolic functions
Week 4	Integrals involving trigonometric substitutions, Integrals involving hyperbolic substation .
Week 5	Mid-Term Exam + Integrals involving quadratic substation
Week 6	Integration by parts
Week 7	Integration of Rational Functions
Week 8	Integration of Irrational Functions, Integration of Rational Functions of Trigonometric
Week 9	Improper integrals: Definition of improper integral and examples
Week 10	Mid-Term Exam + Test for convergence and divergence of improper integrals (P-test, Domination test, Limit comparison test)
Week 11	Application of Definite Integrals: Mean value theorem of integration , Area under the curve
Week 12	Area between two curves, Volume of solid of revolution (Disk (washer) and shell) methods
Week 13	Arc length, Area of surface of revolution

Week 14	Area in polar coordinates
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Integration in MATLAB
Week 2	Lab 2: Definite Integrals
Week 3	Lab 3: Indefinite integrals
Week 4	Lab 4: Sine and Cosine Integral functions
Week 5	Lab 5: Hyperbolic Sine and Cosine Integral functions
Week 6	Lab 6: Integration by parts in MATLAB
Week 7	Lab 7: Integrating inverse trigonometric Functions
Week 8	Lab 8: Partial Fraction Expansion in MATLAB
Week 9	Lab 9: Solving an improper Integral
Week 10	Lab 10: Area in MATLB
Week 11	Lab 11: Area between two curves in MATLAB
Week 12	Lab 12: Compute Volumes of Revolution
Week 13	Lab 13: Arc length
Week 14	Lab 14: Using Polar Coordinates in MATLAB

اساتذة المختبر

م.د. ابتسام كامل حنان 2- م. رنين زيد حمود 3- م.م. حنين عبد الكريم أمين 4- م.م. عباس 1-ابراهيم خليف

5 - م.م. شيماء عبد الستار 6 - م. م. فرح لطيف

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by Thomas	Yes
Recommended Texts	Calculus Labs for MATLAB	No
Websites	www.mathhandbook.com	

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

Fail Group (0 – 49)	**FX –** Fail	**راسب (قيد المعالجة)**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(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.

Course Description Form

Module Information
معلومات المادة الدراسية

Module Title	Introduction to Computer Science	**Module Delivery**	
Module Type	Basic	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UREQ1102		
ECTS Credits	3		
SWL (hr/sem)	75		

Module Level	1	**Semester of Delivery**	1
Administering Department	Mathematics and Computer Applications Science	**College**	College of Sciences
Module Leader	Mohammed Q. Ali	**e-mail**	mohammed.q.ali@nahrainuniv.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**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	26/11/2023	**Version Number**	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. The History of the Personal Computer 2. Understanding Digital Components 3. Processing, Storage, and Connectivity 4. Understanding Number systems and Arithmetic operations 5. Understanding how text coding 6. The Application Software 7. What is Networks Function

	8. The Internet and its threats
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. You will be able to describe the history of personal computer hardware and software development. 2. You will be able to describe the devices that make up a computer system. 3. You will be able to describe how computers process and store data and how devices connect to a computer system 4. Describe the different types of application software 5. You will be able to calculate numbers in binary system 6. You will be able to explain the types and functions of operating systems 7. You will be able to explain the basics of networking, including the components needed to create a network, and describe the different ways a network can connect to the Internet. 8. You will be able to describe hackers, viruses, and other online annoyances and the threats they pose to your digital security
Indicative Contents المحتويات الإرشادية	Understanding Digital Components, Understanding Your Computer, Input Devices, Output Devices. Processing, Storage, and Connectivity, Processing and Memory on the Motherboard, Storing Data and Information, Connecting Peripherals to the Computer, Power Management and Ergonomics. Accessing, Using, and Managing Software, Software Basics, Managing Your Software, Application Software, Productivity and Business Software, Multimedia and Educational Software. Understanding System Software, Operating System Fundamentals, What the Operating System Does, Starting Your Computer. Understanding Networks and Internet Threats to Your Digital Assets, Identity Theft and Hackers, Computer Viruses

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is by explaining lectures in an interactive way by letting the students to participate in the presenting through questions and answers while at the same time refining and expanding their critical thinking skills. This will be achieved through classes and labs.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	10% (10)	2,5,8,12,14	All
	Assignments	2	10% (10)	9,10	All
	Report	1	10% (10)	Continuous	
	Lab	2	10%(10)	8,15	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7,14	All
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introducing computer system
Week 2	Evolutions of Computer (computer generations)
Week 3	Basic Computer System Organization
Week 4	Essential Computer Hardware (Processer and Memory)
Week 5	Essential Computer Hardware (Secondary storage)
Week 6	Essential Computer Hardware (I/O Units)
Week 7	Mid-term Exam 1
Week 8	Computer Number Systems
Week 9	Computer Arithmetic (Operations in Binary)
Week 10	Computer Text Codes
Week 11	Computer Software
Week 12	Computer Networks
Week 13	The Internet and Threats to Your Digital Assets
Week 14	Mid-term Exam 2
Week 15	**Preparatory Week**

Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Computer Hardware and Assembly
Week 2	Lab 2: Understanding Operating Systems
Week 3	Lab 3: Working with Windows (Windows Features)
Week 4	Lab 4: Working with Windows (Decorating Widows)
Week 5	Lab 5: Working with Windows (Basic windows)
Week 6	Lab 6: Working with Windows (Folders and Files)
Week 7	Lab 7: Working with Windows (Window Settings)
Week 8	Practical Exam 1
Week 9	Lab 8: Starting Microsoft Word (Application Environment)
Week 10	Lab 9: Starting Microsoft Word (Entering Your Text, fonts styles ….)
Week 11	Lab 10: Starting Microsoft Word (Documents features)
Week 12	Lab 11: Starting Microsoft Word (Create a table)
Week 13	Lab 12: Starting Microsoft Word (Insert an equation)
Week 14	Lab 13: Starting Microsoft Word (Document decorate as output)
Week 15	Practical Exam 2
Teaching Staff	م.م. محمد قاسم علي / م.م. فرح لطيف / م.م. رقيه سعدي/ م.م. نبأ حسين فخري

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Peter Norton's Introduction to Computer (6th. Ed.) by Peter Norton, 2004	Yes

Recommended Texts	Fundamentals Of Computers (1st Edition) by E. Balagurusamy 2009	No
Websites	Office 2013 training - Microsoft Support Windows help & learning (microsoft.com)	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Course Description Form

Module Information معلومات المادة الدراسية					
Module Title	ELECTRICITY AND MAGNETISM I			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CREQ1212				
ECTS Credits	5				
SWL (hr./Sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Mathematics and Computer Applications		**College**	**College of Science**	
Module Leader	Dr. Ammar A. Alrawi		**e-mail**	ammar.alrawi@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ammar A. Alrawi		**e-mail**	ammar.alrawi@nahrainuniv.edu.iq	
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	8/11/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand electric charge and electric field. 2. Knowing the materials. 3. Identify the electric field of charges and electric field lines. 4. Identifying the forces, moments and electric potential energy. 5. Learn about the electrostatic field.

	6. Identification of a point charge inside a spherical surface. 7. Identify the resistance and capacitance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Make the student able to: 1. Understand electric charge and electric field. 2. Knowing the composition of the material. 3. Know the types of matter. 4. Know the types of electric charge. 5. Learn about Coulomb's law. 6. Identify the electric field of charges and electric field lines. 7. Learn about the electrostatic field. 8. Learn about Ohm's Law. 9. Identify the resistance and capacitance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. electric charge and electric field, electric charge and structure of matter, capacitance, use of capacitance, calculating the capacitance, current and resistance, moving charges and electric current, electric current, current density, resistance and resistivity, ohm's law: a microscopic view, energy and power in an electric circuit, the magnetic field, the magnetic field, the definition of b, discovering the electric

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students and by oral, written exams and homework's.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/Sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/Sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/Sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		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	All
	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)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Electric charge: Electromagnetism, Electric Charge, Conductors and Insulators and Semiconductors, Coulomb's Law, Charge is Quantized, Charge is Conserved.
Week 2	Electric charge: Problem solving
Week 3	The Electric Field: Charge and Force, Lines of Force A Point Charge, Calculating the Field: An Electric Dipole
Week 4	The Electric Field: Problem solving
Week 5	Capacitance: The Use of Capacitance, Calculating the Capacitance, Capacitors in Series and in Parallel, Strong Energy in an Electric Field
Week 6	Capacitance: Problem solving
Week 7	Mid exam
Week 8	Current and Resistance: Moving Charges and Electric Current, Electric Current, Current Density
Week 9	Current and Resistance: Resistance and Resistivity, Ohm's Law: A Microscopic View, Resistor in Series and in Parallel, Strong Energy in an Electric Field, Energy and Power in an Electric Circuits
Week 10	Current and Resistance: Problem solving
Week 11	The Magnetic Field: The Magnetic Field, The Definition of Discovering the Electric
Week 12	Ampere's Law: Current and Magnetic Field, Calculating the Magnetic Field
Week 13	Faraday's Law of Induction: Two symmetries, Two Experiments, Faraday's Law of Induction, Lenz's Law
Week 14	Mid exam
Week 15	**Preparatory Week**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Ohms law
Week 2	Lab 2: Ohmic and Non Ohmic materials
Week 3	Lab 3: Series and parallel of capacitor and energy
Week 4	Lab 4: Electrical resonance phenomenon
Week 5	Lab 5: Voltage difference for the resistance and capacitance

Week 6	Lab 6: Voltage and resistance for the battery
Week 7	Lab 7: parallel and series for resistance and equivalent resistance

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Edward Purcell, Electricity and magnetism,3rd edition	No (Available as an e-book)
Recommended Texts	University physics with modern physics, 13th edition	
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound works with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Course Description Form

Module Information الدراسية المادة معلومات					
Module Title	English Language			**Module Delivery**	
Module Type	S			**Theory** **Lecture** • **Lab** • **Tutorial** • **Practical** • **Seminar**	
Module Code	URENG – UREQ1101				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	UGI	**Semester of Delivery**	One		
Administering Department	Mathematics and Computer Applications	**College**	Science		
Module Leader	Shayma Abdul-Sattar	**e-mail**	Shayma.abdulsatter@nahrainuniv.edu.iq		
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSc Mathematics		
Module Tutor	-	**e-mail**	-		
Peer Reviewer Name	Manaf Adnan	**e-mail**	Manaf.adnan@nahrainuniv.edu.iq		
Review Committee Approval		**Version Number**			

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents **الإرشادية والمحتويات التعلم ونتائج الدراسية المادة أهداف**			
Module Aims **اهداف المادة الدراسية**	The main objective of this course is to strengthen the English language for the first year's students by focusing on: • Encouraging students to use the English language in conversations in the classroom and focusing on the importance of their knowledge of vocabulary and enhancing their ability to understand and listen to curriculum-based conversations concerning meeting new friends, self-description, life styles, families, personality, habits, and preferences; and the related every day's English phrases and vocabulary including numbers, the alphabet, days of the week, and some social expressions. • Reinforcing the related English grammar like auxiliary verbs, question types including short answers, possessive		

	adjectives, present simple tense, the adverb frequency, and pronouns. • Enhancing their reading and writing skills that help them communicate with new friends, making a questionnaire, or writing a holiday's postcard.
Module Learning Outcomes **الدراسية للمادة التعلم مخرجات**	A- Cognitive goals. A1- To encourage students to speak English. A 2- Enrich them with an adequate amount of vocabulary. A3- Understand syntax using grammar. A4- Know the difference between the tenses of the English language. B. The skills goals special to the course. B1 - Learn how to break up sentences and analyze them grammatically. B2 - improve listening, speaking and writing abilities.
Indicative Contents **المحتويات الإرشادية**	Students should be able to understand the basic concepts of English Language that deals with the subjects of Mathematics.
Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	• The New Headway Beginner student's book is mainly taught which is enriched with a digital revising material provided by the Oxford university press, in addition to English for the Students of Mathematics book that focuses on Mathematics' history and its subjects' classification and mathematics phrases that help them in their first year of study at the Mathematics Dept. • Discussions and questions will be performed to help students break the barrier of speaking the English language by using the suitable vocabulary and grammar. Besides listening to the conversations • Writing on a white board with a marker in the classroom for demonstration and an audio device might be used to help the students listening to the taught conversations and hear the words and their pronunciation loudly to be able to repeat them properly.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الفصل خلال للطالب المنتظم الدراسي الحمل	33	**Structured SWL (h/w)** أسبوعيا للطالب المنتظم الدراسي الحمل	2.2
Unstructured SWL (h/sem) الفصل خلال للطالب المنتظم غير الدراسي الحمل	17	**Unstructured SWL (h/w)** أسبوعيا للطالب المنتظم غير الدراسي الحمل	1.13
Total SWL (h/sem) الفصل خلال للطالب الكلي الدراسي الحمل	50		

Module Evaluation الدراسية المادة تقييم					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	5, 10	LO #1, 2, and 3
	Assignments	2	10% (10)	2, 12	LO # 1, 2, 3, 6, and 7
	Seminars / Lab.	1	10% (10)	14	LO # 6, 7, and 8
	Report	1	10% (10)	13	LO # 4, 5 and 8
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) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	This is … How are you? Good morning
Week 2	What's this in English? Numbers 1-10 Plurals
Week 3	Countries He/she/they, his/her Where's he from?
Week 4	Fantastic/awful/beautiful Numbers11-30Jobs
Week 5	Am/are/is Negatives and questions Personal information Social expressions (1)
Week 6	First Mid written exam+ listening test + an Oral test (and /or) Groups competition
Week 7	Our/their Possessive 's
Week 8	The family Has/have The alphabet
Week 9	Sports/Food/Drinks Present simple – I/you/we/they
Week 10	a/an Languages and nationalities Numbers and prices
Week 11	The time Present simple – he/she Always/sometimes/never
Week 12	Words that go together Days of the week
Week 13	Question words Me/him/us/them This/that Adjectives Can I …?
Week 14	Second mid exam of the first semester
Week 15	**Preparatory Week (Study Material review for the final exam)**

Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	New Headway Beginner Plus Student's Book + the workbook	No
Recommended Texts	English for the Students of Mathematics book (Extra material for the Department's purposes)	No
Websites	www.oup.com/elt	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	**امتياز**	90 - 100	Outstanding Performance
	B - Very Good	**جيد جدا**	80 - 89	Above average with some errors
	C - Good	**جيد**	70 - 79	Sound work with notable errors
	D - Satisfactory	**متوسط**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**مقبول**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	**بقرار مقبول**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(0-44)	Considerable amount of work required
Note:				

NB 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.

Course Description Form

Module Information معلومات المادة الدراسية			
Module Title	**Finite Mathematics**		**Module Delivery**
Module Type	Core		• ☐ **Theory** • ☒ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	**MATH1205**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level		**Semester of Delivery**	1
Administering Department	MATH	**College**	Type College Code
Module Leader	Dr.Fatimah Al-Taie	**e-mail**	fatimah.altaie@nahrainuniv.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	me	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **اهداف المادة الدراسية**	The aim of this course is for the students to be primarily concerned with applying mathematics problem-solving and reasoning to real-world phenomena, making finite mathematics a critical area of knowledge for students pursuing careers in business, social sciences, computer science, and other practical career disciplines.

Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	Learning the basic concepts of mathematics, such as: o To be able to deal with Sigma Notation, and mathematical induction. o To be familiar with complex numbers and their properties. o To deal with matrices: definition and some applications, and solution of mathematical equations with first, and higher degrees. o To learn about polynomials and their properties with applications and definitions. o To have experience in applications of Linear functions.
Indicative Contents **المحتويات الإرشادية**	1. Mathematical induction: summation, induction. 2. Complex numbers: definitions, solutions, polar coordinates, Demoiver's Theorem, square roots of complex numbers. 3. Matrices: definitions, type of matrices, operations on matrices, determinants, the inverse of matrices, linear systems, solving linear systems. 4. Polynomials: definitions, properties, number of the roots, Cardan method, solution of nonlinear systems. 5. Applications: linear functions, definitions, slope, two methods of the graph of linear equations.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	The subject will be given to the students on a whiteboard through a series of lectures with problem-solving practice carried out in interactive tutorials. These tutorials will be supported by practice and directed study outside the classroom. Formative assessment takes place during tutorials and feedback is given during these tutorials.

Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	63	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	4.2
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	37	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	2.46
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	100		

Module Evaluation **تقييم المادة الدراسية**					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	2, 6	LO #1, 3
	Assignments	2	10% (10)	3, 8	LO # 2 and 3

	Projects / Lab.	-	10% (10)	continuous	
	Report	1	10% (10)	14	LO # 4, 5
Summative assessment	**Midterm Exam**	2	10% (10)	4,12	LO # 1,2 and 2-4
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Sigma Notation: Summation, changing index summation, properties of Sigma notation, summation formulas
Week 2	Mathematical Induction, principles, definition, method of solution
Week 3	Complex Numbers: Definitions, Properties, Some areas of applications, Operations on complex numbers
Week 4	Mid-Term Exam + Complex conjugates, laws of Algebra, solving for parameters
Week 5	Polar representation for complex numbers, Demoiver's Theorem
Week 6	Matrices: definitions, types, properties, operations of matrices
Week 7	Determinants, different methods of computing determinants, properties, solving linear systems using determinants
Week 8	The inverse of matrices, definition, two methods of computing matrix inversion
Week 9	solving linear systems using the inverse of matrices, solving equations formulas
Week 10	Polynomials: definitions, properties, operations
Week 11	A quick method for computing the quotient of two polynomials, roots of a polynomial equation
Week 12	Mid-Term Exam + upper and lower bounds of the real roots of the polynomial equation,
Week 13	Relation between roots and coefficients of (2 by 2) polynomials, (3 by 3) polynomials, (4 by 4) polynomials, and (n by n) polynomials
Week 14	Applications of Linear functions: the slope, increasing and decreasing of functions
Week 15	Calculating the rate of change, two methods of graphing linear functions
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Applied method, د. رياض شاكر نعوم , د. سليم الكتبي,د. كاظم محمد الصومعي Introduction to finite mathematics, د. مصطفى احمد , د. جلال نعوم , د.محمد سردار	Yes
Recommended Texts	Mathematics with application brief version	No
Websites	https://www.khanacademy.org/math , www.mathhandbook.com , www.google.com ,	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A –** Excellent	**امتياز**	90 - 100	Outstanding Performance
	B - Very Good	**جيد جدا**	80 - 89	Above average with some errors
	C – Good	**جيد**	70 - 79	Sound work with notable errors
	D – Satisfactory	**متوسط**	60 - 69	Fair but with major shortcomings
	E – Sufficient	**مقبول**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**راسب (قيد المعالجة)**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(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.

Course Description Form

Module Information معلومات المادة الدراسية					
Module Title	Foundation of Mathematics (I)			**Module Delivery**	
Module Type	Core			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MATH1102				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		1	**Semester of Delivery**		1
Administering Department		MATH	**College**	Science	
Module Leader	Ayat Abdulaali Neamah		**e-mail**	ayatneamah@nahrainuniv.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		01/06/2023	**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the concepts of sets, logic and functions and enable the student to study the theorems that are related to them. 2. To understand the need for proofs and develop the skills to enable the student to construct for themselves formal proofs. 3. To develop the manipulative skills and mathematical intuition necessary for the study of mathematics at university.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and use logical notation and arguments. 2. Construct simple mathematical proofs. 3. To express correctly statements and proofs of simple mathematical theorems. 4. To explain the properties of sets and their operations. 5. Understand theorems related with algebra of sets and their proofs. 6. Recognize the domain and the range of a function, draw the graph of a function 7. Recognize the inverse of a function and the inverse image of a function. 8. Understand the cardinal number and its applications. 9. Recognize the countable sets.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Chapter One – Mathematical Logic</u> Mathematical statements, Compound statements, Negation, Connective, Conjunction, Disjunction, Conditional and biconditional statements, Logical equivalence, Tautology, Contradiction, Algebra of statements, Idempotent laws, Associatively, De Morgan's laws, Arguments, Valid arguments, Invalid arguments. <u>Chapter Two – Set Theory</u> Set, Subset, Belongs, Equal sets, Union, Intersection, Complement, Disjoint, Partition, Empty set, Universal set, Power set, Algebra of sets, Idempotent law, Commutative law, Distributive law, De Morgan's law, Cartesian product of sets. <u>Chapter Three– Mappings</u> Basic concepts and definition, Domain, Codomain, Range, Graph of mapping, 1-1 mappings, Onto mappings, Bijective mapping, Equality of mappings, types of mapping, Identity mapping, Constant mapping, Restriction of mapping, Extension of mapping, Absolute value function, Composition mapping and inverse mapping, Direct images and inverse images under mapping. [21 hrs] <u>Chapter Four– Cardinality, Cardinal Numbers, Arithmetic on Cardinal Numbers</u> Finite and infinite sets, Countable and uncountable sets.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be used in this module is to encourage the students to participation in the module activities. This strategy will be by giving the students quizzes, assignments, projects and midterm exams throughout the semester.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.4666667
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3, 9	LO #1, 2, 4 and 5
	Assignments	2	10% (10)	5,11	LO # 1,2, 3, 6 and 7
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	14	LO # 4, 5 and 8
Summative assessment	**Midterm Exam**	2	10% (10)	6,12	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Mathematical statements, Compound statements, Negation, Connective,
Week 2	Conjunction, Disjunction, Conditional and biconditional statements,
Week 3	Logical equivalence, Tautology, Contradiction

Week 4	Algebra of statements, Idempotent laws, Associatively, De Morgan's laws
Week 5	Arguments, Valid arguments, Invalid arguments
Week 6	Mid-term Exam+ Set, Subset, Belongs, Equal sets, Union, Intersection, Complement
Week 7	Disjoint, Partition, Empty set, Universal set, Power set, Algebra of sets
Week 8	Idempotent law, Commutative law, Distributive law, De Morgan's law
Week 9	Cartesian product of sets, Basic concepts and definition, Domain, Codomain, Range
Week 10	Graph of mapping, 1-1 mappings, Onto mappings, Bijective mapping, Equality of mappings
Week 11	types of mapping, Identity mapping, Constant mapping, Restriction of mapping, Extension of mapping, Absolute value function
Week 12	Mid-term Exam + Composition mapping and inverse mapping
Week 13	Direct images and inverse images under mapping, cardinal number of a set
Week 14	Finite and infinite sets
Week 15	Countable and uncountable sets
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	أسس الرياضيات, هادي جابر مصطفى واخرون, الجزء الاول ١٩٨٣, جامعة البصرة-العراق.	Yes
Recommended Texts	Schaum's Outline of Set Theory and Related Topics	No
Websites	https://www.britannica.com/science/foundations-of-mathematics	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
	A - Excellent	امتياز	90 - 100	Outstanding Performance

Success Group (50 - 100)	**B -** Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Course Description Form

Module Information معلومات المادة الدراسية					
Module Title	Foundation of Mathematics (II)			**Module Delivery**	
Module Type	Core			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MATH1204				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		1	**Semester of Delivery**		2
Administering Department		MATH	**College**	Science	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- To become familiar with different types of relations between two sets. 2- To understand the complete and well ordered sets. 3- Perform appropriate proofs of properties within a given number system.
Module Learning Outcomes	1- Understand and use relations on a set and arguments. 2- Construct the equivalence relations and find the equivalence

مخرجات التعلم للمادة الدراسية	classes. 3- Understand Partial order and total order relations. 4- Recognize the bounded sets and complete sets. 5- Understand the construction of the natural numbers and understand their properties 6- Understand the construction of the integer numbers, rational numbers and their properties 7- Use the mathematical induction in proofs within a given number system. 8- Understand the construction of the complex numbers and perform appropriate calculations within this number system. 9- Understand the binary operation and groups.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter One –Relations Type of relations, Reflexive, Symmetric, Transitive, Anti-symmetric, Equivalence relations, Equivalent classes, Properties of equivalent classes, Partition. Chapter Two –Ordering Partial order and total order, Least and greatest elements , Bounded sets, Upper bound, Lower bound, Least upper bound, Greatest lower bound, Complete sets, Well-ordered set . Chapter Three –The set of Natural Numbers $\mathbb{N}$ Peano's Axioms, Arithmetic of the natural number, Addition, Subtraction, Multiplication, Properties, Associative law of addition and multiplication, Distribution law, Cancelation law of addition and multiplication, Ordering on $\mathbb{N}$, Well ordering of $\mathbb{N}$. Chapter Three –The set of Integer Numbers $\mathbb{Z}$ Construction of the set of integers, The addition and multiplication on integers, Properties, Associative law of addition and multiplication, Commutative law of addition and multiplication, Distribution law, Cancelation law of addition and multiplication, Ordering on $\mathbb{Z}$. Chapter Four –The set of Integer Numbers $\mathbb{Q}$ Construction of the rational numbers, The addition and multiplication on rational and its properties, Ordering on $\mathbb{Q}$, Density of $\mathbb{Q}$. Chapter Five–The set of Real Numbers $\mathbb{R}$ Completeness property of real numbers, Additional Properties of the Integer Numbers, Divisibility and primes, Greatest common divisor and least common multiple, The fundamental theorem of arithmetic.

	Chapter Six– The Set of Complex Numbers $\mathbb{C}$ Addition and multiplication on complex numbers. Chapter Seven– Basic Concepts in Group Theory Binary Operation, Basic definitions, Groups, Commutative group, Subgroup, Order of group.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be used in this module is to encourage the students to participation in the module activities. This strategy will be by giving the students quizzes, assignments, projects and midterm exams throughout the semester.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	122	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	8.1333333
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Type of relations, Reflexive, Symmetric
Week 2	Transitive, Anti-symmetric,

Week 3	Equivalence relations, Equivalent classes
Week 4	Properties of equivalent classes, Partition
Week 5	Partial order and total order, Least and greatest elements
Week 6	Mid-term Exam+ Bounded sets, Upper bound, Lower bound
Week 7	Least upper bound, Greatest lower bound
Week 8	Complete sets, Well-ordered set
Week 9	The set of Natural Numbers $\mathbb{N}$
Week 10	The set of Natural Integer $\mathbb{Z}$
Week 11	Mid-term Exam+ The set of Rational Numbers $\mathbb{Q}$
Week 12	The set of Real Numbers $\mathbb{R}$
Week 13	The Set of Complex Numbers$\mathbb{C}$
Week 14	Binary Operation, Basic definitions, Groups
Week 15	Commutative group, Subgroup, Order of group
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	أسس الرياضيات, هادي جابر مصطفى واخرون, الجزء الثاني ١٩٨٣, جامعة البصرة-العراق.	Yes
Recommended Texts	Schaum's Outline of Set Theory and Related Topics	No
Websites	https://www.britannica.com/science/foundations-of-mathematics	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Course Description Form

Module Information معلومات المادة الدراسية			
Module Title	**General Chemistry**		**Module Delivery**
Module Type	**S**		4- ☒ **Theory** • ☒ **Lecture** • ☒ **Lab** • ☐ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	CRGENCHE		
ECTS Credits			
SWL (hr/sem)			
Module Level		**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Ahmed Al-Ani	**e-mail**	ahmed.sabeeh@nahrainuniv.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	Ahmed Al-Ani	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	The primary objective of this course is to acquire basic concepts, principles, and techniques of modern chemistry that would empower students with an analytical mind set and the abilities to solve diverse analytical problems in an efficient and quantitative way that conveys the importance of accuracy and precision of the analytical results. On successful completion of this course, students will be able: 1. To develop an understanding of the range and uses of analytical methods in chemistry. 2. To establish an appreciation of the role of chemistry in quantitative analysis 3. To develop an understanding of the broad role of the chemist in measurement and problem solving for analytical tasks. 4. To provide an understanding of chemical methods employed for elemental and compound analysis. 5. To provide experience in some scientific methods employed in analytical chemistry.

	6. To develop some understanding of the professional and safety responsibilities residing in working on chemical analysis.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	After attending this course in general Chemistry, the students have to be able to develop a basic knowledge of main principles of chemical methods as follows • To understand qualitative and quantitative properties of solutions, understanding all kinds of analytical concentrations. • To describe and explain chemical equilibriums of acid base reactions • Understanding the periodic table and atomic structure • Understanding ionic compounds, types of bonds and Metal and nonmetal • Understanding the acid/base reactions and titration methods • Effectively teach practical science through the context of general chemistry • Design problem solving activities to challenge student understanding of analytical method • Understanding the safe handling of chemicals and the principles apparatus and unit operation in general chemistry
Indicative Contents **المحتويات الإرشادية**	Indicative content includes the following. 1. Areas of general chemistry 2. The current role of general chemistry 3. Improve the student's mind by how he or she can deal with chemicals and its uses Teach students about hazardous chemicals and how can avoid any risk in the lab

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises presented during the class, home works and quizzes. Furthermore, encourage the student participation in panel discussion.

Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	102	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	7
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	98	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	6.5
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	200		

Module Evaluation **تقييم المادة الدراسية**					
		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

Summative assessment	**Midterm Exam**	2 hr	30% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	Matter, measurements and significant figures
Week 3-5	Atomic weight, molecular weight and moles calculations
Week 6-8	Chemical reactions in solutions and concentrations
Week 9-11	Periodic table and atomic structure
Week 12-14	Ionic compounds and types of bonds
Week 15	Acid base reactions and titrations
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Safety rules and Laboratory equipments
Week 2	Lab 2: PH and indicators
Week 3	Lab 3: Acid base titration
Week 4	Lab 4: Preparation of sodium hydroxide
Week 5	Lab 5: Effect of concentration on reaction rate
Week 6	Lab 6: Preparation and reaction of barium peroxide
Week 7	Lab 7: Calculation the percentage of water in hydrated salt

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Fundamental of analytical chemistry: Nine edition, Skoog	Yes
Recommended Texts	Fundamentals of chemistry: Fourth Edition, David E. Goldberg	Yes
Recommended Texts	Basic Inorganic Chemistry F. Albert Cotton, Geoffrey Wilkinson, Paul L. Gaus, , 3rd Edition, 1995	Yes
Websites	Different wabsites	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A –** Excellent	**امتياز**	90 - 100	Outstanding Performance
	B - Very Good	**جيد جدا**	80 - 89	Above average with some errors
	C – Good	**جيد**	70 - 79	Sound work with notable errors
	D – Satisfactory	**متوسط**	60 - 69	Fair but with major shortcomings
	E – Sufficient	**مقبول**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**راسب (قيد المعالجة)**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(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.

Course Description Form

Module Information معلومات المادة الدراسية					
Module Title	Mechanics			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CREQ1111				
ECTS Credits	5				
SWL (hr./Sem)	125				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Mathematics and Computer Applications		**College**	**College of Science**	
Module Leader	Dr. Ammar A. Alrawi		**e-mail**	ammar.alrawi@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ammar A. Alrawi		**e-mail**	ammar.alrawi@nahrainuniv.edu.iq	
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	8/11/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Introduce students to basic concepts related to static and mobile systems. 2- Introducing the student to the methods of classifying mechanical systems, the laws related to them, and the life applications that simulate their theories. 3- Introducing the student to the methods of mathematical solutions to problems related to kinetic systems
Module Learning Outcomes	1- Providing the student with sufficient experience to deal with kinetic systems according to the mathematical theories and laws compatible with them.

مخرجات التعلم للمادة الدراسية	2- Enhancing the student's mental ability to analyze kinetic systems according to those theories to find the required solutions to the problems that the student may face during study and after graduation.
Indicative Contents المحتويات الإرشادية	The instructional content includes the following: In our practical life we need to indicate the location of an object, whether it is stationary, non-stationary, or moving, and to determine the location of that object we use so-called "coordinates." There are several types of coordinates we can apply, such as rectangular coordinates and polar coordinates. And studying the usefulness of applying vectors in our lives [6 hours] Mechanics is one of the branches of physics that studies motion, and includes two main sections: kinematics, a science that describes the motion of objects without paying attention to the causes of motion. (Dynamics) is a science concerned with the causes of movement such as force and energy. We will first learn about the concepts of position, displacement, velocity and acceleration of objects to move in one dimension and in two dimensions with some nomenclature [10 hours] Physicist Isaac Newton based his theory of motion through three laws known as Newton's laws of motion, where he described the forces acting on the motion of bodies by these laws and the difference between mass and weight. [6 hours] While solving an exercise in kinesiology it is important to correctly analyze the forces acting on the body or system, and therefore the body. The forces acting on it will be illustrated, and this method is called a free body diagram. [4 hours] The concept of equilibrium, tensile equilibrium, rotational equilibrium, torque, vector torque, couple, center of mass, center of gravity. [10 hours] Work, Energy, Energy, Momentum, Energy Type [6 hours] Explain periodic motion, rotational motion, simple harmonic motion, relationship between uniform circular motion and simple harmonic motion, simple pendulum, simple harmonic motion, wave motion [10 hours]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Enabling students to solve problems related to the theoretical framework of the lecture material. 2. Enabling students to thinking about life problems related to the subject of the lecture. 3. Linking the lecture curriculum with practical applications, especially with our daily life.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/Sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/Sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/Sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		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	All
	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)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to vectors:** Scalar Quantity, Vector quantity, resultant, graphical addition of vectors, Parallelogram method, subtraction of vectors, trigonometric functions, components of a vector, unit vectors
Week 2	**Introduction to vectors:** Problem solving
Week 3	**Equilibrium under the action of concurrent forces:** Concurrent forces, an object in equilibrium, first condition in equilibrium, Problem solution method.
Week 4	**Equilibrium under the action of concurrent forces:** Problem solving
Week 5	**Equilibrium under the action of coplanar forces:** Torque or momentum, two conditions for equilibrium, center of gravity
Week 6	**Equilibrium under the action of coplanar forces:** Problem solving
Week 7	**Mid-term exam**
Week 8	**Uniformly accelerated motion:** Speed, velocity and acceleration. Uniformly accelerated motion on straight line, projectiles.
Week 9	**Uniformly accelerated motion:** Problem solving

Week 10	**Newton's Laws:** Mass, Force, External force. Newton first law, Newton second law, Newton third law. Law of universal gravitation. Weight. Types of forces.
Week 11	**Newton's Laws:** Problem solving
Week 12	**Work, Energy and Power:** Work, kinetic energy, gravitational potential energy, conservation of energy, Power, Kilowatt-hour
Week 13	**Work, Energy and Power:** Problem Solving
Week 14	**Impulse and Momentum:** Linear momentum, impulse causes change in momentum, conservation of linear momentum, collisions and explosions. Elastic collision, coefficient of restitution.
Week 15	**A week of preparation before the final exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Instructions to students, Basic personal needs and other requirements. Writing experiment calculations, Introduction to graphical representation of experimental data, Errors, their determination and minimization, least square fitting and units.
Week 2	Forces and Equilibrium
Week 3	Spiral Spring and Hooks Law
Week 4	Simple Pendulum and determination of gravitational acceleration (g).
Week 5	Surface tension measurement
Week 6	calculate the refractive index of light using a moving microscope

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	University Physics, By Zemansky and Young	No (Available as an e-book)
Recommended Texts	Fundamental of Physics by Halliday, Resnick and Walker	No (Available as an e-book)
Websites		

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 – 100	Outstanding Performance

	B - Very Good	جيد جدا	80 – 89	Above average with some errors
	C - Good	جيد	70 – 79	Sound works with notable errors
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Second Stage

Course Description Form

Module Information معلومات المادة الدراسية					
Module Title	**ADVANCED CALCULUS I**			**Module Delivery**	
Module Type	Core			☒**Theory** ☒**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MATH 211**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level			**Semester of Delivery**	1	
Administering Department	Department of Mathematics and Computer Applications		**College**	College of Science	
Module Leader	Nabaa Hussain Fakhry		**e-mail**	Nabaa.hussein@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Assistant Teacher		**Module Leader's Qualification**	Ph	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Me		**e-mail**	E-mail	
Review Committee Approval			**Version Number**		

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1. To introduce the students to the sequences and infinite series and studying the sequences, infinite series and the test for convergence of series, absolute convergence and conditional convergence.		

	2. Study and solutions of power series with its convergence, Taylor's series, Maclurian series expansion of different functions and applications. 3. Studying dimensional coordinate systems, distance in space, Vectors and unit vectors. 4. Studying vector and distance in space: scalar (Dot), product (Cross). Lines and plane in space. 5. Studying quadratic surfaces: paraboloid, ellipsoid and hyperboloid.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. That students gain proficiency in computations, in advance calculus. 2. That students to be able knowledge and understanding oh how laws are linked. 3. That Students enhance their logical thinking and problem structuring abilities. 4. That students can obtain knowledge and understanding the advanced differentiation and integrations. 5. The Support students in identify the most important applications in mathematics.
Indicative Contents المحتويات الإرشادية	1. The student will be able to use new advanced methods and theorems in advance calculus. 2. studying types of series, including tests, as well as binomial series and Taylor applications. 3. The various vectors and the unit vector will be discussed in detail and studied extensively.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module will be presented to the students through a specified series of lectures, supported by problem solving practice carried out in interactives tutorials. These tutorials will be supported by practice and directed study outside the classroom. Completing homework is part of the learning experience. Students should review topics from prior courses as needed.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

		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**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Sequences of numbers, limit of sequences, bounded monotonic sequence.
Week 2	Infinite series: definition of infinite series and examples, the n^{th} term test for divergence, geometric series.
Week 3	Test for convergence of series with Harmonic series.
Week 4	Absolute convergences: Ratio tests and Root tests.
Week 5	Alternating series and conditional convergence.
Week 6	Power series for functions, convergence of power series.
Week 7	Taylor's and Maclaurin series expansion of functions.
Week 8	The binomial series and applications of Taylor series: integral and limit.
Week 9	The dimensional coordinate systems, distance in space.
Week 10	Vectors, unit vectors.
Week 11	Dot product, vector projections.
Week 12	Cross product, parallel vectors.
Week 13	Lines and plane in space.
Week 14	Quadratic surfaces: cylinder, ellipsoid, hyperbolic paraboloid.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: introducing of limit of sequences and bounded monotonic sequence.
Week 2	Lab 2: Using infinite series and geometric series in MATLAB.
Week 3	Lab 3: Using Harmonic series in MATLAB.
Week 4	Lab 4: computing Power series for functions.
Week 5	Lab 5: Taylor's and Maclaurin series expansion of functions.
Week 6	Lab 6: Calculating Vectors and unit vectors.
Week 7	Lab 7: Using Dot product and Cross product in MATLAB.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by Thomas	Yes
Recommended Texts	Calculus Labs for MATLAB	No
Websites	www.mathhandbook.com	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 – 89	Above average with some errors
	C - Good	جيد	70 – 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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.

Course Description Form

Module Information معلومات المادة الدراسية			
Module Title	اللغة العربية		**Module Delivery**
Module Type	**Secondary**		3- ☒ Theory • ☒ Lecture • ☐Lab • ☐ Tutorial • ☐ Practical • ☒ Seminar
Module Code	**URARA**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	Preliminary studies	**Semester of Delivery**	2
Administering Department	Physics Science	**College**	College of science
Module Leader	Rana Majed Hamed	**e-mail**	Rana.Majid@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.D.
Module Tutor	None	**e-mail**	E-mail
Peer Reviewer Name	Fatimah Sahib Kadhim	**e-mail**	fatimah.altaie@nahrainuniv.edu.iq
Scientific Committee Approval Date	20/11/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	لا يوجد	**Semester**	
Co-requisites module	لا يوجد	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	The main objective of this semester is to strengthen the Queen of First Graders and :develop their linguistic abilities and focus on 1.Acquiring knowledge skills about linguistic concepts 2.Keep the tongue from falling into the word's pronunciation error 3.Developing the student's expressive abilities 4.Teaching students to analyze the speech system 5.Teach students to distinguish between the origins of the word or increase and what it .does in increasing meaning

	.6.Teaching students on methods and rules of control and drafting of vocabulary 7.Enabling the student to use the language vocabulary in the proper location 8.Provide trainings to strengthen the student's queen and develop his ability in language practice and influential rhetoric, taking advantage of experiences and .training 9.Enabling students to read and analyze literary texts, understand them and be able to .save them Teaching students to read properly the words of the Holy Quran, learn its .meaning and develop students' ability to keep and pronounce
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	The University of Nahrin works by teaching Arabic to strengthen the student's linguistic queen. By adjusting and perfecting the rules of Arabic, introducing students to speech systems and the possibility of contributing to the teaching and refinement of writing and damaged times, and being able to know the divisions of actions. This develops students' ability to understand the subject. and have the ability to detect language errors. Teaching the right reading and understanding of educational grammatical systems and developing the skill in addressing the problems faced by students in teaching Arabic .and directing it correctly
Indicative Contents **المحتويات الإرشادية**	Students should be able to understand the basic principles of Arabi by studying the sections of speech (name, verb and letter) and describing the definition of each of them and what their .connotation is Innovative knowledge, experience and detailed knowledge of its types with representation The study was made by her sisters, her sisters, the statement of her meaning, her work, what changes occurred in the sentence when she entered it, how to write the number, numbering marks, tied and open tags, and other topics of interest to the student in learning the .principles of Arabic

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. POWERPOINT DISPLAY 2. Writing Reports 3. Quarterly Tests 4. Discussing and Solving Questions .5 Homework

Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	33	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	2.2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1.1

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		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
	Seminar	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	20% (20)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Grammar - Speech Section (Name, verb, letter), beginner, types, news and types
Week 2	It was her sisters, her sisters.
Week 3	Muthanna and his attachment, the collection of the peaceful masculine and his attachment, the collection of the peaceful feminine and his attachment, the five names
Week 4	Building the past act, building the act.
Week 5	The tense act of building and godmother
Week 6	Assigned names (effect - absolute effect - effect - effect - effect - effect)
Week 7	Hair - Nazik Angels
Week 8	Poetry - Mohammed Mahdi Al Jawahiri
Week 9	Dictatorship - Writing the Shame (Connecting and Cutting)
Week 10	Intermediate and Extreme Shaking
Week 11	Writing Antidote and Adversity
Week 12	Writing short and long diversion
Week 13	Punctuation -The rule of a thousand paradoxes
Week 14	Writing Number
Week 15	The Holy Quran

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Expression, creation, written drawing and written dictation/a. d. Abdulrahman Matlak al-Jabouri	لا
Recommended Texts	Clarify the trajectory of the millennium of the son of Malik/Ibn Hisham. Qatar al-Nada and Bel al-Echo of Hisham's son. The hummus of the Sooty, as adequate as Abbas Hassan, is a shrewd custom in the art of drainage, polite in drainage.	لا
Websites	Adequate Grammar / Abbas Hassan.	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A –** Excellent	**امتياز**	90 - 100	Outstanding Performance
	B - Very Good	**جيد جدا**	80 - 89	Above average with some errors
	C – Good	**جيد**	70 - 79	Sound work with notable errors
	D – Satisfactory	**متوسط**	60 - 69	Fair but with major shortcomings
	E – Sufficient	**مقبول**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**راسب (قيد المعالجة)**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(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.

Course Description Form

Module Information
معلومات المادة الدراسية

Module Title	Computer programming 2	**Module Delivery**	
Module Type	Basic	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRCOMPRO2		
ECTS Credits	5		
SWL (hr/sem)	125		

Module Level	2	**Semester of Delivery**	1
Administering Department	Mathematics and Computer Applications Science	**College**	College of Sciences
Module Leader	Mohammed Q. Ali	**e-mail**	mohammed.q.ali@nahrainuniv.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**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**	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	i. Cover fundamental programming concepts such as variables, data types, operators, expressions, and basic syntax specific to MATLAB. ii. Introduce students to MATLAB's capabilities in handling and manipulating data, including arrays (vectors and matrices), indexing, and slicing. iii. Teach students how to use conditional statements (if, else if, else) and iterative structures (for loops, while loops) in MATLAB to control the flow of their programs.

	iv. Familiarize students with writing and using functions and scripts in MATLAB, emphasizing good coding practices and code organization. v. Provide students with skills in performing numerical computations and basic mathematical operations using MATLAB's built-in functions and operations. vi. Develop students' ability to apply MATLAB programming skills to solve simple computational problems and implement algorithms. vii. Equip students with skills in debugging MATLAB programs to identify and resolve errors
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand MATLAB syntax and basic programming concepts (variables, operators, expressions). 2- Work with different data types (numeric, character, logical, etc.) in MATLAB. 3- Understand basic data structures such as arrays (vectors and matrices). 4- Perform arithmetic and logical operations using MATLAB. 5- Use conditional statements (if, else if, else) and loops (for, while) to control program flow. 6- Create and call user-defined functions in MATLAB. Differentiate between scripts and functions. 7- Perform basic numerical computations using MATLAB (e.g., solving equations, numerical integration). 8- Debug simple MATLAB programs to identify and fix errors and utilize MATLAB Help and documentation to find information and resources.
Indicative Contents المحتويات الإرشادية	• Overview of MATLAB environment (Basic operations and calculations in MATLAB, introduction to variables and data types and working with matrices and vectors) • Control Flow and Loops in MATLAB • Scripts and Basic Programming Concepts • Functions in MATLAB (user defined functions) • Introduction to symbolic computations (solving equations and calculus)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is by explaining lectures in an interactive way by letting the students to participate in the presenting through questions and answers while at the same time refining and expanding their critical thinking skills. This will be achieved through classes and labs.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.0
Unstructured SWL (h/sem)	50	**Unstructured SWL (h/w)**	3.33

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	3,6,10,13	All
	Assignments	4	10% (10)	4,7,11,14	All
	Project	1	10% (10)	Continuous	
	Lab	2	10% (10)	8,15	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8,15	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Declaration variables, vectors and matrices
Week 2	Programming Using Script Files
Week 3	Input & Output Commands
Week 4	Relational And Logical Operators
Week 5	Conditional Statements
Week 6	Conditional Loops
Week 7	Conditional Loops … cont.
Week 8	Mid-term exam
Week 9	User-Defined Functions
Week 10	Anonymous Functions and Subfunctions
Week 11	Symbolic Math Programming
Week 12	Substituting A Numerical Value and Simplification an Equation
Week 13	Solving Algebraic Equations
Week 14	Calculus (Differentiation and Integration)
Week 15	Mid-term Exam 2

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Define variables, vector and matrix
Week 2	Lab 2: Create m-file and its properties
Week 3	Lab 3: I/O commands ("input", "disp" and "fprintf") statements and its properties
Week 4	Lab 4: Relational Operators and Logical ("and", "or" … statements)
Week 5	Lab 5: {if – elseif – else – end} and {switch} statements
Week 6	Lab 6: {for loop} and {while loop} statements
Week 7	Lab 7: {break} and {continue} statements
Week 8	Practical Exam 1
Week 9	Lab 8: Write User-Defined Functions
Week 10	Lab 9: define Anonymous Functions and subfunctions
Week 11	Lab 10: Symbolic Variables and Expressions with "sym" and "syms" statements
Week 12	Lab 11: substitution and simplification Functions
Week 13	Lab 12: Solving Equations with {solve} statement
Week 14	Lab 13 and Calculus programming using {diff, and int} statements
Week 15	Practical Exam 2
Teaching Staff	م.م. محمد قاسم علي / م.م عباس ابراهيم / م.م. فرح لطيف / م.م. عذراء عبدالسلام

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
Recommended Texts	MATLAB: An Introduction with Applications (6th. Edition) by Amos Gilat. 2017	No
Websites	Documentation - MATLAB & Simulink (mathworks.com)	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors

	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Course Description Form

Module Information معلومات المادة الدراسية					
Module Title	Linear Algebra I			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Math 212				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		2	**Semester of Delivery**		1
Administering Department		MATH	**College**	Science	
Module Leader	Dr.Zainab Riyadh Shaker		**e-mail**	zaianb.riyadh22@nahrainuniv.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		01/09/2024	**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The course provides students with an understanding of a number of topics and concepts in linear algebra. The course also introduce techniques of proof which are useful to other courses. The course aims to encourage students to develop interest in the subject and pursue other courses that require these skills.
Module Learning Outcomes	By the end of this course, successful students should be able to: • Have a sound and broad understanding of how to solve systems of linear equations and matrix manipulation including computation of its inverse

مخرجات التعلم للمادة الدراسية	(when possible) and evaluate determinants • Have a broad understanding of the concepts of vector and matrix algebra, including linear dependence/independence, basis and dimension of a subspace, rank and nullity • Have an understanding of the principles and applications of eigenvectors and eigenvalues, Linear Transformations and present a rigorous analysis of problems • Be able to choose the correct method/strategy to solve problems using appropriate mathematical routines and strategies
Indicative Contents المحتويات الإرشادية	• Systems of linear equations; Row reduction and Matrix Equation • Linear Transformations; Transformation Matrix; • Matrix Operations; Inverse Matrix • Vector Spaces; Null Space • Vector Algebra, Basis, dimension and rank • Eigenvectors and Eigenvalues • Linear Transformation • Orthogonality and Gram-Schmidt Process

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be used in this module is to encourage the students to participation in the module activities. This strategy will be by giving the students quizzes, assignments, projects and midterm exams throughout the semester.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem)	200		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3, 9	LO #1, 2, 4 and 5
	Assignments	2	10% (10)	5,11	LO # 1,2, 3, 6 and 7
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	14	LO # 4, 5 and 8
Summative assessment	**Midterm Exam**	2	10% (10)	6,12	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Linear Equations and Matrices
Week 2	Systems of Linear Equations
Week 3	Matrices
Week 4	Matrix Multiplication
Week 5	Algebraic Properties of Matrix Operations
Week 6	Special Types of matrices
Week 7	Solving Linear Systems
Week 8	Echelon Form of a Matrix

Week 9	Elementary Matrices; Finding A^(-1)
Week 10	Determinants
Week 11	Properties of Determinants
Week 12	Cofactor Expansion
Week 13	Inverse of a Matrix
Week 14	Other Applications of Determinants
Week 15	Vector space and its properties
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Linear Algebra and Application by Bernard Kolman	Yes
Recommended Texts	Introduction to Linear Algebra by Franz hohn	No
Websites	Any website that specializes in the study of linear algebra	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Course Description Form

Module Information معلومات المادة الدراسية			
Module Title	Probability Theory		**Module Delivery**
Module Type	**Core**		4- ☐ **Theory** • ☒ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	**MATH 2108**		
ECTS Credits			
SWL (hr/sem)	**100**		
Module Level		**Semester of Delivery**	1
Administering Department	Mathematics and Computer Applications	**College**	College of Sciences
Module Leader	Raneen Zaid	**e-mail**	Ranen.z.ahmood@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Describe discrete data graphically and compute of location and dispersions (mean and variance) 2. Compute probabilities by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional probability 3. Introducing basic statistical methodology of data analysis including; graphs, descriptive statistics

	4. Interpret probabilities and use probabilities of outcomes to calculate probabilities of events in discrete sample spaces- exclusive and independent events 5. The purpose of the random variable, some discrete and continuous distributions
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Having successfully completed this module you will be able to: 1. A good understanding of elementary probability theory and its application 2. A good understanding of the basic concepts of statistical inference 3. A good understanding of the concept of a statistical distribution 4. A good understanding of the standard univariate distributions and their properties 5. A good understanding of exploratory data analysis. 6. A good understanding of the laws of probability and the use of Bayes theorem 7. A good understanding of the Central Limit Theorem and its application 8. Ability to write a short-report describing a simple statistical data set.
Indicative Contents المحتويات الإرشادية	1. Exploratory data analysis: measures of location and spread; symmetry and skewness. 2. Presentation and interpretation of data and report writing. 3. Probability: Sample space, events, outcome, and axioms of probability. Addition and multiplication rules. The law of total probability, conditional probability, independence, Bayes Theorem. Practical applications. 4. Random variables: Discrete and continuous random variables. Probability mass function, probability density function and cumulative distribution function. Expectation, variance and moments.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The module will be presented to the students through a specified series of lectures, supported by practice and directed study outside the classroom. Formative assessment takes place throughout the module during lectures and feedback is given during these lectures.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation
تقييم المادة الدراسية

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

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction and overview of statistics
Week 2	Organization and presentation of statistical data
Week 3	Measures of central tendency (mean, median, mode, …) of the simple data and the frequency distribution
Week 4	Measures of dispersion (the range – the variance and the standard deviation
Week 5	Coefficient of variation of the simple data and the frequency distribution
Week 6	Sample space and events
Week 7	Counting techniques (fundamental basics, addition rule – multiplication rule- permutation and combinations)
Week 8	Definition of the probability and its applications
Week 9	Conditional probability
Week 10	Midterm exam.
Week 11	Independence of events and bayes theorem and its applications
Week 12	6definition of the random variable
Week 13	The probability distribution
Week 14	Some special probability distributions
Week 15	The normal distribution.
Week 16	**Preparatory week before the final exam.**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	-Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. - MATHEMATICAL S T A T I S T I C S WITH APPLICATIONS, Dennis D. Wackerly, William Mendenhall III, Richard L. Scheaffer, Thomson Brooks, 2008.	No
Websites	www.mathhandbook.com	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition

Success Group (50 - 100)	**A –** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(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.

Third Stage

Course Description Form

1. Course Name:	
Fuzzy sets	
2. Course Code:	
MATH317	
3. Semester / Year:	
Second 2024-2025	
4. Description Preparation Date:	
23/3/2024	
5. Available Attendance Forms:	
Attendance lectures in the classroom	
6. Number of Credit Hours (total) / Number of Units (total)	
60 hours / 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Dr. Fadhel Subhi Fadhel Email: fadhel.subhi@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• Studying fuzzy logic and in connection with classical mathematical logic in set theory. • Reviewing the basic algebraic and mathematical properties, as well as fundamental operations on fuzzy sets. • Formulating some real-life problems using fuzzy logic and indicating the appropriateness of fuzzy logic in these studies. • Studying some mathematical topics using fuzzy logic, such as evaluating fuzzy derivatives and integrals, solutions of fuzzy differential equations, studying fuzzy real analysis
9. Teaching and Learning Strategies	
Strategy	The teaching and learning strategy is considered a set of tools and practices carried out by both the teacher and the student in order to comprehend the academic material or course, which is the theory of fuzzy sets, in the best possible way. This depends on two basic factors: good transmission by the subject teacher, which is supported by teaching strategies, and good reception by the student, which is supported by learning strategies. Educational strategies include a set of organized plans and methods followed by the subject teacher in order to guide students towards achieving learning goals, including the cognitive goals of fuzzy logic, the skill goals in formulating life problems in a mathematical manner by representing them with a mathematical model, and the emotional and value goals through the sensory perception of the nature of the problem and how to deal with it. With it, this is done

	through specific teaching and learning methods in order for the student to acquire transferable general and qualifying skills.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Studying fuzzy logic	Basic definitions and examples	Attendance interactive lectures	Ask questions and give assignments
2	4	Study the basic algebraic operations with examples	Basic algebraic operations	Attendance interactive lectures	Ask questions and give assignments
3	4	Generalization of non-fuzzy concepts to fuzzy logic	Expansion principle and level sets	Attendance interactive lectures	Ask questions and give assignments
4	4	Studying the membership functions and how to find some of them analytically	The membership functions	Attendance interactive lectures	Ask questions and give assignments
5	4	Review some types of fuzzy numbers and their relationship to fuzzy sets	Fuzzy numbers	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attendance mid exam
6	4	Studying different types of fuzzy functions	Fuzzy derivatives and integrals	Attendance interactive lectures	Ask questions and give assignments
7	4	Use the extension principle to find fuzzy derivatives and integrals	Fuzzy derivatives and integrals	Attendance interactive lectures	Ask questions and give assignments
8	4	Introducing the fuzzifying function and find its derivatives	Fuzzy derivatives and integrals	Attendance interactive lectures	Ask questions and give assignments
9	4	Use of left-right fuzzing functions to find derivatives and integrals	Fuzzy derivatives and integrals	Attendance interactive lectures	Ask questions and give assignments
10	4	Introducing fuzzy differential equations	Fuzzy differential equations	Attendance interactive lectures	Ask questions and give assignments
11	4	Solving fuzzy differential equations analytically using complex numbers	Fuzzy differential equations	Attendance interactive lectures	Ask questions and give assignments

12	4	Study the numerical solutions of fuzzy differential equations	Fuzzy differential equations	Attendance interactive lectures	Ask questions, give assignments, and make a 2nd attence mid exam
13	4	Using the Hausdorff distance function to define fuzzy metric space	Fuzzy real analysis	Attendance interactive lectures	Ask questions and give assignments
14	4	Give the basics definitions of real analysis in fuzzy metric space	Fuzzy real analysis	Attendance interactive lectures	Ask questions and give assignments
15	4	Study compact sets and convergent sequences in fuzzy metric space	Fuzzy real analysis	Attendance interactive lectures	Ask questions and give assignments

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports ... etc.

30% monthly written exams

10% daily and oral exams, homework's, and class activities

60% written final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Fuzzy Set Theory and Its Applications, Third Edition, By: H.-J. Zimmermann, 1996. 2- Fuzzy Mathematical Techniques with Applications, By: Kandel A., 1985.
Main references (sources)	Fuzzy Set Theory, Foundations and Applications, by Klir G. J.
Recommended books and references (scientific journals, reports...)	1- Fuzzy sets and systems: theory and applications, by: D. J. Dubois and Prade. 2- D. and M.Sc. Theses of Al-Nahrain university. 3- Journal of Fuzzy sets and Systems.
Electronic References, Websites	3-

Course Description Form

1. Course Name
Numerical Analysis I
2. Course Code:
MATH314
3. Semester / Year
First / 2024/2025
4. Description Preparation Date
1ST September 2023
5. Available Attendance Forms
Full time attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
75/4
7. Course administrator's name (mention all, if more than one name)
Course leader name: **Dr. Omar Al-Tameemi** Email: omar.ismael@nahrainuniv.edu.iq Tutorial Assistant name: **Dr. Omar Al-Tameemi** Lab staff names: **1- Ass. Lec. Haneen Abdulkareem** **2- Ass. Lec. Batool Imkhelf** **3- Ass. Lec. Abbas Ibraheem** 4- **Ass. Lec. Nubras Yasir** 5- **Ass. Lec. Farah Lateef**
8. Course Objectives

Course Objectives	• Derive appropriate numerical methods to solve algebraic and transcendental equations. • Develop appropriate numerical methods to approximate a function. • Derive appropriate numerical methods to evaluate a derivative at a value. • Perform an error analysis for various numerical methods • Prove results for various numerical root finding methods. • Derive appropriate numerical methods to calculate a definite integral. • Code various numerical methods in a modern computer language.

9. Teaching and Learning Strategies

Strategy	Subject content will be presented in a combination of online materials and in the lectures. Lectures will take the form of an interactive session (3 hours per week) where the material is covered in depth. Students are expected to revise the online material before each lecture. Computer labs (2 hours per week) will focus on the practical implementation of numerical methods. Direct feedback will be provided during the computer labs. Further feedback on progress will be provided using the check-in Assignments which are spaced throughout the semester. Students will be encouraged to develop code-sharing practices in the computer labs, and to tackle problems collaboratively, as well as being able to work on solving problems individually. A central aim of this is to prepare students for real-world coding environments, which consist of a mix of collaboration with intense periods of individual work. Real world problems examples will enable the students to tackle an authentic and challenging problem in science or mathematics that can be approached using the methods given in this subject.

10. Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 hrs of lecture +1 hr tutorial	Preliminaries of Computing	Numerical Solution, type of errors; relative error, absolute error, percentage	Lectures notes, In class presentations, Examples of Practical	Quizzes , Weekly homework, Team and homework problems , Open questions that have

			error, truncation error, round off error. Floating	Applications, Tutorial	a definite answer , (Oral questions)
2	3 hrs of lecture +1 hr tutorial	Numerical solution of Nonlinear Equations	Bisection method, fixed-point iteration, Newton's method.		
3	3 hrs of lecture +1 hr tutorial		Error analysis for Iterative Methods		
4	3 hrs of lecture +1 hr tutorial		Computing roots of polynomials.		
5	3 hrs of lecture +1 hr tutorial	Interpolation and Polynomial Approximation	Lagrange Polynomial		
6	3 hrs of exam +1 hr tutorial	Midterm exam			
7	3 hrs of lecture +1 hr tutorial	Interpolation and Polynomial Approximation	Divided Differences	Lectures notes, In class presentations, Examples of Practical Applications, Tutorial	Quizzes , Weekly homework, Team and homework problems , Open questions that have a definite answer , (Oral questions)
8	3 hrs of lecture +1 hr tutorial		Hermite Interpolation, Extrapolation Methods		
9	3 hrs of lecture +1 hr tutorial	Numerical Differentiation	Forward, backward and central difference approximation of the derivatives.		
10	3 hrs of exam	Midterm exam			

	+1 hr tutorial				
11	3 hrs of lecture +1 hr tutorial	Numerical Differentiation	Higher Order Derivatives.	Lectures notes, In class presentations, Examples of Practical Applications, Tutorial	Quizzes , Weekly homework, Team and homework problems , Open questions that have a definite answer , (Oral questions)
12	3 hrs of lecture +1 hr tutorial	Numerical Integration	Trapezoidal Method, Simpson's Method		
13	3 hrs of lecture +1 hr tutorial		Quadrature Integration Methods, Including Gauss-Quadrature Methods, NewtonCots Open and Closed Methods		
14	3 hrs of lecture +1 hr tutorial		Romberg integration		
15	4hrs	Review			

Course Structure (Lab)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours of Lab.	Preliminaries of Computing	Fundamentals of MATLAB Programming, relative error, absolute error, percentage error, round off error. Floating	Lab Lectures, Practical Applications, Tutorial	Exams , Weekly homework, Lab quizzes
2	2 hours of Lab.	Numerical solution of Nonlinear Equations	Bisection method, fixed-point iteration, Newton's method.		
3	2 hours of Lab.		Error analysis for Iterative Methods		

4	2 hours of Lab.	Interpolation and Polynomial Approximation	Computing roots of polynomials.		
5	2 hours of Lab.		Lagrange Polynomial		
6	2 hours of Lab.	Midterm exam			
7	2 hours of Lab.	Interpolation and Polynomial Approximation	Divided Differences	Lab Lectures, Practical Applications, Tutorial	Exams , Weekly homework, Lab quizzes
8	2 hours of Lab.		Hermite Interpolation, Extrapolation Methods		
9	2 hours of Lab.	Numerical Differentiation	Forward, backward and central difference approximation of the derivatives.		
10	2 hours of Lab.	Midterm exam			
11	2 hours of Lab.	Numerical Differentiation	Higher Order Derivatives.	Lab Lectures, Practical Applications, Tutorial	Exams , Weekly homework, Lab quizzes
12	2 hours of Lab.	Numerical Integration	Trapezoidal Method, Simpson's Method		
13	2 hours of Lab.		Quadrature Integration Methods, Including Gauss-Quadrature Methods, Newton Cots Open and Closed Methods		
14	2 hours of Lab.		Romberg integration		
15	2hrs	Review			
11. Course Evaluation					

Formative assessment 40%: Theory (15% Midterm exams + 10% homework) + 15% lab assessment. Summative assessment 60%: Theoretical final exam 50% + Lab final exam 10%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Burden, R. L., Faires, J. D., & Burden, A. M. (2015). Numerical analysis. Cengage learning.
Main references (sources)	J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, Springer-Verlag, ISBN 0-387- 90420-4
Recommended books and references (scientific journals, reports…)	C.T. Kelley, Iterative methods for linear and nonlinear equations, Society of Industrial and Applied Mathematics
Electronic References, Websites	

Course Description Form

1. Course Name
Numerical Analysis II
2. Course Code:
MATH315
3. Semester / Year
Second / 2024/2025
4. Description Preparation Date
1ST Feb 2024
5. Available Attendance Forms
Full time attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
75/4
7. Course administrator's name (mention all, if more than one name)
Course leader name: **Dr. Omar Al-Tameemi** Email: omar.ismael@nahrainuniv.edu.iq Tutorial Assistant name: Ass. Lec. **Abbas Ibrahim Khleaf** Lab staff names: **1- Lec. Dr. Ibtisam Kamil** **2- Lec. Raneen zaid** **3- Ass. Lec. Haneen Abdulkareem** **4- Ass. Lec. Nabaa Husain** 5- **Ass. Lec. Batol Imkhelf** **6- Ass. Lec Iman Khalid** 7- **Ass. Lec. Yasemen Moen** 8- **Ass. Lec. Farah Lateef**

8. Course Objectives	
Course Objectives	• Develop appropriate numerical methods to solve a differential equation. • Derive appropriate numerical methods to solve a linear system of equations. • Derive appropriate numerical methods to solve a system of nonlinear equations. • Perform an error analysis for various numerical methods • Code various numerical methods in a modern computer language.

9. Teaching and Learning Strategies

Strategy	Subject content will be presented in a combination of online materials and in the lectures. Lectures will take the form of an interactive session (3 hours per week) where the material is covered in depth. Students are expected to revise the online material before each lecture. Computer labs (2 hours per week) will focus on the practical implementation of numerical methods. Direct feedback will be provided during the computer labs. Further feedback on progress will be provided using the check-in Assignments which are spaced throughout the semester. Students will be encouraged to develop code-sharing practices in the computer labs, and to tackle problems collaboratively, as well as being able to work on solving problems individually. A central aim of this is to prepare students for real-world coding environments, which consist of a mix of collaboration with intense periods of individual work. Real world problems examples will enable the students to tackle an authentic and challenging problem in science or mathematics that can be approached using the methods given in this subject.

10. Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 hrs of lecture +1 hr tutorial	Introduction to Numerical Solution of Ordinary Differential Equations	Introduction to Numerical Solution of Ordinary Differential Equations	Lectures notes, In class presentations, Examples of Practical	Quizzes , Weekly homework, Team and homework problems , Open questions that have

2	3 hrs of lecture +1 hr tutorial		Finite Difference Method	Applications, Tutorial	a definite answer , (Oral questions)
3	3 hrs of lecture +1 hr tutorial		Euler and Modified Euler Methods		
4	3 hrs of lecture +1 hr tutorial		Explicit and Implicit Methods		
5	3 hrs of lecture +1 hr tutorial		Runge-Kutta Method, of 2 and 4 Orders		
6	3 hrs of exam +1 hr tutorial	Midterm exam			
7	3 hrs of lecture +1 hr tutorial	Direct Methods for Solving Linear Systems Iterative Techniques in Matrix Algebra	Linear Systems of Equations, Pivoting Strategies	Lectures notes, In class presentations, Examples of Practical Applications, Tutorial	Quizzes , Weekly homework, Team and homework problems , Open questions that have a definite answer , (Oral questions)
8	3 hrs of lecture +1 hr tutorial		Linear Algebra and Matrix Inversion, The Determinant of a Matrix, Matrix Factorization		
9	3 hrs of lecture +1 hr tutorial		Norms of Vectors and Matrices		
10	3 hrs of exam +1 hr tutorial	Midterm exam			

11	3 hrs of lecture +1 hr tutorial	Direct Methods for Solving Linear Systems Iterative Techniques in Matrix Algebra	Iterative Techniques for Solving Linear Systems: Jacobi Iterative Gauss–Seidel Iterative	Lectures notes, In class presentations, Examples of Practical Applications, Tutorial	Quizzes , Weekly homework, Team and homework problems , Open questions that have a definite answer , (Oral questions)
12	3 hrs of lecture +1 hr tutorial		Error Bounds and Iterative Refinement		
13	3 hrs of lecture +1 hr tutorial	Numerical Solutions of Nonlinear Systems of Equations	Fixed Points for Functions of Several Variables		
14	3 hrs of lecture +1 hr tutorial		Newton's Method		
15	4hrs	Review			

Course Structure (Lab)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours of Lab.	Introduction to Numerical Solution of Ordinary Differential Equations	Finite Difference Method	Lab Lectures, Practical Applications, Tutorial	Exams , Weekly homework, Lab quizzes
2	2 hours of Lab.		Euler and Modified Euler Methods		
3	2 hours of Lab.		Taylor Methods		
4	2 hours of Lab.		Explicit and Implicit Methods		
5	2 hours of Lab.		Runge-Kutta Method, of 2 and 4 Orders		

6	2 hours of Lab.	Midterm exam			
7	2 hours of Lab.	Direct Methods for Solving Linear Systems Iterative Techniques in Matrix Algebra	Forward and Backward substitution	Lab Lectures, Practical Applications, Tutorial	Exams , Weekly homework, Lab quizzes
8	2 hours of Lab.		Gauss Elimination		
9	2 hours of Lab.		LU factorization		
10	2 hours of Lab.	Midterm exam			
11	2 hours of Lab.	Direct Methods for Solving Linear Systems Iterative Techniques in Matrix Algebra	Jacobi Iterative Gauss–Seidel Iterative	Lab Lectures, Practical Applications, Tutorial	Exams , Weekly homework, Lab quizzes
12	2 hours of Lab.		Error Bounds and Iterative Refinement		
13	2 hours of Lab.	Numerical Solutions of Nonlinear Systems of Equations	Fixed Points for Functions of Several Variables		
14	2 hours of Lab.		Newton's Method		
15	2hrs	Review			

11. Course Evaluation

Formative assessment 40%: Theory (15% Midterm exams + 10% homework) + 15% lab assessment.
Summative assessment 60%: Theoretical final exam 50% + Lab final exam 10%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Burden, R. L., Faires, J. D., & Burden, A. M. (2015). Numerical analysis. Cengage learning.
Main references (sources)	J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, Springer-Verlag, ISBN 0-387- 90420-4
Recommended books and references (scientific journals, reports…)	C.T. Kelley, Iterative methods for linear and nonlinear equations, Society of Industrial and Applied Mathematics
Electronic References, Websites	

Course Description Form

1. Course Name:
Optimization II
2. Course Code:
MATH 319
3. Semester / Year:
First / 2024/2025
4. Description Preparation Date:
23/3/2024
5. Available Attendance Forms:
Full time attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
60 hours/ 4 Units
7. Course administrator's name (mention all, if more than one name)
Name: Associate Professor Saad Mohsen Asst. Lec. Nubras Yasir Asst. Lec. Farah Lateef Asst. Lec. Eman Khalid Asst. Lec. Athraa Abdulsalam Email: saad.mohsen@nahrainuiv.edu.iq
8. Course Objectives

Course Objectives	• Study of non-linear programming systems and their solutions. • Study classical optimization and solve systems u many methods. • numerical optimization and its applications

9. Teaching and Learning Strategies	
Strategy	The strategy is to provide the students with as much information about linear programming as possible by attending lectures to maximize the connection between the students and the lecturer in order to solve as many real-life statistical applications as possible with practical lab. The lectures, some homework and some other additional exercises is also shared on Google Classroom.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

2-1		4	Definition and classification of nonlinear programming		
6-3		8	Solution of single variable optimization		
9-7		8	Multi variable optimization with no constraints		
11-10		10	Multi variable optimization with constraints		
13-12		14	Solve numerical optimization unrestricted search and exhaustive		
15-14		16	Solve numerical optimization dichotomous, Fibonacci and golden section		

11. Course Evaluation

Midterm exam: 40 marks
Final exam: 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Optimization theory and applications by S.S. RAO
Main references (sources)	Operation research by HAMDY A. TAHA
Recommended books and references (scientific journals, reports…)	Any website related to our study
Electronic References, Websites	Google.com

1. بنية المقرر

الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة / أو الموضوع	طريقة التعليم	طريقة التقييم
2-1	4	الطريقة البيانية	Graphical solution	برمجة باستخدام الماتلاب	
6-3	8	الطريقة المبسطة	Simplex method	برمجة باستخدام الماتلاب	
9-7	8	طريقة Big M	Big M method	برمجة باستخدام الماتلاب	
11-10	10	طريقة ذات الطورين	Two phase method	برمجة باستخدام الماتلاب	
13-12	14	طريقة الثنائية	Dual simplex method	برمجة باستخدام الماتلاب	
15-14	16	طريقة النقل	Transportation method	برمجة باستخدام الماتلاب	

Course Description Form

1. Course Name: Human Rights and Democracy	
2. Course Code: UREQ 420	
3. Semester / Year: First/ 2024-2025	
4. Description Preparation Date: 6/12/2023	
5. Available Attendance Forms: In Presence	
6. Number of Credit Hours (Total) / Number of Units (Total)	
15 /1	
7. Course administrator's name (mention all, if more than one name)	
Name: Ahmed Neama Jouda Email: ahmedjuda68@gmail.com	
8. Coarse Objectives The aim of human rights and democracy lectures is to simplify the principles of human right and to assure democracy disciplines applying by equally and properly distribution among people in the society.	
9. Teaching and Learning Strategies	
Strategy	This is done through a booklet that was prepared by me using external sources such as books, newspapers, and the information network, through in-person lectures, and supporting this with illustrative means in Word or PDF format. It is carried out through weekly lectures and through observations made by the teacher and measuring the extent of .students' knowledge

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	One Hour	The concept of human rights	Concepts about human rights and fundamental freedoms	Theoretical lecture	
2			Categories and Features of Human Rights	Theoretical lecture	
3			Characteristics and advantages of human rights in Islam.	Theoretical lecture	
4			The difference between human rights and public freedoms.	Theoretical lecture	
5			Freedom, its concept and types.	Theoretical lecture	
6			Human rights In ancient civilizations (Mesopotamia civilization).	Theoretical lecture	
7			Human rights in ancient civilizations (Chinese, Hindu, Pharaonic and Greek Egypt).	Theoretical lecture	
8			Human rights in the heavenly religions (Christianity and Islam).	Theoretical lecture	
9			Human rights in the Middle Ages.	Theoretical lecture	
10			Human rights in the modern era and the international	Theoretical lecture	

			organizations responsible for implementing them.		
11		Written Exam			
12			The concept of democracy and it's characteristics.	Theoretical lecture	
13			Types of democracy.	Theoretical lecture	
14			Pictures democratic syster	Theoretical lecture	
15			Democratic political rights.	Theoretical lecture	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1.Universal Declaration of Human Rights (Drafting Committee of the Universal Declaration of Human Rights). 2. Human Rights (Thomas Paine). 3.Human rights in Islam (Ali Abdul Wahid).
Main references (sources)	3. Human Rights in the Divine Religions (Abdul Razzaq Rahim Salal).
Recommended books and references (scientific journals, reports…)	Human rights in the Arab world (Hussein Jameel)
Electronic References, Websites	

Course Description Form

1. Course Name:
Theory of Ordinary Differential Equations
2. Course Code:
MATH 318
3. Semester / Year:
Second Semester / 2024-2025
4. Description Preparation Date:
1/3/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):
60 Hours/ 4Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahmed Ayyoub Yousif Email: ahmed.ayyoub@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• **The course aims to give the basic exercises and theories of first–order differential systems and find the solution to them through the basic solution matrix.** • **After that, the course deals with the study of the phase level and the solution behavior of these systems without addressing their solution** • **At the end of the course, the study of the stability of solutions was addressed through the theory of parallel behavior and the theories of Lyabanov.**

9. Teaching and Learning Strategies

Strategy	1- Daily Post. 2- Daily Exams. 3- The Monthly Exam. 4- Home Works.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st & 2nd	8	Linear systems		Give Lectures	Daily Exams and H.W.
3rd & 4th	8	Fundamental matrix solution		Give Lectures	Daily Exams and H.W.

5th & 6th	8	Jordan canonical form		Give Lectures	Daily Exams and H.W.
7th & 8th	8	Phase plane		Give Lectures	Daily Exams and H.W.
9th & 10th	8	Existence and Uniqueness theorem		Give Lectures	Daily Exams and H.W.
11th & 12th	8	Periodic Systems		Give Lectures	Daily Exams and H.W.
13th & 14th	8	Stability theory		Give Lectures	Daily Exams and H.W.
15th	4	Liapunov stability		Give Lectures	Daily Exams and H.W.

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The Qualitative Theory of Ordinary Differential Equations: An Introduction By Fred Brauer، John A. Nohel
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: Real Analysis I

2. Course Code: MATH 310

3. Semester / Year: First/ 2024-2025

4. Description Preparation Date: 15/10/2023

5. Available Attendance Forms: physical attendance

6. Number of Credit Hours (Total) / Number of Units (Total): 60/4

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Aamena Rasim Mohammed
Email: aamen.raimmohammed@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	- Understand the real number system. - Understand concepts of convergence and divergence for sequences, subsequences and Cauchy sequences. - Understand metric spaces, complete metric spaces and compact metric spaces.

9. Teaching and Learning Strategies

Strategy	• Giving Lectures supported by exercises and activities in the classroom • Daily and Weekly Assessments. • Giving homework

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	(3)+(1) Discussion	Well-ordered complete sets	Real Numbers	Lectures	General questions, discussion and assignments
Second	(3)+(1) Discussion	Absolute value	Real Numbers Sequences	Lectures Lectures	General questions, discussion and assignments

Third	(3)+(1) Discussion	Definition of sequence	Sequences	Lectures	General questions, discussion and assignments
Fourth	(3)+(1) Discussion	convergent divergent sequences	Sequences	Lectures	General questions, discussion and assignments
Fifth	(3)+(1) Discussion	Monotonic sequence	Sequences	Lectures	General questions, discussion and assignments
Sixth	(3)+(1) Discussion	Subsequences	Sequences	Lectures	General questions, discussion and assignments
Seventh	(3)+(1) Discussion	Cauchy sequences	Metric Spaces	Lectures	General questions, discussion and assignments
Eighth	(3)+(1) Discussion	Definition of me spaces with example	Metric Spaces	Lectures	General questions, discussion and assignments
Ninth	(3)+(1) Discussion	Open and closed sets	Metric Spaces	Lectures	General questions, discussion and assignments
Tenth	(3)+(1) Discussion	Limit points	Metric Spaces	Lectures	General questions, discussion and assignments
Eleventh	(3)+(1) Discussion	Convergent seque Cauchy sequences	Metric Spaces	Lectures	General questions, discussion and assignments
Twelfth	(3)+(1) Discussion	Complete metric spa	Metric Spaces	Lectures	General questions, discussion and assignments
Thirteenth	(3)+(1) Discussion	Contraction Mapping	Metric Spaces	Lectures	General questions, discussion and assignments
Fourteenth	(3)+(1) Discussion	Compact sets	Metric Spaces	Lectures	General questions, discussion and assignments
Fifteenth	(3)+(1) discussion	Hiene-Borel Theorer	Metric Spaces	Lectures	General questions, discussion and assignments

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Homework 5%
Daily preparation 5%
Monthly Assessments 30%
Final Test 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Mathematical Analysis, Adil G. Naoum, Baghdad University-Iraq.
Main references (sources)	Introduction to Mathematica Analysis, William F. Trench -USA 2015

Recommended books and references (scientific journals, reports…)	Principle of Mathematical Analysis, Walter Rudin, 2000
Electronic References, Websites	https://www.britannica.com/science/analysis-mathematics

Course Description Form

1. Course Name: Real Analysis II

2. Course Code: MATH 311

3. Semester / Year: Second/ 2024-2025

4. Description Preparation Date: 15/10/2023

5. Available Attendance Forms: physical attendance

6. Number of Credit Hours (Total) / Number of Units (Total): 60/4

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Aamena Rasim Mohammed
Email: aamen.raimmohammed@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	- Understand Continuity and learn test the continuity of functions in different methods. - Understand concepts of Riemann Integrations. - Understand concepts of Differentiation.

9. Teaching and Learning Strategies

Strategy	• Giving Lectures supported by exercises and activities in the classroom • Daily and Weekly Assessments. • Giving homework

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	(3)+(1) Discussion	Definition of Continuous Functions	Continuity	Lectures	General questi discussion assignments
Second	(3)+(1) Discussion	Continuity using open and Closed sets	Continuity	Lectures	General questi discussion assignments
Third	(3)+(1) Discussion	Continuity u sequences	Continuity	Lectures	

Fourth	(3)+(1) Discussion	Uniform Continuity	Continuity	Lectures	General discussion assignments questi
Fifth	(3)+(1) Discussion	Concept of sequence Functions convergent	Sequence of Functions	Lectures	General discussion assignments questi
Sixth	(3)+(1) Discussion	Uniform convergent	Sequence of Functions	Lectures	General discussion assignments questi
Seventh	(3)+(1) Discussion	Definition of Riemann	Riemann Integrals	Lectures	General discussion assignments questi
Eighth	(3)+(1) Discussion	Integrals Examples of Riemann	Riemann Integrals	Lectures	General discussion assignments questi
Ninth	(3)+(1) Discussion	Negligible sets¨	Riemann Integrals	Lectures	General discussion assignments questi
Tenth	(3)+(1) Discussion	continuous Functions and integration	Riemann Integrals	Lectures	General discussion assignments questi
Eleventh	(3)+(1) Discussion	The Integration as continuous Function	Riemann Integrals	Lectures	General discussion assignments questi
Twelfth	(3)+(1) Discussion	Differentiation conce	Differentiation	Lectures	General discussion assignments questi
Thirteenth	(3)+(1) Discussion	Definitions Examples	Differentiation	Lectures	General discussion assignments questi
Fourteenth	(3)+(1) Discussion	Differentiation and Integration	Differentiation	Lectures	General discussion assignments questi
Fifteenth	(3)+(1) Discussion	the Fundamental Theorem in Calculus	Differentiation	Lectures	General discussion assignments questi

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Homework 5%
Daily preparation 5%
Monthly Assessments 30%
Final Test 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Mathematical Analysis, Adil Naoum, Baghdad University-Iraq.
Main references (sources)	Introduction to Mathematica Analysis, William F. Tren USA 2015
Recommended books and references (scientific journals, reports…)	Principle of Mathematical Analysis, Wa Rudin, 2000

Electronic References, Websites	https://www.britannica.com/science/analysis-mathematics

Course Description Form

1. Course Name:	
Applied Mathematics	
2. Course Code:	
Math 316	
3. Semester / Year:	
First / 2024-2025	
4. Description Preparation Date:	
23-3-2024	
5. Available Attendance Forms:	
Attendance lectures in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Yasmin Mueen Mohammed Email: yasameen.mueen@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	1. To introduce students to the new method solving Second and third Order Differential Equations Using Power Series Method. 2. Study and solutions of Special Functions/Equations. • 3. Study and solution of Fourier series method
9. Teaching and Learning Strategies	
Strategy	- Cognitive goals. 1. Students will enhance their logical thinking and problem structuring abilities, and will further develop their understanding of the concept of proof. 2. Enable students to obtain knowledge and understanding of the basic principles of applied mathematics. 3. Empower students to obtain knowledge and understanding the power series method and Fourier Series Analysis in applied mathematics. 4. Enable students to gain knowledge and understanding of how laws are linked.

	5. Support students to identify the most important applications in mathematics such as solving some complicated equations with complex roots and how to make a mathematical analysis using Fourier series.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Introduction to Linear Equations and Power Series. Studying the convergence of power series.	Linear Equations	Attendance interactive lectures	Ask questions and give assignments
2	4	Ordinary Points and Singular Points. Regular Singular Points, The Indicial Equation.	Linear Equations	Attendance interactive lectures	Ask questions and give assignments
3	4	Form and Validity of The Solution Near a Regular Singular Point. Indicial Equation with Difference of Roots NonIntegral.	Linear Equations	Attendance interactive lectures	Ask questions and give assignments
4	4	Differentiation of a Product of Equation. Indicial Equation with Equal Roots. Non-homogenous case.	Linear Equations	Attendance interactive lectures	Ask questions and give some homework's

5	4	Indicial Equation with Difference of Roots a Positive Integer (Non Logarithmic Case, Logarithmic Case). Solution of Large x (Point at Infinity).	Linear Equations	Attendance interactive lectures	Ask questions and give assignments
6	4	Special Functions: The Gamma, Beta and Error Functions	Gamma, Beta	Attendance interactive lectures	Ask questions and give assignments
7	4	Bessel's Functions: Bessel's Equation, Repeated Relation, Integral Form for Bessel's Functions, Modified Bessel's Functions	Bessel's Equation	Attendance interactive lectures	Ask questions and give assignments
8	4	Legender Equation, Legender Polynomial.	Bessel's Equation	Attendance interactive lectures	Ask questions and give assignments
9	4	Generating Function for Legender Polynomials, Orthogonalily for Legender Polynomials Associated Legender Equation.	Bessel's Equation	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attendance mid exam

10	4	Hypergeometric Equation and The Confluent Hypergeometric Equation.	Fourier Series	Attendance interactive lectures	Ask questions and give assignments
11	4	Laguerre Polynomials Hermite Polynomials	Fourier Series	Attendance interactive lectures	Ask questions and give assignments
12	4	Fourier Series: Orthogonalily of a Set of Sine and Cosine.	Fourier Series	Attendance interactive lectures	Ask questions and give assignments
13	4	Fourier Series: An Expansion Theorem. Examples of Fourier series: Even and odd Functions.	Fourier Series	Attendance interactive lectures	Ask questions, give assignments, and make a 2nd attendance mid exam
14	4	Fourier Sine Series, Fourier Cosine Series. Change of Interval. Complex Form of Fourier Series. Differentiation and Integration of Fourier Series. Fourier Transform.	Fourier Series	Attendance interactive lectures	Ask questions and give assignments
15	4	Integral Transforms. Fourier Integrals. Fourier Transforms. Fourier Sine & Cosine Transform. Convolution Theory of	Fourier Series	Attendance interactive lectures	Ask questions and give assignments

		Fourier Transform.			

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports ... etc.

30% monthly written exams

10% daily and oral exams, homework's, and class activities

60% written final exam

12 . Learning and Teaching Resources

1. Books Required reading:	Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint Fourier series and Boundary Value Problems 1. (Brown and Churchill Series) 8th Edition.
2. Main references (sources)	lementary Differential Equations, by E. D. 1-Rainville and P. E. Bedeint
A- Recommended books and referen (scientific journals, reports…).	طرق في الرياضيات التطبيقية, تأليف د. باسل يعقوب يوسف Any website that specializes and reliable to study applied mathematics.
Electronic References, Websites	1-https://math.libretexts.org/Bookshelves/Analysis

Course Description Form

1. Course Name:
Abstract algebra I
2. Course Code:
Math312
3. Semester / Year:
1st semester / 2024−2025
4. Description Preparation Date:
2023
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
3 Hours
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahlam J. Khaleel Email: ahlam.jamial@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	- Introducing students to basic concepts and important theorems in basic algebra topics
	- Equipping students with the basic concepts of the theory of groups.
	- At the end of this semester , the student can
	  - Create complex examples in the topic of group theory.
	  - Proof of new theories, preliminaries and results in the subject of the group

9. Teaching and Learning Strategies	
Strategy	The main strategy that will be used in this module is to encourage the students participation in the module activities. This strategy will be by giving the stude quizzes, assignments, projects and midterm exams throughout the semester

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Binary operation- algebraic structure- semi group- monoid		Theoretical lectures	Weekly quizzes

2	**3**	Group and commutative group and some examples		Theoretical lectures	Weekly quizzes
3	**3**	Properties of groups and some Theorems		Theoretical lectures	Weekly quizzes
4	**3**	Left (right) cancellation law + some examples		Theoretical lectures	Weekly quizzes
5	**3**	Order of a group and order of an element		Theoretical lectures	Weekly quizzes
6	**3**	Some theorems and problems		Theoretical lectures	Weekly quizzes
7	**3**	Exam 1 + definition of complex + multiplication of two complexes +definition of subgroup		Theoretical lectures	Weekly quizzes
8	**3**	Two step test + one step test + some theorems and examples		Theoretical lectures	Weekly quizzes
9	**3**	Definition of Coset +Some notes of cosets + Examples		Theoretical lectures	Weekly quizzes
10	**3**	Normalizer of an element +self conjugate element+center of group		Theoretical lectures	Weekly quizzes
11	**3**	Exam 2 + normal subgroup+ some results and examples		Theoretical lectures	Weekly quizzes
12	**3**	Some theorems of normal group + some problems		Theoretical lectures	Weekly quizzes
13	**3**	More theorems of Normal subgroup		Theoretical lectures	Weekly quizzes
14	**3**	Quotient group (factor group) + some examples and theorems		Theoretical lectures	Weekly quizzes
15	**3**	Review		Theoretical lectures	Weekly quizzes

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Modern Abstract Algebra By Burton.
Main references (sources)	Rose, John S., A course on group theory, Dover, Newyork 1994
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Fourth Stage

Course Description Form

1. Course Name: Topics in Pure Mathematics
2. Course Code: MATH430
3. Semester / Year: second/fourth 2024-2025
4. Description Preparation Date:2024/3/13
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):60hours/4
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahlam J. Khaleel Email: ahlam.jamial@nahrainuniv.edu.iq

8. Course Objectives	
Course Objectives	1-Enable students to obtain knowledge and understanding some of the basic principles of Fields. 2-Empowering and raising the students skills to obtain knowledge and understanding of the Algebra

9. Teaching and Learning Strategies	
Strategy	• Introductory written lectures and various activities and assignments which are given in the classroom. • Answering the quick questions raised in the hall and the possibility of solving them by the student. • Adopting the principle of preparing reports by students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Definition of the Fields, some examples of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
2	4	Some Properties and Theorems of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
3	4	Some Properties and Theorems of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
4	4	Subfields and Prime Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
5	4	Maximal Ideals with Some Examples	Certain Special Ideals	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attence mid exam
6	4	Some Properties of Maximal Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
7	4	Some Theorems of Maximal Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
8	4	Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
9	4	Some examples and Theorems of Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
10	4	Some Theorems of Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
11	4	The Radical of A ring, Semisimple Ring	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
12	4	Some Theorems of Radical	Certain Special Ideals	Attendance interact lectures	Ask questions, give assignments, and make a 2nd attence mid exam
13	4	Definition of Polynomial ring With some Examples	Polynomial Ring	Attendance interactive lectures	Ask questions and give assignments
14	4	Some Theorems of Polynomial Ring	Polynomial Ring	Attendance interactive lectures	Ask questions and give assignments
15	4	Some Theorems of Polynomial Ring	Polynomial Ring	Attendance interactive lectures	Ask questions and give assignments

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	A first Course in Abstract Algebra by J. B. Fraleigh
Main references (sources)	Introduction to to Modern Abstract Algebra by Burton
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Partial Differential Equations
2. Course Code:
MATH 410
3. Semester / Year:
First Semester / Fourth Class 2024-2025
4. Description Preparation Date:
1/10/2023
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):
60 Hours/ 3Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahmed Ayyoub Yousif Email: ahmed.ayyoub@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	• **The student knows how to solve a differential equation of the first and second order.** • **The student knows how to make a system of differential equations of the first order.** • **The student knows how to use transformations of integration in place of partial differential equations.**

9. Teaching and Learning Strategies

Strategy	1- Daily Post. 2- Daily Exams. 3- The Monthly Exam. 4- Home Works.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st & 2nd	8	Introduction to partial differential equations and the separation of variables.		Give Lectures	Daily Exams and H.W.
3rd & 4th	8	Transforming nonhomogeneous Bcs to homogeneous ones and solving more complicated problems.		Give Lectures	Daily Exams and H.W.
5th & 6th	8	Transforming hard equations into easier ones and solving nonhomogeneous PDE using eigenvector expansion method.		Give Lectures	Daily Exams and H.W.

7th & 8th	8	Integral transform (sine and cosine transform.		Give Lectures	Daily Exams and H.W.
9th & 10th	8	The Fourier series and transforms and its application to PDEs		Give Lectures	Daily Exams and H.W.
11th & 12th	8	The Laplace transform and its application to PDEs		Give Lectures	Daily Exams and H.W.
13th & 14th	8	The one dimensional wave equation (hyperbolic equation)		Give Lectures	Daily Exams and H.W.
15th	4	The D'alembert solution of the wave equation and the finite vibrating string (standing waves) and Elliptic type problems (the Laplacian)		Give Lectures	Daily Exams and H.W.

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Partial differential equations for scientists a engineers By Stanley J. Farlow
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Mathematical Statistics I
2. Course Code:
MATH413
3. Semester / Year:
First/ Fourth Class 2024−2025
4. Description Preparation Date:
5. Available Attendance Forms:
Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
60 ours/ 4 credits
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Akram Abbas Al-Sabbagh Email: akram.alsabbagh@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Learning the basic concepts of mathematical statistics • the definition of random variables and statistical distributions • introducing some of the most common statistical distributions with some properties and applications

9. Teaching and Learning Strategies	
Strategy	The strategy is to provide the students with as much information about mathematical statistics as possible by attending lectures to maximize the connection between the students and the lecturer in order to solve as many real-life statistical applications as possible. The lectures, some homework and some other additional exercises is also shared on Google Classroom.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	4	Basic concepts	Introduction to Statistics	lectures	
2-8	28	Statistical distributions	Distribution of Random Variables	lectures	
8-15	28	Common statistical distributions	Some Special Mathematical Distributions	lectures	

11. Course Evaluation

Midterm exam: 40 marks
Final exam: 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to the Theory Statistics, Alixander Mood,
Main references (sources)	-Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. - Mathematical Statistics w Applications, Dennis D. Wackerly, Willi Mendenhall III, Richard L. Scheaf Thomson Brooks, 2008.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Mathematical Statistics II
2. Course Code:
MATH414
3. Semester / Year:
Second/ Fourth Class 2024−2025
4. Description Preparation Date:
5. Available Attendance Forms:
Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
60 ours/ 4 credits
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Akram Abbas Al-Sabbagh Email: akram.alsabbagh@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Learning the basic concepts of multivariate mathematical statistics • the definition of variable transformation and Order Statistics • Statistical Estimations
9. Teaching and Learning Strategies	
Strategy	The strategy is to provide the students with as much information about mathematical statistics as possible by attending lectures to maximize the connection between the students and the lecturer in order to solve as many real-life statistical applications as possible. The lectures, some homework and some other additional exercises is also shared on Google Classroom.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1-5	20	Multivariate statistics	Multivariate Probability Distribution	lectures	
6-9	16	Statistical transformations	Function of Random Variable	lectures	
10-12	12	Statistical distribution for order statistics	Sampling Distribution	lectures	
12-15	12	Parameter estimation	Estimation	lecture	

11. Course Evaluation

Midterm exam: 40 marks
Final exam: 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to the Theory Statistics, Alixander Mood,
Main references (sources)	-Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. - Mathematical Statistics w Applications, Dennis D. Wackerly, Willi Mendenhall III, Richard L. Scheaf Thomson Brooks, 2008.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: Topology I

2. Course Code: MATH 415

3. Semester / Year: First/ 2024-2025

4. Description Preparation Date: 14/11/2024

5. Available Attendance Forms: Attendance lectures in the classroom

6. Number of Credit Hours (Total) / Number of Units (Total): 60/4

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Aamena Rasim Mohammed
Email: aamen.raimmohammed@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	- Understand the topological spaces with different examples - Understand concepts of open, closed sets and limit, interior, exterior, boundary sets in topological spaces - Understand continuous mapping on topological Spaces and their properties.

9. Teaching and Learning Strategies

Strategy	• Giving Lectures supported by exercises and activities in the classroom • Daily and Weekly Assessments. • Giving homework

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	(3)+(1) Discussion	Definition of Topolog Spaces	Topological Spaces	Lectures	General question, Discussion, assignments
Second	(3)+(1) Discussion	Examples of Topolog Spaces	Topological Spaces	Lectures	General question, Discussion, assignments

Third	(3)+(1) Discussion	Open and closed sets In Topological spaces	Topological Spaces	Lectures	General question, Discussion, Assignments
Fourth	(3)+(1) Discussion	The limit points and Closure of sets	Topological Spaces	Lectures	General question, Discussion, Assignments
Fifth	(3)+(1) Discussion	Interior points of sets in topological spaces	Topological Spaces	Lectures	General question, Discussion, Assignments
Sixth	(3)+(1) Discussion	Exterior points of sets in topological spaces	Topological Spaces	Lectures	General question, Discussion, Assignments
Seventh	(3)+(1) Discussion	boundary points of set in topological spaces	Topological Spaces	Lectures	General question, Discussion, Assignments
Eighth	(3)+(1) Discussion	Base and Sub-base	Topological Spaces with special properties	Lectures	General question, Discussion, Assignments
Ninth	(3)+(1) Discussion	Dense and Nowhere Dens sets with Properties	Topological Spaces with special properties	Lectures	General question, Discussion, Assignments
Tenth	(3)+(1) Discussion	Connected disconnected sets with Properties	Topological Spaces with special properties	Lectures	General question, Discussion, Assignments
Eleventh	(3)+(1) Discussion	Continuous mapping Between topological Spaces	Mapping Between Topological spaces	Lectures	General question, Discussion, Assignments
Twelfth	(3)+(1) Discussion	Open and closed sets With examples	Mapping Between Topological spaces	Lectures	General question, Discussion, Assignments
Thirteenth	(3)+(1) Discussion	Homeomorphisms	Mapping Between Topological spaces	Lectures	General question, Discussion, Assignments
Fourteenth	(3)+(1) Discussion	Hereditary with examples	Mapping Between Topological spaces	Lectures	General question, Discussion, Assignments
Fifteenth	(3)+(1) discussion	Product Topological Spaces	Mapping Between Topological spaces	Lectures	General question, Discussion, assignments

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Homework 5%
Daily preparation 5%
Monthly Assessments 30%
Final Test 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to General Topology, by: K. D. Joshi
Main references (sources)	TOPOLOGY, Edited by Dr. Sachin Kaushal

Recommended books and references (scientific journals, reports…)	Theory and problems of general topology, Seymour Lipchitz, Schuam's series,1965
Electronic References, Websites	https://en.wikipedia.org/wiki/Topology

Course Description Form

1. Course Name: Topology II

2. Course Code: MATH 416

3. Semester / Year: First/ 2024-2025

4. Description Preparation Date: 17/11/2024

5. Available Attendance Forms: Attendance lectures in the classroom

6. Number of Credit Hours (Total) / Number of Units (Total): 60/4

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Aamena Rasim Mohammed
Email: aamen.raimmohammed@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	- Understand the connectedness on topological spaces with different examples - Understand concepts of Separation Axioms, T_0, T_1, T_2, T_3, T_4 spaces and relation between them, and ability To prove some of their properties. - Understand compactness on topological Spaces and learn some fundamental theorems and ability to prove some properties of compactness.

9. Teaching and Learning Strategies

Strategy	• Giving Lectures supported by exercises and activities in the classroom • Daily and Weekly Assessments. • Giving homework

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	(3)+(1) Discussion	Paths	Connectedness	Physical Attendance Lectures	General question, Discussion, assignments
Second	(3)+(1) Discussion	Closed Path	Connectedness	Physical Attendance Lectures	General question, Discussion, assignments

Third	(3)+(1) Discussion	Pathwise Connected Topological Spaces	Connectedness	Physical Attendance Lectures	General question, Discussion, Assignments
Fourth	(3)+(1) Discussion	Pathwise Connected Topological Spaces	Connectedness	Physical Attendance Lectures	General question, Discussion, Assignments
Fifth	(3)+(1) Discussion	Simply Connected Topologic Spaces	Connectedness	Physical Attendance Lectures	General question, Discussion, Assignments
Sixth	(3)+(1) Discussion	Locally Connected Topologic Spaces	Connectedness	Physical Attendance Lectures	General question, Discussion, Assignments
Seventh	(3)+(1) Discussion	T_0 Space	Separation Axioms	Physical Attendance Lectures	General question, Discussion, Assignments
Eighth	(3)+(1) Discussion	T_1 Space and its relat with T_0 Space.	Separation Axioms	Physical Attendance Lectures	General question, Discussion, Assignments
Ninth	(3)+(1) Discussion	T_2 Space (Hansdorff Space) and its relatio with T_1 Space.	Separation Axioms	Physical Attendance Lectures	General question, Discussion, Assignments
Tenth	(3)+(1) Discussion	Regular spaces and T_3 Space and its rela with T_2 Space.	Separation Axioms	Physical Attendance	General question, Discussion, Assignments
Eleventh	(3)+(1) Discussion	Normal spaces and T_4 Space and its rela with T_3 Space	Separation Axioms	Physical Attendance Lectures	General question, Discussion, Assignments
Twelfth	(3)+(1) Discussion	Basic Definition and Fundamental Theore	Compactness Topological Spaces	Physical Attendance Lectures	General question, Discussion, Assignments
Thirteenth	(3)+(1) Discussion	Compactness in Hansdorff Spaces	Compactness Topological Spaces	Physical Attendance Lectures	General question, Discussion, Assignments
Fourteenth	(3)+(1) Discussion	Local Compactness	Compactness Topological Spaces	Physical Attendance Lectures	General question, Discussion, Assignments
Fifteenth	(3)+(1) discussion	Compactness Separation Axioms	Compactness Topological Spaces	Physical Attendance Lectures	General question, Discussion, assignments

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Homework 5%
Daily preparation 5%
Monthly Assessments 30%
Final Test 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to General Topology, by: K. D. Joshi

Main references (sources)	TOPOLOGY, Edited by Dr. Sachin Kaushal
Recommended books and references (scientific journals, reports…)	Theory and problems of general topology, Seymour Lipchitz, Schuam's series,1965
Electronic References, Websites	https://en.wikipedia.org/wiki/Topology

Course Description Form

1. Course Name: Complex Analysis I

2. Course Code: MATH411

3. Semester / Year: First/2024-2025

4. Description Preparation Date:2023-2024

5. Available Attendance Forms: Attendance

6. Number of Credit Hours (Total) / Number of Units (Total)60 hours

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Iman A. Hussain
Email: iman a. hussain@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	**1-To study the techniques of complex variable and functions together with their derivatives, contour integration and transformations.** **2-To study complex power series, classification of singularities.** **3-To study calculus of residues and its applications the evaluation of integ and other concepts and properties**

9. Teaching and Learning Strategies

Strategy	Lectures, Homework, some activities in the class, Electronic referenc

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	12	Field of com numbers	Chapter 1	lectures	
4-8	20	Analytic Functions	Chapter 2	lectures	
9-11	12	Elementary Functions	Chapter 3	lectures	

12-1	16	Elementary Mapping	Chapter 4	lectures	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Complex variables and applications Ruel v. Churchill 2-Complex analysis Theodore
Main references (sources)	1. Ablowitz, M. J., Fokas, A. S. (2003). *Complex variables: introduction and applications* (2nd ed). Cambridge University Press. 2. Brown, J. W., Churchill, R. V. (2009). *Complex Variables and Applications.* 8th Edition. New York: McGraw-Hill Higher Education. 3. Lundmark, H. (2004). *Visualizing complex analytic functions using domain coloring.* 4. Needham, T. (1997). *Visual Complex Analysis.* Oxford University Press, Oxford.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: Complex Analysis II

2. Course Code: MATH 412

3. Semester / Year: Second /2024-2025

4. Description Preparation Date:2023-2024

5. Available Attendance Forms: Attendance

6. Number of Credit Hours (Total) / Number of Units (Total)60 hours/4 Units

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Iman A. Hussain
Email: iman a. hussain@nahrainuniv.edu.iq

8. Course Objectives

Course Objectives	**1-To study integral together with various technique with their derivatives, contour integration and transformations.** **2-To study complex sequence and series and conformal mappings and Rimn sphere.**

9. Teaching and Learning Strategies

Strategy	Lectures, Homework, some activities in the class, Electronic referenc

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	12	Integral	Chapter 4	lectures	
4-8	20	Complex sequence	Chapter 5	lectures	
9-11	12	Conformal mapping	Chapter6	lectures	

12-1	16	Sphere surface	Chapter 7	lectures	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Complex variables and applications Ruel v. Churchill 2-Complex analysis Theodore
Main references (sources)	5. Ablowitz, M. J., Fokas, A. S. (2003). *Complex variables: introduction and applications* (2nd ed). Cambridge University Press. 6. Brown, J. W., Churchill, R. V. (2009). *Complex Variables and Applications.* 8th Edition. New York: McGraw-Hill Higher Education. 7. Lundmark, H. (2004). *Visualizing complex analytic functions using domain coloring.* 8. Needham, T. (1997). *Visual Complex Analysis.* Oxford University Press, Oxford.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	