Ministry of Higher Education and Scientific Research Scientific Supervision and Scientific Evaluation Apparatus Directorate of Quality Assurance and Academic Accreditation Accreditation Department

ACADEMIC PROGRAM DESCRIPTION GUIDE UNDERGRADUATE STUDIES BOLOGNA SYSTEM

2025-2026

Academic Program Description Form

University Name: Al-Nahrain University

Faculty/Institute: College of Scinces

Scientific Department: Department of Mathematics and Computer Applications

Academic or Professional Program Name: Bachelors

Final Certificate Name: Bachelors in Mathematics and Computer Applications

Academic System: Semester / Bologna System

Description Preparation Date: 2025-2026

File Completion Date: 28 / 10 / 2025

جامعة النهرين / كلية العلوم
قسم الرياضيات
و
تطبيقات الحاسوب

Signature:

Head of Department Name:

Prof. Dr. Fadhel Subhi Fadhel

Date: 6 / 11 / 2025

Signature:

Scientific Associate Name:

Assist. Prof. Dr. Manaf Adnan Saleh

Date: 6 / 11 / 2025

The file is checked by: Dr. Orooba Nadhim

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Lect. Dr. Orooba Nadhim Harbi

Date: 9 / 11 / 2025

Signature:

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

Approval of the Dean

Prof. Dr. Asmaa Hadi Mohammed

Introduction:

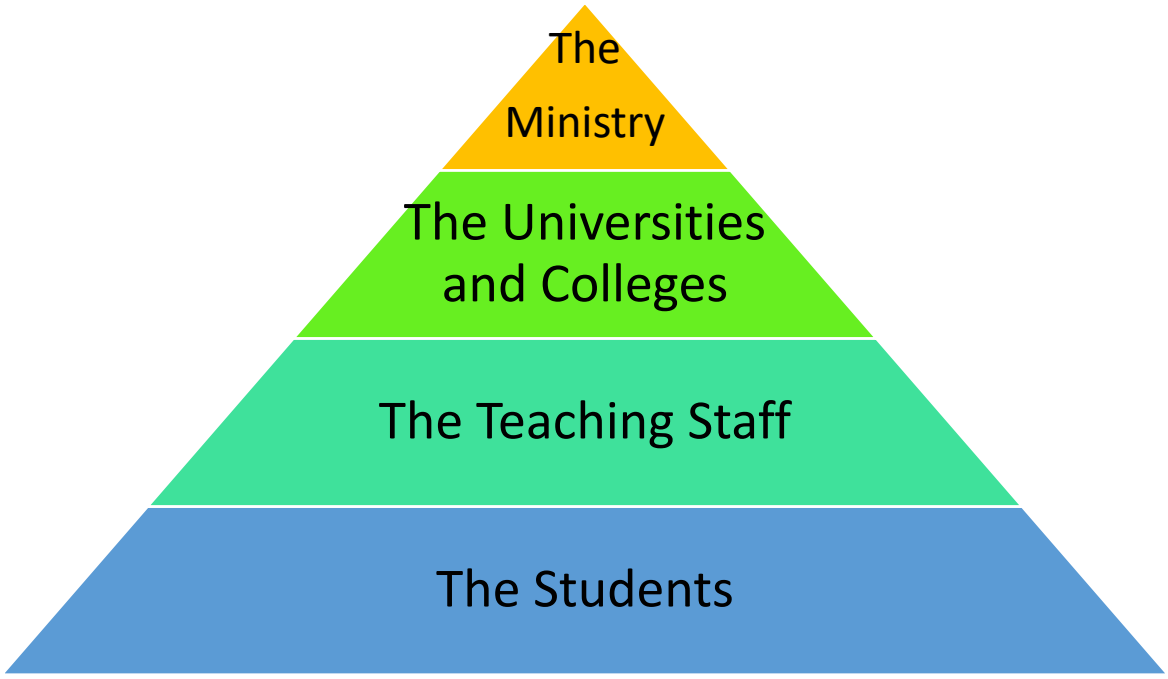
Based on the first edition of the Digital Bologna System (BIS) Guide, the Digital Bologna System is an integrated application system that combines the Student Information System (SIS) with the Bologna Process Application System. It represents the first and fundamental step in digitizing educational institutions and transforming them into smart universities. Its function is to handle all students' personal information, Bologna Process academic variables, university information, semester information, educational resources, academic reports, examination committees, and other academic activities. The system, with all its sections and functions, was analyzed and built in accordance with the laws and regulations in force in the Iraqi Ministry of Higher Education and Scientific Research, and based on the Bologna Process Guide, launched by the Ministry's Department of Studies, Planning, and Follow-up. It also operates according to the principle of the powers and permissions granted to educational and administrative bodies working within the educational institution.

The system administrator (ministry staff or teaching and administrative staff of the educational institution) can manage all system activities by providing the system with information about its users and distributing powers among them according to the tasks assigned to them, in addition to providing it with information about the educational institution such as the names of colleges, academic departments, study stages, etc. and other academic information, in addition to managing the reports provided by the system professionally in order to reach smart universities where decisions are made quickly, flexibly, and based on accurate data.

The advantages of using the system include:

1. A repository for storing all student personal and academic information.
2. A smart digital system for implementing the requirements and activities of the Bologna Process in accordance with the standards of the Iraqi Ministry of Higher Education and Scientific Research.
3. A repository for storing all personal and academic information of the institution's teaching staff.
4. The system is equipped with an integrated file manager, through which we can link all official documents and administrative orders to the student's digital record, as well as those of the institution's teaching staff.
5. An advanced system for evaluating the educational institution's professors and their courses, in order to measure the quality of education and its outcomes at these institutions.
6. Organizing and managing the electronic master sheet, which contains the student's grades and marks obtained during the academic level, with the above-mentioned master sheet available for each system (annual, semester, and course).
7. Forming central and sub-examination committees within the educational institution and distributing powers among them, in order to enter, organize, and manage student exam grades in the colleges and departments affiliated with that educational institution.
8- The ability to send various administrative notifications and alerts to both the teaching staff and the students, or one of them, with the ability to allocate these notifications to some and not to all.

It is also worth noting that those who use the Bologna Process information system are arranged hierarchically as follows:



Concepts and Terminology:

Academic Program Description: The academic program description provides a concise summary of the program's vision, mission, and objectives, including a precise description of the intended learning outcomes based on specific learning strategies.

Course Description: Provides a concise summary of the course's key features and the learning outcomes expected of students, demonstrating whether they have maximized the available learning opportunities. It is derived from the program description.

Program Vision: That the graduating students be academically, research-wise, and innovatively distinguished, qualifying them to engage efficiently in the labor market.

Program Mission: The mission of the academic program (Bachelor's) is for the Department of Mathematics and Computer Applications to provide distinguished academic education that aligns with quality and accreditation standards, combining theoretical foundations with contemporary applications that meet the changing demands of the job market. It also aims to prepare qualified scientific competencies capable of critical and analytical thinking, offering consultations that serve the community and promote sustainable development, as well as enriching scientific research.

Program Goals:

1- Enabling graduates to link academic and applied sciences according to the needs of society by understanding that mathematics and computer applications have great importance in planning and decision-making through analyzing data from state institutions, for example: banks, the Ministry of Defense, the Ministry of Planning, Health, Industry, and insurance companies, in a way that serves and contributes to the development of all the mentioned fields in the country.

2- The ability to design and conduct experiments, analyzes them, and estimates their results in the lab. This is achieved by creating mathematical models that simulate real scientific scenarios and then studying the results of these models with the possibility of developing them in the future in a way that aligns with available data and goals and serves the job market practically, in addition to the ability to deduce, analyze, and innovate.

3- Enabling bachelor's program graduates to secure a successful future and aspire to pursue higher studies in the field of mathematics and related areas.

4- Professionalism in various applications of mathematics, using the knowledge acquired to solve real-life and practical problems arising within the requirements of the labor market.

5- Instill a sense of awareness of ethical and professional responsibilities through the academic and practical journey toward the community in a way that does not conflict with societal norms and traditions.

Curriculum Structure: All courses/subjects included in the academic program according to the approved learning system (semester, annual, Bologna Process), whether required by a ministry, university, college, or scientific department, along with the number of credits.

Learning outcomes: A consistent set of knowledge, skills, and values acquired by a student after successfully completing an academic program. Learning outcomes for each course must be defined in a manner that achieves the program's objectives.

Teaching and learning strategies: These are the strategies used by faculty members to develop student teaching and learning. They are plans followed to achieve learning objectives. This describes all class and extracurricular activities to achieve the program's learning outcomes.

Republic of Iraq - Ministry of Higher Education and Scientific Research	جمهورية العراق - وزارة التعليم العالي والبحث العلمي
Al-Nahrain University	جامعة النهرين
Bachelor's degree in Mathematics and Computer Applications (First cycle)	بكالوريوس في علوم الرياضيات وتطبيقات الحاسوب (الدورة الأولى)
Four years (Eight semesters) 240 ECTS credits - 1 ECTS = 25 hr	أربع سنوات (ثمانية فصول دراسية) ٢٤٠ وحدة أوربية - كل وحدة أوربية = ٢٥ ساعة
Program Curriculum 2024-2025	المنهاج الدراسي للعام ٢٠٢٤-٢٠٢٥

Level	Semester	No.	Module Code	Module Name in English	اسم المادة باللغة العربية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	One	1	MATH1101	Calculus I	حساب التفاضل و التكامل ١	English	4		1		1		4	94	106	200	8.00	C	
		2	MATH1102	Foundation of Mathematics I	أسس الرياضيات ١	English	4		0		1		3	78	97	175	7.00	C	
		3	CREQ1111	Mechanical Physics	الفيزياء الميكانيكية	English	2		2		0		4	64	81	125	5.00	S	
		4	CREQ1103	Introduction to Chemistry	مدخل الى الكيمياء	English	2		2		0		4	64	81	125	5.00	S	
		5	URENG1	New Headway Plus	اللغة الإنكليزية	English	2		0		0		3	33	17	50	2.00	B	
		6	URCOM	Computer	حاسوب	English	2		2		0		3	83	12	75	3.00	B	
						Total	18	0	7	0	2	0	21	396	354	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة باللغة العربية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	Two	1	MATH1203	Calculus II	حساب التفاضل و التكامل ٢	English	4		1		1		4	94	81	175	7.00	C	
		2	MATH1204	Foundation of Mathematics II	أسس الرياضيات ٢	English	4		0		1		3	78	97	175	7.00	C	
		3	MATH1205	Finite Mathematics	الرياضيات المتنية	English	4		0		1		3	78	22	100	4.00	C	
		4	CREQ1212	Electricity and Magnetism	الكهربائية والمغناطيسية	English	2		2		0		4	64	81	125	5.00	S	
		5	CREQ1114	Computer Programming I	برمجة الحاسب الالي ١	English	2		2				4	64	81	125	5.00	S	
		6	URDEM	Democracy and Human Rights	الديمقراطية وحقوق الإنسان	Arabic	2		0				3	33	17	50	2.00	B	
						Total	18	0	5	0	3	0	21	411	339	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة باللغة العربية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGII	Three	1	URARA	Arabic Language	اللغة العربية	Arabic	2						3	33	17	50	2.00	B	
		2	MATH2108	Advanced Calculus I	التفاضل والتكامل المتقدم ١	English	4		1	0	1		4	94	106	200	8.00	C	MATH1101+MATH120
		3	MATH2107	Linear Algebra I	الجبر الخطي ١	English	4		1		1		4	94	81	175	7.00	C	
		4	MATH2108	Propability Theory	نظرية الاحتمالات	English	3				1		3	63	87	150	6.00	C	
		5	CRCOMPRO2	Computer Programming II	برمجة الحاسوب ٢	English	2		2				4	64	81	125	5.00	S	
		6	URBRC	Baath Regime Crimes in Iraq	جرائم نظام البعث في العراق	Arabic	2		0		0		3	33	17	50	2.00	B	
						Total	17	0	4	0	3	0	21	381	389	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة باللغة العربية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGII	Four	1	MATH2209	Advanced Calculus II	التفاضل والتكامل المتقدم ٢	English	4		1		1		4	94	81	175	7.00	C	
		2	MATH2210	Linear Algebra II	الجبر الخطي ٢	English	4		1		1		4	94	81	175	7.00	C	
		3	URARA2	Arabic Language II	اللغة العربية ٢	Arabic	2						3	33	17	50	2.00	B	
		4	URENG2	English Language	مادة اللغة الإنكليزية	English	2						3	33	17	50	2.00	B	
		5	MATH2212	Ordinary Differential Equations	المعادلات التفاضلية الاعتيادية	English	4						3	63	62	125	5.00	C	
		6	URCOM2	Computer 2	الحاسوب ٢	English	2		2				4	64	11	75	3.00	B	
		7	MATH2211	Operations Research	بحوث العمليات	English	3		1		1		4	79	21	100	4.00	C	
						Total	18	0	4	0	2	0	21	381	289	650	30.00		

Note: The student should complete 4 weeks of Summer Internships to fulfil the requirements of the Bachelor's degree

Structured SWL (hr/w) type			Module type				
	CL	Class Lecture		B	Basic learning activities	SWL:	Student Workload
	Lab	Laboratory		C	Core learning activity	SSWL:	Structured SWL
	Pr	Practical Training		B	Suport or related learning activity	USSWL:	Unstructured SWL
	Tut	Tutorial		E	Elective learning activity		
	Lect	Online lecture	Note: Columns O, Q and R are progrmaed, protected and should not be edited				
	Semn	Seminar					

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Al-Nahrain University	جامعة النهرين
Bachelor's degree in Mathematics and Computer Applications (First cycle)	بكالوريوس في علوم الرياضيات وتطبيقات الحاسوب (الدورة الأولى)
Four years (Eight semesters) 240 ECTS credits - 1 ECTS = 25 hr	أربع سنوات (ثمانية فصول دراسية) ٢٤٠ وحدة أوربية . كل وحدة أوربية = ٢٥ ساعة
Program Curriculum 2025-2026	المنهاج الدراسي للعام ٢٠٢٥-٢٠٢٦

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UG3	Five	1	MATH3101	Real Analysis I	التحليل الحقيقي ١	English	4				1		3	78	47	125	5.00	C	
		2	MATH3102	Numerical Analysis I	التحليل العددي ١	English	3		2		1		4	94	56	150	6.00	C	
		3	MATH3103	Abstract Algebra I	الجبر المجرد ١	English	3				1		3	63	62	125	5.00	C	
		4	MATH3104	Applied Mathematics	رياضيات تطبيقية	English	3				1		3	63	62	125	5.00	C	
		5	MATH3105	Theory of Ordinary Differential Equations	نظرية المعادلات التفاضلية الاعتيادية	English	3				1		3	63	62	125	5.00	C	
		6	MATH3106	Fuzzy Sets	المجموعات الضبابية	English	3				1		3	63	37	100	4.00	C	
						Total	19	0	2	0	6	0	19	424	326	750	30.00		

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
						CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
Six	1	MATH3201	Real Analysis II	التحليل الحقيقي ٢	English	4				1		3	78	47	125	5.00	C	
	2	MATH3202	Numerical Analysis II	التحليل العددي ٢	English	3		2		1		4	94	56	150	6.00	C	
	3	MATH3203	Abstract Algebra II	الجبر المجرد ٢	English	3				1		3	63	62	125	5.00	C	
	4	MATH3204	Partial Differential Equations	المعادلات التفاضلية الجزئية	English	4		2		1		4	109	66	175	7.00	C	
	5	MATH3205	Mathematical Statistics I	الإحصاء الرياضي ١	English	4				1		3	78	72	150	6.00	C	
	6	URMET	Ethics	الاخلاقيات المهنية	Arabic	1						3	18	7	25	1.00	B	
					Total	19	0	4	0	5	0	20	440	310	750	30.00		



Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Sciences
Department of Mathematics and Computer Applications



MODULE 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	Eman Khalid Khalef	**e-mail**	eman.khalid@nahrainuniv.edu.iq
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	Inequalities, Intervals, Absolute value, Properties of Absolute values.

2	
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- أ. م.د. ابتسام كامل حنان 2- م. رنين زيد حمود 3- م. ورود رياض
4- م.م.بتول امخيلف 5-م.م. ايمان خالد 6- م.م. رقيه سعدي

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.

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University College of Science
Department of Math and Computer Application

MODULE DESCRIPTION FORM

Module Information
معلومات المادة الدراسية

Module Title	Computer	**Module Delivery**	
Module Type	Basic		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	URCOM		
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	19/12/2024	**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	1. The History of the Personal Computer 2. Understanding Digital Components 3. Processing, Storage, and Connectivity 4. Input and Output peripherals 5. Understanding Number systems 6. The Applications Software and OS 7. Communication and Computer networks 8. The Internet and World Wide Web 9. Cloud computing
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. You will understand the differences between input and output devices 5. You will be able to explain the types and functions of operating systems 6. Describe the different types of application software 7. You will be able to use Microsoft Office applications (Word, Excel and PowerPoint) 8. You will be able to convert numbers in binary and other number system with binary arithmetic operations 9. 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. 10. Describe the Cloud computing
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. 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, the Internet and Cloud computing.

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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
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	5% (5)	Continuous	All
	Assignments	2	10% (10)	7,8	All
	Report	1	10% (10)	Continuous	
	Lab	2	15% (15)	8,14	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7,15	All
	Final Exam	4hr	50% (50)	16	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 (Input/Output Units)
Week 7	**Mid-term Exam 1**
Week 8	Computer Number Systems

Week 9	Computer Arithmetic (Operations in Binary)
Week 10	Computer Software and Operating System
Week 11	Data Communication and Computer Networks
Week 12	The Internet and WWW (Web Browsers)
Week 13	The Internet and WWW (Communications and Emails)
Week 14	Cloud computing and Services
Week 15	**Mid-term Exam 2**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Computer Hardware and Understanding Operating Systems
Week 2	Lab 2: Working with Windows (Windows Features, Decorating Widows and Basic windows)
Week 3	Lab 3: Working with Windows (Folders and Files)
Week 4	Lab 4: Working with Windows (Window Settings)
Week 5	Lab 5: Starting Microsoft Word (Application environment, entering Your Text, fonts styles ….)
Week 6	Lab 6: Starting Microsoft Word (Documents features, create a table and insert an equation)
Week 7	Lab 7: Starting Microsoft Word (Document decorate as output)
Week 8	**Practical Exam 1**
Week 9	Lab 8: Data analysis with Microsoft excel (create data model and formatting tools)
Week 10	Lab 9: Data analysis with Microsoft excel (using formula and basic functions)
Week 11	Lab 10: Data analysis with Microsoft excel (filtering data)
Week 12	Lab 11: Presentation authoring with Microsoft PowerPoint (Creating a New Presentation)
Week 13	Lab 12: Presentation authoring with Microsoft PowerPoint (Enhancing Presentation - Visuals and Media)
Week 14	**Practical Exam 2**
Teaching Staff	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts		
Recommended Texts	• Cambridge IGCSE Information and Communication Technology (3rd. Edition) by David Watson, Graham Brown 2021 • Fundamentals Of Computers (1st Edition) by E. Balagurusamy 2009	No

	• Microsoft Office 2019 Step by Step (1st Edition) by Joan Lambert, Curtis Frye 2019	
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.

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Science
Mathematics and
Computer Applications Department

MODULE DESCRIPTION FORM

Module Information
معلومات المادة الدراسية

Module Title	Mechanic physics	**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 مخرجات التعلم للمادة الدراسية	1. Providing the student with sufficient experience to deal with kinetic systems according to the mathematical theories and laws compatible with them. 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 اسبوعا			
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
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	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Math and Computer Application	



MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية			
Module Title	**General Chemistry**		**Module Delivery**
Module Type	**Core**		• ☒ **Theory** • ☒ **Lecture** • ☒ **Lab** • ☐ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code			
ECTS Credits			
SWL (hr/sem)			
Module Level		**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Atheel Alwash	**e-mail**	atheelalwash@nahrainuniv.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	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 **أهداف المادة الدراسية**	The primary objective of this course is to acquire basic concepts, principles, and techniques of modern chemistry including a mix of (analytical chemistry and basic of organic chemistry) that would empower students with an investigative mind set and the abilities to solve diverse 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. 7. To understand some basic of organic chemistry such structure and properties of alcohol, alkane alkene …
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 general chemistry 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 - To know basic definitions, properties and nomenclature of alkan, alkenes, alcohol etc. - Understanding the principles of gravimetric and specrochemical methods - Understanding the acid/base reactions and titration methods Effectively teach practical science through the context of analytical chemistry Design problem solving activities to challenge student understanding of analytical chemistry Understanding the safe handling of chemicals and the principles apparatus and unit operation in analytical chemistry
Indicative Contents المحتويات الإرشادية	

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	102	**Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا**	7

الفصل			
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	Chemicals, Apparatus, and Unit Operations of Analytical Chemistry
Week 2	Concentrations of solutions: molarity, normality, part per million and percentage
Week3	
Week 3	Aqueous solutions: solubility and Chemical Equilibria
Week 4	
Week 5	Gravimetric method of analysis
Week 6	Acid and Bases: pH buffer acid-base and titration
Week 7	Introduction to Spectrochemical Methods
Week 8	The nature of chelation: Equilibria in solution of chelating ligands. Conditions for chelation.
Week 9	Med exam
Week 10	Organic Chemistry: Alkanes
Week 11	Alkenes and Alkynes, Nomenclature of Alkenes and Alkynes

Week 12	Aromatic compounds: Nomenclature of Benzene Derivatives
Week 13	Structure and Properties of Alcohols: Ethers: Thiols
Week 14	Final exam
Week 15	Review and open discussion with the students
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	No
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.				

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	New Headway Plus	**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		**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**	The main objective of this course is to strengthen the English language skills 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 **مخرجات التعلم للمادة الدراسية**	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 Plus 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) خلال للطالب المنتظم غير الدراسي الحمل الفصل	17	**Unstructured SWL (h/w)** للطالب المنتظم غير الدراسي الحمل أسبوعيا	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 #A and B
	Assignments	2	10% (10)	2, 12	LO # A
	Seminars / Lab.	1	10% (10)	14	LO # B
	Report	1	10% (10)	13	LO # A and B
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # A and B
	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**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

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	**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.



ملاحظة :هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University College of Science
Department of Math and Computer Application

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	Nibras Yasir Khudhair		**e-mail**	nibras.yasir@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ms.c	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**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	To understand the concepts of sets, logic and functions and enable the student to study the theorems that are related to them. To understand the need for proofs and develop the skills to enable the student to construct for themselves formal proofs. To develop the manipulative skills and mathematical intuition necessary for the study of mathematics at university.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand and use logical notation and arguments. Construct simple mathematical proofs. To express correctly statements and proofs of simple mathematical theorems. To explain the properties of sets and their operations. Understand theorems related with algebra of sets and their proofs. Recognize the domain and the range of a function, draw the graph of a function Recognize the inverse of a function and the inverse image of a function. Understand the cardinal number and its applications. Recognize the countable sets.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Chapter One – Logic</u> Statements, propositional connectives, conjunction, disjunction, negation, conditional statement, implication, equivalence, statement formula and truth functional rules, universal quantifier, existential quantifier, negation of a statement formula involving quantifiers, tautology and logical equivalences, theory of logical inference, consistency of premises. <u>Chapter Two – Set Theory</u> Set, zermelo-fraenkel axiomatic system, subset, proper subset, intersection, empty set, union, De Morgan's law, successor, successor set, Peano's axiom. <u>Chapter Three– Cartesian product and relations</u> Cartesian product, relation, composition, inverse, reflexive relation, symmetric relation, antisymmetric relation, transitive relation, equivalence relation, equivalence classes, partition, quotient set,

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	Statements, propositional connectives, conjunction, disjunction, negation
Week 2	conditional statement, implication, equivalence.
Week 3	statement formula and truth functional rules, universal quantifier, existential quantifier.

Week 4	negation of a statement formula involving quantifiers, tautology and logical equivalences
Week 5	theory of logical inference, consistency of premises.
Week 6	Mid-term Exam+ Set, zermelo-fraenkel axiomatic system
Week 7	zermelo-fraenkel axiomatic system, subset, proper subset, intersection, empty set
Week 8	De Morgan's law, successor, successor set
Week 9	Peano's axiom.
Week 10	Cartesian product, relation, composition
Week 11	inverse, reflexive relation, symmetric relation, antisymmetric relation
Week 12	Mid-term Exam + transitive relation, equivalence relation,
Week 13	equivalence classes
Week 14	Partition
Week 15	quotient set
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**
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	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit

(0 – 49)				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\ First Term

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

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	Batool Imkhilif Ruqaya Saadi Yasameen Mueen Mays Majid	**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 nth 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:

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ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

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**	zainab.riyadh22@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Mais Majid Mohammed		**e-mail**	Mays.majid@nahrainuniv.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/09/2025	**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 مخرجات التعلم للمادة الدراسية	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 (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) 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)	6,12	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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer programming II			**Module Delivery**	
Module Type	Support			☒ **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	10. Cover fundamental programming concepts such as variables, data types, operators, expressions, and basic syntax specific to MATLAB. 11. Introduce students to MATLAB's capabilities in handling and manipulating data, including arrays (vectors and matrices), indexing, and slicing. 12. 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. 13. Familiarize students with writing and using functions and scripts in

	MATLAB, emphasizing good coding practices and code organization. 14. Provide students with skills in performing numerical computations and basic mathematical operations using MATLAB's built-in functions and operations. 15. Develop students' ability to apply MATLAB programming skills to solve simple computational problems and implement algorithms. 16. Equip students with skills in debugging MATLAB programs to identify and resolve errors
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. Understand MATLAB syntax and basic programming concepts (variables, operators, expressions). 12. Work with different data types (numeric, character, logical, etc.) in MATLAB. 13. Understand basic data structures such as arrays (vectors and matrices). 14. Perform arithmetic and logical operations using MATLAB. 15. Use conditional statements (if, else if, else) and loops (for, while) to control program flow. 16. Create and call user-defined functions in MATLAB. Differentiate between scripts and functions. 17. Perform basic numerical computations using MATLAB (e.g., solving equations, numerical integration). 18. 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	5% (5)	Continuous	All
	Assignments	4	10% (10)	Continuous	All
	Project	1	10% (10)	Continuous	
	Lab	2	15% (15)	8,15	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8,15	All
	Final Exam	4hr	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

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.

Module Information
معلومات المادة الدراسية

Module Title	Probability Theory		**Module Delivery**
Module Type	**Core**		☐ **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	23/10/2025	**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	Describe discrete data graphically and compute of location and dispersions (mean and variance) Compute probabilities by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional probability Introducing basic statistical methodology of data analysis including; graphs, descriptive statistics Interpret probabilities and use probabilities of outcomes to calculate probabilities of events in discrete sample spaces- exclusive and independent events

	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: A good understanding of elementary probability theory and its application A good understanding of the basic concepts of statistical inference A good understanding of the concept of a statistical distribution A good understanding of the standard univariate distributions and their properties A good understanding of exploratory data analysis. A good understanding of the laws of probability and the use of Bayes theorem A good understanding of the Central Limit Theorem and its application Ability to write a short-report describing a simple statistical data set.
Indicative Contents المحتويات الإرشادية	Exploratory data analysis: measures of location and spread; symmetry and skewness. Presentation and interpretation of data and report writing. 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. 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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Biology	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Crimes of the Ba'ath regime in Iraq			**Module Delivery**	
Module Type	Basic			**Theory** **Lecture** • **Lab** • **Tutorial** • **Practical** • **Seminar**	
Module Code	URBRC				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	2		**Semester of Delivery**	2	
Administering Department	**Math and Computer Application dept.**		**College**	**College of sciences**	
Module Leader	**Dr. Ahmed Neama Juda**		**e-mail**	**: ahmedjuda68@gmail.com**	
Module Leader's Acad. Title			**Module Leader's Qualification**	**University Doctor Assistant**	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**		

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى

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

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

Module Aims **الدراسي ة المادة أهداف**	1- Introducing the student to concepts and definitions related to the subject of crimes committed by the Baath regime during its rule over Iraq. 2- University students' knowledge of the reality of life over decades that Iraq lived through during the rule of the Baath regime in Iraq. 3- To increase students' knowledge of the facts without being influenced by any media blackout regarding the crimes of the Ba'athist regime in Iraq. The subject of the crimes of the Ba'athist regime in Iraq is important and necessary for students because it acquaints them with the events, circumstances, and violations that Iraq witnessed during the rule of the Ba'athist regime from 1968 to 2003. The subject also clarifies for students the effects of the Ba'athist regime's practices on Iraqi society.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. The student should understand the seriousness of crimes in general. 2. The student should understand the extent of the injustice perpetrated by the previous regime. 3. The student should comprehend the scope of crime and its legal consequences.
Indicative Contents **المحتويات الإرشادية**	To educate students about the subject of crimes throughout history and in Islamic law, the legal aspect in detail, and their

	consequences.
Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1) Primarily: Discussion and dialogue between the professor and students. 2) Regular presentation of documentaries to enhance understanding. Preparation of concise worksheets from selected groups on a weekly basis.

Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem) **الفصل خلال للطالب المنتظم الدراسي الحمل**		**Structured SWL (h/w)** **أسبوعي ا للطالب المنتظم الدراسي الحمل**	
Unstructured SWL (h/sem) **خلال للطالب المنتظم غير الدراسي الحمل الفصل**		**Unstructured SWL (h/w)** **أسبوعي ا للطالب المنتظم غير الدراسي الحمل**	
Total SWL (h/sem) **الفصل خلال للطالب الكلي الدراسي الحمل**			

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	General and foundational introduction to the subject / Crimes of the Ba'ath regime according to the Iraqi High Criminal Court Law of 2005.
Week 2	Psychological and social crimes, their effects, and the most prominent violations of the Ba'athist regime in Iraq .
Week 3	Ba’ath regime violations of public freedoms.
Week 4	The Ba'athist regime's stance on religion.
Week 5	Prisons and detention centers of the Ba'ath regime.
Week 6	Ba'ath regime violations against political parties.
Week 7	Environmental crimes of the Ba'ath regime in Iraq.
Week 8	Drying the marshes.
Week 9	Mid exam.
Week 10	Mass grave crimes .
Week 11	Events of the mass graves of genocide committed by the Ba'athist regime in Iraq.
Week 12	Discussing students' scientific reports as an assignment within the scope of the course.
Week 13	Chronological classification of genocide graves in Iraq for the period 1963-2003.
Week 14	Conducting an extensive discussion of the scientific material and identifying the most significant obstacles facing students.
Week 15	Preparatory Week (Study Material review for the final exam).
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:

Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	**- Ayman Abdel Aziz Salama, International Responsibility for the Crime of Genocide, 1st ed., Dar Al-Ulum for Publishing and Distribution, Cairo, 2006.** **- Raed Abis and Dr. Abbas Attia Al-Quraishi, United Nations Reports Condemning the Ba'ath Regime for Human Rights Violations during the Period 1991-2003, Publisher: Iraqi Center for Documenting Crimes of Extremism, 1st ed., Dar Al-Kafeel Press, Karbala, 2023.**	**available**
Recommended Texts	**- Hassan al-Khayyat, Geography of the Marshes and Swamps of Southern Iraq, Al-Alamiyah Press, Cairo, 1975.** **- Abbas Atiyah al-Quraishi, Raed Abis, and Hussein Ali Atwan, The Documentary Encyclopedia of Open Mass Graves in Iraq from 1963-2003, Publisher: The Iraqi Center for Documenting Crimes of Extremism, 1st Edition, Dar al-Kafeel Press, Karbala, 2003.**	**available**
Websites		

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	**مقبو ل**	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.

ملاحظة :هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Science
Mathematics Department and Computer Applications

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Optimization II**	**Module Delivery**	
Module Type	**Core**	☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☒**Seminar**	
Module Code	**math319**		
ECTS Credits	**5**		
SWL (hr/sem)	**75**		
Module Level	Gx1 third year	**Semester of Delivery**	One
Administering Department	Mathematics and Computer Applications	**College**	Science
Module Leader	Rewayda Razaq Mohsin	**e-mail**	rewayda.r.mohsin@nahrainuniv.edu.iq
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	PhD. Mathematics
Module Tutor		**e-mail**	
Peer Reviewer Name	Fadhel subhi Fadhel	**e-mail**	Fadhel.subhi@nahrainuniv.edu.iq
Review Committee Approval	1\10\2025	**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 word "optimum" is Latin, and means "the ultimate ideal;" similarly, "optimus" means "the best." Therefore, to optimize refers to trying to bring whatever we are dealing with towards its ultimate state. Optimization is an important tool in decision science and in the analysis of physical systems. To use it, we must first identify some *objective*, a quantitative measure of the performance of the system under study. This objective could be profit, time, potential energy, or any quantity or combination of quantities that can be represented by a single number. The objective depends on certain characteristics of the system, called *variables* or *unknowns*. Our goal is to find values of the variables that optimize the objective. Often the variables are restricted, or *constrained*, in some way. For instance, quantities such as electron density in a molecule and the interest rate on a loan cannot be negative. Our aim is to help the third stage study real-life problems and find mathematical solutions to them. 1. Develop a strategy to develop an understanding of real life problems. 2. Develop a strategy to write a model for clear and appropriate problems to solve them mathematically. 3. Encouraging students to use different methods to deal with new problems previously unknown to them through effective training of using mathematical solutions methods. 4. Exploring and evaluating research techniques, finding sources, and identifying sources to extract information. 5. Promote independent learning by encouraging students to return to the initial learning skills to stimulate memory or to see how new skills can build and develop the skills mentioned above
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student learns the skill of building a mathematical model. 2. The student learns the skill of solving the proposed model. 3. The student learns many ways to solve. 4. The student learns how to distinguish problems. 5. Learning programming by Matlab
Indicative Contents المحتويات الإرشادية	Students should be able to understand the basic concepts of optimization that deals with the real life problems.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• Teaching in the class and discussing the material with the students and ask questions. • Writing on a white board with a marker in the classroom for demonstration the subject. • Sudden daily and continuous weekly tests and participation in solving exercises. • Exercises and activities in the classroom and electronically. • Guide students to some sources that contain examples and exercises to

	benefit from them. • Develop the student's ability to work on the duties and deliver them on time. • Teaching them programming by using Matlab code • Trying to apply the concepts by solving different types of exercises. • Develop the student's ability to solve questions and discussion.

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	5% (5)	5, 10	
	Assignments				
	Projects / Lab.	2	10%(10)	4, 10	
	Report				
Summative assessment	**Midterm Exam**	2	25% (25)	7	
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
الأسبوع الاول	مقدمة عن البرمجة اللاخطية, مسائل التحسين, متسلسلة تايلور
الأسبوع الثاني	طرق التحليلية لحل المتغير المسائل ذات متغير واحد: الشرط الضروري و الشرط المكافئ

الأسبوع الثالث	مسائل الامثلية لاكثر من متغير بدون قيود: الشرط الضروري و الشرط المكافئ, الحالة العامة
الأسبوع الرابع	مسائل الامثلية لاكثر من متغير مع قيود معادلات: طريقة التعويض المباشرة
الأسبوع الخامس	طريقة التغاير المقيدة
الأسبوع السادس	امتحان شهري
الأسبوع السابع	الشرط الضروري و الشرط المكافئ, الحالة العامة
الأسبوع الثامن	طريقة مضروب لاكرانج: مسالة ذات قيد واحد و متغيرين, الشرط الضروري و الشرط المكافئ, الحالة العامة
الأسبوع التاسع	طرق الحذف لحل مسائل ذات المتغير واحد: طريقة تنصيف الفترة
الأسبوع العاشر	طريقة بوبيناتشي
الأسبوع الحادي عشر	طريقة المقطع الذهبي
الأسبوع الثاني عشر	الطرق التكرارية لحل الانظمة الاخطية
الأسبوع الثالث عشر	طرق البحث الانحدارالغير مباشر \طريقة (كوشي) الانحدار الشاهق
الأسبوع الرابع عشر	**طريقة الانحدار المترافق**
الأسبوع الخامس عشر	امتحان شهري
الأسبوع السادس عشر	

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: برنامج متسلسلة تايلور
Week 2	Lab 2: برنامج المصفوفة الموجبة
Week 3	Lab 3: برنامج طريقة لاكرانج
Week 4	Lab 4: برنامج طريقة تنصيف الفترة
Week 5	Lab 5: برنامج المقطع الذهبي
Week 6	Lab 6: برنامج فوبيوناتشي
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**1-** Engineering Optimization: Theory and	

	Practice, Fourth Edition Singiresu S. Rao. 2009 by John Wiley & Sons, Inc. 2- Numerical optimization / Jorge Nocedal, Stephen J. Wright. Springer series in operations research, 1999. 3- E. M. L. Beale, Introduction to optimization, 1989. 4- R. Fletcher, Practical methods of optimization, 1987.	
Recommended Texts		No
Websites		

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.



ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Solution of Ordinary Differential Equation (ODE)**		**Module Delivery**
Module Type	Core		• ☐ **Theory** • ☒ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** ☐ **Seminar**
Module Code			
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level		**Semester of Delivery**	2
Administering Department	Math. & Comp. Appl.	**College**	Type College Code
Module Leader	Asst. Prof. 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		**e-mail**	E-mail
Scientific		**Version Number**	

Committee Approval Date			

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 the students to be primarily concerned with learning the basic concepts of mathematics, application in reality, solution of ordinary differential equations with first-, and higher-order and their applications. In addition, different classes of ODEs are considered.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	Learning the basic concepts of differential equations, such as: o To be able to deal with ordinary differential equations (ODE) and their applications. o To be familiar with first order ODE and learning how to solve such equations. o To deal with higher order ODE and their solutions. o To learn the difference between homogeneous and non-homogeneous differential equations. o To have experience in applications of Laplace transform.
Indicative Contents **المحتويات الإرشادية**	1. Differential Equations: definition, properties, classifications. 2. First-order DE: Types, methods of solution: separable, homogeneous, exact, non-exact, linear, Bernoulli differential equation. 3. Higer-order DE: Definition, homogeneous linear DE., methods of solution. 4. Non-homogeneous DE: definitions, properties, <ethods

	of solution. 5. Laplace Transform: Definitions, properties, applications.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategy is presented by: Providing the students with a sufficient amount of mathematical terms and definitions by attending lectures and presenting on the whiteboard to connect the students with the lecturer to solve as many real-life applications as possible. The pdf lectures, homework, quizzes, reports, seminar, and exercises are shared on Google Classroom. The subject will be given to the students 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	3hr	50% (50)	16	All
Total assessment			100% (100		

	Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to DE's: Definition and classification of Differential Equations (DE's)
Week 2	First-order DE's: Separable DE.
Week 3	Homogeneous first-order DE.
Week 4	Exact differential equations
Week 5	Non-exact differential equations.
Week 6	Linear differential equation and Bernoulli equation.
Week 7	Higher-order DE's: The general form of higher-order DE's
Week 8	Homogeneous DE's
Week 9	Definition and methods on solving homogeneous DE's
Week 10	Nonhomogeneous DE's
Week 11	Definition, properties, and methods of solving non-homogeneous DE's
Week 12	Mid-Term Exam
Week 13	Reducing second-order DE to first-order DE
Week 14	Laplace Transform
Week 15	Definition / properties of Laplace transform and then using Laplace transformation in solving DE's
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	

Week 13	
Week 14	
Week 15	

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	[1] C. Henry Edwards and David E. Penney, Differential Equations and Linear Algebra, ser. Pearson International Edition, third edition. Pearson Education, United States of America, 2010. [2] William E. Boyce, and Richard C. DiPrima, Elementary Differential Equations and Boundary Value Problems, John Wiley and Sons, Inc. Seventh edition, United State of America. 2001.	No
Recommended Texts	Earl D. Rainville and Phillip E. Bedient, Elementary Differential Equations, Collier Macmillan Publishers, fifth Edition, New York, 1974.	Yes
Websites	https://www.khanacademy.org/math/differential-equations , 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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Arabic language**		**Module Delivery**
Module Type	**Basic**		• ☒ Theory • ☒ Lecture • ☐Lab • ☐ Tutorial • ☐ Practical • ☒ Seminar
Module Code	**URARA**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	2	**Semester of Delivery**	4
Administering Department	Mathmatics and Computer Applications	**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	Dr. Fadhel Subhi Fadhel	**e-mail**	fadhel.subhi@nahrainuniv.edu.iq
Scientific Committee Approval Date	2026	**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 Enabling the student to use the language vocabulary in the proper 7.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) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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	Kana and its sisters, Inna and its 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 Silent Alif
Week 14	Writing Number
Week 15	The Holy Quran – Surah Ya-Sin

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
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	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
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Third Stage\ First Term

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Sciences
Mathematics Department and Computer Applications

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Abstract Algebra (I)**	**Module Delivery**	
Module Type	**Core**	☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH3103**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	3	**Semester of Delivery**	1
Administering Department	MATH	**College**	Sciences
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	Nibras Yasser	**e-mail**	nibras.yasir@nahrainuniv.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	1/9/2025	**Version Number**	1

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 students to the fundamental concepts and principles of group theory. 2. To develop students' understanding of abstract algebraic structures and their applications. 3. To provide students with a solid foundation for further study in mathematics, physics, and

	other fields. 4. To understand the definition and properties of groups, subgroups, and homomorphisms. 5. To learn how to work with groups, including calculating with groups and proving theorems. 6. To understand the importance of group theory in various fields, such as physics, chemistry, and computer science. 7. To develop problem-solving skills using group theory. 8. To apply group theory to solve problems in mathematics and other fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing this module, students should be able to: 1. Define and identify groups, subgroups, and homomorphisms. 2. Prove theorems and results in group theory. 3. Apply group theory to solve problems in mathematics and other fields. 4. Analyze and understand the structure of groups and their applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Groups: definition, examples, and properties 2. Subgroups: definition, examples, and properties 3. Cosets and Lagrange's Theorem 4. Normal subgroups and quotient groups 5. Group homomorphisms: definition, examples, and properties 6. Isomorphism theorems

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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.133
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)	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	**Midterm Exam**	2	10% (10)	6,12	LO # 1-7

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Binary operation- algebraic structure- semi group- monoid
Week 2	Group and commutative group and some examples
Week 3	Properties of groups and some Theorems
Week 4	Left (right) cancellation law + some examples
Week 5	Order of a group and order of an element
Week 6	Some theorems and problems
Week 7	Exam 1 + definition of complex + multiplication of two complexes +definition of subgroup
Week 8	Two step test + one step test + some theorems and examples
Week 9	Definition of Coset +Some notes of cosets + Examples
Week 10	Normalizer of an element + self conjugate element + center of group
Week 11	Exam 2 + normal subgroup+ some results and examples
Week 12	Some theorems of normal group + some problems
Week 13	More theorems of Normal subgroup
Week 14	Quotient group (factor group) + some examples and theorems
Week 15	Review
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	A First Course in Abstract Algebra by John B. Fraleigh	Yes
Recommended Texts	Abstract Algebra by David S. Dummit and Richard M. Foote	No
Websites	Khan Academy: Group Theory	

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
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	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.



ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Science
Mathematics Department and Computer Applications

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**APPLIED MATHEMATICS**	**Module Delivery**	
Module Type	**THEORY**	☒**Theory** ☒**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☒**Seminar**	
Module Code	**316 Math – الرياضيات التطبيقية**		
ECTS Credits	**4**		
SWL (hr/sem)	**60**		
Module Level	3	**Semester of Delivery**	
Administering Department	Mathematics and computer applications	**College**	science
Module Leader	Wurood Riyadh	**e-mail**	Worood.riad@nahrainunive.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Master degree
Module Tutor	Wurood riyadh	**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**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	يهدف هذا المقرر إيجازاً مقتضياً لأهم خصائص المقرر ومخرجات التعلم المتوقعة من الطالب تحقيقها مبرهناً عما إذا كان قد حقق الاستفادة القصوى من فرص التعلم المتاحة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- تمكين الطلبة من الحصول على المعرفة والفهم لمبادئ الأساسية للرياضيات التطبيقية 2- تمكين الطلبة من الحصول على المعرفة والفهم الاستخدام طريقة متسلسلات القوى. 3- تمكين الطلبة من الحصول على المعرفة والفهم لحل الدوال الخاصة وايجاد صيغ نهائية تطبيقية لهكذا نوع من المعادلات. 4- تمكين الطلبة من التعرف على اهم تطبيقات متسلسلات فورير ودراستها وحلها نظريا
Indicative Contents المحتويات الإرشادية	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	سيتم تقديم الوحدة للطلاب من خلال سلسلة محددة من المحاضرات، مدعومة بممارسة حل المشكلات التي يتم تنفيذها في البرامج التعليمية التفاعلية. سيتم دعم هذه الدروس من خلال الممارسة والدراسة الموجهة خارج الفصل الدراسي. يتم تقديم البرامج التعليمية والتعليقات خلال هذه البرامج التعليمية.

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	20% (20)	5, 10	
	Assignments	2	10% (10)	2, 11	
	Projects / Lab.				
	Report	2	10% (10)	14	
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
الأسبوع الاول	معرفة الصيغة العامة للمعادلات التفاضلية من الرتبة الثانية ايجاد النقاط المنفردة والنقاط الاعتيادية للمعادلات
الأسبوع الثاني	طريقة متسلسلات القوى
الأسبوع الثالث	ايجاد صيغة الحل عند الاقتراب من النقاط الاعتيادية
الأسبوع الرابع	ايجاد صيغة الحل عند الاقتراب من النقاط الشاذة
الأسبوع الخامس	يجاد صيغة الحل عند الاقتراب من النقاط الشاذة – الجذور المختلفة
الأسبوع السادس	يجاد صيغة الحل عند الاقتراب من النقاط الشاذة – الجذور المتساوية
الأسبوع السابع	ايجاد صيغة الحل عند الاقتراب من النقاط الشاذة – الجذور المختلفة اللوغاريتمية والغير لوغاريتمية صيغ الحل كبير x عندما يكون المتغير
الأسبوع الثامن	التعرف على الدوال الخاصة ومزاياها وطرق دراستها وحلها
الأسبوع التاسع	دوال كاما وبيتا ودالة الخطأ دوال بيزل وليجيندر والكبر وحلهم باستخدام متسلسلات القوى
الأسبوع العاشر	المعادلات التفاضلية فوق الهندسية وفر فوق الهندسية ومعادلات هيرمت وحلها ودراستها
الأسبوع الحادي عشر	التعرف على متسلسلات وتحويلات فورير بتفاصيلها وأمثلتها واستخداماتها في حلول المعادلات التفاضلية الاعتيادية
الأسبوع الثاني عشر	تحويلات فورير الجيبية
الأسبوع الثالث عشر	متسلسلات فورير المعقدة والجيبية المعقدة

الأسبوع الرابع عشر	التفاضل والتكامل لمتسلسلات فورير
الأسبوع الخامس عشر	تحويلات فورير ونظرية الالتفاف

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

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

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.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Science
Mathematics Department and Computer Applications

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Real Analysis I**		**Module Delivery**	
Module Type	**C**		☐**Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MATH 3101**			
ECTS Credits	**5**			
SWL (hr/sem)	**125**			
Module Level	UG3	**Semester of Delivery**	1	
Administering Department	Mathematics and Computer Applications	**College**	Sciences	
Module Leader	Aamena Rasim Mohammed	**e-mail**	aamen.raimmohammed@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD	
Module Tutor	Ruqayah Saadi Hashem	**e-mail**	ruqayah.saadi@nahrainuniv.edu.iq	
Peer Reviewer Name		**e-mail**		
Review Committee Approval		**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- To provide a formal introduction to mathematical analysis by approaching concepts crucial in subsequent analytical topics. 2- Emphasis will be given to the concepts of real numbers, convergent of sequences of real numbers, metric spaces. 3- Understand the need for proof and developing the skills to enable the student to construct for themselves formal proofs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand the real number system. 2- Understand Completeness property. 3- Understand Absolute value property. 4- Understand concepts of convergence and divergence for sequences. 5- Understand subsequences and Cauchy sequences. 6- Understand metric spaces, open and closed sets. 7- limit points. 8- diameter of sets. 9- Understand complete metric spaces and contraction maps. 10- Understand compact metric spaces.
Indicative Contents المحتويات الإرشادية	Bounded sets, complete sets, convergent and divergent sequences, bounded and monotonic sequences, subsequences and Cauchy sequences, countable sets, metrics spaces, open and closed sets, limit points, contraction maps, complete metric spaces.

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 solving more examples and homework. Formative assessments, quizzes and seminar take 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.133
Total SWL (h/sem)	125		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
الأسبوع الاول	Well-ordered sets, complete sets, bounded sets
الأسبوع الثاني	Density of rational and irrational numbers, Absolute value
الأسبوع الثالث	Definition of the sequence
الأسبوع الرابع	convergent and divergent sequences
الأسبوع الخامس	Monotonic sequences
الأسبوع السادس	Subsequences
الأسبوع السابع	Cauchy Sequences
الأسبوع الثامن	Definition of metric spaces with examples
الأسبوع التاسع	Open and closed sets
الأسبوع العاشر	Limit points
الأسبوع الحادي عشر	Convergent sequence, Cauchy sequences, Complete metric spaces
الأسبوع الثاني عشر	Diameter of sets, bounded sets, distances between a point and set
الأسبوع الثالث عشر	Contraction Mapping
الأسبوع الرابع عشر	Compact sets
الأسبوع الخامس عشر	Hiene-Borel Theorem

الأسبوع السادس عشر	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Mathematical Analysis, Adil G. Naoum, Baghdad University-Iraq.	yes
Recommended Texts	Introduction to Mathematica Analysis, William F. Trench -USA 2015 Principle of Mathematical Analysis, Walter Rudin, 2000	yes
Websites	https://www.britannica.com/science/analysis-mathematics	

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.



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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Fuzzy Sets**		**Module Delivery**
Module Type	**Core**		• ☐ **Theory** • ☒ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	**MATH3106**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level		**Semester of Delivery**	1
Administering Department	Department of mathematics and computer applications	**College**	College of Sciences
Module Leader	Dr. Abbas Ibrahim	**e-mail**	abbas.ibrahim@nahrainuniv.edu.iq
Module Leader's Acad. Title	LECT.	**Module Leader's Qualification**	Doctora
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**	• Studying Fuzzy Logic and Its Connection to Classical Mathematical Logic within Set Theory • Reviewing the General Characteristics and Algebraic and Mathematical Operations of Fuzzy Sets • Formulating Real-life and Practical Problems Using Fuzzy Sets, and Demonstrating the Suitability of Fuzzy Logic in Such Studies • Exploring Selected Mathematical Topics Through Fuzzy Logic, Such as Calculating Fuzzy Derivatives and Integrals, Solving Fuzzy Differential Equations, and Studying Fuzzy Real Analysis
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. Defining the Concept of a Fuzzy Set and Comparing It to a Classical (Crisp) Set 2. Explaining the Concepts of Gradual Membership and Membership Functions 3. Clarifying the Basic Operations on Fuzzy Sets such as Union, Intersection, and Complement 4. Understanding the Concept of Fuzzy Relations and Their Properties 5. Identifying Fuzzy Systems and Their Core Components (Fuzzy Inference Systems) 6. Recognizing the Relationship Between Fuzzy Logic, Classical Logic, and Probabilistic Logic 7. Analyzing Mathematical or Logical Problems Involving Imprecise or Uncertain Data 8. Building Fuzzy Models to Represent Real-World Systems (e.g., Control or Decision-Making Systems) 9. Comparing Different Methods for Constructing Membership Functions and Selecting the Most Appropriate One for a Given Application

	10. Interpreting the Outputs of Fuzzy Systems and Drawing Conclusions
Indicative Contents **المحتويات الإرشادية**	1. Introduction to the Concept of Fuzziness and the Distinction Between Crisp and Non-Crisp Systems 2. Classical Sets vs. Fuzzy Sets 3. Membership Functions: Types and Shapes 4. Operations on Fuzzy Sets and Mathematical Operations on Fuzzy Data 5. Fundamental Properties of Fuzzy Sets: Inclusion and Equality 6. Representation of Relations and Applications in Databases 7. Implementation of Composite Relations in Intelligent Systems and Binary Operations on Fuzzy Relations 8. Understanding Fuzzy Logic Rules: Foundations and Principles 9. Differentiation in Fuzzy Logic 10. Integration in Fuzzy Logic

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	The teaching and learning strategy is considered a set of tools and practices employed by both the instructor and the student to comprehend the subject matter or academic course—in this case, the theory of fuzzy sets—in the best possible way. This process relies on two fundamental factors: the effectiveness of content delivery by the instructor, which is supported by teaching strategies, and the efficiency of content reception by the student, which is reinforced by learning strategies. Teaching strategies encompass a set of organized plans and methods adopted by the instructor to guide students toward achieving learning objectives. These include: Cognitive goals related to fuzzy logic, Skill-based goals involving the formulation of real-life problems in a mathematical manner through their representation in mathematical models, and Affective and value-based goals, achieved by developing a sensory

	perception of the nature of the problem and how to approach it. This is accomplished through specific teaching and learning methods aimed at enabling students to acquire both general and transferable preparatory skills

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	60	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	4
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	40	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	2.667
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)	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	Learning Fuzzy Logic
Week 2	Studying Basic Algebraic Operations with Examples
Week 3	Generalizing Crisp Concepts to Fuzzy Logic
Week 4	Understanding Types of Membership Functions and Analytical Methods for Deriving Some of Them
Week 5	Reviewing Types of Fuzzy Numbers and Their Relation to Fuzzy Sets
Week 6	Studying Different Types of Fuzzy Functions
Week 7	Applying the Extension Principle to Derive Fuzzy Derivatives and Integrals
Week 8	Exploring Fuzzification Functions and Deriving the Derivatives of Fuzzy Functions
Week 9	Using Left-Right Fuzzification Functions in Derivatives and Integrals
Week 10	Identifying Types of Fuzzy Differential Equations
Week 11	Solving Fuzzy Differential Equations Analytically Using Complex Numbers

Week 12	Studying Numerical Solutions of Fuzzy Differential Equations
Week 13	Using the Hausdorff Distance Function to Define the Fuzzy Metric Space
Week 14	Introducing Fundamental Definitions of Real Analysis within the Fuzzy Metric Space
Week 15	Studying Compact Sets and Convergent Sequences in the Fuzzy Metric Space
Week 16	**Preparatory week before the final Exam.**

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Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	1- Fuzzy Set Theory and Its Applications, Third Edition, By: H.-J. Zimmermann, 1996. 2- Fuzzy Mathematical Techniques with Applications, By: Kandel A., 1985. 3- Fuzzy Set Theory, Foundations and Applications, by Klir G. J. 4- Fuzzy sets and systems: theory and applications, by: D. J. Dubois and Prade.	No
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 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.



Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
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Department of Mathematics and Computer Applications

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Numerical Analysis I**		**Module Delivery**
Module Type	**Core**		• ☐ **Theory** • ☒ **Lecture** • ☒ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☒ **Seminar**
Module Code	**MATH3102**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level		**Semester of Delivery**	1
Administering Department	Department of Mathematics and Computer Applications	**College**	College of Sciences
Module Leader	Omar Ismael	**e-mail**	omar.ismael@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutors	Athraa Abdulsalam Nabaa Hussain Huda Abdulrazzaq Farah Lateef	**e-mail**	E-mail

	Adawiah Naji		
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**	To introduce students to the fundamental ideas, methods, and applications of numerical analysis. The module aims to: • Develop understanding of different types of numerical errors, their propagation, and control. • Provide theoretical and practical knowledge of numerical algorithms used to solve mathematical problems that have no closed-form solution. • Train students to implement and test algorithms for root-finding, interpolation, differentiation, and integration. • Strengthen the ability to analyze convergence, stability, and efficiency of numerical methods. • Encourage the use of computational tools (MATLAB) for applied problem solving.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	On successful completion of this module, students will be able to: 1. Identify and classify sources of error and evaluate their influence on numerical results. 2. Apply iterative methods (Bisection, Newton–Raphson, Secant, Fixed-Point) to solve nonlinear equations. 3. Construct and analyze polynomial interpolation formulas (Lagrange and Newton forms). 4. Derive and implement finite-difference formulas for numerical differentiation. 5. Apply and compare numerical integration techniques such as Trapezoidal, Simpson's, and Romberg rules. 6. Assess the convergence, accuracy, and computational cost

	of numerical algorithms. 7. Use mathematical software to perform numerical experiments and interpret results.
Indicative Contents **المحتويات الإرشادية**	• **Error Analysis** – accuracy, absolute / relative / percentage errors, truncation and round-off errors, Taylor expansion, stability of algorithms. • **Root-Finding Methods** – Bisection, Newton–Raphson, Secant, and Fixed-Point iteration; convergence theorems; stopping criteria; error bounds. • **Interpolation and Polynomial Approximation** – Lagrange and Newton divided-difference forms; error of interpolation; applications. • **Numerical Differentiation and Integration** – finite differences; Richardson extrapolation; Newton–Cotes formulas; composite rules; Romberg integration. • **Laboratory Work** – programming and comparison of numerical methods using MATLAB. • **Seminar Topics** – stability and efficiency of numerical algorithms; real-world engineering or physical applications.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	• **Lectures** – presentation of theoretical concepts, derivations, and examples. • **Tutorials** – guided analytical exercises and step-by-step algorithm design. • **Laboratory sessions** – computer implementation and numerical experimentation. • **Seminars / discussions** – applications of numerical methods and comparison of techniques.

	• **Independent study** – reading, homework, and project-based exploration.

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**	4
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	56	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	150		

Module Evaluation **تقييم المادة الدراسية**					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	5% (5)	3, 8	LO #1-6
	Assignments	2	10% (10)	6, 9	LO # 1-6
	seminar	1	10% (10)	12	LO # 6-7
Summative assessment	**Midterm Exam**	1	10% (10)	5,10	LO # 1-6
	Lab exam	1	15%(15%)		LO # 6-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Numerical Solution, type of errors; relative error, absolute error, percentage error, truncation error, round off error. Floating
Week 2	Bisection method, Newton's method.
Week 3	fixed-point iterative method
Week 4	Error analysis for Iterative Methods
Wee	Interpolation and Polynomial Approximation, Lagrange Polynomial

k 5	
Week 6	Interpolation and Polynomial Approximation
Week 7	Newton's Form of Polynomial Interpolation
Week 8	Midterm Exam
Week 9	Numerical Differentiation, Forward, backward and central difference approximation of the derivatives
Week 10	Numerical Differentiation, Higher Order Derivatives
Week 11	review
Week 12	Numerical Integration, Trapezoidal Method, Simpson's Method
Week 13	Quadrature Integration Methods, Including Gauss-Quadrature Methods, Newton Cots Open and Closed Methods
Week 14	Romberg integration
Week 15	Seminar and coursework presentations
Week 16	**Preparatory week before the final Exam.**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Fundamentals of MATLAB Programming, relative error, absolute error, percentage error, round off error. Floating
Week 2	Bisection method,
Week 3	Newton's method.
Week 4	Secant Method,
Week 5	fixed-point iteration,
Week 6	Lagrange Polynomial Interpolation
Week 7	Newton Divided Differences
Week 8	Extrapolation Methods

Week 9	Midterm Exam
Week 10	Forward, backward and central difference approximation of the derivatives.
Week 11	Higher Order Derivatives.
Week 12	Trapezoidal Method, Simpson's Method
Week 13	Quadrature Integration Methods, Including Gauss-Quadrature Methods, Newton Cots Open and Closed Methods
Week 14	Romberg Integration
Week 15	Seminar and coursework presentations

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Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Burden, R. L., Faires, J. D., & Burden, A. M. (2015). Numerical analysis. Cengage learning.	Yes
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 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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Mathematical Statistics I**		**Module Delivery**
Module Type	**CR**		• ☒ **Theory** • ☒ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	**MATH3205**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level		**Semester of Delivery**	2
Administering Department		**College**	
Module Leader	Akram Abbas Al-Sabbagh	**e-mail**	Akram.alsabbagh@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Akram Abbas Al-Sabbagh	**e-mail**	Akram.alsabbagh@nahrainuniv.edu.iq
Peer Reviewer Name	Dr. Fadhel Subhi	**e-mail**	fadhel.subhi@nahrainuniv.edu.iq
Scientific Committee Approval Date	22/01/2026	**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**	This course is designed to provide an introduction to the subject of mathematical statistical, which includes • 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
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	○ Review some basic statistical terms and properties which are of relevance to the area of analytical science. ○ The definition of random variable and its types. ○ The definition of the probability density function (pdf), the mode, the cumulative distribution function (cdf), the median, and their properties and some real-life applications. ○ Calculating the mathematical expectations such as the mean, moments, the variance, and the moment generating function (mgf). ○ Presenting the transformation of variables using the cdf technique. ○ Providing some of the most common statistical distributions with some properties and applications for both the discrete and the continuous types.
Indicative Contents **المحتويات الإرشادية**	1. Introduction to Statistics • Basics of probability theory • Random variable 2. Distribution of random variable • The probability density function (pdf) • The cumulative distribution function (cdf) • Mathematical expectations • Transformation of variables 3. Some special statistical distributions

	• Discrete distributions:
	  ○ Binomial distribution
	  ○ The Geometric Distribution
	  ○ Negative Binomial Distribution
	  ○ The Hypergeometric Probability Distribution
	  ○ The Poisson Distribution
	• Continuous distributions:
	  ○ The Uniform Distribution
	  ○ Gamma Distribution
	  ○ The Exponential Distribution
	  ○ Chi-Square Distribution
	  ○ The Beta Distribution
	  ○ The Normal Distribution

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The teaching methods used will be a combination of online-lectures, self-study, online practical workshops, and any combination of discussion, case study, problem-solving exercises and computer-based learning. The practical element of the course will be delivered separately to students in their various class groups (Biomedical Science/Medical Biotechnology, Forensic Science, Pharmaceutical Science) so that the examples used in the practical application of statistics can be tailored to their field of study.

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
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	72	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	4.8
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3, 7	LO #1, 2, and 3
	Assignments	2	10% (10)	5, 10	LO # 4 and 6
	Projects / Lab.	1	10% (10)	continuous	
	Report	1	10% (10)	14	LO # 5 and 7
Summative assessment	Midterm Exam	2 hr	10% (10)	8	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 to Statistics
Week 2	• The probability density function (pdf), properties and applications
Week 3	• The cumulative distribution function (cdf), properties and applications
Week 4	• Mathematical expectations
Week 5	• Transformation of variables
Week 6	• Binomial distribution
Week 7	• The Geometric Distribution • Negative Binomial Distribution
Week 8	• Midterm exam
Week 9	• The Hypergeometric Probability Distribution • The Poisson Distribution
Week 10	• The Uniform Distribution
Week 11	• Gamma Distribution
Week	• The Exponential Distribution

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Week 13	• Chi-Square Distribution
Week 14	• The Beta Distribution
Week 15	• The Normal Distribution
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Introduction to the Theory of Statistics, Alixander Mood,	Yes
Recommended Texts	Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Mathematical Statistics 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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Mathematics Department and Computer Applications	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Theory of Ordinary Differential Equations**		**Module Delivery**	
Module Type	**Core**		☒**Theory** ☒**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☒**Seminar**	
Module Code	**Math3105**			
ECTS Credits	**5**			
SWL (hr/sem)	**125**			
Module Level	Thired Year	**Semester of Delivery**	First	
Administering Department	Mathematics	**College**	Sciences	
Module Leader	Dr. Ahmed Ayyoub Yousif	**e-mail**	ahmed.ayyoub@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ahmed Ayyoub Yousif	**e-mail**	ahmed.ayyoub@nahrainuniv.edu.iq	
Peer Reviewer Name	Dr. Fadhel S. Fadhel	**e-mail**	fadhel.subhi@nahrainuniv.edu.iq	
Review Committee Approval		**Version Number**	1.0	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prer quisite 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 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. 2. After that, the course deals with the study of the phase level and the solution behavior of these systems without addressing their solution 3. 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will gain experience being able to solve various types of ODEs (first-order, second-order, and linear systems), understanding fundamental theories like existence and uniqueness, and analyzing solutions through techniques like phase portraits and stability analysis. Students should also be able to apply ODEs to model real-world phenomena, such as population dynamics or physical systems.
Indicative Contents المحتويات الإرشادية	1- The indicative contents of theory of ordinary differential equation are: 2- First, we will give the linear system of ordinary differential equations. 3- Give some theorems, lemmas and remarks about the fundamental Matrix of solution to linear system of ordinary differential equations. 4- Some theorem about homogenous and non- homogenous linear system of ordinary differential equations. 5- The relation between eigenvalues and eigenvectors with homogenous linear system of ordinary differential equations to finding the fundamental Matrix of solution. 6- The fundamental Matrix of solution to non-homogenous linear system of ordinary differential equations. 7- Jordan canonical form of 2×2 linear system. 8- Phase plane of 2×2 linear system. 9- Existence and Uniqueness theorem of first and higher order of ordinary differential equations. 10- Stability of Nonlinear Systems Ordinary Differential Equations.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Daily activity. 2. Complete the duties

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	
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	

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**	2	20% (20)	5, 10	
	Assignments	2	10% (10)	2, 11	
	Projects / Lab.				
	Report	2	10% (10)	14	
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
الأسبوع الاول	Linear systems
الأسبوع الثاني	Fundamental matrix solution
الأسبوع الثالث	some theorems, lemmas and remarks about the fundamental Matrix of solution to linear system of ordinary differential equations.
الأسبوع الرابع	Some theorem about homogenous and non- homogenous linear system of ordinary differential equations.
الأسبوع الخامس	The eigenvalues and eigenvectors of homogenous linear system of ordinary differential equations
الأسبوع السادس	Jordan canonical form of 2×2 linear system.
الأسبوع السابع	Phase plane of 2×2 linear system.
الأسبوع الثامن	Certain sequence of functions and the limiting function solution.
الأسبوع التاسع	Stability theory
الأسبوع العاشر	Stability theory
الأسبوع الحادي عشر	Existence theorem of first order of ordinary differential equations.
الأسبوع الثاني عشر	Uniqueness theorem of first order of ordinary differential equations.
الأسبوع الثالث عشر	Existence and Uniqueness theorem of higher order of ordinary

	differential equations.
الأسبوع الرابع عشر	Stability of Nonlinear Systems Ordinary Differential Equations.
الأسبوع الخامس عشر	Stability of Nonlinear Systems Ordinary Differential Equations.
الأسبوع السادس عشر	Liapunov stability

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The Qualitative Theory of Ordinary Differential Equations. By Fred Brauer ،John A. Nohel	
Recommended Texts		No
Websites		

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.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Sciences
Department of Mathematics and Computer Applications

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

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	Asst. Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Eman Khalid Khalef	**e-mail**	eman.khalid@nahrainuniv.edu.iq
Peer Reviewer Name	me	**e-mail**	E-mail
Scientific	01/09/2023	**Version**	1.0

Committee Approval Date		**Number**	

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 o To determine proper integral of one variable functions. o To determine integral involving the fundamental theorem of Calculus and method of substitution. o To determine the solution of problems involving the integral of one variable function. o To compute integral involving transcendental functions. o To compute integral with advanced integration techniques. o To demonstrate ability to think critically by recognizing patterns and determining and using appropriate techniques for solving a variety of integration problems. o To solve indeterminate forms and improper integral problems. o To calculate the length of a plane curve and solving area and volume application problems. o To sketch the graph of a polar equation and the area problems in the polar coordinate system. o 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

1- أ. م.د. ابتسام كامل حنان 2- م. رنين زيد حمود 3- م. ورود رياض
4- م.م.بتول امخيلف 5-م.م. ايمان خالد 6- م.م. رقيه سعدي

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
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	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.

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University College of Science
Department of Math and Computer Application

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer Programming 1			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRCOMPRO1				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
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	Nibras Yasir Khdair Batool Imkhelif Worood Riadh Shaymaa Abdulsattar Eman Khalid Mays Majid Muna Salih Addawea Naji		**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	17. Understanding the computer languages and their features 18. Learn how to analysis a problem using algorithms 19. The ability using flowcharts and pseudocode for expressing the problem and converting it to program in C++ 20. Equip students with a solid understanding of the basic syntax and structure of C++ programs. 21. Enable students to declare, initialize, and work with various data types, and understand the importance of type conversion and type safety in C++. 22. Develop students' ability to implement conditional logic using if, else, and switch statements, allowing them to control the flow of their programs. 23. Foster an understanding of the importance of logical operations and conditions in solving real-world problems. 24. How to use for, while, and do-while loops to repeat operations efficiently, introducing control structures like break and continue for managing loop execution. 25. Provide a strong understanding of how to define, call, and pass arguments to functions, enabling students to write modular, reusable, and maintainable code. 26. the differences between passing by value and by reference and how to handle return values. 27. Introduce arrays and their role in handling collections of data, as well as how to manipulate strings operations like concatenation, comparison, and length manipulation. 28. Encourage students to develop problem-solving skills by applying their knowledge of C++ concepts to solve practical problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students should be able to: 1. Write an algorithm, flowchart and pseudocode in order to convert to program in C++ 2. Write and Execute Simple C++ Programs. 3. Understand and Use Variables and Data Types. 4. Implement Conditional Logic and Decision-Making. 5. Use Loops for Iteration. 6. Define and Call Functions and user defined functions 7. Work with Arrays and Strings
Indicative Contents المحتويات الإرشادية	• Algorithm, flowchart and pseudocode • Overview of C++ (Setting C++ Environment and Structure of a C++ Program) • Variables, Data Types, and Constants • Operators in C++ (Arithmetic, relational and logic Operators) • Control Flow: Conditional Statements and Loops • Functions and user defined function • Arrays and String in C++

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	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**	4	5% (5)	3,6,10,13	All
	Assignments	4	10% (10)	4,7,11,14	All
	Project	1	10% (10)	Continuous	
	Lab	2	15% (15)	8,15	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	8,15	All
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computer Languages
Week 2	Planning of Computer Program (Algorithms and Flowcharts)
Week 3	Planning of Computer Program (Pseudocodes)
Week 4	Operators in C++
Week 5	Conditional Statements
Week 6	Conditional Loops
Week 7	Loop Control Statements
Week 8	Mid-term exam
Week 9	Functions: Basics and Parameters (definition, declaration, and calling)
Week 10	Recursive Functions
Week 11	Arrays: Basics and Manipulation (Declaring, initializing, and accessing array elements)
Week 12	Arrays: Multi-dimensional arrays
Week 13	Introduction to C-strings (null-terminated arrays of characters)
Week 14	Basic string operations: concatenation, comparison, length, etc.
Week 15	Mid-term Exam 2

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to C++ Programming (Writing, compiling, and running your first "Hello, World!" program)
Week 2	Lab 2: Introduction to Variables and Data Types (Identifiers, Introduction to variables and constants)
Week 3	Lab 3: Arithmetic and Relational operators
Week 4	Lab 4: Logical operators, Assignment operators, increment, and decrement operators
Week 5	Lab 5: if, else if, else statements, Nested if conditions and switch statement
Week 6	Lab 6: for loop, while loop and do-while loop
Week 7	Lab 7: break and continue statements
Week 8	Practical Exam 1
Week 9	Lab 8: Write a user defined function
Week 10	Lab 9: Recursive Functions examples
Week 11	Lab 10: one dimension array declaration with examples
Week 12	Lab 11: two-dimension array declaration with examples
Week 13	Lab 12: Using the `string` class (Standard Library)

Week 14	Lab 13: Other string functions in C++ with examples
Week 15	Practical Exam 2
Teaching Staff	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
Recommended Texts	• A Complete Guide to Programming in C++ by Ulla Kirch-Prinz, Peter Prinz 2001 • Schaum's Outline of Programming with C++ (2nd. Edition) by John Rast Hubbard 2000 • Introduction to Algorithms, Second Edition (2nd. Edition) by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein 2001	No
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 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.

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Science
Mathematics and Computer Applications Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	ELECTRICITY AND MAGNETISM	**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	2025\2026	**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	4. Understand electric charge and electric field. 5. Knowing the materials. 6. Identify the electric field of charges and electric field lines. 7. Identifying the forces, moments and electric potential energy. 8. Learn about the electrostatic field. 9. Identification of a point charge inside a spherical surface. 10. Identify the resistance and capacitance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Make the student able to: 3. Understand electric charge and electric field. 4. Knowing the composition of the material. 5. Know the types of matter. 6. Know the types of electric charge. 7. Learn about Coulomb's law. 8. Identify the electric field of charges and electric field lines. 9. Learn about the electrostatic field. 10. Learn about Ohm's Law. 11. 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 اسبوعا			
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.

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University College of Science
Department of Math and Computer Application

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	**7**				
SWL (hr/sem)	**175**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	MATH		**College**	Science	
Module Leader	Nibras Yasir Khudair		**e-mail**	nibras.yasir@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ms.c	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/2/2026		**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	To become familiar with different types of relations between two sets. To understand the complete and well ordered sets. Perform appropriate proofs of properties within a given number system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand and use relations on a set and arguments. Construct the equivalence relations and find the equivalence classes. Understand Partial order and total order relations. Recognize the bounded sets and complete sets. Understand the construction of the natural numbers and understand their properties Understand the construction of the integer numbers, rational numbers and their properties Use the mathematical induction in proofs within a given number system. Understand the construction of the complex numbers and perform appropriate calculations within this number system. Understand the binary operation and groups.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Chapter One –Functions</u> Mapping, domain, co-domain, range, image, composite, identity map, surjective, injective, bijective, inverse, inverse image, direct image. <u>Chapter Two –Ordering</u> Partial order and total order, Upper bound, minimal element, Lower bound, Least upper bound, Greatest lower bound, Complete sets, Well-ordered set . <u>Chapter Three– Basic Concepts in Group Theory</u> Binary Operation, groupoid, associative operation, commutative operation, identity element and inverse, Basic definitions, Groups, Commutative group, Subgroup, Order of group, semigroup, commutative semigroup.

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	6.46666667
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)	6,11	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	Mapping, domain, co-domain, range, image
Week 2	composite, identity map, surjective
Week 3	injective, bijective, inverse
Week 4	inverse image
Week 5	direct image
Week 6	Mid-term Exam+ Partial order and total order
Week 7	Least upper bound, Greatest lower bound
Week 8	Complete sets, Well-ordered set
Week 9	Binary Operation, groupoid
Week 10	associative operation, commutative operation
Week 11	Mid-term Exam+ identity element and inverse
Week 12	Basic definitions, Groups, Commutative group
Week 13	Subgroup
Week 14	Order of group
Week 15	Semigroup, commutative semigroup
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.

Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University College of Science
Department of Math and Computer Application

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	Muna Salih	**e-mail**	muna.saleh@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor	Yasmeen Muaen	**e-mail**	
Peer Reviewer Name		**e-mail**	E-mail
Scientific Committee Approval Date	2025/2026	**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: To be able to deal with Sigma Notation, and mathematical induction. To be familiar with complex numbers and their properties. To deal with matrices: definition and some applications, and solution of mathematical equations with first, and higher degrees. To learn about polynomials and their properties with applications and definitions. To have experience in applications of Linear functions.
Indicative Contents **المحتويات الإرشادية**	Mathematical induction: summation, induction. Complex numbers: definitions, solutions, polar coordinates, Demoiver's Theorem, square roots of complex numbers. Matrices: definitions, type of matrices, operations on matrices, determinants, the inverse of matrices, linear systems, solving linear systems. Polynomials: definitions, properties, number of the roots, Cardan method, solution of nonlinear systems. . 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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Math and Computer Application	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية

Module Title	**Democracy and Human Rights**	**Module Delivery**	
Module Type	**Theory Lecture**	**Theory Lecture**	
Module Code		**Lab** **Tutorial** **Practical** **Seminar**	
ECTS Credits			
SWL (hr/sem)			
Module Level	**First stage**	**Semester of Delivery**	**Second Semester**
Administering Department	**Math and Computer Application**	**College**	**College of sciences**
Module Leader	**Dr. Ahmed Neama Jouda**	**e-mail**	**: ahmedjuda68@gmail.com**
Module Leader's Acad. Title		**Module Leader's Qualification**	**University Doctor Assistant**
Module Tutor	-	**e-mail**	-
Peer Reviewer Name		**e-mail**	
Review Committee Approval	1/2/2026	**Version Number**	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى

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

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

Module Aims الدراسي ة المادة أهداف	**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.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Cognitive objectives:** **A1- Introducing the student to the principles of human rights.** **A2- Briefly introduce the student to the nature of human rights and freedoms and the nature of democracy and its types.** **A3- Comprehensive knowledge of human rights and basic freedoms in light of the existing reality and types of political systems and states.** **A4- Introducing the bullying stereotype and the Iraqi historical performance in Iraqi governments in the ancient and modern era.** **The skills objectives of the course:** **B1 - Introducing the student to human rights and freedoms and how to deal with international and regional treaties and their internal legislation.** **B2 - Deriving knowledge related to human rights and how they are reflected and their true civilizational role in the lives of peoples.** **B3 - Knowing how different governments and ideologies deal with human rights and democracy in practice in countries of the world.**
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	**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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الفصل خلال للطالب المنتظم الدراسي الحمل		Structured SWL (h/w) أسبوعي ا للطالب المنتظم الدراسي الحمل	
Unstructured SWL (h/sem) خلال للطالب اله		Unstructured SWL (h/w) أسبوعي ا للطالب المنتظم غير الدراسي الحمل	
Total SWL (h/sem) الفصل خلال للطالب الكلي الدراسي الحمل			

Module Evaluation الدراسية المادة تقييم					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2 times	10 marks		
	Assignments	once	20 marks		
	Seminars / Lab.				
	Report	once	10 marks		
Summative assessment	Midterm Exam	once	10 marks		
	Final Exam	once	50 marks		
Total assessment			100 marks		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Concepts about human rights and fundamental freedoms.
Week 2	Categories and Features of Human Rights.
Week 3	Characteristics and advantages of human rights in Islam.
Week 4	The difference between human rights and public freedoms.

Week 5	Freedom, its concept and types.
Week 6	Human rights In ancient civilizations (Mesopotamia civilization) .
Week 7	Human rights in ancient civilizations (Chinese, Hindu, Pharaonic and Greek Egypt) .
Week 8	Human rights in the heavenly religions (Christianity and Islam).
Week 9	Human rights in the Middle Ages.
Week 10	Human rights in the modern era and the international organizations responsible for implementing them.
Week 11	The concept of democracy and it's characteristics.
Week 12	Types of democracy.
Week 13	Pictures of democratic systems.
Week 14	Democratic political rights.
Week 15	Preparatory Week (Study Material review for the final exam).
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?

Required Texts	**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) .**	**Not available**
Recommended Texts	**Human rights in the Arab world (Hussein Jameel) .**	**Not available**
Websites		

APPENDIX:

ADING 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	**مقبو ل**	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.				

ملاحظة :هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

Second Stage\ Second Term

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**ADVANCED CALCULUS II**		**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			**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	6. To introduce the students to the partial derivatives for functions of two or more variables. Limit and continuity, chain rules. 7. Study and solutions of the directional derivatives and tangent plans, maxima, minima and saddle points, Lagrange multiplier. 8. Studying double integral and iterated integrals over rectangles, double integral over general regions, area by double integration, triple integrals in rectangular coordinates, Substitutions in double integrals and line integral. 9. Studying Vector fields, Greens theorem, Surface and area and Surface integrals. 10. Studying and understanding the Stokes theorem and The diverge theorem.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. That students gain proficiency in computations, in advance calculus. 7. That students to be able knowledge and understanding oh how laws are linked. 8. That Students enhance their logical thinking and problem structuring abilities. 9. That students can obtain knowledge and understanding the advanced differentiation and integrations. 10. 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 the vector fields in details. 3. The various types of integrations and its applications will be discussed and studying intensively.		
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	Function of two or more variables, Limit and continuity.
Week 2	Partial derivatives, chain rules.
Week 3	Directional derivatives and tangent planes.
Week 4	Maxima, minima and saddle points.
Week 5	Lagrange multiplier.
Week 6	Double integral and iterated integrals over rectangles.
Week 7	Double integral over general regions.
Week 8	Area by double integration, triple integrals in rectangular coordinates.

Week 9	Substitutions in double integrals, line integral.
Week 10	Vector fields, Greens theorem.
Week 11	Surface and area.
Week 12	Surface integrals.
Week 13	Stokes theorem.
Week 14	The diverge theorem.
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 and continuity.
Week 2	Lab 2: Computing derivatives.
Week 3	Lab 3: Finding Maxima and minima.
Week 4	Lab 4: Using Lagrange multiplier in MATLAB.
Week 5	Lab 5: Computing Integral and double integral.
Week 6	Lab 6: Calculating area by double integration and line integral.
Week 7	Lab 7: Using Greens theorem 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.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	English Language II	**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**	Second
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		**e-mail**	
Review Committee Approval	2025\2026	**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	The main objective of this course is to reinforce the importance

الدراسية المادة أهداف	of English language for the Second 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 – Enhancing the student's business conversations using the English language. B2 – improve their 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 and life concerns.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• The New Headway Pre-Intermediate 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 second 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 listen 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) خلال للطالب المنتظم غير الدراسي الحمل الفصل	17	**Unstructured SWL (h/w)** للطالب المنتظم غير الدراسي الحمل أسبوعيا	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 #A and B
	Assignments	2	10% (10)	2, 12	LO # A and B
	Seminars / Lab.	1	10% (10)	14	LO # B
	Report	1	10% (10)	13	LO # A
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # A and B
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	How to introduce yourself and personality through talking about your ideas
Week 2	Reading material
Week 3	Writing methodology using English Language
Week 4	Re-introducing the additional material “English for the students of mathematics”
Week 5	Listening training and quiz
Week 6	Practicing conversations of two persons each, the theme is “Job Interview”
Week 7	Preparing students by a review for the Mid exam
Week 8	First mid exam
Week 9	Teaching students how to prepare a questionnaire; students will practice during the lesson
Week 10	Some extra activities
Week 11	Distributing and discussing reports material
Week 12	Performing seminars – first session
Week 13	Performing seminars – second session
Week 14	Second mid exam of the first semester

Week 15	**Preparatory Week (Study Material review for the final exam)**
Week 16	**Final Exam**

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

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	New Headway Plus Pre-Intermediate 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	**FX** – Fail	**مقبول**	(45-49)	More work required but credit

(0 – 49)		بقرار		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.



ملاحظة :هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Linear Algebra II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**Math 213**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	2		**Semester of Delivery**	2	
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	01/02/2025		**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 مخرجات التعلم للمادة الدراسية	1. Study of vector spaces and their solutions. 2. Solving linear systems by RREF and GJRR methods. 3. Inner product space and its applications. 4. Gram Schmidt method and their applications.
Indicative Contents المحتويات الإرشادية	• Real Vector Spaces • Linear Independence • Vector Spaces; Null Space • Isomorphism's • Rank of a Matrix • Gram-Schmidt Process • Eigenvalues and Eigenvectors and Similarity

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) 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)	6,12	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	Real Vector Spaces
Week 2	Subspaces
Week 3	Span
Week 4	Linear Independence
Week 5	Basis and Dimension
Week 6	Homogeneous Systems
Week 7	Relationship between Nonhomogeneous Linear Systems and Homogeneous Systems
Week 8	Coordinates and Isomorphism's
Week 9	Isomorphism's
Week 10	Rank of a Matrix
Week 11	Inner Product Spaces
Week 12	Length and Direction in $R^2$and R^3

Week 13	Gram-Schmidt Process
Week 14	Linear Transformations and Matrices
Week 15	Eigenvalues and Eigenvectors and Similarity
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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer II			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	URCOM2				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	Second		**Semester of Delivery**	Second	
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	20/1/2026		**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	29. Network security 30. Computer Troubleshooting 31. E-commerce 32. Artificial Intelligent (AI) 33. Applications and Tools in AI. 34. AI in Modern Smartphones 35. AI and Society 36. Ethics In AI 37. The AI Future
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. You will be able to understand network and its types 2. You will be able to Identify and understand the important of network security 3. Understanding the E-commerce Application and how use them 4. You will be able to solve common HW and SW problems in computer 5. You will be able to explain the Fundamentals of AI 6. You will be able to describe AI Applications and Real-World Problem Solving. 7. You will be able to use the AI application in smartphones 8. You will be able to Understand and Discuss the Ethics and Social Implications of AI 9. You will be able to understand what is the AI future. 10. You will be able to understand and use methos of plotting 2D,3D equations and digital image processing in MATLAB as practical application
Indicative Contents المحتويات الإرشادية	Introduction to Networking and Network Security **Introduction to E-commerce** (Types of E-commerce, E-commerce marketplaces and websites and online payment systems) **Hardware Troubleshooting, Software** Troubleshooting and **System Maintenance and Preventative Care.** Introduction to Artificial Intelligence (History and Evolution, Types of AI and Applications of AI) AI Ethics and Social Implications AI in Real-World Applications AI Tools Plotting and Digital Image Processing

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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
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	4	5% (5)	Continuous	All
	Assignments	3	10% (10)	Continuous	All
	Report	1	10% (10)	Continuous	
	Lab	2	15% (15)	8,14	All
Summative assessment	Midterm Exam	2hr	10% (10)	7,15	All
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Security and Networking
Week 2	E-Commerce
Week 3	Computer troubleshooting
Week 4	Computer troubleshooting (cont..)
Week 5	Introduction to AI (definition and evolution of AI)
Week 6	Introduction to AI (Key characteristics and Benefits of AI)
Week 7	**Mid-term Exam 1**
Week 8	The Role of AI in Modern Smartphones (AI mobile technologies and virtual assistants)
Week 9	The Role of AI in Modern Smartphones (Adaptive learning and real time translation services)
Week 10	Applications and AI tools (overview of AI applications)
Week 11	Applications and AI tools (Transportation, marketing, advertising, robotics and automation technologies)

Week 12	AI and Society
Week 13	Ethics In AI
Week 14	The future of AI
Week 15	**Mid-term Exam 2**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: sketch equations with (plot) command and its properties
Week 2	Lab 2: sketch equations with (fplot and ezplot) commands. Graphic Properties & Creating 2D shapes
Week 3	Lab 3: 3D Plotting (sketch curves, surfaces and other objects)
Week 4	Lab 4: Introduction to Image Processing (Working with Image Types in MATLAB)
Week 5	Lab 5: Image Representation (read, display, save and information of an image)
Week 6	Lab 6: Display Array Data as Image
Week 7	Lab 7: Display Array Data as Image (Cont.)
Week 8	**Practical Exam 1**
Week 9	Lab 8: Thresholding and Histogram tools
Week 10	Lab 9: Image Arithmetic
Week 11	Lab 11: Image Arithmetic (Cont.)
Week 12	Lab 11: Analyzing and Enhancing image
Week 13	Lab 13: Analyzing and Enhancing image (Cont.)
Week 14	**Practical Exam 2**
Teaching Staff	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts		
Recommended Texts	• Introduction to Artificial Intelligence (AI) by Ahmed Banafa 2024 • Cambridge IGCSE Information and Communication Technology (3rd. Ed.) by David Watson, Graham Brown 2021 • Technology In Action Complete (16th. Ed.) by Alan Evans, Mary Anne Poatsy, Kendall Martin 2020 • MATLAB: An Introduction with Applications (6th. Edition) by Amos Gilat. 2017 • Fundamentals of Digital Image Processing: A Practical Approach with Examples in MATLAB by	No

	Chris Solomon 2011	
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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Solution of Ordinary Differential Equation (ODE)**		**Module Delivery**
Module Type	Core		• ☐ **Theory** • ☒ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** ☐ **Seminar**
Module Code			
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level		**Semester of Delivery**	2
Administering Department	Math. & Comp. Appl.	**College**	Type College Code
Module Leader	Asst. Prof. 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		**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**	The aim of this course is for the students to be primarily concerned with learning the basic concepts of mathematics, application in reality, solution of ordinary differential equations with first-, and higher-order and their applications. In addition, different classes of ODEs are considered.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	Learning the basic concepts of differential equations, such as: ○ To be able to deal with ordinary differential equations (ODE) and their applications. ○ To be familiar with first order ODE and learning how to solve such equations. ○ To deal with higher order ODE and their solutions. ○ To learn the difference between homogeneous and non-homogeneous differential equations. ○ To have experience in applications of Laplace transform.
Indicative Contents **المحتويات الإرشادية**	11. Differential Equations: definition, properties, classifications. 12. First-order DE: Types, methods of solution: separable, homogeneous, exact, non-exact, linear, Bernoulli differential equation. 13. Higer-order DE: Definition, homogeneous linear DE., methods of solution. 14. Non-homogeneous DE: definitions, properties, <ethods

	of solution. 15. Laplace Transform: Definitions, properties, applications.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategy is presented by: Providing the students with a sufficient amount of mathematical terms and definitions by attending lectures and presenting on the whiteboard to connect the students with the lecturer to solve as many real-life applications as possible. The pdf lectures, homework, quizzes, reports, seminar, and exercises are shared on Google Classroom. The subject will be given to the students 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	3hr	50% (50)	16	All
Total assessment			100% (100		

	Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to DE's: Definition and classification of Differential Equations (DE's)
Week 2	First-order DE's: Separable DE.
Week 3	Homogeneous first-order DE.
Week 4	Exact differential equations
Week 5	Non-exact differential equations.
Week 6	Linear differential equation and Bernoulli equation.
Week 7	Higher-order DE's: The general form of higher-order DE's
Week 8	Homogeneous DE's
Week 9	Definition and methods on solving homogeneous DE's
Week 10	Nonhomogeneous DE's
Week 11	Definition, properties, and methods of solving non-homogeneous DE's
Week 12	Mid-Term Exam
Week 13	Reducing second-order DE to first-order DE
Week 14	Laplace Transform
Week 15	Definition / properties of Laplace transform and then using Laplace transformation in solving DE's
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	

Week 13	
Week 14	
Week 15	

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	[1] C. Henry Edwards and David E. Penney, Differential Equations and Linear Algebra, ser. Pearson International Edition, third edition. Pearson Education, United States of America, 2010. [2] William E. Boyce, and Richard C. DiPrima, Elementary Differential Equations and Boundary Value Problems, John Wiley and Sons, Inc. Seventh edition, United State of America. 2001.	No
Recommended Texts	Earl D. Rainville and Phillip E. Bedient, Elementary Differential Equations, Collier Macmillan Publishers, fifth Edition, New York, 1974.	Yes
Websites	https://www.khanacademy.org/math/differential-equations , 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.

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Department of Mathematics and Computer Applications	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Arabic language**		**Module Delivery**
Module Type	**Basic**		• ☒ Theory • ☒ Lecture • ☐Lab • ☐ Tutorial • ☐ Practical • ☒ Seminar
Module Code	**URARA**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	2	**Semester of Delivery**	4
Administering Department	Mathmatics and Computer Applications	**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	Dr. Fadhel Subhi Fadhel	**e-mail**	fadhel.subhi@nahrainuniv.edu.iq
Scientific Committee Approval Date	2026	**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 Enabling the student to use the language vocabulary in the proper 7.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) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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	Kana and its sisters, Inna and its 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 Silent Alif
Week 14	Writing Number
Week 15	The Holy Quran – Surah Ya-Sin

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.

Third Stage\ Second Term

	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Sciences Mathematics Department and Computer Applications	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Abstract Algebra (II)**	**Module Delivery**	
Module Type	**Core**	☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH3203**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	3	**Semester of Delivery**	2
Administering Department	MATH	**College**	Sciences
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	Nibras Yasir Khudair	**e-mail**	nibras.yasir@nahrainuniv.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	1/9/2025	**Version Number**	1

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 students to the fundamental concepts and principles of group theory. 2. To develop students' understanding of abstract algebraic structures and their applications.

	3. To provide students with a solid foundation for further study in mathematics, physics, and other fields. 4. To understand the definition and properties of homomorphism of groups, permutation groups and cyclic groups. 5. To learn how to work with groups, including calculating with groups and proving theorems. 6. To understand the importance of group theory in various fields, such as physics, chemistry, and computer science. 7. To develop problem-solving skills using group theory. 8. To apply group theory to solve problems in mathematics and other fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing this module, students should be able to: 1. Define and identify homomorphism of groups, permutation groups and cyclic groups. 2. Prove theorems and results in group theory. 3. Apply group theory to solve problems in mathematics and other fields. 4. Analyze and understand the structure of groups and their applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Group homomorphisms: definition, examples, and properties. 2. Isomorphism theorems. 3. Permutation groups: definition, examples and properties. 4. Cyclic groups: : definition, examples and properties.

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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.133
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)	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	Homomorphism of groups + isomorphism of group + Examples
Week 2	Some theorems
Week 3	Kernel and image of homomorphism+ examples
Week 4	Fundamental theorem of homomorphism of groups
Week 5	Automorphism + some theorems and problems
Week 6	Permutation of groups + order of permutation+ some examples
Week 7	Exam + Cyclic permutation + product of disjoint cycles
Week 8	even permutation and odd permutation
Week 9	Important properties of even and odd permutation
Week 10	Definition of Alternating group+ Examples
Week 11	Some Theorems
Week 12	Cayley's theorem and its proof
Week 13	Cyclic group + Examples
Week 14	Some Theorems and problems
Week 15	Review
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	A First Course in Abstract Algebra by John B. Fraleigh	Yes
Recommended Texts	Abstract Algebra by David S. Dummit and Richard M. Foote	No
Websites	Khan Academy: Group Theory	

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.



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Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Science
Mathematics Department and Computer Applications

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Real Analysis II**	**Module Delivery**	
Module Type	**C**	☐**Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MATH 3101**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	UG3	**Semester of Delivery**	1
Administering Department	Mathematics and Computer Applications	**College**	Sciences
Module Leader	Aamena Rasim Mohammed	**e-mail**	aamen.raimmohammed@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD
Module Tutor	Ruqayah Saadi Hashem	**e-mail**	ruqayah.saadi@nahrainuniv.edu.iq
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**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- To provide a formal introduction to mathematical analysis by approaching concepts crucial in subsequent analytical topics. 2- Emphasis will be given to the concepts of continuous functions, sequences of functions, Riemann integration, Differentiation. 3- Understand the need for proof and developing the skills to enable the student to construct for themselves formal proofs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand the Continuity of Functions. 2- Understand Uniform Continuity. 3- Understand Sequence of functions. 4- Understand Convergent sequence of functions uniformly. 5- Understand Riemann Integration. 6- Understand some properties of spaces of Integral functions. 7- Understand the connection between integration and continuity. 8- Understand Negligible sets. 9- Understand the concept of differentiation. 10- Understand the connection between the differentiation and integration.
Indicative Contents المحتويات الإرشادية	Continuous functions, Continuous functions using sequences, Uniform continuity, Sequence of functions, Riemann Integral, Negligible set, Integration and continuity, Differentiation, Differentiation and Integration.

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 solving more examples and homework. Formative assessments, quizzes and seminar take 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.133
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	20% (10)	7, 10	LO # 4-7
	Assignments	2	10% (10)	3,6,9	1,4,6,8,9
	Projects / Lab.				
	Report	1	10% (10)	12	
Summative assessment	**Midterm Exam**	2hr	20% (20)	5,12	LO # 1-3, 8-10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
الأسبوع الاول	Definition of Continuous Functions, Concept of Continuity geometrically
الأسبوع الثاني	continuity using open and closed sets
الأسبوع الثالث	Continuity using sequences
الأسبوع الرابع	Uniform Continuity
الأسبوع الخامس	Concept of sequence functions and converge
الأسبوع السادس	Uniform convergent
الأسبوع السابع	Definition of Riemann Integrals, basic concepts
الأسبوع الثامن	Examples of Riemann Integrable functions
الأسبوع التاسع	Negligible sets, continuous functions and integration
الأسبوع العاشر	The Integration as continuous function
الأسبوع الحادي عشر	Definitions and Examples
الأسبوع الثاني عشر	Differentiation
الأسبوع الثالث عشر	Differentiation and Integration
الأسبوع الرابع عشر	The Fundamental theorem in Calculus
الأسبوع الخامس عشر	Theorems in Differentiation
الأسبوع السادس عشر	

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Mathematical Analysis, Adil G. Naoum, Baghdad University-Iraq.	yes
Recommended Texts	Introduction to Mathematica Analysis, William F. Trench -USA 2015 Principle of Mathematical Analysis, Walter Rudin, 2000	yes
Websites	https://www.britannica.com/science/analysis-mathematics	

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:

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Professional ethics**		**Module Delivery**
Module Type			• ☒ Theory • ☒ Lecture • ☐Lab • ☒ Tutorial • ☐ Practical • ☒ Seminar
Module Code			
ECTS Credits			
SWL (hr/sem)			
Module Level		**Semester of Delivery**	1/2/2026
Administering Department	Mathematics and computer applications	**College**	College of science
Module Leader	Ranen Zaed Ahmood	**e-mail**	ranen.z.ahmood@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		**e-mail**	
Scientific Committee Approval Date		**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**	1. introduce students to the concept of professional ethics and its importance in academic and professional life. 2.develop awareness of core professional values such as integrity, honesty, and responsibility. 3.promote commitment to ethical conduct in scientific research and the use of

	technology. 4. prepare students to be responsible professionals capable of making ethical decisions.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	By the end of the course, the student will be able to: 1. Define and differentiate the concepts of ethics and professional ethics. 2. Analyze the role of ethics in scientific and technical work. 3. Apply professional values in academic and research practices. 4. Distinguish between ethical and unethical behavior in the workplace. 5. Adhere to computer ethics and data protection. 6. Avoid plagiarism and uphold academic integrity. 7. Evaluate ethical issues and make responsible professional decisions.
Indicative Contents **المحتويات الإرشادية**	1. Introduction to Professional Ethics 2. The Concept of Ethics and its Sources 3. Work, Profession, and Craft 4. Characteristics of Professional Ethics and Qualities of a Professional 5. Professional Values (Honesty, Integrity, Responsibility, and Excellence) 6. Ethics of Scientific Research 7. Plagiarism and Scientific Theft 8. Ethics of Computer and Information Technology Use 9. Information Security and Privacy 10. Unethical Conduct in the Profession 11. Administrative Corruption 12. Codes of Professional Ethics

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**			
Strategies	1.Theoretical lectures. 2. Classroom discussions. 3. Case studies. 4. Presentations. 5. Analysis of real-life ethical situations.		
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**		**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	

الفصل			
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	20% (20)	5, 10	
	Assignments	2	10% (10)	2, 11	
	Projects / Lab.				
	Report	2	10% (10)	14	
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 Professional Ethics
Week 2	The Concept of Ethics and its Sources
Week 3	The Importance of Ethics in Scientific Life
Week 4	Work, Profession, and Craft
Week 5	Characteristics of Professional Ethics
Week 6	Qualities of an Ethical Professional
Week 7	Basic Professional Values
Week 8	Midterm Exam
Week 9	Research Ethics
Week 10	Plagiarism and Scientific Theft
Week 11	Computer Ethics
Week 12	Information Security and Privacy
Week 13	Unethical Behavior
Week 14	Administrative Corruption
Week 15	Ethics Codes

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Professional Ethics Lectures – Department of Mathematics and Computer Applications	No
Recommended Texts		
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 work with notable errors
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	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

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Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Sciences
Department of Mathematics and Computer Applications

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Numerical Analysis II**		**Module Delivery**
Module Type	**Core**		• ☐ **Theory** • ☒ **Lecture** • ☒ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☒ **Seminar**
Module Code	**MATH3202**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level		**Semester of Delivery**	2
Administering Department	Department of Mathematics and Computer Applications	**College**	College of Sciences
Module Leader	Omar Ismael	**e-mail**	omar.ismael@nahrainuniv.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutors	Athraa Abdulsalam Iman Khalid Huda Abdulrazzaq Farah Lateef Iman	**e-mail**	E-mail

	Abdulwahab Nibras Yasir Khudair Mays Majid Batool Emkhilf		
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**	8. Develop appropriate numerical methods to solve a differential equation. 9. Derive appropriate numerical methods to solve a linear system of equations. 10. Derive appropriate numerical methods to solve a system of nonlinear equations. 11. Perform an error analysis for various numerical methods 12. Code various numerical methods in a modern computer language.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	On successful completion of this module, students will be able to: 1. Analyze numerical problems and identify appropriate numerical solution strategies. 2. Apply numerical methods to solve **initial-value problems for ordinary differential equations** and assess their accuracy and stability. 3. Derive and implement **direct numerical methods** for solving systems of linear equations. 4. Apply **iterative techniques in matrix algebra** and analyze their convergence using vector and matrix norms. 5. Solve **systems of nonlinear equations** using **fixed-point iteration** and **Newton's method**, including formulation of Jacobian matrices. 6. Evaluate convergence behavior, error propagation, and

	computational cost of numerical algorithms. 7. Implement numerical methods using mathematical software and interpret numerical results.
Indicative Contents **المحتويات الإرشادية**	Chapter 1: Numerical Solutions • Motivation for numerical methods and types of numerical problems • Sources of numerical error: truncation, round-off, absolute and relative errors • Taylor series expansion and its role in numerical approximation • Stability and conditioning of numerical algorithms Chapter 2: Initial-Value Problems for Ordinary Differential Equations • Basic theory of ordinary differential equations • Well-posedness, existence and uniqueness of solutions • Euler's method: derivation, algorithm, convergence, and error bounds • Higher-order Taylor methods and local truncation error • Runge–Kutta methods (second-order and classical fourth-order methods) • Comparison of accuracy and efficiency of ODE solvers Chapter 3: Direct Methods for Solving Linear Systems • Linear systems and matrix representation • Triangular systems and substitution techniques • Gaussian elimination and pivoting strategies • Matrix factorization methods • Numerical stability of direct methods Chapter 4: Iterative Techniques in Matrix Algebra • Vector and matrix norms • Eigenvalues and spectral radius • Classical iterative methods: Jacobi and Gauss–Seidel • Successive Over-Relaxation (SOR) method • Convergence analysis of iterative methods Chapter 5: Numerical Solutions of Nonlinear Systems of Equations

	• Formulation of systems of nonlinear equations • Fixed-point iteration for nonlinear systems • Convergence criteria and stopping conditions • Newton's method for systems of nonlinear equations • Jacobian matrix construction and implementation • Convergence behavior and computational considerations

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• **Lectures** – presentation of theoretical concepts, derivations, and examples. • **Tutorials** – guided analytical exercises and step-by-step algorithm design. • **Laboratory sessions** – computer implementation and numerical experimentation. • **Seminars / discussions** – applications of numerical methods and comparison of techniques. • **Independent study** – reading, homework, and project-based exploration.

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**	4
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	56	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	150		

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

Formative assessment	**Quizzes**	1	5% (5)	3, 8	LO #1-6
	Assignments	2	10% (10)	6, 9	LO # 1-6
	seminar	1	10% (10)	12	LO # 6-7
Summative assessment	**Midterm Exam**	1	10% (10)	5,10	LO # 1-6
	Lab exam	1	15%(15%)		LO # 6-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	**Initial-Value Problems for Ordinary Differential Equations**: basic theory of ODEs; existence and uniqueness of solutions; Lipschitz condition; well-posedness.
Week 2	**Euler's Method**: derivation using Taylor expansion; algorithm formulation; numerical implementation.
Week 3	**Error Analysis for Euler's Method**: local truncation error; global error bounds; convergence behavior.
Week 4	**Higher-Order Methods for ODEs**: Taylor methods; accuracy improvement; comparison with Euler's method.
Week 5	**Runge–Kutta Methods**: second-order methods (Midpoint, Modified Euler, Heun) and classical fourth-order Runge–Kutta method.
Week 6	Midterm Examination
Week 7	**Numerical Stability in Linear Systems**: pivoting strategies; matrix factorization; stability considerations.
Week 8	Midterm Exam
Week 9	**Iterative Techniques in Matrix Algebra**: vector and matrix norms; eigenvalues; convergence concepts.
Week 10	**Classical Iterative Methods**: Jacobi and Gauss–Seidel methods; convergence criteria and analysis.
Week 11	**Successive Over-Relaxation (SOR)**: formulation; convergence behavior; comparison with Jacobi and Gauss–Seidel methods.
Week 12	Review
Week 13	**Numerical Solutions of Nonlinear Systems**: formulation of nonlinear systems; fixed-point iteration; convergence conditions.
Week 14	**Newton's Method for Nonlinear Systems**: Jacobian matrix; algorithm; convergence properties; comparison with fixed-point methods.
Week 15	**Review and Preparatory Week**: comprehensive revision and problem-solving before final examination.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Finite Difference Method
Week 2	Euler and Modified Euler Methods
Week 3	Taylor Methods
Week 4	Explicit and Implicit Methods
Week 5	Runge-Kutta Method, of 2 and 4 Orders
Week 6	Midterm exam
Week 7	Forward and Backward substitution
Week 8	Gauss Elimination
Week 9	LU factorization
Week 10	Jacobi Iterative
Week 11	Gauss–Seidel Iterative
Week 12	Error Bounds and Iterative Refinement
Week 13	Fixed Points for Functions of Several Variables
Week 14	Newton method for Functions of Several Variables
Week 15	Review

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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Burden, R. L., Faires, J. D., & Burden, A. M. (2015). Numerical analysis. Cengage learning.	Yes
Websites		

Grading Scheme مخطط الدرجات

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