	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 210**		
ECTS Credits	**8**		
SWL (hr/sem)	**200**		

Module Level		Semester of Delivery	1
Administering Department	Department of Mathematics and Computer Applications	**College**	College of Science
Module Leader	Nabaa Hussain Fakhry	**e-mail**	Nabaa.hussein@nahrainuniv.edu.iq
Module Leader's Acad. Title	Assistant Teacher	**Module Leader's Qualification**	Ph
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	me	**e-mail**	E-mail
Review Committee Approval		**Version Number**	

Relation With Other Modules		
العلاقة مع المواد الدراسية الأخرى		
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce the students to the sequences and infinite series and studying the sequences, infinite series and the test for convergence of series, absolute convergence and conditional convergence. 2. Study and solutions of power series with its convergence, Taylor's series, Maclurian series expansion of different functions and applications. 3. Studying dimensional coordinate systems, distance in space, Vectors and unit vectors. 4. Studying vector and distance in space: scalar (Dot), product (Cross). Lines and plane in space. 5. Studying quadratic surfaces: paraboloid, ellipsoid and hyperboloid.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. That students gain proficiency in computations, in advance calculus. 2. That students to be able knowledge and understanding oh how laws are linked. 3. That Students enhance their logical thinking and problem structuring abilities. 4. That students can obtain knowledge and understanding the advanced differentiation and integrations. 5. The Support students in identify the most important applications in mathematics.
Indicative Contents المحتويات الإرشادية	1. The student will be able to use new advanced methods and theorems in advance calculus. 2. studying types of series, including tests, as well as binomial series and

	Taylor applications. 3. The various vectors and the unit vector will be discussed in detail and studied extensively.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The module will be presented to the students through a specified series of lectures, supported by problem solving practice carried out in interactives tutorials. These tutorials will be supported by practice and directed study outside the classroom. Completing homework is part of the learning experience. Students should review topics from prior courses as needed.

Student Workload (SWL)
الحمل الدراسي للطالب

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

Module Evaluation
تقييم المادة الدراسية

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

<table>
<tr><td colspan="2" align="center">**Delivery Plan (Weekly Syllabus)**
المنهاج الاسبوعي النظري</td></tr>
<tr><td></td><td>**Material Covered**</td></tr>
<tr><td>**Week 1**</td><td>Sequences of numbers, limit of sequences, bounded monotonic sequence.</td></tr>
<tr><td>**Week 2**</td><td>Infinite series: definition of infinite series and examples, the nth term test for divergence, geometric series.</td></tr>
<tr><td>**Week 3**</td><td>Test for convergence of series with Harmonic series.</td></tr>
<tr><td>**Week 4**</td><td>Absolute convergences: Ratio tests and Root tests.</td></tr>
<tr><td>**Week 5**</td><td>Alternating series and conditional convergence.</td></tr>
<tr><td>**Week 6**</td><td>Power series for functions, convergence of power series.</td></tr>
<tr><td>**Week 7**</td><td>Taylor's and Maclaurin series expansion of functions.</td></tr>
<tr><td>**Week 8**</td><td>The binomial series and applications of Taylor series: integral and limit.</td></tr>
<tr><td>**Week 9**</td><td>The dimensional coordinate systems, distance in space.</td></tr>
<tr><td>**Week 10**</td><td>Vectors, unit vectors.</td></tr>
<tr><td>**Week 11**</td><td>Dot product, vector projections.</td></tr>
<tr><td>**Week 12**</td><td>Cross product, parallel vectors.</td></tr>
<tr><td>**Week 13**</td><td>Lines and plane in space.</td></tr>
<tr><td>**Week 14**</td><td>Quadratic surfaces: cylinder, ellipsoid, hyperbolic paraboloid.</td></tr>
<tr><td>**Week 15**</td><td>**Preparatory Week**</td></tr>
<tr><td>**Week 16**</td><td>**Final Exam**</td></tr>
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<tr><td colspan="2" align="center">**Delivery Plan (Weekly Lab. Syllabus)**
المنهاج الاسبوعي للمختبر</td></tr>
<tr><td></td><td>**Material Covered**</td></tr>
<tr><td>**Week 1**</td><td>Lab 1: introducing of limit of sequences and bounded monotonic sequence.</td></tr>
<tr><td>**Week 2**</td><td>Lab 2: Using infinite series and geometric series in MATLAB.</td></tr>
<tr><td>**Week 3**</td><td>Lab 3: Using Harmonic series in MATLAB.</td></tr>
<tr><td>**Week 4**</td><td>Lab 4: computing Power series for functions.</td></tr>
<tr><td>**Week 5**</td><td>Lab 5: Taylor's and Maclaurin series expansion of functions.</td></tr>
<tr><td>**Week 6**</td><td>Lab 6: Calculating Vectors and unit vectors.</td></tr>
<tr><td>**Week 7**</td><td>Lab 7: Using Dot product and Cross product in MATLAB.</td></tr>
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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