MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Linear algebra			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU12045				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level			**Semester of Delivery**	4	
Administering Department	ATU12		**College**	PMETC	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Single variable calculus + Multi variable calculus	**Semester**	1,2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The basic language of algebraic expression 2. recognize technical terms and appreciate some of the uses of algebra 3. collect like terms and simplify expressions term by term 4. multiply out brackets and simplify some formulas
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Simplify or manipulate expressions involving polynomial, radical, rational, exponential, or logarithmic terms using appropriate properties and rule 2. Solving of linear equations and inequalities 3. The basic language of graphing 4. The addition, subtraction, multiplication and division of vectors 5. The several methods of factoring 6. Solving rational equations 7. Systems of equations 8. Radical expressions and equations. 9. Solving quadratic equations.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** **Part A –** Vectors: -Vector in Space, Parallel Vectors, Triple Product - Volume of Box {Projection of Two Vectors, Applications} - Equation of Line in Space, Equation of Plane in space, Applications - Vector Valued Functions, Curvature, Motion of Particle [20 hrs], **Part B - Matrices** - Elementary Operations with matrices and Vectors, **Determinants and Properties**, Transpose and inverse of matrices **-Solution of non- linear equations**, Application of non- linear equations, - Rank of a matrix, Linear transformation, Orthogonal transformation, Eigen values, Eigen vectors [25 hrs] **Part C – I Complex Numbers** - Introduction to complex numbers, **Mathematical Operations for Complex Numbers**, Argrand diagrams and product quotients [10hrs] **Part D – Solution of simultaneously linear equations:** -Definition of equations, Methods of solution, -**Direct methods**, Matrix inversion, Gauss Elimination, Gauss -Jordan Elimination, **Indirect methods**, Jacob's method, Gauss- Seidle method, **Applications** [20 hrs].

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	5
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**	3	10% (10)	5,10 and 14	LO #1, #2 and #4, LO LO #5, #6 and #9
	Assignments	5	10% (10)	2 and 13	LO #3, #4 and #6, #7
	Projects / Lab.	2	10% (10)	0	0
	Report	1	10% (10)	0	0
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Vector** - Vector in Space - Parallel Vectors - Triple Product
Week 2	- Volume of Box - Projection of Two Vectors - Applications
Week 3	- Equation of Line in Space - Equation of Plane in space - Applications
Week 4	- Vector Valued Functions - Curvature - Motion of Particle
Week 5	**Matrices** - Elementary Operations with matrices and Vectors **Determinants and Properties** - Transpose and inverse of matrices
Week 6	**Determinants and Properties** - Transpose and inverse of matrices
Week 7	**Solution of non- linear equations** - Introduction - Application of non- linear equations
Week 8	- Rank of a matrix - Vectors - Linear transformation - Orthogonal transformation
Week 9	- Eigen values - Eigen vectors
Week 10	**Complex Numbers** - Introduction to complex numbers
Week 11	**Mathematical Operations for Complex Numbers** - Argrand diagrams and product quotients
Week 12	**Solution of simultaneously linear equations** - Definition of equations - Methods of solution
Week 13	**Direct methods** - Matrix inversion - Gauss- Elimination - Gauss -Jordan Elimination
Week 14	**Indirect methods** - Jacob's method - Gauss- Seidle method
Week 15	**Applications** - Examples

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas Calculus Early Transcendentals Single Variable 13th	Yes
Recommended Texts	Engineering Mathematics - 5th Edition [K A Stroud].	No
Websites	https://www.khanacademy.org/math/calculus-1. https://www.mathsisfun.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.