



Ministry of Higher Education and  
Scientific Research - Iraq

University of Warith Al\_Anbiyaa  
Engineering College  
Biomedical Engineering Department



## MODULE DESCRIPTION FORM

Module Information			
<b>Module Title</b>	Engineering Analytics		<b>Module Delivery</b>
<b>Module Type</b>	Basic		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>Module Code</b>	WBM-22-03		
<b>ECTS Credits</b>			
<b>SWL (hr/sem)</b>			
<b>Module Level</b>	1	<b>Semester of Delivery</b>	
<b>Administering Department</b>	BME-111	<b>College</b>	ENG
<b>Module Leader</b>	Ahmed Merza		<b>e-mail</b> ahmed.merza@uowa.edu.iq
<b>Module Leader's Acad. Title</b>	Assistant Professor	<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>		<b>e-mail</b>	
<b>Peer Reviewer Name</b>		<b>e-mail</b>	
<b>Scientific Committee Approval Date</b>		<b>Version Number</b>	1.0

Relation with other Modules			
<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

<b>Module Aims</b>	<ol style="list-style-type: none"> <li>1. The student will be able to use numerical methods to solve equations and apply them appropriately.</li> <li>2. Acquire experience and knowledge in different types of differential equations and their numerical solution methods.</li> <li>3. Acquire experience and knowledge in solving different types of integrals numerically.</li> <li>4. Enable the student to demonstrate a solid understanding of mathematical concepts throughout the academic stages and apply them in the engineering field.</li> <li>5. Develop an understanding of the fundamental ideas and concepts of numerical methods.</li> </ol>
<b>Module Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. How to write programs using <b>MATLAB</b> to solve mathematical problems and obtain numerical solutions.</li> <li>2. Solving mathematical models that represent various physical and engineering systems numerically, and determining the best fit for experimental data.</li> <li>3. Skills in computing different types of integrals using various numerical methods.</li> <li>4. Skills in solving differential equations using a range of numerical methods.</li> <li>5. 📖 Skills in solving exercises from the prescribed textbook and supplementary references that have practical applications.</li> </ol>
<b>Indicative Contents</b>	<p>Indicative content includes the following.</p> <p>Solution of non-linear equations (8 hrs)</p> <p>Numerical Integration (8 hrs)</p> <p>Linear Interpolation (12 hrs)</p> <p>Finite differences (12 hrs)</p> <p>Numerical solution of ODE (12 hrs)</p>

### Learning and Teaching Strategies

<b>Strategies</b>	<p>The main strategy to be adopted in delivering this unit is to encourage students to prepare solutions, measure concentration, and practice laboratory techniques. This will be achieved through classroom sessions, interactive tutorials, and by considering simple experimental activities that include sampling tasks of interest to the students.</p>
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Student Workload (SWL)			
Structured SWL (h/sem)		Structured SWL (h/w)	
Unstructured SWL (h/sem)		Unstructured SWL (h/w)	
Total SWL (h/sem)			

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Linear Interpolation: Newton-Gregory
Week 2	Linear Interpolation: Lagrange interpolating polynomial
Week 3	Interpolation: General Equation
Week 4	Numerical integration: Equal segments Trapezoidal method
Week 5	Numerical integration: Unequal segments Trapezoidal method
Week 6	Numerical integration: Simpson's rules
Week 7	Numerical Integration: Gaussian Quadrature Method
Week 8	Solution of non-linear equations: Bisection method
Week 9	Solution of non-linear equations: Newton Raphson method
Week 10	Solution of non-linear equations: Secant method
Week 11	Numerical solution of ODE: Taylor series
Week 12	Euler method and modified Euler method
Week 13	Runge - Kutta method
Week 14	Finite differences method
Week 15	Matrix method
Week 16	Final Exam Preparation Week

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Numerical Methods of Engineers, Chapra & Canale, 6th Edition.	Yes
Recommended Texts		No
Websites		

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