

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Chemical Engineering Department
3. Course title/code	Mathematics (I) /121
4. Programme(s) to which it contributes	CE.121, ME.731, BE.1102, CSE.121, LE.101, PT.121
5. Modes of Attendance offered	Fall
6. Semester/Year	2 semester/year
7. Number of hours tuition (total)	3
8. Date of production/revision of this Specification	
9. Aims of the Course	
1. To develop an understanding with the concepts of calculus and analytic geometry and the applications of these concepts to the solution of engineering problems.	
2. Introduction to functions, limits, derivatives and their applications.	
3. Introduction to integral calculus with applications, vector analysis, complex algebra.	
4. Provide practice at developing critical thinking skills, solving open ended problems and to work in teams.	

10• Learning Outcomes, Teaching, Learning and Assessment Method
A-Knowledge and Understanding A1. Develop a deep understanding of issues related to the basic principles of calculus, and how to solve problems in chemical engineering. A2. The ability to understand and analysis problems related to specific field. A3. Understanding the nesecery of all subject of matheamtics in other siences . A4. Understanding the nesecery of derivatives and its application in other siences .
B. Subject-specific skills B1. Apply methods of integrations to solve differential equations in other siences of chemical engineering like mass transfer, heat transfer reactor design etc. B2. The ability to good imagination for shapes of three dimensions and geometric shapes.
Teaching and Learning Methods
Lectures, Tutorials , Example Classes , Informal and formal teamwork , Weekly homework problems
Assessment methods
Midterm exams , Final exam , Quizzes, Weekly homework, Team and homework problems , partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer .
C. Thinking Skills C1. An ability to apply effective, creative and innovative solutions, both independently and cooperatively, to current and future problems. C2. Solve chemical engineering problems through logic. C3. Characterization and analyses the performance of any problems in any object of chemical engineering. C4. Characterization, analyses and evaluate scientific and engineering information and identify knowledge gaps and opportunities to design any equipment, like absorber, distillation tower, etc.
Teaching and Learning Methods
Lectures, Tutorials , Example Classes , Informal and formal teamwork , Weekly homework problems .
Assessment methods
Midterm exams , Final exam , Quizzes, Weekly homework, Team and homework problems , partial test (Oral questions).

D.General and Transferable Skills (other skills relevant to employability and personal development).

- D1. Work together in same-discipline teams to solve engineering problems.
 D2. To review state-of-the-art concepts for process intensification and design approaches used for such reactors.
 D3. Speed intuitive, predictability and evaluate information and ideas in the handling of chemical engineering issues.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1st semester					
1	3	Ability to graph the functions and knowing domain and range of any function.	Revision, domain and range, functions and graphs.	Lectures, Tutorials, Example Classes, Practical Applications	partial test (Oral questions :- multiple choice, alternative response), Open questions.
2	3	Understanding how to identify odd and even functions	Even and odd functions, how to shift graph, inverse functions, trigonometric functions	Lectures, Tutorials, Example Classes, Practical Applications	partial test (Oral questions :- multiple choice, alternative response), Open questions.
3	3		Tutorials, quiz		
4	3	Ability to evaluate limits and identify whether the function is continuous or not	Limits, properties, Continuity limits involving infinity, limits of exponential functions	Lectures, Tutorials, Example Classes, Practical Applications	partial test (Oral questions :- multiple choice, alternative response), Open questions.
5	3	Understanding Transcendental functions and how to solve such problems include these functions.	Transcendental functions: logarithmic and exponential functions, inverse trigonometric functions	Lectures, Tutorials, Example Classes, Practical Applications	partial test (Oral questions :- multiple choice, alternative response), Open questions.

6	3	Understanding hyperbolic functions and its inverse.	Hyperbolic functions, inverse hyperbolia trigonometric functions.	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
7	3	Learning how to solve problems	Tutorials of the previous subjects	Tutorials , Oral questions ,classes practical	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
8	3	Understanding differential equations and how to make differential to different kinds of functions.	Derivatives: definition, second and higher order derivative, implicit differentiation	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
9	3	Ability to solve any problems related to these subject.	Chain rule, derivative of inverse trigonometric functions, derivative of hyperbolic functions, derivative of inverse hyperbolia	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
10	3	Ability to solve any problems related to these subject.	Tutorials of previous subjects	Tutorials, Examples, case study, Oral questions etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
11	3	Ability to solve any problems related to these subject.	Derivative of exponential and logarithmic functions, hospitals rule, partial derivative.	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
12	3	Ability to solve any problems related to this subject.	Tutorials of derivatives	Tutorials, Examples, case study, etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
13	3	Understanding integration and its kinds.	Integration: indefinite integration, integration of trigonometric functions, integration of inverse trigonometric functions	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
14	3	Ability to solve any problems related to this subject.	Tutorials of integrations	Tutorials, Examples, case study, etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .

15			First term exam.		
2nd semester					
16	3	Understanding the rules of integration of these functions	Integration of logarithmic and exponential functions, integration of hyperbolic functions	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
17	3	Ability to solve any problems related to this subject.	Tutorials of integrations	Tutorials, Examples, case study, etc.	Quiz ,Oral questions
18	3	Understanding integration methods	Integration methods; (substitution, by part, power trigonometric functions, trigonometric substitution, by partial function	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
19	3	Ability to solve problems related to this subject	Tutorials of Integration methods	Tutorials, Examples, case study, etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
20	3	Understanding definite integral, how to evaluate area under curves	Definite integration and Applications: area between two curves, length of curves , surface area, volumes,	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
21	3	Ability to solve problems related to this subject	Tutorials of definite integrals and its applications	Tutorials, Examples, case study, etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
22	3	Understanding Complex algebra	Complex Algebra: Definitions, Graphing in complex number (argand diagram), polar form of complex number	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
23	3	Knowing how to make derivative to complex number.	Power of complex number, derivatives of complex variable and Cauchy Remann, analytic functions	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
24	3	Ability to solve problems related to this subject	Tutorials of complex numbers and its derivatives	Tutorials, Examples, case study, etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
25			Second term exam		

26	3	Understanding polar coordinates	Polar coordinates: definition, Cartesian versus polar coordinates, graphing in polar coordinate	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
27	3	Ability to solve problems related to this subject	Tutorials of polar coordinates and how to transform cartesian coordinates to polar coordinates	Tutorials, Examples, case study, etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
28	3	Understanding vector analysis	Vector Analysis: definitions, properties, vector in space, scalar and cross product of vectors	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
29	3	Ability to solve problems related to this subject	Tutorials of vector analysis	Tutorials, Examples, case study, etc.	partial test (Oral questions :- multiple choice ,alternative response), Open questions .
30	3	Understanding determinants	Determinant : types of determinants , grammars rule for solving system of equations	Lectures, Tutorials , Example Classes , Practical Applications	partial test (Oral questions :- multiple choice ,alternative response), Open questions .

12.Infrastructure	
<p>Required reading:</p> <ul style="list-style-type: none"> · CORE TEXTS · COURSE MATERIALS · OTHER 	<ul style="list-style-type: none"> ○ Lecturers Book "THOMAS' CALCULUS, Eleventh Edition Media Upgrade 2008" ○
Special requirements (include for example workshops, periodicals, IT software, websites)	websites

Community-based facilities (include for example, guest Lectures, internship, field studies)	field trips
--	-------------

13. Admissions	
Pre-requisites	Before undertaking this module the student should have undertaken all the mathematics of high school.
Minimum number of students	Center admission
Maximum number of students	Center admission