

# TEMPLATE FOR COURSE SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### 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/CE.221
4. Programme(s) to which it contributes	ME.322; B.E. 3202; CSE 223; P.T. 221
5. Modes of Attendance offered	Fall
6. Semester/Year	2 semester/year
7. Number of hours tuition (total)	3 per week
8. Date of production/revision of this Specification	14/5/2016
9. Aims of the Course	
1. Develop the technical knowledge and understanding of mathematical techniques and the ability to apply them appropriately in context.	
2. Giving student the skills to use the method to solve problems.	
3. Enable students to demonstrate appropriate transferable skills and the ability to work with relatively little guidance and support.	
4. Give the learner the skills necessary to accommodate considered and disclosure of new relationships.	
5. Equip students with the confidence and study skills to enable them to progress both in the workplace and in post-graduate study.	

<b>10• Learning Outcomes, Teaching, Learning and Assessment Method</b>
<b>A-Knowledge and Understanding</b> A1. The importance of using a structured analytical approach to problem solving. A2. Understand the concept of stochastic process and how can be apply to solve real problems in chemical engineering. A3. Understand discrete dynamical systems and their application in modelling problems in Chemical engineering process.
<b>B. Subject-specific skills</b> B1. Applying the mathematics principles in chemical engineering. B2. Help the learner to rely on himself in the collection and development of himself in mathematics. B3. Compare and contrast various method so as to get the best solutions.
<b>Teaching and Learning Methods</b>
Lectures, Tutorials , Example Classes , Informal and formal teamwork , Weekly homework problems
<b>Assessment methods</b>
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 , or do not have a definite answer
<b>C. Thinking Skills</b> C1. An ability to apply effective, creative and innovative solutions, both independently and cooperatively, to current and future problems. C2. Solving different types of chemical engineering problems through mathematics' logic. C3. Characterization and analyses the performance of all chemical engineering units and evaluate the operation with different types of solutions. C4. Characterization, analyses and evaluate scientific and engineering information and identify knowledge gaps and opportunities to design different operation systems.
<b>Teaching and Learning Methods</b>
Lectures, Tutorials , Examples , Informal and formal teamwork , Weekly homework problems , Analysis of cases linked to the work environment , Practical Applications
<b>Assessment methods</b>
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 , or do not have a definite answer

## D.General and Transferable personal development).

## Skills (other skills relevant to employability and

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 different operation units in chemical engineering.

D3. To emphasize that mathematics is the mother of science.

### 11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
<b>1<sup>st</sup> semester</b>					
1	3	Calculate the partial derivatives of real functions in two or three variables.	Function of two or more variables, partial derivatives.	Lectures, Tutorials, Example Classes.	Open questions that have a definite answer, or do not have.
2	3	Devise the solutions to wide range of different problems.	Directional derivatives, higher order derivatives.	Lectures, Tutorials, Example Classes.	Open questions that have a definite answer, or do not have.
3	3	characterization and specify of types of functions	Maxima, minima and saddle point,	Lectures, Tutorials, Example Classes.	Open questions that have a definite answer, or do not have.
4	3	Learning solution of specified Derivative.	Lagrange multipliers.	Lectures, Tutorials, Example Classes.	partial test (Oral questions :- multiple choice, alternative.
5	3	Devise the solutions to wide range of different first order problems.	Solution of first order ordinary differential equations.	Lectures, Tutorials, Example Classes.	Open questions that have a definite answer, or do not have.
6	3	Devise the solutions to wide range of different second order problems.	Solution of second order ordinary differential equations.	Lectures, Tutorials, Example Classes.	Open questions that have a definite answer, or do not have.
7	3	Solution problem for more than three variables.	Higher order differential equations.	Lectures, Tutorials, Example Classes.	Open questions that have a definite answer, or do not have.
8	3	Use the integral calculus in engineering applications: calculus of areas, volumes, lengths, moments...	Double Integral, Area, Volume.	Lectures, Tutorials, Example Classes.	partial test (Oral questions :- multiple choice, alternative.
9	3	Characterization and	Double Integral in polar coordinates.	Lectures, Tutorials	Open questions that

		specify of the mathematics.		, Example Classes.	have a definite answer , or do not have.
10	3	Calculate the integral of functions which admit usual primitives.	Triple Integral in rectangular coordinates	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
11	3	Applying integral in engineering: calculus of areas, volumes, lengths, moments...	physical application of double and triple integration.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
12	3	Ability to solve probability,distribution of residence times, conduction of heat and diffusion of matter.	The error function.	Lectures,Tutorials , Example Classes.	partial test (Oral questions :- multiple choice ,alternative.
13	3	Characterization and specify of types of definite functions	The gamma function.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
14	3	characterization and specify of types of definite functions	The beta function.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
15	3	Apply mathematical operations and analyze its results correctly.	Factorial function.	Lectures,Tutorials , Example Classes.	Midterm exams
<b>2<sup>nd</sup> semester</b>					
16	3	The possible tests for defining the series type, calculation methods of its limits and its applications.	Sequences, Convergence, Geometric series.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
17	3	The possible tests for defining the series type, calculation methods of its limits and its applications.	Tests of convergence, alternating series.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
18	3	Determine convergence or divergence of series and calculate the limits in the possible cases.	power and Taylors series.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
19	3	Employ wave equations in different applications.	Periodic functions.	Lectures,Tutorials , Example Classes.	partial test (Oral questions :- multiple choice ,alternative.
20	3	Solve linear differential equations by Fourier series techniques.	Fourier series.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.

21	3	Distinguish between different types of functions	Even and odd functions.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
22	3	Solve cosine and sine series which is even and odd periodic extention.	Half range expansion.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
23	3	Teaching the principles of the calculation in vector space.	Products of three vectors	Lectures,Tutorials , Example Classes.	partial test (Oral questions :- multiple choice ,alternative.
24	3	Determine some geometry shapes equations (lines, planes, surfaces, tangent planes and normal lines to surfaces ...) in space.	Equations of lines and planes.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
25	3	Ability to solve chemical engineering equations.	Vector function and motion (velocity and acceleration).	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
26	3	Solving the system of linear equations with matrix method.	Solution of system of linear equations by matrix.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
27	3	Solving the system of linear equations with inverse matrix method.		Lectures,Tutorials , Example Classes.	partial test (Oral questions :- multiple choice ,alternative.
28	3	Solving the system of linear equations with Gauss matrix method.	Gauss elimination.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
29	3	Ability to solve different types equations by matrix.	Rank of matrix.	Lectures,Tutorials , Example Classes.	Open questions that have a definite answer , or do not have.
30	3	Solving the system of linear equations with Eigen matrix method.	Eigen values and Eigen vectors.	Lectures,Tutorials , Example Classes.	Final exam

## 12.Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	<ul style="list-style-type: none"> <li>○ Lecturers</li> <li>○ Book “G. B. Thomas, M. D. Weir and J. R. Hass, Thomas' Calculus, 12th Edition, Copyright© 2010, Pearson Education.</li> <li>○ Other support books :- Howard Anton, Calculus with Analytical Geometry, (3rd edition), John Wiley &amp; Sons 1988.</li> </ul>
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 the following: the basic principles of mathematics such as calculus and trigonometric functions and as well as applied mathematics and the basic principles of computer science in addition to the English language.
Minimum number of students	Central admission.
Maximum number of students	Central admission.