NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN

COURSE OUTLINE			
Course Title	**Mathematics-I**		
Course Code	**MAIR11**	**No. of Credits**	**4**
Department	**ICE (sections A & B)**	**Faculty**	**Dr. V. Kumaran**
Pre-requisites Course Code	**10 + 2 Mathematics**		
Course Coordinator(s) (if, applicable)	**-**		
Other Course Teacher(s)/Tutor(s) E-mail	**kumaran@nitt.edu**	**Telephone No.**	**0431-2503670**
Course Type	■ **Core course**	☐ **Elective course**	

COURSE OVERVIEW

The course develops the basic concepts of matrices, convergence of series, partial differentiation & optimization of funtions of several variables and multiple integrals to apply them in various academic/industrial applications.

COURSE OBJECTIVES

Students will be able to learn the concepts of matrices, convergence of series, partial differentiation & optimization of funtions of several variables, multiple integrals and will be able to apply them in the relevant academic/industrial applications.

COURSE OUTCOMES (CO)

Course Outcomes	**Aligned Programme Outcomes (PO)**
The students would have learnt the concepts and applications of the following: **1. Matrices** **2. Series convergence** **3. Partial differentiation & Optimization of functions** **4. Multiple integrals**	**PO's 1 & 5 (in attendance book)**

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Delevery Mode
Unit-I 16/8-3/9 (10-12 hrs)	1st Week 2nd Week 3rd Week	Introduction to matrices, Eigen value problem, Properties. Diagonalization, Cayley-Hamilton Theorem–applications. Quadratic form – types – Orthogonal reduction.	Chalk and Talk
Unit-II 4/9-24/9 (10-12 hrs)	4th Week 5th Week 6th Week	Introduction to sequences, Infinite series. Convergence Tests for positive & Alternating series. Absolute & Conditional Convergence, Riemann theorem.	
Unit-III 25/9-22/10 (10-12 hrs)	7th Week 8th Week 9th Week	Partial derivatives, Transformation of variables, Jacobian. Properties of Jacobian, Taylor series. Maxima and Minima of function of two variables.	
Unit-IV 23/10-12/11 (10-12 hrs)	10th Week 11th week 12th week	Double integral, Change of order, Change of coordinates. Area & volume in different coordinate systems. Triple integral in different coordinate systems.	
13/11-25/11 (6-8 hrs)	13th week 14th week	Revision/Advanced Topics Revision/Advanced topics	

COURSE ASSESSMENT METHODS

S.No.	Assessment Mode	Week/Date	Duration	% Weigh tage
01.	Test-I	26-09-2016*	1 hour	*20%*
02.	Test-II	15-11-2016*	1 hour	*20%*
03.	Group –ass-ignments - 4	3rd ,6th, 9th, 12th weeks	Next 1 Week	*12%*
04.	Individual Assignment	12th Week	1 week	*8%*
05.	Re-Test	22-11-2016*		
06.	Semester Exam	02-12-2016*	3 hours	*40%*
07.	Reassessment Exam	*If holiday then next day		

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Kreyszig, E., Advanced Engineering Mathematics, 10th edn, John Wiley Sons, 2010.

2. Grewal, B.S., Higher Engineering Mathematics, 43rd edition, Khanna Publications, Delhi.

3. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Edu. Inc. 1998

4. Strauss. M.J, Bradley, G.L. and Smith, K.J. Calculus, 3rd Edition, Prentice Hall, 2002.

COURSE EXIT SURVEY

Twice in a semester students can give oral (recorded by student)/anonymous written feedback about the content, content delivery and valuation.

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

1. **Attendance: Students who are absent for classes with valid reason must inform immediately with proof. Otherwise it (ML-OD-etc.,) will not be considered.**
2. **Absent for tests: If reason is genuine and informed his inability to write the test in time with a written request, the student may be permitted for re-test.**
3. **If attendance in class room (excluding ML, OD, etc.,) is < 60%, "F" grade will be assigned and they have to pass the course through formative assessment only.**
4. **Permitted to write Semester Exam if**
   a) **attendance in class room (excluding ML, OD, etc.,) is >= 60%**
      and
   b) **attendance ((classes attended)/(classes conducted-ML-OD)) is >= 75%.**
5. **If they fail in semester exam, reassessment exam will be conducted after evaluation of papers. If they fail in reassessment exam also, "F" grade will be assigned and they have to pass the course through formative assessment only.**
6. **If found copying in any form in tests/semester exam will get zero marks.**

ADDITIONAL COURSE INFORMATION

The faculty is available for consultation during working hours at his room. Queries may also be emailed to the faculty directly at kumaran@nitt.edu

FOR SENATE'S CONSIDERATION

9/9/16 15/9/16 15/9/2016

Course Faculty:Dr.V.Kumaran **CC-Chairperson :** **HOD:**

Course Code	MAIR11
Course Title	MATHEMATICS- I
Number of Credits	(3L+1T=)4
Prerequisites	-
Course Type	General Institute requirements

Learning Objectives: Objective of the course is to

1. determine canonical form of given quadratic form.
2. discuss the convergence of infinite series.
3. analyze and discuss the extrema of the functions of several variables.
4. evaluate the multiple integrals and apply in solving problems.

Characteristic equation of a matrix –Eigen values and Eigen vectors – Properties of Eigen values – Diagonalization of matrix – Cayley-Hamilton Theorem (without proof) verification – Finding Inverse and Power of a matrix using it – Quadratic form – Definite and indefinite forms – Orthogonal reduction of quadratic form to canonical form.

Introduction to sequences , Infinite series-Convergence Tests for positive term series – Comparison, integral test, Root, Ratio test, Raabe's tests, logarithmic test - Alternating series – Leibnitz's rule – Absolute and Conditional Convergence. Riemann rearrangement theorem (without proof).

Functions of several variables – Partial derivatives and Transformation of variables – Jacobian and its Properties- Taylor series-Maxima and Minima of function of two variables.

Double integral – Changing the order of Integration – Change of variables from Cartesian to Polar Coordinates – Area using double integral in Cartesian and Polar Coordinates – Triple integral – Change of Variables from Cartesian to Spherical and Cylindrical Coordinates – Volume using double and triple integrals.

Learning Outcomes:

After the completion of the course, students would be able to

1. compute eigenvalues and eigenvectors of the given matrix.
2. transform given quadratic form into canonical form.
3. discuss the convergence of infinite series by applying various test.
4. compute partial derivatives of function of several variables
5. write Taylor's series for functions with two variables.
6. evaluate multiple integral and its applications in finding area, volume.

Reference Books

1. Kreyszig, E., Advanced Engineering Mathematics, 10th edn, John Wiley Sons, 2010.
2. Grewal, B.S., Higher Engineering Mathematics, 43rd edition, Khanna Publications, Delhi.
3. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. 1998.
4. Strauss. M.J, Bradley, G.L. and Smith, K.J. Calculus, 3rd Edition, Prentice Hall, 2002.