NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
Department of Mathematics

Course Title	**Mathematics-I**		
Course Code	MAIR11	No. of Credits	3(L)+1(T)=4
Department	Mathematics	Faculty	**Dr. N. Prakash**
Section	I B.Tech MME		
E-mail ID	prakashn@nitt.edu	Telephone No.	7845688072
Course Type	General Institute requirements		

COURSE OVERVIEW

This course will introduce

- ➤ eigenvalues and eigenvectors of a martix and its applications.

- ➤ theory of convergence of seqences and infinite series of real numbers.

- ➤ theory of functions of several variables.

- ➤ multiple integrals and its applications in engineering problems.

COURSE OBJECTIVES

The course objective is to

- ➤ familiarize eigenvalues and eigenvectors of a square matrix and its properties.

- ➤ classify quadratic forms and explain the approach to convert the given quadratic form into cannonical form.

- ➤ introduce various test to discuss the convergence of sequences and infinite series of real numbers.

- ➤ Introduce limit,continuity,derivative of function of several variables.

- ➤ discuss the maxima and minima of function of several variables

- ➤ explain the multiple integrals and its applications in evaluating area and volume.

COURSE OUTCOMES (CO)	
Course Outcomes	Aligned Programme Outcomes(PO)
On completing this course students will 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. discuss maxima and minima of functions of two variables 7. evaluate multiple integral and its applications in finding area, volume.	

MAIR11 MATHEMATICS- I

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 test, 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.

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week	Topic	Mode of Delivery
1.	1st 2nd & 3rd week	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.	Chalk and talk.

2.	4th & 5th week	Introduction to sequences. Infinite series-Convergence Tests for positive term series – Comparison, integral test, Root, Ratio test, Raabe's tests. logarithmic test.	
3.	6th week	Assessment -1	
4.	6th, 7th & 8th week	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.	
5.	9th & 10th week	Double integral – Changing the order of Integration – Change of variables from Cartesian to Polar Coordinates – Area using double Integral in Cartesian and Polar Coordinates	
6.	11th week	Assessment - 2	
7.	11th week	Triple integral – Change of Variables from Cartesian to Spherical and Cylindrical Coordinates – Volume using double and triple integrals.	
8.	After 12th week	Assessment - 4	

COURSE ASSESSMENT METHODS				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Assessment - 1	6th week	1 hour	20%
2.	Assessment - 2	11th week	1 hour	20%
3.	Assessment - 3		Will be announced at the time of distribution of assignment sheets	10%
4.	Assessment – 4 (semester exam)	12th or 13th week	3 hours	50%
ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc				

1. Kreyszig, E., Advanced Engineering Mathematics, 10thedn, 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.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

1. Students can meet the faculty at any stage in the course durationin case he/she finds difficulty in understanding the concepts.
2. Feedback form issued to students to express their comments about the course before assessment - 1& after completing the syllabus. Students are requested to give genuine feedback about the course.
3. Student knowledge about the topic covered in this course will be judged through marks obtained in examination.

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

1. Examination:
   a) Students who have missed the assessment – 1 or assessment - 2or both can register the Assessment-3 which shall be conducted soon after the completion of the assessment – 2 and before the regular semester examination (assessment – 4).
   b) The Assessment-3 examination shall be conducted for 20 marks comprising the syllabus of both assessment – 1 and assessment - 2.
   c) Students should submit assignments before last date of submission. In case students fail to submit their assignments, he/she will get zero mark for that particular assignment.
   d) Students are strictly not allowed to enroll for Re-Test to improve their marks.

2. Attendance:
   a) The minimum attendance for appearing for the semester examination is 75%.
   b) Those students, whose attendance falls below 75% but above and equal to 50% in a subject, shall attend mandatory classes before the semester examinations to qualify to write semester exam.
   c) The students who are having attendance less than 50% or have not attended mandatory classes has to redo the course in next semester.

3. The Institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades. All assessment of a course will be done on the basis of marks.

4. The Performance Analysis Committee, which shall meet within seven days after the completion of all examinations, shall analyze the relative cumulative performance of students in all examinations (continuous and end-semester) of a course and finalize the letter grade ranges for the course.

5. The letter grades and the corresponding grade points are as follows:

Letter	S	A	B	C	D	E,R	F,I	V	FF	X
Grade(GP)	10	9	8	7	6	5	0	-	2	-

a) Students scoring less than the passing minimum marks in the assessments defined in the course plan shall be deemed to have not successfully completed the course and be given an 'F' grade.

b) Students awarded F grade may REDO the course or opt for formative assessment.

c) 'V' indicates lack of required attendance. Students awarded 'V' grade must compulsorily redo the course.

d) 'I' grade indicates incompletion of formative assessment.

e) A student who gets an 'I' grade must necessarily convert it to a 'R' grade by completing the formative assessment.

f) An 'FF' grade is awarded for not completing the formative assessment in the prescribed maximum period of study due to gross negligence. An 'FF' grade will have a grade point of 2 and it will remain on the grade card permanently. This will be used in the CGPA calculations.

g) A student who earns a minimum of 5 grade points (a 'E' grade or a 'R' grade) in a course is declared to have successfully completed the course.

h) If the students fails to appear semester examination due to genuine/medical reason, can register for special end semester examination after approval from course teacher & Head of department of Mathematics/Dean(academic). The special end semester examination will be conducted within 15 daysfromreopening of institute for next semester.Students should register their names with course teacher to appear for special end semester examination within a week from reopening of institute for next semester. Grade issued as per the guidelines followed for his/her batch students.

i) There will be one reassessment (for 90 marks) for the students who have secured "F" in this course and will be conducted within 15 days from reopening of institute for next semester. Students should register their names with course teacher to appearfor reassessment within a week from reopening of institute for next semester. If the students satisfy the criteria fixed by the faculty to promote E grade will be given E grade and others given 'F' grade.

ADDITIONAL COURSE INFORMATION

Students can reach course faculty by fixing appointment through E-mail (prakashn@nitt.edu) or phone (7845688072).

FOR SENATE'S CONSIDERATION

N. Prakash

Dr. N.Prakash
(Course Faculty)

CC-Chairperson

Dr. K. Murugesan,
Professor &Head,
Dept. of Mathematics