

DEPARTMENT OF MATHEMATICS

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech – MME		
Course Title	MATRICES AND CALCULUS		
Course Code	MAIR11	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session	July 2023	Section (if, applicable)	
Name of Faculty	V. Lakshmana Gomathi Nayagam ✓	Department	MATHEMATICS ✓
Official Email	velulakshmanan@nitt.edu	Telephone No.	Int.com: 3672 0431-250-3672
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
MAIR11 – MATRICES AND CALCULUS			
Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem. Quadratic form			
Sequence and series: Convergence of sequence. Infinite series-Tests for convergence-Integral test, comparison test, Ratio test, Root test, Raabe's test, Logarithmic test, and Leibnitz's test; Power series.			
Functions of two variables: Limit, continuity and partial derivatives; Total derivative, Jacobian, Taylor series, Maxima, minima and saddle points; Method of Lagrange multipliers.			
Double and triple integrals, change of variables, multiple integral in cylindrical and spherical coordinates.			
Gradient, divergence and curl; Line and surface integrals; Green's theorem, Stokes theorem and Gauss divergence theorem (without proofs).			
Reference books:			
<ol style="list-style-type: none"> 1. Dennis Zill, Warren S. Wright, Michael R. Cullen, Advanced Engineering Mathematics, Jones & Bartlett Learning, 2011 2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2019. 3. Jerrold E. Marsden, Anthony Tromba, Vector Calculus, W. H. Freeman, 2003 4. Strauss M.J, G.L. Bradley and K.J. Smith, Multivariable calculus, Prentice Hall, 2002. 5. Ward Cheney, David Kincaid, Linear Algebra: Theory and Applications, Jones & Bartlett Publishers, 2012. 			

COURSE OBJECTIVES

Objective of the course is to

1. study the properties of eigen value and eigen vectors and determine canonical form of given quadratic form.
2. discuss the convergence of infinite series by applying various tests.
3. analyze and discuss the extrema of the functions of several variables.
4. evaluate the multiple integrals and apply in solving problems.
5. study differential operator for scalar/vector functions and verify Green's, Stoke's and divergence theorems.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
Completion of the course, student will be able to	
1. diagonalize a given matrix and use it to compute higher powers of the given matrix and to analyze quadratic forms	PO1
2. test the convergence of infinite series by applying various tests.	PO2
3. compute maxima/minima for functions of two and three variables	PO1
4. evaluate multiple integrals	PO1
5. verify Green's, Gauss divergence and Stoke's theorems	PO2

COURSE PLAN – PART II

COURSE OVERVIEW

This course deals with

- eigenvalues and eigenvectors of a square matrix and its applications to find higher powers by diagonalizing it and to study quadratic forms
- various tests for convergence of infinite series of real numbers.
- series expansion, maximums and minima of functions of several
- evaluation of multiple integrals.
- differential and integral calculus of vector-valued functions.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1,2,3 (8 hours)	Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem. Quadratic form	PPT, Chalk & Talk
2	Week 4, 5, 6 (8 hours)	Sequence and series: Convergence of sequence. Infinite series-Tests for convergence-Integral test, comparison test, Ratio test, Root test, Raabe's test, Logarithmic test, and Leibnitz's test; Power series;	PPT, Chalk & Talk
3	Week 7,8,9 (8hours)	Functions of two variables: Limit, continuity and partial derivatives; Total derivative, Jacobian, Taylor series, Maxima, minima and saddle points; Method of Lagrange multipliers.	PPT, Chalk & Talk
4	Week 10,11,12 (8 hours)	Double and triple integrals, change of variables, multiple integral in cylindrical and spherical coordinates	PPT, Chalk and Talk
5	Week 13,14,15 (8 hours)	Gradient, divergence and curl; Line and surface integrals; Green's theorem, Stokes theorem and Gauss divergence theorem (without proofs).	PPT, Chalk & Talk

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment 1	6 th week	60 mins	20
2	Assessment 2	13 th week	60 mins	20
3	Assessment 3 (Assignment)	6 th , 15 th week	-	10
CPA	Compensation Assessment*	15 th week	60 mins	20
4	Assessment 4 (end semester examination)	16 th week	3 hours	50

COURSE EXIT SURVEY

1. Students can meet the faculty at any stage in the course duration in case he/she finds difficulty in understanding the concept.
2. Feedback form issued to students to express their comments about the course before final assessment & 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

- a) Assessments 1 and 2 are descriptive in nature of indicated duration.
- b) Students who have missed first or second assessments can register for CPA which shall be conducted soon after the completion of the assessment 2 and before the regular semester examination. Other students were strictly **NOT** allowed to register for CPA.
- c) The CPA examination shall be conducted for 20 marks comprising the syllabus of assessments 1 & 2.
- d) If a student fail 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 the time specified by office of the Dean (academic). Students should register in MIS to appear for special end semester examination (Reassessment) within the time specified by the office of Dean(academic). Grade issued as per the guidelines followed for his/her batch students.
- e) There will be one reassessment for the students who have secured "F" in this course and will be conducted within the time specified by office of the Dean(academic). Students should register their names in MIS within the time specified by the office of Dean(academic). If the students satisfy the criteria fixed by the faculty to promote E grade, will be given E grade and others given 'F' grade.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.

- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.


ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

Students can reach course faculty by fixing appointment through E-mail (velulakshmanan@nitt.edu) or phone (intercom: 3672).

FOR APPROVAL


Course Faculty
Dr. V. Lakshmana Gomathi
Nayagam


CC- Chairperson


HOD

Dr. S. MUTHUKUMARAN
Professor & Head
Dept. of Metallurgical & Materials Engineering
National Institute of Technology
Tiruchirappalli - 620 015. Tamil Nadu, INDIA

Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.