



Mathe

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF MATHEMATICS

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech. / Electrical and Electronics Engineering-B Section		
Course Title	Linear Algebra and Calculus		
Course Code	MAIR 12	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session	July- 2023	Section (if, applicable)	-
Name of Faculty	Dr. R. Tamil Selvi	Department	Mathematics
Official Email	tamil@nitt.edu	Telephone No.	7598176202
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)			
MAIR12 LINEAR ALGEBRA AND CALCULUS			
COURSE CONTENT:			
Vector space – Subspaces – Linear dependence and independence – Spanning of a subspace– Basis and Dimension. Inner product – Inner product spaces – Orthogonal and orthonormal basis – Gram Schmidt orthogonalization process. Linear transformation. Eigenvalues and eigen vectors; 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.			
Reference Books:			
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. Strauss M.J, G.L. Bradley and K.J. Smith, Multivariable calculus, Prentice Hall, 2002.
4. Ward Cheney, David Kincaid, Linear Algebra: Theory and Applications, Jones & Bartlett Publishers, 2012.

COURSE OBJECTIVES

The course objective is to

1. Introduce vector space and inner product space and its properties.
2. Introduce eigen values, eigen vectors and canonical form of quadratic forms.
3. Discuss the convergence of infinite series.
4. Analyze and discuss the extrema of the functions of several variables.
5. Evaluate the multiple integrals and apply in solving problems.

Course Outcomes

On completion of this course students will be able to

1. Understand the concepts of vector spaces, bases, dimension, inner product spaces and orthogonalization of the basis.
2. Predict diagonalizability of a given square matrix and categorize its quadratic form, using Eigenvalues and Eigenvectors.
3. Select proper test and apply it to determine the convergence/divergence of an infinite series.
4. Compute Jacobians, Taylor's series and identify local extremes of function of a several variables.
5. Evaluate multiple integrals and use it in physical/engineering applications.

MAPPING OF COs with POs &PSOs

	CO1	CO2	CO3	CO4	CO5
PO1	3	3	3	3	3
PO2	2	2	2	2	2
PO3	1	1	1	1	1
PO4	-	-	-	-	-
PO5	-	-	-	2	3
PO6	-	-	-	-	-
PO7	-	-	-	-	-
PO8	-	-	-	-	-
PO9	-	-	-	-	-
PO10	1	1	1	1	1
PO11	1	1	1	1	1
PO12	1	1	1	1	1
PSO1	-	-	-	-	-
PSO2	-	-	-	-	-
PSO3	1	1	1	1	1

COURSE PLAN – PART II

COURSE OVERVIEW

1. Analyze Vector Space concepts, Basis and Dimension, Inner Product Space
2. Introduce eigenvalues and eigenvectors of a matrix, Diagonalization of a matrix and several types of quadratic forms.
3. Study the convergence of sequences and infinite series of real numbers.
4. Explain the derivative concepts for functions of several variables and their applications in finding extrema.
5. Discuss the multiple integrals and their applications.



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COURSE TEACHING AND LEARNING ACTIVITIES				
S.No.	Week/Contact Hours	Topic	Mode of Delivery	
1	1 st , 2 nd , 3 rd , 4 th and 5 th week (15 hrs.)	Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem. Quadratic form. Vector space – Subspaces – Linear dependence and independence – Spanning of a subspace– Basis and Dimension. Inner product – Inner product spaces – Orthogonal and orthonormal basis – Gram-Schmidt orthogonalization process. Linear transformation.	Chalk and Talk	
2	6 th , 7 th , 8 th week (10 hrs.)	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.	Chalk and Talk	
3	7 th Week	ASSESSMENT I		
4	9 th , 10 th , 11 th , 12 th Week (14 hrs.)	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, changing the order of integration and area problems.	Chalk and Talk	
5	13 th week	ASSESSMENT II		
6	14 th week (4 hrs.)	multiple integral in cylindrical and spherical coordinates and volume problems	Chalk and Talk	
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment I	7 th week	1 hour	20



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2	Assessment II	13 th Week	1 hour	20
3	Assessment III(Assignment)			10
CPA	Compensation Assessment*	14 th week	1 hour	20
4	Assessment IV (Final Assessment)	After 14 th week	3 hours	50

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Students can contact 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 Assessment -I & 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 compensation assessment to be specified)

1. Students who have missed the assessment 1 or assessment 2 or both (genuine reasons with proof) can register for compensation assessment 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 compensation assessment.
2. The compensation assessment shall be conducted for 20 marks comprising the syllabus of both assessment 1 and assessment 2.
3. Students should submit assignments before last date of submission. In case students fails to submit their assignments, he/she will get zero mark for that particular assignment.
4. The Institute follows relative grading with flexibility given to class committee to decide the mark ranges for grades. All assessment of a course will be done on the basis of marks.

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

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



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- 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.

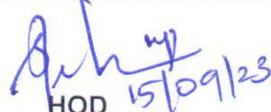
ADDITIONAL INFORMATION, IF ANY

Students can meet the course faculty for discussion on working days(with prior appointment) in the department of Mathematics, Lyceum block, room no.216.

FOR APPROVAL


Course Faculty
Dr. R. TAMIL SELVI


CC- Chairperson
Dr. M. Venkatakirthiga


HOD 15/09/23
Dr. M. P. Selvan