



DEPARTMENT OF MATHEMATICS

| COURSE PLAN – PART I | | | |
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| Name of the programme and specialization | B. Tech. / Instrumentation and Control Engineering | | |
| Course Title | Linear Algebra and Calculus | | |
| Course Code | MAIR12 | No. of Credits | 03 |
| Course Code of Pre-requisite subject(s) | - | | |
| Session | July 2022 | Section (if, applicable) | A |
| Name of Faculty | Dr. R. Gowthami Ms. S. Madhumitha | Department | Mathematics |
| Official Email | gowthami@nitt.edu 416119002@nitt.edu | Telephone No. | 8903844986 9952729740 |
| 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) | | | |
| <p>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 eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem. Quadratic form</p> <p>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;</p> <p>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.</p> | | | |
| ESSENTIAL READINGS: Textbooks, Reference books, Website addresses, Journals, etc. | | | |
| <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. 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 | |
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| The course objective is to: | |
| <ol style="list-style-type: none"> 1. Introduce vector space and inner product space and its properties. 2. Introduce eigen value and eigen vectors and its properties. 3. Determine canonical form of given quadratic form. 4. Discuss the convergence of infinite series. 5. Analyze and discuss the extrema of the functions of several variables. 6. Evaluate the multiple integrals and apply in solving problems. | |
| MAPPING OF COs with POs | |
| Course Outcomes: | Programme Outcomes (PO) |
| <p>On completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. Compute eigenvalues and eigenvectors of the given matrix. 2. Identity vector space and its basis. 3. Construct orthonormal basis for a given vector space. 4. Transform given quadratic form into canonical form. 5. Discuss the convergence of infinite series by applying various test. 6. Compute partial derivatives of function of several variables 7. Write Taylor's series for functions with two variables. 8. Evaluate multiple integral and its applications in finding area, volume. | 1 |

| COURSE PLAN – PART II | | | |
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| COURSE OVERVIEW | | | |
| This course will introduce: | | | |
| <ol style="list-style-type: none"> 1. Vector spaces and its notions. Eigen values and Eigen vectors of a matrix and their applications. 2. Convergence of sequences and infinite series of real numbers. 3. Functions of two variables and their properties. 4. Multiple integrals and their applications. | | | |
| COURSE TEACHING AND LEARNING ACTIVITIES | | | |
| S.No. | Week/Contact Hours | Topic | Mode of Delivery |
| 1. | 1 st , 2 nd and 3 rd week | Functions of two variables: Limit, continuity and partial derivatives; Total derivative, Jacobian, Taylor series, Maxima, minima and saddle points; Method of Lagrange multipliers; | Chalk and talk |
| 2. | 4 th and 5 th week | Double and triple integrals, change of variables, and multiple integral in cylindrical and spherical coordinates. | Chalk and talk |



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| 3. | 6th week | Assessment 1 | | |
|---|---|--|---|-------------|
| 4. | 6 th , 7 th and 8 th week | 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. | Chalk and talk | |
| 5. | 9 th , 10 th and 11 th week | Linear transformation. Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem. Quadratic form | Chalk and talk | |
| 6. | 12th week | Assessment 2 | | |
| 7. | 12 th , 13 th and 14 th week | 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 | |
| COURSE ASSESSMENT METHODS (shall range from 4 to 6) | | | | |
| S.No. | Mode of Assessment | Week/Date | Duration | % Weightage |
| 1 | Assessment I (Written exam) | 6 th week | 1 Hour | 20 |
| 2 | Assessment II (Written exam) | 12 th week | 1 Hour | 20 |
| 3 | Assignment | - | Will be announced while giving the assignment | 10 |
| CPA | Compensation Assessment | 14 th week | 1 Hour | 20 |
| 4 | Final Assessment | After 14 th week | 3 Hours | 50 |
| COURSE EXIT SURVEY | | | | |
| <ol style="list-style-type: none"> 1. After the completion of each topic, the students will be asked for their feedback. 2. Anonymous feedback through questionnaire (as followed previously by the Institute). 3. Students can meet the faculty at any stage in the course duration in case he/she finds difficulty in understanding the topic. 4. Student knowledge about the topics covered in this course will be judged through marks obtained in examination. | | | | |



COURSE POLICY

EXAMINATION POLICY:

- Students who have missed the first or second assessment or both assessments for genuine reasons only can register for the Compensation Assessment which shall be conducted soon after the completion of the second assessment test and before the regular semester examination.
- The Compensation Assessment shall be conducted for 20 marks comprising the syllabus of both first and second assessment tests.
- Students should submit the assignments before the last date of submission. In case students fail to submit their assignments, he/she will get zero mark for that particular assignment.

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:

MODE OF CORRESPONDENCE

Students can meet the course faculty by fixing appointment through E-mail (gowthami@nitt.edu/ 416119002@nitt.edu) or over phone call (8903844986/9952729740) during office hours (8:30 am to 5:30 pm).

FOR APPROVAL

Course Faculty 1 *Gowthami* CC- Chairperson *Sridevi* = HOD *Dhanalakshmi*
(Dr. R. Gowthami) (Dr. V. Sridevi) (Dr. K. Dhanalakshmi)

Course Faculty 2 *S. Madhumitha*
(Ms. S. Madhumitha)