Department of Mathematics

Programme: M. Sc. Mathematics

Institute Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Institute Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

Department Vision

To be among the top ten centers of excellence in Mathematics at the national level through quality Mathematics education and research.

Department Mission

Department of Mathematics, through our enlightened management and committed faculty envisages to

- provide world-class education to the students of Mathematics
- give them a learning-centered environment
- ensure knowledge transfer
- instill research aptitude
- infuse ethical and cultural values
- transform our students into disciplined citizens in order to improve their quality of life.

Programme Educational Objectives (PEOs)

PEO1	Graduates will possess advanced knowledge, analyticalinsights in Mathematics and its related fields.
PEO2	Graduates will develop independent learning ability, critical thinking and problem-solving skills necessary for lifelong learning and success in competitive examinations at national and international levels.
PEO3	Graduates will demonstrate the capability to pursue research in pure and applied Mathematics.
PEO4	Graduates will establish professional careers in higher education, research institutions, IT industry, and various government and private sector organizations.

Programme Outcomes (POs)

On successful completion of **M. Sc. Mathematics** programme, students will be able to

PO1	**Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
PO2	**Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	**Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	**Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	**Analytical reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesise data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

PO6	**Research-related skills:** A sense of inquiry and capability for asking relevant/ appropriate questions, problematising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.
PO7	**Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO8	**Scientific reasoning:** Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	**Reflective thinking:** Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
PO10	**Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	**Self-directed learning:** Ability to work independently, identifies appropriate resources required for a project, and manages a project through to completion.
PO12	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO13	**Moral and ethical awareness/reasoning:** Ability to embrace moral/ethical values in conducting one's life, formulates a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PO14	**Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO15	**Lifelong learning: Ability** to acquire knowledge and skills, including 'learning how to learn', that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development / reskilling.

Programme Specific Outcomes (PSOs)

PSO1	**Domain Knowledge:** Students will be thoroughly exposed to almost all branch of Mathematics to clear CSIR, NET and GATE exams and pursue research in their interested area of Mathematics.
PSO2	**Critical Thinking Skills:** Provides a platform to do projects individually or as a team and analyze a variety of real-world problems Mathematically.

N.G.M COLLEGE - CURRICULUM DEVELOPMENT CELL
M.Sc., MATHEMATICSSCHEME OF EXAMINATION FOR 2026 - 2028
CHOICE BASED CREDIT SYSTEM & OBE

Subject Code	Subjects	Ins Hrs/week	Examinations				Credits
			Dur. Hrs	CIA	ESE	Total	
	SEMESTER I						
26PMS101	Core I: Algebra-I	6	3	25	75	100	5
26PMS102	Core II: Real Analysis	6	3	25	75	100	5
26PMS103	Core III: Ordinary Differential Equations	6	3	25	75	100	4
26PMS104	Core IV: Mathematical Methods	6	3	25	75	100	4
26PMS1E1/ 26PMS1E2	Major Elective I : Matlab/Special Functions	4	3	20	30	50	2
26PMS1E3	Major Elective Practical II : Programming Lab in Matlab	2	3	20	30	50	2
TOTAL		**30**	**-**	**140**	**360**	**500**	**22**
SEMESTER II							
26PMS205	Core V: Algebra-II	6	3	25	75	100	5
26PMS206	Core VI: Measure Theory and Integration	6	3	25	75	100	5
26PMS207	Core VII:Partial Differential Equations	5	3	25	75	100	4
26PMS208	Core VIII: MathematicalStatistics	6	3	25	75	100	4
26PMS2E4/ 26PMS2E5	Major Elective III: Numerical Analysis/ Algebraic Number Theory	4	3	20	30	50	2
26PMS2E6	Major Elective Practical IV: Programming lab inNumericalAnalysis using Matlab	2	3	20	30	50	2
26PMS2N1/ 26PMS2N2	Non-Major Elective: Mathematical Statistics and Techniques/Mathematics in Finance	1	3	-	100	100	1
26PMS2VA	Value Added Course: Internet of Things	-	-	-	-	-	2*
TOTAL		**30**	**-**	**140**	**460**	**600**	**23**

SEMESTER III							
26PMS309	Core IX: Topology	6	3	25	75	100	5
26PMS310	Core X: Complex Analysis	6	3	25	75	100	5
26PMS311	Core XI: Mechanics	6	3	25	75	100	4
26PMS312	Core XII: Graph Theory	6	3	25	75	100	4
26PMS3E7/ 26PMS3E8	Major Elective V: Latex/ Mathematical Modelling	4	3	20	30	50	2
26PMS3E9	Major Elective Practical VI: Programming Lab in Latex	2	3	20	30	50	2
26PMS3AL	Advanced Learner Course (Optional) : Any MOOC / NPTEL Course	-	-	50	50	100	4*
26PMS3CC	Certificate Course: Data Analytics with Python	-	-	-	-	-	2*
TOTAL		**30**	-	**140**	**360**	**500**	**22**
SEMESTERIV							
26PMS413	Core XIII: Fluid Dynamics	6	3	25	75	100	5
26PMS414	Core XIV: Functional Analysis	6	3	25	75	100	5
26PMS415	Core XV: Optimization Techniques	6	3	25	75	100	4
26PMS4E10/ 26PMS4E11	Major Elective VII: Combinatorics/ Fuzzy Logic and Fuzzy sets	6	3	25	75	100	4
26PMS4P1	Core XVI: Project	4+ 2(Lab)	----	100	100	200	5
TOTAL		**30**	**----**	**200**	**400**	**600**	**23**
GRAND TOTAL		**120**		**1100**	**1100**	**2200**	**90**

*Extra credits

CO-SCHOLASTIC COURSES
ONLINE COURSES
SWAYAM, MOOC Courses etc.
CERTIFICATE COURSE(Optional)
Data analytics with Python Total duration hours: 30
VALUE ADDED COURSE(Mandatory**)**
Internet of Things Total duration hours:30
The scholastic courses are only counted for the final grading and ranking. However for the award of the degree, the completion of co-scholastic one online and one value added course are mandatory. All other co-scholastic courses are optional only.

Question Paper Pattern

(Based on Bloom's Taxonomy)

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q1 – 5 MCQ) (Q6 – 10 Define / Short Answer / MCQ)	10 * 1 = 10	MCQ / Define	**75**
K3 (Q11-15)	B (Either or pattern)	5 * 5 = 25	Short Answers	
K4 & K5 (Q16 – 20)	C (Either or pattern)	5 * 8 = 40	Descriptive/ Detailed	

2. Theory Examinations: 38 Marks (3 Hours Examination) (Part III: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q 1 – 10 MCQ)	10 * 1 = 10	MCQ	**50 (Reduced to 38)**
K3 (Q11 – 15)	B (Either or pattern)	5 * 3 = 15	Short Answers	
K4 & K5 (Q16-20)	C (Either or pattern)	5 * 5 = 25	Descriptive/ Detailed	

3. Theory Examinations: 38 Marks (2 Hours Examination) (Part IV: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1-10)	A (Q1 – 5 MCQ) (Q6–10 Define / Short Answer)	10 * 1 = 10	MCQ / Define	**50 (Reduced to 38)**
K3, K4 & K5 (Q11-15)	B (Either or pattern)	5 * 8 = 40	Descriptive/ Detailed	

4. Practical Examinations:

Paper	Maximum Marks	Marks for		Components for CIA		
		CIA	CEE	Tests	Observation Note	Record Note
Practical (Core / Elective)	50	20	30	10	05	05
Practical (Core / Elective)	75	30	45	20	05	05
Practical (Core / Elective)	100	40	60	30	05	05

5. Project:

Paper	Maximum Marks	Marks for		
		CIA	CEE	
			Evaluation	Viva-voce
Project	100	25	50	25
Project	150	40	75	35
Project	200	50	100	50

***** CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

Components of Continuous Internal Assessment (CIA)

THEORY

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Test 1	75	(75+75+15+10)/7	25
Test 2 / Model	75		
Assignment / Digital Assignment	15		
Others*	10		

*Others may include the following: Seminar / Socratic Seminars,Group Discussion, Role Play, APS, Class participation, Case Studies Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

Maximum Marks: 50; CIA Mark: 12; CEE Mark: 38; (Part III: If applicable)

Components		Calculation	CIA Total
Test 1	50	(50+50+10+10)/10	12
Test 2 / Model	50		
Assignment / Digital Assignment	10		
Seminar	10		

PROJECT

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Review I	5	5+5+5+10	25
Review II	5		
Review III	5		
Report Submission	10		

Maximum Marks: 200; CIA Mark: 50; CEE Mark: 150;

Components		Calculation	CIA Total
Review I	10	10+ 10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

** Components for 'Review' may include the following:*

Originality of Idea, Relevance to Current Trend, Candidate Involvement, and Presentation of Report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

Continuous Internal Assessment for Project
For Science Stream

The Final year Science students should undergo a project work during (V/VI) semester

- The period of study is for 4 weeks.
- Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- Students are divided into groups and each group is guided by a Mentor.
- The group should not exceed four students, also interested student can undergo individually.
- A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- Project work constitutes 200 marks, out of which 50 is CIA and 150 is CEE Marks.

Mark Split UP

CIA	CEE	Total
50	150	200

S. No	Components for CIA	Marks
1	Review – I *	10
2	Review – II *	10
3	Review – III *	10
4	Rough Draft Submission / Report Submission	20
Total		**50**

*** Review I: -** Problem Analysis
*** Review II: -** Data collection & Design
*** Review III: -** Data Analysis

S. No	Components for CEE	Marks
1	Evaluation *	100
2	Viva-Voce	50
Total		**150**

* Evaluation includes Problem and Hypothesis, Experimental Design / Materials / Procedure, Variables / Controls / Sample Size, and Data Collection / Analysis.

STUDENT SEMINAR EVALUATION RUBRIC

Grading Scale:

A	B	C	D
8-10	5-7	3-4	0-2

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as an interesting story in a logical, easy-to-follow sequence	Information presented in logical sequence; easy to follow	Most of the information is presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of the subject & References	Demonstrated full knowledge; answered all questions with elaboration **&** Material sufficient for clear understanding **AND** exceptionally presented	At ease; answered all questions **but** failed to elaborate **&** Material sufficient for clear understanding **AND** effectively presented	At ease with information; answered most questions **&** Material sufficient for clear understanding **but** not clearly presented	Does not have a grasp of information; answered only rudimentary Questions **&** Material not clearly related to the topic **OR** background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain the text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation
Eye Contact	Refers to slides to make points; engaged with the audience	Refers to slides to make points; eye contact the majority of the time	Refers to slides to make points; occasional eye contact	Reads most slides; no or just occasional eye contact
Elocution – (Ability to speak English language)	Correct, precise pronunciation of all terms The voice is clear and steady; the audience can hear well at all times	Incorrectly pronounces a few terms Voice is clear with few fluctuations; the audience can hear well most of the time	Incorrectly pronounces some terms Voice fluctuates from low to clear; difficult to hear at times	Mumbles and/or Incorrectly pronounces some terms Voice is low; difficult to hear

WRITTEN ASSIGNMENT RUBRIC

Grading Scale:

A	B	C	D	F
13-15	10-12	7-9	4-6	0-3

CRITERION	A - Excellent	B - Good	C - Average	D - Below Average	F - Inadequate
Content & Focus	Hits on almost all content exceptionally clear	Hits on most key points and the writing is interesting	Hits in basic content and writing are understandable	Hits on a portion of content and/or digressions and errors	Completely off track or did not submit
Sentence Structure & Style	* Word choice is rich and varies * Writing style is consistently strong * Students own formal language	* Word choice is clear and reasonably precise * Writing language is appropriate to the topic * Words convey intended message	* Word choice is basic * Most writing language is appropriate to the topic * Informal language	* Word choice is vague * Writing language is not appropriate to the topic * Message is unclear	* Not Adequate
Sources	Sources are cited and are used critically	Sources are cited and some are used critically	Some sources are missing	Sources are not cited	Sources are not at all cited
Neatness	Typed; Clean; Neatly bound in a report cover; illustrations provided	Legible writing, well-formed characters; Clean and neatly bound in a report cover	Legible writing, some ill-formed letters, print too small or too large; papers stapled together	Illegible writing; loose pages	Same as below standard
Timeliness	Report on time	Report one class period late	Report two class periods late	Report more than one week late	Report more than 10 days late

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS101	Title	Batch:	2026 - 2028
		ALGEBRA-I	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objective

This course enable the students to learn several advanced concepts in algebra such as study of Sylow's theorems, polynomial rings, extension and finite fields and Galois Theory.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall and understand fundamental concepts of groups, rings, fields, and their basic properties.	PO1 (3), PO2 (1), PO5 (2), PO8 (2), PO10 (1), PO11 (1), PO15 (2)
CO2	Explain and solve problems related to polynomial rings, vector spaces, and roots of polynomials over fields.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (1), PO15 (2)
CO3	Apply Sylow's theorems, irreducibility criteria, and field extension techniques to solve algebraic problems.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (1), PO15 (3)
CO4	Examine and analyze finite fields, Galois extensions, splitting fields, normal and simple extensions, and fixed fields.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (2), PO11 (2), PO15 (3)
CO5	Develop advanced algebraic solutions, construct field extensions, and explore research-oriented applications in Galois theory and interdisciplinary areas.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (3), PO11 (3), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	–	–	2	–	–	2	–	1	1	–	–	–	2		
CO2	2	1	3	3	3	2	–	3	–	2	1	–	–	–	2		
CO3	2	1	3	3	3	2	–	3	–	2	1	–	–	–	3		
CO4	2	1	3	3	3	3	–	3	–	2	2	–	–	–	3		
CO5	2	1	2	3	3	3	–	3	–	3	3	–	–	–	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Group Theory:** Another counting principle - Sylow's theorem. **Chapter 2: Sections: 2.11, 2.12**	18
Unit II	**Ring Theory:** Definitions and Examples of rings - *Some special classes of rings (Self-study)* - Polynomial rings - Polynomials over the rational field - Polynomial rings over commutative rings. **Chapter 3: Sections: 3.1, 3.2and 3.9 - 3.11.**	18
Unit III	**Fields:** Extension Fields. **Selected Topics**: Finite Fields. **Chapter 5: Section: 5.1. Chapter 7: Section: 7.1.**	18
Unit IV	**Vector Spaces and Modules:** Inner product spaces, *Modules (Self-study, Definitions and examples only)* **Fields:** Roots of Polynomials. **Chapter 4: Sections:4.4, 4.5.Chapter 5: Section: 5.3**	18
Unit V	**Fields:** More about roots and The Elements of Galois theory. **Chapter 5: Sections: 5.5, 5.6**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Herstein I. N.,*Topics in Algebra*, 2nd Edition, Wiley India Pvt. Ltd., New Delhi, 2010.

Books for Reference:

1. Bhattarcharya P. B., Jain K, and Nagpaul S.R., *Basic Abstract Algebra*, Cambridge University Press, New York, 2009.
2. John B. Fraleigh, *A First Course in Abstract Algebra*, Narosa Publishing House, New Delhi, 2003.
3. Surjeet Singh, QaziZameeruddin,*Modern Algebra*, Vikas Publishing House Pvt. Ltd., New Delhi., 2006.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/111/106/111106051/
2. https://onlinecourses.nptel.ac.in/noc20_ma31/preview
3. https://onlinecourses.nptel.ac.in/noc20_ma25/preview
4. https://math.libretexts.org/Bookshelves/Abstract_and_Geometric_Algebra
5. https://onlinecourses.nptel.ac.in/noc20_ma25/preview
6. https://onlinecourses.swayam2.ac.in/cec20_ma15/preview

Course Designed by	Dr. M. MAHESWARI	M.Mallesh
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS102	Title	Batch:	2026 - 2028
		REAL ANALYSIS	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objective

This course will help students to understand the basics of real analysis and to reading and writing mathematical proofs. It will lay the foundation for the subsequent study of complex analysis and functional analysis.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	
CO1	Recall and understand the concepts of continuity, Riemann–Stieltjes integrals, and sequences and series of functions.	PO1 (3), PO2 (2), PO3 (1), PO4 (1), PO5 (2), PO6 (1), PO8 (2), PO10 (1), PO11 (1), PO15 (2)
CO2	Analyze uniform convergence and its impact on continuity, differentiation, and integration of functions.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (2), PO15 (2)
CO3	Examine and apply the Inverse Function Theorem and Implicit Function Theorem in solving analytical problems.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (2), PO11 (2), PO15 (3)
CO4	Apply concepts of power series, exponential and logarithmic functions, Fourier series, and Gamma function.	PO1 (3), PO2 (2), PO3 (2), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (2), PO15 (3)
CO5	Develop analytical thinking and research-oriented approaches in real analysis and related mathematical fields.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (3), PO11 (3), PO15 (3)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	1	1	2	1	-	2	-	1	1	-	-	-	2		
CO2	3	2	3	3	3	2	-	3	-	2	2	-	-	-	2		
CO3	3	2	3	3	3	3	-	3	-	2	2	-	-	-	3		
CO4	3	2	2	3	3	2	-	3	-	2	2	-	-	-	3		
CO5	3	2	3	3	3	3	-	3	-	3	3	-	-	-	3		

3-Point scale-1, 2, 3

Units	Content	Hrs.
Unit I	**Continuity:**Limits of functions – Continuous functions - Continuity and compactness - Continuity and connectedness - Discontinuities – Monotonic functions – Infinite limits and limits at infinity **Chapter 4.**	18
Unit II	**Riemann-Stieltjes Integral**: Definition and Existence of the Integral - Properties of the Integral - Integration and Differentiation - Integration of Vector-valued Functions -*Rectifiable Curves (Self-study).* **Chapter 6.**	18
Unit III	**Sequences and Series of Functions**:Uniform convergence - Uniform Convergence and Continuity-Uniform Convergence and Integration-Uniform Convergence and Differentiation- Equicontinuous Families of Functions-The Stone-Weierstrass Theorem. **Chapter 7.**	18
Unit IV	**Some Special Functions:**Power series – The exponential and logarithmic functions – The Algebraic completeness of the complex field – Fourier Series – The Gamma Function. **Chapter 8.**	18
Unit V	**Functions of Several Variables**: Linear Transformations - The Contraction Principle -The Inverse Function Theorem - The Implicit Function Theorem - Determinants -*Derivatives of Higher Order (Self-study).* **Chapter 9** (Except Differentiation, The Rank Theorem & Differentiation of Integrals).	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

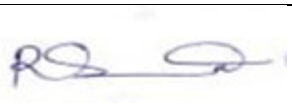
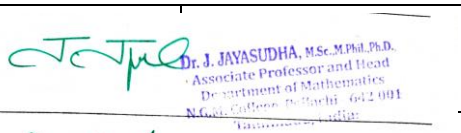
Walter Rudin, *Principles of Mathematical Analysis*, McGraw Hill, New York, 2014.

Books for Reference:

1. Royden H. L. and Fitzpatrick P. M., *Real Analysis*, Fourth Edition, Pearson Education, Inc., Publishing as Prentice Hall, 2013.
2. R.G.Bartle, *Elements of Real Analysis*,2nd Edition, John Wiley and Sons, New York, 1976.
3. W. Rudin, *Real and Complex Analysis*, 3rd Edition, McGraw-Hill, New York, 1986.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.classcentral.com/course/swayam-basic-real-analysis-17525
2. https://nptel.ac.in/course.html
3. https://www.adelaide.edu.au/course-outlines/104831/1/sem-2/

Course Designed by	Dr. R. SANTHI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS103	Title	Batch:	2026 - 2028
		ORDINARY DIFFERENTIAL EQUATIONS	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

This course introduces the formulation, classification of differential equations and existence and uniqueness of solutions. It also provides skill in solving initial value and boundary value problems and developing the skill in solving first and second order linear homogeneous and non- homogeneous differential equations using power series method.

Course Outcomes (CO)

On successful completion of this course, students will be able to

CO Number	CO Statement	
CO1	Remember the preliminaries of analysis and calculus and understand the concept of Linear differential equations. Understand and explain fundamental concepts of higher-order linear differential equations, power series solutions, and systems of differential equations.	PO1 (3), PO2 (1), PO3 (2), PO5 (1), PO6 (1), PO7 (2), PO15 (2)
CO2	Apply analytical methods such as variation of parameters, power series techniques, and matrix methods to solve differential equations in a coherent and meaningful manner for real world problems.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (2), PO9 (1), PO11 (1), PO15 (1)
CO3	Analyze qualitative and quantitative behaviour of solutions using Wronskian, existence and uniqueness theorems, and oscillation criteria and apply in the field of industrial organization engineering and research.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO11 (2), PO12 (1), PO13 (2), PO15 (1)
CO4	Evaluate solutions of boundary value problems, including Sturm–Liouville problems and Green's functions, and interpret their physical significance.	PO1 (3), PO2 (3), PO3 (2), PO5 (3), PO6 (3), PO8 (3), PO11 (3), PO12 (2), PO13 (2), PO14 (1), PO15 (2)
CO5	Utilize appropriate digital and mathematical tools to model, simulate, and visualize solutions of differential equations and boundary value problems and determine the real life problems beyond the classroom.	PO1 (3), PO2 (2), PO3 (1), PO4 (3), PO7 (3), PO8 (3), PO9 (2), PO10 (3), PO11 (2), PO13 (1), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	-	1	1	2	-	-	-	-	-	-	-	2		
CO2	3	2	3	3	3	2	1	2	1	-	1	-	-	-	1		
CO3	3	2	3	3	3	2	-	3	-	-	2	1	2		1		
CO4	3	3	2	-	3	3	-	3	-	-	3	2	2	1	2		
CO5	3	2	1	3	-	-	3	3	2	3	2	-	1	-	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Linear differential equations of higher order**: Introduction-Linear dependence and Wronskian - Basic theory for linear equations - Method of variation of parameters - Two useful formulae - Homogeneous linear equations with constant co-efficients. **Chapter 2: Sections: 2.1 - 2.6.**	18
Unit II	**Solutions in power series**: Second order linear equations with ordinary points - Legendre equation and Legendre polynomials - Second order equations with regular singular points - Bessel equation. **Chapter 3: Sections : 3.2 - 3.5**	18
Unit III	**Systems of Linear Differential Equations**: Systems of first order equations - Existence and uniqueness theorem - Fundamental matrix - Non-homogeneous linear systems - Linear systems with constant co-efficients- *Linear systems with periodic co-efficients (Self study).* **Chapter 4: Sections : 4.2 - 4.7**	18
Unit IV	**Existence and uniqueness of solutions and Oscillations of second order equations**: Introduction - Preliminaries - Successive approximations- Picard's theorem - Fundamental results - Strum's comparison theorem-Elementary linear oscillations - Comparison theorem of Hille-Wintner - Oscillations of $x'' + a(t)x=0$. **Chapter 5 and 6 : Sections : 5.1-5.4 and 6.1- 6.5**	18
Unit V	**Boundary Value Problems**: Introduction - Strum-Liouville problem - Green's functions - Picard's theorem. **Chapter 7: Sections : 7.1 - 7.3, 7.5**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

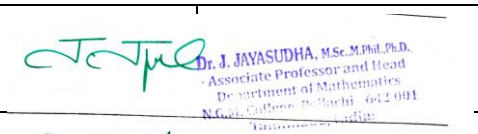
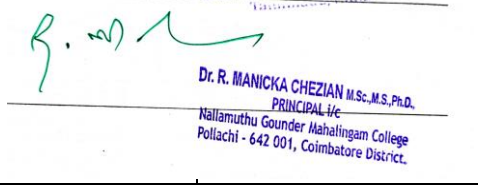
Deo S. G. and Raghavendran V, *Ordinary Differential Equations and Stability Theory*, Tata McGraw Hill Publishing Company Limited, 1990.

Books for Reference:

1. Coddington E. A and Levinson N., *Theory of Ordinary Differential Equations*, McGraw Hill, New York, 1955.
2. Martin H., *Ordinary Differential Equations*, Tata McGraw Hill Publishing Company Limited, 1985.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/111/107/111107111/
2. https://ocw.mit.edu/courses/mathematics/18-03-differential-equations-spring-2010/videolectures/
3. https://nptel.ac.in/courses/122/107/122107037/

Course Designed by	Dr. S. KALEESWARI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS104	Title	Batch:	2026 – 2028
		MATHEMATICAL METHODS	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

This course concerns the analysis and applications of calculus of variations and integral equations. Applications include areas such as classical mechanics and differential equations.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall and understand fundamental concepts of linear algebra, matrices, vector spaces, and basic differential equations.	PO1 (3), PO2 (1), PO5 (2), PO8 (2), PO10 (2), PO11 (1), PO15 (2)
CO2	Apply techniques of ordinary differential equations, partial differential equations, and linear transformations to solve standard problems in mathematics and physics.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (1), PO15 (2)
CO3	Analyze systems using series solutions, special functions, and orthogonal functions, and evaluate their applicability in real-world mathematical models.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (1), PO15 (3)
CO4	Evaluate numerical and analytical solutions of differential equations and transforms using computational tools, assessing accuracy and efficiency.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (2), PO11 (1), PO15 (3)
CO5	Develop advanced mathematical models and solve complex problems in applied mathematics, physics, and engineering using integrative analytical and computational methods.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (3), PO11 (1), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	–	–	2	–	–	2	–	2	1	–	–	–	2		
CO2	2	1	3	3	3	2	–	3	–	2	1	–	–	–	2		
CO3	2	1	3	3	3	2	–	3	–	2	1	–	–	–	3		
CO4	2	1	2	3	3	3	–	3	–	2	1	–	–	–	3		
CO5	2	1	2	3	3	3	–	3	–	3	1	–	–	–	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Introduction**: Definition - Regularity Conditions - Special Kinds of Kernels – Eigenvalues and Eigenfunctions - Convolution Integral - The Inner or Scalar Product of Two Functions. **Integral Equations with Separable Kernels:**Reduction to a System of Algebraic Equations - Examples - Fredholm Alternative - Examples - An Approximate Method. **Method of Successive Approximations:**Iterative scheme - Examples- Volterra Integral equation - Examples - S*ome results about the Resolvent Kernel(Self study).* **Classical Fredholmtheory:**The Method of Solution of Fredholm- Fredholm'sfirst Theorem - Examples - Fredholm's second Theorem, Freholm's Third Theorem. **Text Book 1: Chapter 1: Sections: 1.1-1.6, Chapter 2: Sections: 2.1-2.5, Chapter 3: Sections: 3.1-3.5, Chapter4: Sections: 4.1-4.5.**	18
Unit II	**Applications to Ordinary Differential Equations**: Initial value problems - Boundary value problems - Examples. **Singular integral equations**: The Abel integral equation - Examples. **Text Book 1: Chapter 5: Sections: 5.1, 5.2, 5.3.Chapter 8: Sections: 8.1, 8.2.**	18
Unit III	**The Method of Variations in Problems with Fixed Boundaries:** Variation and its properties - Euler's Equation - Functionals of the Form $\int$ F(x,y1,y2,… yn,y1',y2',…yn')dx - Functionals Dependent on Higher Order Derivatives - Functional Dependent on the Functions of Several Independent Variables - Variational Problems in Parametric Form - Some Applications. **Text Book 2: Chapter 6: Sections: 6.1-6.7.**	18
Unit IV	**Sufficient Conditions for an Extremum:** Field of Extremals - The Function E(x,y,p,y') - Transforming the Euler Equations to the Canonical Form. **Text Book 2: Chapter 8: Sections: 8.1-8.3.**	18
Unit V	**Direct Methods in Variational Problems:** Direct Methods - Euler's Finite-Difference Method - The Ritz Method - Kantorovich's Method. **Text Book 2: Chapter 10: Sections: 10.1-10.4.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

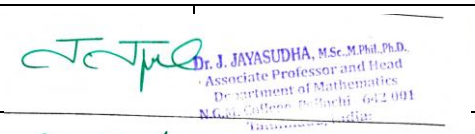
1. Kanwal R. P., *Linear Integral Equations - Theory and Technique* , Academic Press, NewYork and London, 1971.
2. ElsgoltsL.,*Differential Equations and the Calculus of Variations*, MIR Publishers, Moscow, 1970.

Books for Reference:

1. CorduneanuC.,*Integral Equations and Applications*, Cambridge University Press, Cambridge, 1991.
2. Weinstock R., *Calculus of Variations with Applications to Physics and Engineering*, McGraw Hill Book Co. Inc. New York, 1952.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/111/107/111107103/
2. https://nptel.ac.in/courses/111/104/111104025/
3. https://nptel.ac.in/courses/111/102/111102129/

Course Designed by	Dr. A. GNANASOUNDARI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS1E1	Title	Batch:	2026 - 2028
		MATLAB	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	4		Credits:	2

Course Objective

This course ensures the students to learn about the basics of MATLAB programming. It also enables the students to gain knowledge about the use of loops, functions, operators and insertion of plots using MATLAB commands.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Demonstrate comprehensive knowledge and understanding of MATLAB concepts including arrays, mathematical operations, scripts, functions, plotting techniques, programming constructs, and numerical methods.	PO1 (3), PO3 (2), PO6 (2), PO9 (1), PO10 (2), PO11 (3), PO14 (1), PO15 (1)
CO2	Apply MATLAB concepts to develop scripts, functions, and programs for solving computational and real-world engineering problems using appropriate techniques.	PO2 (3), PO4 (3), PO6 (1), PO7 (2), PO8 (2), PO10 (2), PO11 (2), PO12 (1), PO15 (1)
CO3	Analyze data and computational problems using MATLAB tools such as visualization, plotting, and numerical techniques to interpret results and draw meaningful conclusions.	PO5 (3), PO7 (1), PO10 (3), PO11 (3), PO15 (2)
CO4	Design, develop, and evaluate MATLAB-based solutions for complex problems including programming, modeling, curve fitting, and interpolation techniques.	PO1 (1), PO4 (2), PO6 (3), PO8 (3), PO9 (2), PO13 (1), PO15 (2)
CO5	Utilize MATLAB as a digital tool for mathematical modeling, data analysis, and problem-solving; engage in self-directed and lifelong learning through online resources, research articles, and seminars.	PO1 (2), PO2 (1), PO3 (3), PO5 (2), PO7 (1), PO8 (1), PO9 (2), PO10 (3), PO11 (3), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	-	2	-	-	2	-	-	1	2	3	-	-	1	1		
CO2	-	3	-	3	-	1	2	2	-	2	2	1	-	-	1		
CO3	-	-	-	-	3	-	1	-	-	3	3	-	-	-	**2**		
CO4	1	-	-	2	-	3	-	3	2	-	-	-	1	-	2		
CO5	2	1	3	-	2	-	1	1	2	3	3	-	-	-	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	Starting with MATLAB - Creating arrays - Mathematical operations with arrays. **Chapter 1: Sections 1.1-1.9.** **Chapter 2: Sections 2.1-2.11.** **Chapter 3: Sections 3.1-3.9.**	12
Unit II	Scripts files - Functions and function files - *Global variables (Self study)* **Chapter 4: Sections 4.1-4.8.** **Chapter 6: Sections 6.1-6.11.**	12
Unit III	Two-dimensional plots - Three dimensional plots - *Polar plots (Self study).* **Chapter 5: Sections 5.1-5.11.** **Chapter 9: Sections 9.1-9.6.**	12
Unit IV	Programming in MATLAB. **Chapter 7: Sections 7.1-7.8.**	12
Unit V	Polynomial - Curve fitting and interpolation. **Chapter 8: Sections 8.1-8.6.**	12
	Total Contact Hrs.	**60**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Amos Gilat, *MATLAB - An Introduction with Application*, John Wiley & Sons, Singapore, Third Edition, 2007.

Books for Reference:

1. Etter D. M., Kuncicky D. C. and Moore H., Introduction to MATLAB 7, Prentice Hall, New Jersy, 2009.
2. Palm W. J., Introduction to MATLAB 7 for Engineers, McGraw-Hill Education, New York, 2005.
3. Prata R. P., Getting Started with MATLAB - A Quick Introduction for Scientist and Engineers, Oxford University Press, New Delhi, 2010.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/103/106/103106118/
2. https://web4.cs.ucl.ac.uk/teaching/3085/archive/2010/matlab_tutorial/matlab_booklet.pdf
3. https://nptel.ac.in/courses/111/102/111102137/

Course Designed by	Dr. M. AMSAVENI	HOD
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	**Programme Title:**	M.Sc. Mathematics	
Course Code:	26PMS1E2	**Title**	**Batch:**	2026 - 2028
		SPECIAL FUNCTIONS	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4		**Credits:**	2

Course Objective

To enable the learners to obtain basic knowledge on fundamental properties of several special functions.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	
CO1	Students will be able to demonstrate comprehensive knowledge and understanding of special functions including Legendre polynomials, Bessel functions, Beta and Gamma functions, and improper integrals across all units.	PO1 (3), PO3 (2), PO6 (2), PO9 (1), PO10 (2), PO11 (3), PO14 (1), PO15 (2)
CO2	Students will be able to apply concepts and standard techniques of Legendre's equations, Bessel's equations, recurrence relations, and definite integrals to solve mathematical problems.	PO2 (3), PO4 (3), PO6 (1), PO7 (2), PO8 (2), PO10 (2), PO11 (2), PO12 (1), PO15 (1)
CO3	Students will be able to analyse properties and relationshipsof special functions such as orthogonality, generating functions, and series solutions, and interpret their mathematical significance.	PO2 (2), PO5 (3), PO7 (1), PO10 (3), PO11 (3), PO14 (1), PO15 (2)
CO4	Students will be able to formulate, evaluate, and develop solutions for complex problems involving differential equations and special functions, including derivations and advanced integral evaluations.	PO1 (1), PO3 (1), PO4 (2), PO6 (3), PO8 (2), PO9 (2), PO13 (1)
CO5	Students will be able to use mathematical and digital tools (such as software, online resources, and symbolic computation tools) and engage in self-directed learning through seminars, research articles, and online courses related to special functions.	PO1 (2), PO2 (1), PO3 (3), PO5 (2), PO7 (1), PO8 (1), PO9 (2), PO10 (3), PO11 (3), PO15 (2)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	-	2	-	-	2	-	-	1	2	3	-	-	1	2		
CO2	-	3	-	3	-	1	2	2	-	2	2	1	-	-	1		
CO3	-	2	-	-	3	-	1	-	-	3	3	-	-				
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2		
CO5	1	-	1	2	-	3	-	2	2	-	-	-	1	-	-		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Legendre's Equation :** Definition of Legendre's Equation -Solution of Legendre's Equation-Definition of $P_n(x)$ and $Q_n(x)$-General Solution of Legendre's Equation.	12
Unit II	To show that $P_n(x)$ is the coefficient of h^n in the expansion of $(1-2xh+h^2)^{-1/2}$ - Laplace Definite integral for $P_n(x)$-Orthogonal properties of Legendre's polynomials.	12
Unit III	**Bessel's Equation :** Definition of Bessel's Equation- Solution of Bessel's general differential equation- General solution of Bessel's Equation-Integration of Bessel's equation using power series method	12
Unit IV	Definition of $J_n(x)$,Recurrence formulae for $J_n(x)$- Generating function $J_n(x)$ -A second solution of Bessel's Equation -**Beta and Gamma Functions :** -Principal and general values of an improper integral	12
Unit V	Infinite limits- To find the value of $\int f(x)/F(x)\,dx$ - To find the value of $\int x^{2m}/1+x^{2n}dx$- To find the value of $\int x^{2m}/1+x^{2n}dx$- Deductions from $\int x^{2m}/1+x^{2n}dx$ and $\int x^{2m}/1+x^{2n}dx$	12
	Total Contact Hrs.	**60**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

J.N. Sharma and R.K.Gupta, Special Functions, Krishna PrakashanPublisher, Meerut, 1991.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

https://www.youtube.com/watch?v=iuKJHKu2KPI

Course Designed by	Dr. M. AMSAVENI	HOD
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics Pollachi - 642 001
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS1E3	Title	Batch:	2026 - 2028
		PROGRAMMING LAB IN MATLAB	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	2		Credits:	2

Course Objective

This course ensures a practical knowledge for creating the various types of 2D and 3D plots and computing the sub matrices from the existing matrix.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Students will be able to demonstrate fundamental knowledge of MATLAB programming concepts, including matrix operations, plotting techniques, interpolation, polynomial analysis, and applications in geometry, trigonometry, mechanics, and electrical systems through the given set of laboratory programs.	PO1 (3), PO2 (1), PO10 (1), PO15 (1)
CO2	Students will be able to apply MATLAB tools and techniques to solve real-world engineering and mathematical problems, such as projectile motion, friction analysis, resistive networks, and data visualization, by developing logical and efficient program solutions.	PO2 (1), PO3 (3), PO4 (3), PO6 (1), PO8 (1), PO10 (1), PO11 (1), PO12 (2), PO15 (1)
CO3	Students will be able to analyze data and computational results using MATLAB, including interpreting matrix operations, evaluating graphical outputs, examining polynomial roots, and comparing interpolation and curve fitting methods to draw meaningful conclusions.	PO2 (1), PO3 (2), PO5 (3), PO7 (1), PO8 (1), PO10 (1), PO12 (1), PO15 (1)
CO4	Students will be able to design and develop MATLAB programs to model, simulate, and visualize complex systems, such as 2D/3D plots, surface and mesh models, and best-fit functions, while evaluating the accuracy and effectiveness of computational solutions.	PO2 (1), PO3 (1), PO4 (1), PO6 (3), PO8 (3), PO9 (2), PO10 (1), PO11 (1), PO14 (1), PO15 (1)
CO5	Students will be able to utilize MATLAB and related digital tools effectively for data analysis and visualization, engage in self-directed learning through online resources, research articles, and seminars, and develop the ability for lifelong learning to adapt to emerging technologies and problem-solving approaches.	PO1 (1), PO2 (1), PO3 (0), PO5 (2), PO10 (3), PO11 (3), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	0	-	-	-	-	-	-	1	-	-	-	-	1		
CO2	-	1	3	3	-	1	-	1	-	1	1	2	-	-	1		
CO3	-	1	2	-	3	-	1	1	-	1	-	1	-	-	1		
CO4	-	1	1	1	-	3	-	3	2	1	1	-	-	1	1		
CO5	1	1	0	-	2	-	-	-	-	3	3	-	-	-	3		

3 Point Scale – 1, 2, 3

List of Programs:

1. Program to solve geometry and trigonometry problem.
2. Program to illustrate the row vector operations in a given matrix.
3. Program to illustrate the column vector operations in a given matrix.
4. Program to illustrate the creation of sub matrix form a given matrix.
5. Program for friction experiment.
6. Program to analyze the electrical resistive network.
7. Program to calculate distance of projectile by, element by element calculation.
8. Program to create vertical bar, horizontal bar, stairs, stem plots of a function.
9. Program to formatting a plot using commands.
10. Program to create plot of a function using the given data and fplot function.
11. Program to create mesh and surface plots for a given function.
12. Program to create various views of 3D plots.
13. Program for creating a matrix.
14. Program to plot a function and curve corresponds to the interpolation method.
15. Program to calculate value and finding roots of a polynomial.
16. Program to determine a function that best fits the given data.

Text Book:

Amos Gilat, *MATLAB - An Introduction with Application,* John Wiley & Sons, Singapore, Third Edition, 2007.

Books for Reference:

1. Etter D. M., Kuncicky D. C. and Moore H., Introduction to MATLAB 7, Prentice Hall, New Jersy, 2009.
2. Palm W. J., Introduction to MATLAB 7 for Engineers, McGraw-Hill Education, New York, 2005.
3. Prata R. P., Getting Started with MATLAB - A Quick Introduction for Scientist and Engineers, Oxford University Press, New Delhi, 2010.

Course Designed by	Dr. M. AMSAVENI	HOD
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics Pollachi - 642 001
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS205	Title	Batch:	2026 - 2028
		ALGEBRA-II	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objective

At the end of the course the students will have a depth knowledge of canonical forms, decomposition techniques, and bilinear forms, and with the skills to analyze and solve problems related to linear transformations.

Course Outcomes (CO)

On successful completion of this course, the students will be able to

CO Number	CO Statement	
CO1	Recall definitions and basic concepts of characteristic values, annihilating polynomials, invariant subspaces, direct sums, cyclic subspaces, Jordan forms, and bilinear forms.	PO1 (3), PO2 (1), PO3 (1), PO4 (1), PO5 (2), PO8 (2), PO9 (1), PO10 (1), PO11 (2), PO15 (2), PSO1 (3), PSO2 (1)
CO2	Explain the concepts of invariant subspaces, direct sum decompositions, primary decomposition theorem, cyclic decompositions, and properties of symmetric bilinear forms.	PO1 (3), PO2 (2), PO3 (2), PO4 (2), PO5 (2), PO7 (1), PO8 (2), PO9 (2), PO10 (1), PO11 (2), PO15 (2), PSO1 (3), PSO2 (1)
CO3	Apply methods to compute characteristic values, annihilating polynomials, invariant factors, and construct rational and Jordan canonical forms for matrices.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO7 (1), PO8 (3), PO9 (2), PO10 (2), PO11 (2), PO15 (3), PSO1 (3), PSO2 (2)
CO4	Analyze linear transformations using primary decomposition, cyclic subspaces, and invariant subspaces; distinguish between rational and Jordan forms.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (3), PO9 (3), PO10 (2), PO11 (2), PO15 (3), PSO1 (3), PSO2 (2)
CO5	Evaluate and justify appropriate canonical forms and decomposition techniques for simplifying linear transformations and bilinear forms.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (3), PO9 (3), PO10 (2), PO11 (3), PO13 (1), PO14 (1), PO15 (3), PSO1 (3), PSO2 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	1	2	–	–	2	1	1	2	–	–	–	2		
CO2	3	2	2	2	2	–	1	2	2	1	2	–	–	–	2		
CO3	3	2	3	3	3	1	1	3	2	2	2	–	–	–	3		
CO4	3	2	3	3	3	2	1	3	3	2	2	–	–	–	3		
CO5	3	2	3	3	3	2	1	3	3	2	3	–	1	1	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Elementary Canonical Forms**: Introduction - Characteristic Values - Annihilating Polynomials, Invariant Subspaces. **Chapter 6:Sections: 6.1 - 6.4.**	18
Unit II	**Elementary Canonical Forms**: Direct Sum Decompositions - Invariant Direct Sums - The Primary Decomposition Theorem. **Chapter 6: Sections: 6.6 - 6.8.**	18
Unit III	**The Rational and Jordan Forms**: Cyclic Subspaces and Annihilators - Cyclic Decompositions and the Rational Form. **Chapter 7: Sections: 7.1, 7.2.**	18
Unit IV	**The Rational and Jordan Forms**: The Jordan Form - Computations of Invariant Factors. **Chapter 7: Sections: 7.3, 7.4.**	18
Unit V	**Bilinear Forms**: Bilinear Forms - Symmetric Bilinear Forms **Chapter 10: Sections: 10.1, 10.2.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

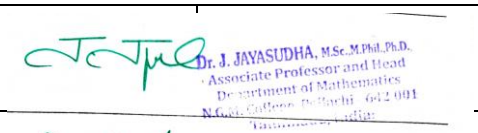
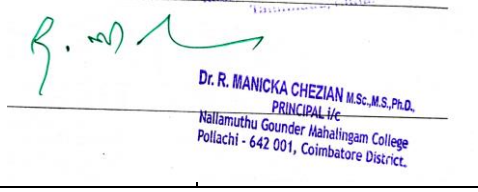
Kenneth Hoffman and Ray Kunze ,*Linear Algebra*, PHI learning Private Ltd., New Delhi, Second Edition, 2010.

Books for Reference:

1. Herstein I. N, *Topics in Algebra,* Wiley India pvt. Ltd., New Delhi, 2010.
2. Kumaresan S, *Linear Algebra,* Prentice-Hall of India, 2001.
3. Serge Lang, *Introduction to Linear Algebra*, Springer, 2005.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

https://nptel.ac.in/courses/111/104/111104137/

Course Designed by	Dr. S. SIVASANKAR	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS206	Title	Batch:	2026-2028
		MEASURE THEORY AND INTEGRATION	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objective

At the end of the course the students will have the ability to do understand measure theory and Lebesgue integration, including measurable functions, differentiation, abstract measure spaces, L^pspaces, and Lebesgue–Stieltjes integration, and to develop the ability to apply these concepts in advanced mathematical analysis and related fields.

Course Outcomes (CO)

On successful completion of the course student will be able to

CO Number	CO Statement	
CO1	Recall fundamental definitions and concepts of Lebesgue outer measure, measurable sets, measurable functions, abstract measure spaces, and L^pspaces.	PO1 (3), PO2 (1), PO3 (1), PO4 (1), PO5 (2), PO8 (2), PO9 (1), PO10 (1), PO11 (2), PO15 (2), PSO1 (3), PSO2 (1)
CO2	Explain the properties of measurable sets and functions, regularity, types of integrals, differentiation concepts, and inequalities such as Jensen's, Hölder's, and Minkowski's	PO1 (3), PO2 (2), PO3 (2), PO4 (2), PO5 (2), PO7 (1), PO8 (2), PO9 (2), PO10 (1), PO11 (2), PO15 (2), PSO1 (3), PSO2 (1)
CO3	Apply Lebesgue integration techniques to evaluate integrals, analyze convergence of series, compute measures, and solve problems involving L^pspaces and Lebesgue-Stieltjes integration.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO7 (1), PO8 (3), PO9 (2), PO10 (2), PO11 (2), PO15 (3), PSO1 (3), PSO2 (2)
CO4	Analyze relationships between Riemann and Lebesgue integrals, differentiation and integration, structure of measure spaces, and properties of functions of bounded variation and absolute continuity.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (3), PO9 (3), PO10 (2), PO11 (2), PO15 (3), PSO1 (3), PSO2 (2)
CO5	Evaluate and justify advanced results in measure theory such as extension and uniqueness of measures, completeness of L^pspaces, and applications like the Riesz Representation Theorem.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO7 (1), PO8 (3), PO9 (3), PO10 (2), PO11 (3), PO13 (1), PO14 (1), PO15 (3), PSO1 (3), PSO2 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	1	2	–	–	2	1	1	2	–	–	–	2		
CO2	3	2	2	2	2	–	1	2	2	1	2	–	–	–	2		
CO3	3	2	3	3	3	1	1	3	2	2	2	–	–	–	3		
CO4	3	2	3	3	3	2	1	3	3	2	2	–	–	–	3		
CO5	3	2	3	3	3	3	1	3	3	2	3	–	1	1	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Measure On The Real Line:** Lebesgue Outer Measure, Measurable sets, Regularity, Measurable Functions, Borel and Lebesgue Measurability, Hausdroff Measure on the Real Line. **Chapter 2: Sections : 2.1 - 2.6.**	18
Unit II	**Integration of Functions of a Real Line:** Integration of Non-Negative Functions, The General Integral, Integration of Series, Riemann and Lebesgue Integrals. **Chapter 3: Sections: 3.1, 3.4.**	18
Unit III	**Differentiation:** The Four Derivates, Continuous Non-differentiable Functions, Functions of Bounded Variation, Lebesgue's Differentiation Theorem, Differentiation and Integration, The Lebesgue Set. **Chapter 4: Sections : 4.1 – 4.6**	18
Unit IV	**Abstract Measure Spaces:** Measure and Outer Measures, Extension of a Masure, Uniqueness of the Extension, Completion of a Measure. Measure Spaces, Integration with respect to a Measure. **Inequalities and the L^PSpaces:** The L^P Spaces, Convex Functions, Jensen's Inequality, The Inequalities of Holder and Minkowski, Completeness of $L^P(\mu)$ **Chapter 5: Sections : 5.1- 5.6.** **Chapter 6:Sections : 6.1 - 6.5** .	18
Unit V	**Lebesgue-Stieltjes Integration:** Lebesgue-Stieltjes Measure, Application to Hausdroff Measures, Absolutely Continuous Functions, Integration by Parts, Change of Variable, Riesz Representation Theorem for *C(I).* **Chapter 9: Sections : 9.1 – 9.6.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

G. de Barra, *Measure Theory and Integration*, New Age International (P) Ltd Publishers, New Delhi, 2003.

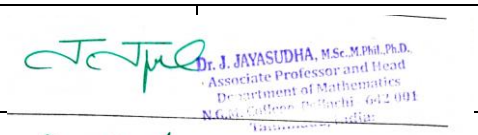
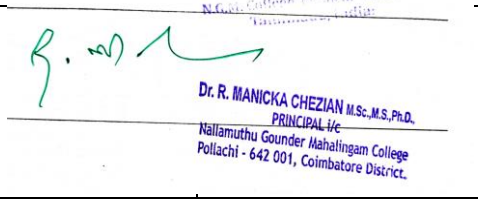
Books for Reference:

1. Royden, *Real Analysis*, MacMillan Publishing Company, New York, 1968.
2. Halmos P R, *MeasureTheorey*, Van Nostrand Princeton, New Jersey, 1950.
3. GanapathyIyer, *Mathematical Analysis*, Tata MCGraw-HillPublishningCopany Ltd., New Delhi.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

https://ocw.mit.edu/courses/18-125-measure-and-integration-fall-2003/resources/lecture-notes/

https://onlinecourses.nptel.ac.in/noc22_ma64/preview

Course Designed by	Dr. S. SIVASANKAR	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS207	Title	Batch:	2026 - 2028
		PARTIAL DIFFERENTIAL EQUATIONS	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	5		Credits:	4

Course Objective

This course helps the students to understand linear and nonlinear partial differential equations and solving those using Charpit's and Jacobi's methods, methods of separation of variables and by method integral transforms. This course includes the study of Laplace equation, wave equation and diffusion equation and their classifications.

Course Outcomes (CO)

On successful completion of this course, the students will be able to

CO Number	CO Statement	
CO1	Understand the fundamental concepts ofpartial differential equations and classify different types of first- and second-order PDEs arising in mathematical and physical problems.	PO1 (3), PO2 (2), PO3 (2), PO4 (2), PO6 (1), PO7 (2), PO15 (1)
CO2	Apply appropriate analytical methods to solve first- and second-order PDEs, including techniques such as Charpit's method, Jacobi's method, separation of variables, and auxiliary equation methods**.**	PO1 (3), PO2 (3), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (2), PO9 (1), PO12 (2), PO14 (1), PO15 (2)
CO3	Analyze and solve standard PDE models such as Laplace, wave, and diffusion equations, and interpret their solutions in terms of physical phenomena and boundary conditions.	PO1 (3), PO2 (3), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO11 (2), PO13 (1), PO15 (2)
CO4	Evaluate and formulate mathematical models using PDEs for real-world problems in science and engineering, and interpret the behavior of solutions under different initial and boundary conditions.	PO1 (3), PO2 (3), PO3 (2), PO5 (3), PO6 (3), PO8 (3), PO9 (2), PO11 (3), PO13 (1), PO15 (2)
CO5	Utilize mathematical software and digital tools (such as MATLAB, Python, or other computational platforms) to model, simulate, and visualize solutions of partial differential equations.	PO1 (3), PO2 (2), PO4 (3), PO5 (3), PO6 (2), PO7 (2), PO8 (3), PO9 (1), PO10 (3), PO11 (2), PO13 (2), PO14 (1), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	-	1	2	-	-	-	-	-	-	-	1		
CO2	3	3	3	3	3	2	1	2	1	-	-	2	-	1	2		
CO3	3	3	3	3	3	2	-	3	-	-	2	-	1	-	2		
CO4	3	3	2	-	3	3	-	3	2	-	3	-	1	-	2		
CO5	3	2	-	3	3	2	2	3	1	3	2	-	2	1	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Partial Differential Equations of the First Order:** Partial Differential Equations - *Origins of First-order Partial Differential Equations (Self study)* - Nonlinear Partial Differential Equations of the First Order - Compatible Systems of First-order Equations - Charpit's Method - Special Types of First-order Equations - Jacobi's Method. **Chapter 2:Sections:1, 2, 7, 9, 10, 11 and 13.**	15
Unit II	**Partial Differential Equations of the Second Order:** The Origin of Second-order Equations - Linear Partial Differential Equations with Constant Coefficients - Equations with Variable Coefficients. **Chapter 3:Sections:1,4 and 5.**	15
Unit III	**Partial Differential Equations of the Second Order:** Separation of variables - The Method of Integral Transforms- Nonlinear Equations of Second Order. **Chapter 3:Sections: 9, 10 and 11.**	15
Unit IV	**Laplace's Equation:** Elementary Solutions of Laplace's Equations - Families of Equipotential Surfaces - *Boundary Value Problems (Self study)* - Separation of Variables - Problems with Axial Symmetry. **Chapter 4 :Sections: 2 - 6.**	15
Unit V	**The Wave Equation:** Elementary Solutions of the One-dimensional Wave Equation - Vibrating Membranes: Application of the Calculus of Variations. **The Diffusion Equation:** Elementary Solutions of Diffusion Equation - Separation of Variables. **Chapter 5: Sections: 2 and 4** **Chapter 6: Sections: 3 and 4.**	15
	Total Contact Hrs.	**75**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

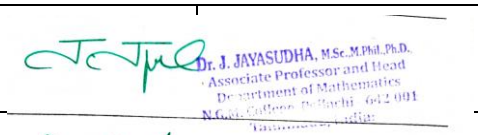
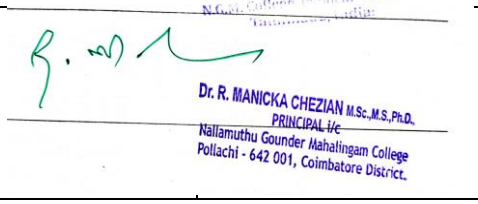
Ian N. Sneddon, *Elements of Partial Differential Equation, Dover Publication*, New York, 2006.

Books for Reference:

1. Michael Renardy and Robert C. Rogers, *An Introduction to Partial Differential Equations.* Second Edition. Springer, 2004.
2. Robert C. Mc Owen, *Partial Differential Equations, Methods and Applications*, Second Edition. Pearson Education, Inc., 2004.
3. SankaraRaoK., Introduction *to Partial Differential Equations, Second Edition,* PHI Learning Pvt.Ltd, New Delhi, 2009.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/111/107/111107111/
2. https://nptel.ac.in/courses/122/107/122107037/
3. https://ocw.mit.edu/courses/mathematics/18-152-introduction-to-partial-differential-equationsfall-2011/lecture-notes/

Course Designed by	Dr. S. KALEESWARI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS208	Title	Batch:	2026 - 2028
		MATHEMATICAL STATISTICS	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

The objective of this syllabus is to give a systematic introduction to modern probability theory and mathematical statistics

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	
CO1	Recall and understand the definitions and properties of random variables, probability distributions, continuous and multivariate densities, and marginal and conditional distributions.	PO1 (3), PO2 (1), PO5 (2), PO8 (2), PO10 (1), PO11 (1), PO15 (2)
CO2	Apply sampling distributions, including the mean, χ^2, t, and F distributions, to solve problems and interpret sample data.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (1), PO15 (2)
CO3	Analyze point estimators using properties such as unbiasedness, efficiency, sufficiency, and consistency, and assess their appropriateness in statistical decision-making.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (1), PO15 (3)
CO4	Construct and evaluate confidence intervals for population parameters, including means, differences between means, proportions, differences between proportions, variances, and ratios of variances.	PO1 (3), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (2), PO11 (1), PO15 (3)
CO5	Formulate and perform hypothesis tests for means, differences between means, variances, and proportions, and interpret the results in practical and research-based scenarios.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (3), PO11 (1), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	–	–	2	–	–	2	–	1	1	–	–	–	2		
CO2	2	1	3	3	3	2	–	3	–	2	1	–	–	–	2		
CO3	2	1	3	3	3	2	–	3	–	2	1	–	–	–	3		
CO4	3	1	2	3	3	3	–	3	–	2	1	–	–	–	3		
CO5	2	1	2	3	3	3	–	3	–	3	1	–	–	–	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Probability Distributions and Probability Densities:** Introduction – Probability Distributions – Continuous Random Variables – Probability Density Functions – Multivariate Distributions - Marginal Distributions – Conditional Distributions. **Chapter 3: Sections: 3.1 - 3.7.**	18
Unit II	**Sampling Distributions:** Introduction – The Distribution of the Mean – The Distribution of the Mean: Finite Populations – The Chi-Square Distribution – The t Distribution – The F Distribution. **Chapter 8: Sections: 8.1 - 8.6.**	18
Unit III	**Estimation: Theory:** Introduction - Unbiased Estimators – Efficiency – Consistency – Sufficiency – The Method of Moments - The Method of Maximum Likelihood. **Chapter 10 :Sections: 10.1 – 10.5, 10.7, 10.8**	18
Unit IV	**Estimation: Applications:** Introduction – The Estimation of Means – The Estimation of Differences Between Means - The Estimation of Proportions - The Estimation of Differences Between Proportions – The Estimation of Variances – The Estimation of the Ratio of Two Variances. **Chapter 11: Sections: 11.1 - 11.7.**	18
Unit V	**Hypothesis Testing: Theory:** Introduction – Testing a Statistical Hypothesis. **Chapter12: Sections: 12.1 - 12.2.** **Hypothesis Testing: Applications:** Introduction – Tests Concerning Means - Tests Concerning Differences Between Means - Tests Concerning Variances - Tests Concerning Proportions. **Chapter13: Sections: 13.1 - 13.5.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Irwin Miller and Marylees Miller, John E. Freund's Mathematical Statistics,Prentice Hall of India Private Limited, New Delhi, Sixth Edition, 2003.

Books for Reference:

Gupta S. C. Kapoor V. K., Fundamentals of Mathematical Statistics a Modern Approach, Sultan Chand & Sons/10th Edition, 2000.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/111/106/111106150/
2. https://nptel.ac.in/courses/111/106/111106112/
3. https://www.youtube.com/watch?v=G_RDxAZJ-ug
4. https://www.youtube.com/watch?v=hcDb12fsbBU
5. https://www.youtube.com/watch?v=MOy2gcCkcRY
6. https://nptel.ac.in/courses/111/105/111105124/

Course Designed by	Dr. M. MAHESWARI	M.Mallesh
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics N.G.M. College, Pollachi - 642 001 Tamilnadu, India.
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS2E4	Title	Batch:	2026 – 2028
		NUMERICAL ANALYSIS	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	4		Credits:	2

Course Objective

This course enables the students to gain knowledge in solving Non-linear equations, Boundary value problems and characteristic value problems using MATLAB functions. It also provides the techniques to find the numerical solutions for ordinary differential equations using MATLAB.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall fundamental concepts of numerical methods including interpolation, iterative techniques, numerical differentiation, integration, and differential equations.	PO1 (3), PO3 (1), PO5 (1), PO8 (1), PO10 (1), PO11 (1), PO14 (1), PO15 (3)
CO2	Explain various numerical techniques such as Newton's method, Gaussian elimination, trapezoidal and Simpson's rules, and Runge-Kutta methods, along with their underlying principles and limitations.	PO1 (3), PO2 (2), PO3 (2), PO4 (1), PO5 (2), PO8 (2), PO10 (1), PO11 (1), PO12 (1), PO15 (3)
CO3	Apply appropriate numerical methods to solve nonlinear equations and ordinary differential equations.	PO1 (3), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (1), PO8 (3), PO10 (2), PO11 (2), PO15 (3)
CO4	Analyze and compare different numerical techniques based on Accuracy and convergence and Computational efficiency.	PO1 (3), PO2 (1), PO3 (3), PO4 (2), PO5 (3), PO6 (2), PO8 (3), PO9 (1), PO10 (2), PO11 (2), PO13 (1), PO15 (3)
CO5	Evaluate and select the most appropriate numerical method for solving real-world engineering and mathematical problems.	PO1 (2), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (2), PO9 (2), PO10 (2), PO11 (3), PO15 (2)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	-	1	-	1	-	-	1	-	1	1	-	-	1	3		
CO2	3	2	2	1	2	-	-	2	-	1	1	1	-	-	3		
CO3	3	1	2	3	3	1	-	3	-	2	2	-	-	-	3		
CO4	3	1	3	2	3	2	-	3	1	2	2	-	1	-	3		
CO5	2	2	3	3	3	2	1	2	2	2	3	-	-	-	2		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Solving Nonlinear Equations:** Linear interpolation methods - Newton's method - Muller's method - Newton's method for polynomials (excluding Horner's methods, Parallel processing) - Bairstow's method for quadratic factors - *Internal halving(Self study).* **Chapter 1: Sections: 1.3 - 1.5, 1.7, 1.8, 1.11.**	12
Unit II	**Solving Sets of Equations:** The Elimination method - Gaussian Elimination and Gauss-Jordan methods - LU decomposition method - Matrix inversion by Gauss-Jordan method - Methods of iteration - Gauss Jacobi and Gauss Seidal iteration - Relaxation method - Systems of nonlinear equations - *Relaxation method (Self study).* **Chapter 2: Sections: 2.3 - 2.5, 2.7, 2.10 - 2.12.**	12
Unit III	**Numerical Differentiation And Integration:** Derivatives from differences tables - Higher-order derivatives - Divided difference, Central difference formulas - The trapezoidal rule - A composite formula - Romberg integration - Simpson's rules. **Chapter 5: Sections: 5.2, 5.3, 5.6 and 5.7.**	12
Unit IV	**Numerical Solution of Ordinary Differential Equations:** Taylor-series method - Euler and Modified Euler methods - Runge - Kutta methods - Multistep methods - Milne's method - Adams-Moulton method. **Chapter 6: Sections: 6.2 - 6.7.**	12
Unit V	**Boundary Value Problems and Characteristic Value Problems:** The shooting method - Solution through a set of equations - Derivative boundary conditions - Characteristic value problems - Eigen values of a matrix by iteration - The power method. **Chapter 7: Sections: 7.2 - 7.5.**	12
	Total Contact Hrs.	**60**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Gerald C.F. and Wheatley P.O., *AppliedNumerical Analysis,* Sixth Edition, Addison-Wesley, Reading, 2005.

Books for Reference:

1. R.L. Burden and J. Douglas Faires, Numerical Analysis, 9th ed., Boston: Cengage Learning, 2011.
2. S.S. Sastry, Introductory Methods of Numerical Analysis, 4th ed., New Delhi: Prentice-Hall of India, 2006.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.,]

1. https://nptel.ac.in/courses/111/102/111102137/
2. https://nptel.ac.in/courses/111/106/111106101/
3. https://nptel.ac.in/courses/103/106/103106118/

Course Designed by	Dr. M. AMSAVENI	HOD
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics Pollachi - 642 001
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS2E5	Title	Batch:	2026 – 2028
		ALGEBRAIC NUMBER THEORY	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	4		Credits:	2

Course Objectives

This course enables the learners

1. An algebraic point-of-view of number theoretic problems.
2. To revisit concepts like principal ideal rings and algebraic extensions; and to know new concepts like Noetherian rings and Dedekind rings.
3. To study algebraic proofs of several numbers theoretic problems.

Course Outcomes (CO)

On completion of the course the students will be able to

CO Number	CO Statement	
CO1	Recall fundamental definitions and concepts related to principal ideal rings, integral elements, algebraic elements, Noetherian rings, and Dedekind rings.	PO1(3), PO3(1), PO5(1), PO8(1), PO15(1), PSO1(2), PSO2(1)
CO2	Understand the properties of principal ideal rings, Noetherian and Dedekind rings, and the concepts of elements integral over a ring and algebraic over a field.	PO1(3), PO2(1), PO3(2), PO4(1), PO5(2), PO8(2), PO11(1), PO15(1), PSO1(2), PSO2(1)
CO3	Apply the concepts of ideals, integral elements, and ring properties to solve problems in algebraic structures.	PO1(3), PO3(3), PO4(2), PO5(2), PO6(1), PO8(3), PO11(1), PO15(2), PSO1(2), PSO2(2)
CO4	Analyze the structure of Dedekind rings, ideal classes, and the behavior of prime ideals in extension fields.	PO1(3), PO3(3), PO4(3), PO5(3), PO6(2), PO8(3), PO11(2), PO15(2), PSO1(2), PSO2(2)
CO5	Evaluate and interpret results related to splitting of prime ideals, unit theorem, and ideal class groups in algebraic number theory.	PO1(3), PO2(1), PO3(3), PO4(3), PO5(3), PO6(2), PO8(3), PO11(2), PO15(2), PSO1(2), PSO2(2)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	–	1	–	1	–	–	1	–	–	–	–	–	–	1		
CO2	3	1	2	1	2	–	–	2	–	–	1	–	–	–	1		
CO3	3	–	3	2	2	1	–	3	–	–	1	–	–	–	2		
CO4	3	–	3	3	3	2	–	3	–	–	2	–	–	–	2		
CO5	3	1	3	3	3	2	–	3	–	–	2	–	–	–	2		

3 POINT SCALE – 1, 2, 3.

Units	Content
Unit I	Principal ideal rings
Unit II	Elements integral over a ring; elements algebraic over a field
Unit III	Noetherian rings and Dedekind rings
Unit IV	Ideal classes and the unit theorem
Unit V	The splitting of prime ideals in an extension field.

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Algebraic theory of Numbers, Pierre Samuel, (Translated from the French by Allen J.Silberger), Herman, Paris, 1970.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://www.youtube.com/watch?v=f3SJON86hcU
2. https://www.youtube.com/watch?v=SCvtxjpVQms

Course Designed by	Dr. M. AMSAVENI	
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics N.G.M. College, Pollachi - 642 001
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS2E6	Title	Batch:	2026 – 2028
		PROGRAMMING LAB IN NUMERICAL ANALYSIS USING MATLAB	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	2		Credits:	2

Course Objective

This course enables a practical knowledge for finding the numerical solutions of a system of non-linear equations and first order ordinary differential equations using MATLAB.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall basic concepts, formulas, and algorithms related to numerical methods for solving equations, integration, and differential equations.	PO1 (3), PO2 (1), PO3 (1), PO5 (1), PO8 (1), PO15 (1)
CO2	Explain the working principles of numerical methods such as Newton-Raphson, Gauss elimination, iterative methods, and numerical integration techniques.	PO1 (3), PO2 (1), PO3 (2), PO4 (1), PO5 (2), PO8 (2), PO11 (1), PO15 (1)
CO3	Apply numerical methods to solve algebraic equations, systems of linear equations, and perform numerical integration and solution of differential equations.	PO1 (3), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO7 (1), PO8 (2), PO10 (1), PO11 (1), PO15 (2)
CO4	Analyze the accuracy, convergence, and efficiency of different numerical methods such as iterative methods and Runge-Kutta techniques.	PO1 (3), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO7 (1), PO8 (2), PO9 (1), PO10 (1), PO11 (1), PO15 (2)
CO5	Evaluate and compare various numerical methods for solving mathematical problems and select appropriate methods for given computational tasks.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO7 (1), PO8 (2), PO9 (1), PO10 (1), PO11 (2), PO13 (1), PO15 (2)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	–	1	–	–	1	–	–	–	–	–	–	1		
CO2	3	1	2	1	2	–	–	2	–	–	1	–	–	–	1		
CO3	3	1	3	3	3	1	1	2	–	1	1	–	–	–	2		
CO4	3	1	3	3	3	1	1	2	1	1	1	–	–	–	2		
CO5	3	2	3	3	3	1	1	2	1	1	2	–	1	–	2		

3 POINT SCALE – 1, 2, 3.

List of Programs:

1. Newton Raphson Method to find the roots.
2. Gauss elimination Method for solving a system of linear equations.
3. Matrix inverse by Gauss Jordan Method.
4. Gauss Jacobi's Method for solving a system of linear equations.
5. Gauss Seidal Method for solving a system of linear equations.
6. Numerical integration by Trapezoidal rule.
7. Numerical integration by Simpon's 1/3 rule.
8. Euler's Method for solving first order ODE.
9. Second order Runge-Kutta Method for solving first order ODE.
10. Fourth order Runge-Kutta Method for solving first order ODE.
11. Milne's Predictor-Corrector Method for solving first order ODE.
12. Eigen values and Eigen vectors by Power Method.

Text Book:

Gerald C.F. and Wheatley P.O., *AppliedNumerical Analysis*, Sixth Edition, Addison-Wesley, Reading, 2005.

Books for Reference:

1. R.L. Burden and J. Douglas Faires, Numerical Analysis, 9th ed., Boston: Cengage Learning, 2011.
2. S.S. Sastry, Introductory Methods of Numerical Analysis, 4th ed., New Delhi: Prentice-Hall of India, 2006.

Course Designed by	Dr. M. AMSAVENI	
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics N.G.M. College, Pollachi - 642 001
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS2N1	Title	Batch:	2026 – 2028
		NME - MATHEMATICAL STATISTICS AND TECHNIQUES	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	1		Credits:	1

Course Objective

The aim of this paper is to train the students to improve the basic knowledge relevant to their major subjects. This syllabus enables students to learn about the concept of Analysis and Testing of Hypothesis**.**

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Understand and explain the fundamental concepts of statistical measures**,** correlation, regression, and hypothesis testing used for data analysis.	PO1 (3), PO2 (1), PO3 (2), PO4 (2), PO5 (1), PO6 (2), PO9 (3), PO15 (2)
CO2	Compute and interpret measures of central tendency and dispersion (mean, median, standard deviation, coefficient of variation) for real-world data sets.	PO1 (3), PO2 (3), PO3 (3), PO4 (3), PO7 (2), PO10 (2), PO13 (1), PO15 (1)
CO3	Analyze relationships between variables using correlation (simple and rank) **and** simple linear regression**,**and interpret the results.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO8 (2), PO10 (1), PO11 (2), PO13 (2), PO14 (2), PO15 (2)
CO4	Apply appropriate statistical hypothesis **tests** (Z-test, t-test, chi-square test, and F-test) to make decisions based on sample data.	PO1 (3), PO2 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (2), PO11 (2), PO13 (1), PO15 (2)
CO5	Use digital tools and statistical software (such as Excel, Python, R, or SPSS) to perform data analysis, model relationships, and visualize statistical results effectively.	PO1 (3), PO2 (3), PO3 (2), PO4 (3), PO6 (3), PO7 (3), PO8 (3), PO9 (2), PO10 (3), PO11 (2), PO12 (1), PO13 (1), PO14 (1), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	2	1	2	-	-	3	-	-	-	-	-	2		
CO2	3	3	3	3	-	-	2	-	-	2	-	-	1		1		
CO3	3	2	3	3	3	-	-	2	-	1	2	-	2	2	2		
CO4	3	2	-	3	3	3	-	3	-	2	2	-	1	-	2		
CO5	3	3	2	3	-	3	3	3	2	3	2	1	1	1	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Measures of central value:** Mean- Median- Standard deviation-Coefficient of variation. **Volume I: Chapter 7.**	03
Unit II	**Correlation Analysis**: Simple and Rank Correlation. **Volume I: Chapter 10.**	03
Unit III	**Regression Analysis**: Simple Linear Regression. **Volume I: Chapter 11.**	03
Unit IV	**Testing of Hypothesis**: Z Test - t Test. **Volume II: Chapter 3.**	03
Unit V	**Testing of Hypothesis**: Chi square Test - F Test. **Volume II: Chapter 4, 5.**	03
	Total Contact Hrs.	**15**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

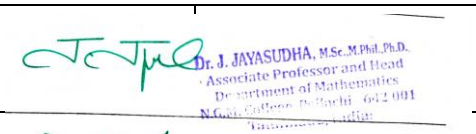
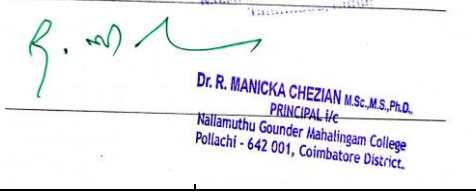
Gupta S. P., *Statistical Methods*, Sultan chand& sons, New Delhi, 2006.

Books for Reference:

1. Gupta S. C. and Kapoor V. K., *Fundamentals of Mathematical Statistics*, S. Chand & Sons, 2009.
2. Vital P. R., *Mathematical Statistics*, Margham publications, 2004.

Related Online Contents [MOOC, SWAYAM,NPTEL, Websites etc.,]

1. https://www.youtube.com/watch?v=zjHfAhcU6kE
2. https://nptel.ac.in/courses/111/105/111105042/
3. https://www.youtube.com/watch?v=VudrNXCYJt4
4. https://www.youtube.com/watch?v=NmgbFJ4UwPs

Course Designed by	Dr. S. KALEESWARI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS2N2	Title	Batch:	2026 – 2028
		NME - MATHEMATICS IN FINANCE	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	1		Credits:	1

Course Objective

The objective of this paper is to introduce the concepts of financial statement analysis which help the students to develop their financial skills.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Understand the concepts of financial statement analysis and ratio analysis, including their meaning, objectives, and basis of comparison for evaluating financial performance.	PO1 (3), PO3 (2), PO6 (2), PO9 (1), PO10 (2), PO11 (3), PO14 (1), PO15 (1)
CO2	Analyze and interpret various financial ratios such as liquidity, turnover, leverage, and coverage ratios to assess the financial position and operational efficiency of a business.	PO1 (3), PO2 (3), PO3 (3), PO4 (3), PO6 (1), PO7 (2), PO8 (2), PO10 (2), PO11 (2), PO12 (1), PO15 (1)
CO3	Evaluate profitability using ratios related to sales and investments, including profit margin, expense ratios, and return on investment (ROI).	PO1 (3), PO2 (2), PO3 (1), PO5 (3), PO7 (1), PO10 (3), PO11 (3), PO15 (1)
CO4	Apply ratio analysis techniques to interpret financial statements and support decision-making regarding solvency, profitability, and capital structure.	PO1 (3), PO2 (1), PO3 (2), PO4 (2), PO6 (3), PO8 (3), PO9 (2), PO13 (1), PO15 (2)
CO5	Utilize digital tools, mathematical techniques, and financial models (such as spreadsheets, ratio analysis software, and data visualization tools) to compute, analyze, and present financial ratios effectively.	PO1 (3), PO2 (1), PO3 (3), PO5 (2), PO7 (1), PO8 (1), PO9 (2), PO10 (3), PO11 (3), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	-	2	-	-	2	-	-	1	2	3	-	-	1	1		
CO2	3	3	3	3	-	1	2	2	-	2	2	1	-	-	1		
CO3	3	2	1	-	3	-	1	-	-	3	3	-	-	-	2		
CO4	3	1	2	2	-	3	-	3	2	-	-	-	1	-	2		
CO5	3	1	3	-	2	-	1	1	2	3	3	-	-	-	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Financial statement analysis**: Introduction - Ratio analysis -Meaning and Rationales - Basis of comparison. **Chapter 4: Sections: 4.1, 4.2.**	03
Unit II	**Financial statement analysis:** Types of ratios - Liquidity ratio - Net working capital - Current ratios - Acid test/Quick ratios. **Chapter 4: Sections: 4.3, 4.4.**	03
Unit III	**Financial statement analysis:** Turnover ratio – Defensive - Interval ratio - Leverage/Capital structure ratio – Debt - Equity Ratios - Debt to total capital ratio. **Chapter 4: Sections: 4.5.**	03
Unit IV	**Financial statement analysis:** Coverage ratios - Profitability ratios - profitability ratios related to sales - Profit margin - Expenses ratio. **Chapter 4: Sections: 4.6, 4.7**.	03
Unit V	**Financial statement analysis:** Profitability ratios related to investments: Return on investment - Importance of ratio analysis. **Chapter 4: Section: 4.9.**	03
	Total Contact Hrs.	**15**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

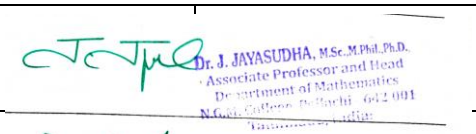
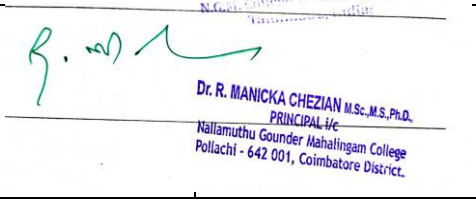
Khan M.Y and Jain P. K, *Financial Management,* Tata McGraw Hill Publishing Company Ltd, New Delhi, 1990.

Books for Reference:

1. Aswathdamodaran, Corporate Finance Theory and Practice,John Wiley and Sons, Inc.
2. Prasanna Chandra, Managing Investments, Tata McGraw - Hill Publishing Company Ltd, New Delhi, 1998.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

https://www.youtube.com/watch?v=IrWeySxY9OA

Course Designed by	Dr. S. KALEESWARI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

VALUE ADDED COURSE

Programme Code:	PMS	**Programme Title:**	Mathematics	
Course Code:	26PMS2VA	**Title**	**Batch:**	2026 – 2028
		INTERNET OF THINGS	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	-		**Credits:**	2*

Course Objectives

This course highlights on physical design, logical design, enabling technologies of IoT, IoT system management and design methodology.

Course outcomes (CO)

At the end of this course, the students will be able to

CO Number	**CO Statement**	
CO1	Recall fundamental concepts, definitions, characteristics, and components of Internet of Things (IoT), including protocols and physical design.	PO1 (2), PO2 (1), PO5 (1), PO10 (1), PO15 (1)
CO2	Explain the structure of LaTeX documents including title pages, section hierarchy, and different environments such as itemize and tabular.	PO1 (2), PO5 (2), PO10 (2), PO15 (1)
CO3	Apply LaTeX commands to create formatted documents including lists, tables (with multiple rows), and insertion of images.	PO1 (2), PO3 (2), PO5 (3), PO10 (2), PO15 (1)
CO4	Analyze and construct complex mathematical expressions such as systems of equations, binomial expressions, and special symbols like Christoffel symbols using appropriate LaTeX formats.	PO1 (3), PO2 (2), PO3 (2), PO4 (1), PO5 (3), PO10 (2), PO15 (2)
CO5	Evaluate and produce well-structured LaTeX documents by integrating cross-references, graphics, and advanced formatting techniques effectively.	PO1 (3), PO2 (2), PO3 (3), PO5 (3), PO10 (3), PO15 (2)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	2	1	–	–	1	–	–	–	–	1	–	–	–	–	1		
CO2	2	–	–	–	2	–	–	–	–	2	–	–	–	–	1		
CO3	2	–	2	–	3	–	–	–	–	2	–	–	–	–	1		
CO4	3	2	2	1	3	–	–	–	–	2	–	–	–	–	2		
CO5	3	2	3	–	3	–	–	–	–	3	–	–	–	–	2		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Introduction to Internet of Things:** Introduction – Definition and Characteristics of IoT – Physical design of IoT – Things in IoT - IoT Protocols.	6
Unit II	Logical Design of IoT – IoT Functional Blocks – IoT communication Models – IoT Communication APIs – IoT Enabling Technologies – Wireless Sensor Networks – Cloud Computing –Big Data Analytics – Communication Protocols – Embedded Systems.	6
Unit III	**IoT Levels and Deployment Templates:** IoT Level 1 - IoT Level 2 - IoT Level 3 - IoT Level 4 - IoT Level 5 - IoT Level 6 – Case Study on IoT System for Weather Monitoring.	6
Unit IV	**IoT Platform Design Methodology**: Purpose and Requirement Specification – Process Specification – Domain Model Specification – Information Model Specification – Service Specification – IoT Level Specification – Functional View Specification – Operational View Specification – Device and Component integration – Application Development.	6
Unit V	**IoT physical devices and End Points – IoT Devices – Exemplanary Device:** Raspberry Pi – About Board – Linux on Raspberry Pi – Raspberry Pi interfaces – Serial – SPI – I2C.	6
	Total Contact Hrs.	**30**

Text Book:

ArshdeepBahga, Vijay Madisetti, Internet of Things – A hands on Approach, OrientBlakswan Provate Limited, 2014 ,Ist Edition.

CourseDesignedby	PROFENAA INDUSTRIAL TRAINING CENTER	
Verifiedby HoD	Dr .J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics
Approved by ChairmanAcademic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS309	Title	Batch:	2026 – 2028
		TOPOLOGY	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objective

This course deals with the essentials of topological spaces and their properties in terms of continuity, connectedness, compactness etc.

Course Outcomes (CO)

After successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Understand fundamental concepts of topological spaces, bases, subspaces, and continuity, including connected and compact spaces.	PO1 (3), PO2 (1), PO3 (2), PO5 (2), PO8 (2), PO11 (1), PO15 (2), PSO1 (3)
CO2	Construct and examine product, metric, and subspace topologies and analyze relationships between these topologies.	PO1 (2), PO2 (1), PO3 (3), PO5 (3), PO8 (3), PO11 (2), PO15 (2), PSO1 (3)
CO3	Investigate connectedness, compactness, and components of topological spaces and analyze their interconnections in theoretical problems.	PO1 (2), PO2 (1), PO3 (3), PO5 (3), PO6 (2), PO8 (3), PO11 (2), PO15 (3), PSO1 (3)
CO4	Evaluate separation axioms, normal spaces, and metrization theorems, understanding their implications for advanced topological reasoning.	PO1 (2), PO2 (1), PO3 (2), PO5 (3), PO6 (2), PO8 (3), PO11 (2), PO15 (3), PSO1 (3)
CO5	Develop solutions and models using Tychonoff's theorem, Stone–Čechcompactification, and metrization techniques, with potential applications in pure and applied mathematics research.	PO1 (2), PO2 (1), PO3 (2), PO5 (3), PO6 (2), PO8 (3), PO11 (3), PO15 (3), PSO1 (3)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	–	2	–	–	2	–	–	1	–	–	–	2		
CO2	2	1	3	–	3	–	–	3	–	–	2	–	–	–	2		
CO3	2	1	3	–	3	2	–	3	–	–	2	–	–	–	3		
CO4	2	1	2	–	3	2	–	3	–	–	2	–	–	–	3		
CO5	2	1	2	–	3	2	–	3	–	–	3	–	–	–	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Topological Spaces and Continuous Functions:** Topological Spaces-Basis for a topology - The order topology - *The Product topology on X×Y (Self study)* - The Subspace topology - Closed sets and Limit points. **Chapter 2: Sections: 12 – 17.**	18
Unit II	**Topological Spaces and Continuous Functions:** Continuous functions - The metric topology - The metric topology (Continued) . **Chapter 2: Sections: 18, 20, 21.**	18
Unit III	**Connectedness and Compactness:** Connected spaces - Connected subspaces of the real line - Components and Local Connectedness - Compact spaces. **Chapter 3: Sections: 23 - 26.**	18
Unit IV	**Countability and Separation Axioms:** The Separation axioms - Normal spaces - The Urysohn lemma - The UrysohnMetrization Theorem - The Tietze Extension theorem. **Chapter 4 : Sections : 31 - 35.**	18
Unit V	**The Tychonoff Theorem:** The Tychonoff theorem - The Stone-CechCompactification. **Metrization Theorems and Paracompactness:** The Nagata-Smirnov Metrization theorem - The Smirnov Metrization Theorem. **Chapter 5:Sections:37, 38,** **Chapter 6: Sections:40, 42.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

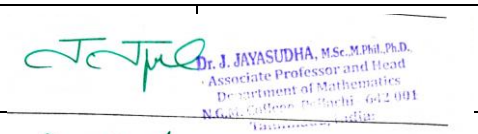
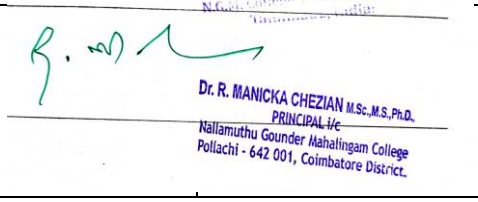
Munkres J. R., Topology, Pearson Education, Inc/Second Edition, 2000.

Books for Reference :

1. Dugundji J, *Topology*, Prentice Hall of India, 1975.
2. John Kelly L, *General Topology*, Dover Publications, Inc., New York, 2017.
3. Simmons G. F, *Introduction to topology and modern analysis*, Tata McGraw Hill book company, Inc, Ninth reprint, 2004.
4. Sundaram P., A Text Book of Topology, KedarNath Ram Nath Publishers, 2017.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. **https://nptel.ac.in/content/storage2/courses/111106054/Topology%20complete%20course.pdf**
2. **https://www.youtube.com/playlist?list=PLbMVogVj5nJRR7zYZifYopb52zjoScx1d**
3. **http://www.math.iitb.ac.in/~ronnie/Fall2019/Lecture-Notes.pdf**
4. **https://www.uio.no/studier/emner/matnat/math/MAT4500/h18/dokumenter/topology.pdf**

Course Designed by	Dr. A. GNANASOUNDARI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS310	Title	Batch:	2026 - 2028
		COMPLEX ANALYSIS	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objectives

The main objectives of this course are:

1. It enables the learners to understand and to evaluate the definite integrals in an easy and effective way using calculus of residues.
2. It gives a deeper understanding in the advanced topics such as harmonic functions, Infinite products, canonical products and Normal families.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	
CO1	Understand fundamental concepts of complex integration, including simple and multiply connected regions, chains and cycles, and locally exact differentials.	PO1 (3), PO2 (1), PO5 (2), PO8 (2), PO10 (1), PO11 (1), PO15 (2), PSO1 (3)
CO2	Apply the residue theorem, argument principle, and Cauchy's theorem to evaluate definite integrals and analyze harmonic functions using Poisson's formula and Schwarz's theorem.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PO11 (1), PO15 (2), PSO1 (3)
CO3	Explore and analyze properties of elliptic functions, Fourier expansions, and doubly periodic functions using computational and mathematical reasoning.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (3), PO11 (1), PO15 (3), PSO1(3)
CO4	Examine and interpret series and product developments, including Taylor, Power, Laurent series, infinite products, canonical products, and normal families of analytic functions.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (2), PO11 (2), PO15 (3), PSO1 (3)
CO5	Construct and evaluate solutions for complex analysis problems, classify singularities and poles, calculate residues, and apply series expansions and integral techniques to novel mathematical and engineering problems.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (3), PO11 (3), PO15 (3), PSO1 (3)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	–	–	2	–	–	2	–	1	1	–	–	–	2		
CO2	2	1	3	3	3	2	–	3	–	2	1	–	–	–	2		
CO3	2	1	3	3	3	3	–	3	–	3	1	–	–	–	3		
CO4	2	1	2	3	3	3	–	3	–	2	2	–	–	–	3		
CO5	2	1	2	3	3	3	–	3	–	3	3	–	–	–	3		

3 Point Scale – 1, 2, 3

Units	Content	Hrs.
Unit I	**Complex Integration:The General form of Cauchy's Theorem**:Chains and Cycles - Simple Connectivity - Homology - The General Statement of Cauchy's Theorem - Proof of Cauchy's Theorem -Locally Exact Differentials - Multiply Connected Regions. **Chapter 4 : Sections: 4.1 - 4.7** **The Calculus of Residues**: The Residue Theorem - The Argument Principle - Evaluation of Definite integrals. **Chapter 4 : Sections: 5.1 - 5.3**	18
Unit II	**Complex Integration: Harmonic Functions:** Definition and Basic Properties of Harmonic Functions - The Mean Value Property. **Chapter 4 : Sections : 6.1and 6.2.** **Harmonic Functions:** Poisson's Formula - Schwarz's Theorem - The Reflection Principle. **Chapter 4 : Sections: 6.3- 6.5.**	18
Unit III	**Series and Product Developments**:**Power Series Expansions:**Weierstrass's Theorem - The Taylor Series - The Laurent Series. **Chapter 5: Sections: 1.1- 1.3.** **Partial Fractions and Factorization:**Partial Fractions - Infinite Products - Canonical Products - The Gamma Function. **Chapter 5: Sections: 2.1- 2.4.**	18
Unit IV	**Series and Product Developments**: **Entire Functions**: Zensen's Formula. **Chapter 5: Sections: 3.1.** **Normal Families:**Equi-continuity - Normality and Compactness, Arzela's Theorem - Families of Analytic Functions. **Chapter 5: Sections: 5.1 - 5.4.**	18
Unit V	**Elliptic Functions**: **Simply Periodic Functions**: Representation by Exponentials - The Fourier Development **Doubly Periodic Functions***: The Period Module –UnimodularTransformations(Self-study)* – The Canonical basis – General properties of Elliptic functions. **Chapter 7: Sections: 1.1-1.2.** **Chapter 7: Sections: 2.1- 2.4.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Lars V. Ahlfors,*Complex Analysis,* McGraw-Hill International Edition, Third Edition (Indian Edition), 2013.

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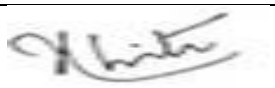
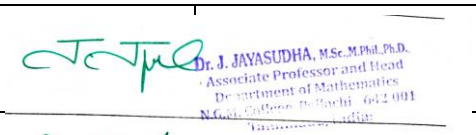
Books for Reference:

1. Serge Lang, *Complex Analysis*, Springer International Edition, 2005.
2. Shanti Narayan & Dr. P. K. Mittal, Theory *of Functions of a Complex Variable*, S. Chand & Company Pvt. Ltd, 2014.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/111/103/111103070/
2. https://nptel.ac.in/courses/111/106/111106084/

Course Designed by	Dr. V. CHITRA	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS311	Title	Batch:	2026 - 2028
		MECHANICS	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

This course deals with some of the key ideas of classical mechanics. The concepts covered in the course include generalized coordinates, Lagrange's equations, Hamilton's equations and Hamilton - Jacobi theory.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	
CO1	Recollect the fundamental concepts of mechanical systems, constraints, virtual work, energy, momentum, generalized coordinates, and basic variational principles.	PO1(3), PO2(1), PO3(1), PO5(1), PO8(1), PO15(1), PSO1(2), PSO2(1)
CO2	Understand the formulation of Lagrange's equations, Hamilton's principle, Hamilton's equations, and the role of constraints and generalized coordinates in describing mechanical systems.	PO1(3), PO2(1), PO3(2), PO4(1), PO5(2), PO8(2), PO11(1), PO15(1), PSO1(2), PSO2(1)
CO3	Apply Lagrange's and Hamilton's equations to solve problems involving motion of mechanical systems and obtain integrals of motion using appropriate techniques.	PO1(3), PO2(1), PO3(3), PO4(3), PO5(3), PO6(1), PO8(3), PO10(1), PO11(1), PO15(2), PSO1(3), PSO2(2)
CO4	Analyze dynamical systems using Hamilton–Jacobi theory, canonical transformations, and Poisson brackets to simplify and interpret the equations of motion.	PO1(3), PO2(1), PO3(3), PO4(3), PO5(3), PO6(2), PO8(3), PO9(1), PO10(1), PO11(1), PO15(2), PSO1(3), PSO2(2)
CO5	Evaluate and justify solutions of complex mechanical systems using advanced methods such as Hamilton–Jacobi equation, generating functions, and canonical transformations.	PO1(3), PO2(2), PO3(3), PO4(3), PO5(3), PO6(2), PO8(3), PO9(1), PO10(1), PO11(2), PO13(1), PO15(3), PSO1(3), PSO2(3)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	–	1	–	–	1	–	–	–	–	–	–	1		
CO2	3	1	2	1	2	–	–	2	–	–	1	–	–	–	1		
CO3	3	1	3	3	3	1	–	3	–	1	1	–	–	–	2		
CO4	3	1	3	3	3	2	–	3	1	1	1	–	–	–	2		
CO5	3	2	3	3	3	2	–	3	1	1	2	–	1	–	3		

3 POINT SCALE – 1, 2, 3.

Units	Content	Hrs.
Unit I	**Introductory concepts**: Mechanical system- *Generalized Coordinates (Self-study)* - Constraints - Virtual Work - Energy and Momentum. **Chapter 1: Sections: 1.1 - 1.5.**	18
Unit II	**Lagrange's equations**: Derivations of Lagrange's Equations –*Examples (Self-study)* - Integrals of Motion. **Chapter 2: Sections 2.1 - 2.3.**	18
Unit III	**Hamilton's equations**: Hamilton's Principle - Hamilton's Equations. **Chapter 4: Sections: 4.1 - 4.2.**	18
Unit IV	**Hamilton - Jacobi theory**: Hamilton's Principle function - Hamilton-Jacobi Equation. **Chapter 5: Sections: 5.1 - 5.2.**	18
Unit V	**Canonical transformations**: Differential forms and Generating Functions - Lagrange and Poisson Brackets. **Chapter 6: Sections: 6.1, 6.3.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

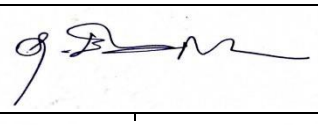
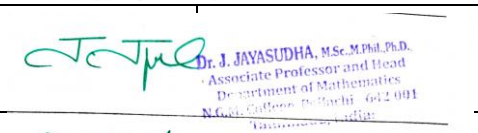
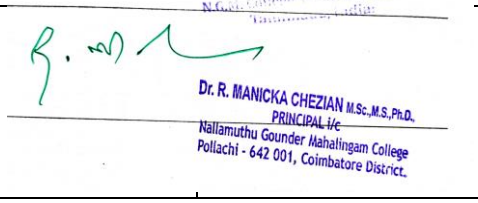
Donald T. Greenwood, C*lassical Dynamics, Dover Publication,* New York, 2014.

Books for Reference:

1. Goldstein H., *Classical Mechanics*. Addison Wesley Press, Inc., 1950.
2. Synge J.L. and Griffith B.A, *Principles of Mechanics*. Third Edition. McGraw-Hill company, 1959.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://youtu.be/J1XbWrcoiCA
2. https://youtu.be/tUaLxI2C1Cc

Course Designed by	Mr. S. EARNEST RAJADURAI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS312	Title	Batch:	2026-2028
		GRAPH THEORY	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

At the end of the course the students will have the ability to understand the concepts of graphs, subgraphs, trees, connectivity, Euler and Hamiltonian paths, matchings, graph coloring, planar graphs, and directed graphs, and to develop the ability to analyze, model, and solve real-world problems using graph-theoretic techniques.

Course Outcomes (CO)

On successful completion of the course student will be able to

CO Number	CO Statement	
CO1	Recall definitions and fundamental concepts of graphs, subgraphs, trees, connectivity, matchings, colorings, planar graphs, and directed graphs.	PO1(3), PO2(1), PO3(1), PO4(1), PO5(2), PO8(2), PO9(1), PO10(1), PO11(2), PSO1(2), PSO2(1)
CO2	Explain properties and characteristics of graph structures such as isomorphism, vertex degrees, paths, cycles, trees, Euler tours, Hamilton cycles, and planar graphs.	PO1(3), PO2(2), PO3(2), PO4(2), PO5(2), PO7(1), PO8(2), PO9(2), PO10(1), PO11(2), PSO1(2), PSO2(1)
CO3	Apply graph theory concepts to construct and analyze graphs using adjacency/incidence matrices, determine matchings, colorings, and identify Eulerian and Hamiltonian properties.	PO1(3), PO2(2), PO3(3), PO4(3), PO5(3), PO6(1), PO7(2), PO8(3), PO9(2), PO10(2), PO11(2), PSO1(3), PSO2(1), PSO2(2)
CO4	Analyze graph structures using connectivity, blocks, independent sets, cliques, edge/vertex colorings, and planarity criteria such as Euler's formula and Kuratowski's theorem.	PO1(3), PO2(2), PO3(3), PO4(3), PO5(3), PO6(2), PO7(2), PO8(3), PO9(3), PO10(2), PO11(2), PSO1(3), PSO2(1), PSO2(2)
CO5	Evaluate and justify solutions for complex graph problems involving optimization of matchings, colorings, and network structures, and assess the applicability of graph theory in real-world scenarios.	PO1(3), PO2(2), PO3(3), PO4(3), PO5(3), PO6(2), PO7(2), PO8(3), PO9(3), PO10(2), PO11(3), PO12(1), PO13(1), PSO1(3), PSO2(1), PSO2(3)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	1	2	-	-	2	1	1	2	-	-	-	2		
CO2	3	2	2	2	2	-	1	2	2	1	2	-	-	-	2		
CO3	3	2	3	3	3	1	2	3	2	2	2	-	-	-	3		
CO4	3	2	3	3	3	2	2	3	3	2	2	-	-	-	3		
CO5	3	2	3	3	3	2	2	3	3	2	3	-	1	1	3		

3 POINT SCALE – 1, 2, 3.

Units	Content	Hrs.
Unit I	**Graphs and Subgraphs**: Graphs and simple graphs - Graph Isomorphism - The Incidence and Adjacency matrices - Subgraphs - Vertex degrees - Path and Connection and Cycles. Trees: Trees - Cut edges and bonds - Cut vertices and Cayley's formula. **Chapter 1: Sections : 1.1 - 1.7** **Chapter 2: Sections : 2.1 - 2.4.**	18
Unit II	**Connectivity:** Connectivity and Blocks. **Euler Tours and Hamilton cycles**: Euler tours and Hamilton cycles. **Chapter 3: Sections: 3.1, 3.2** **Chapter 4: Sections : 4.1, 4.2.**	18
Unit III	**Matchings**: Matchings - Matchings and coverings in bipartite graphs and perfect matchings. **Independent sets and Cliques**: Independent sets. **Chapter 5: Sections : 5.1 - 5.3** **Chapter 7: Sections : 7.1.**	18
Unit IV	**Edge Colorings**: Edge chromatic number and Vizing's theorem. **Vertex Colorings**: Chromatic number - Brooks' theorem - Dirac's Theorem, Chromatic polynomials- Girth and chromatic number. **Chapter 6: Sections : 6.1, 6.2** **Chapter 8:Sections : 8.1,8.2,8.4,8.5**.	18
Unit V	**Planar Graphs**: Plane and planar graphs, Dual graphs - Euler's formula and Kuratowski's theorem. **Directed Graphs**: Directed graphs - Directed paths - Directed cycles. **Chapter 9: Sections : 9.1 -9.3, 9.5** **Chapter 10: Sections : 10.1 - 10.3.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Bondy J. A and Murty U. S. R, *Graph Theory with Applications*, Macmillan Company, 1976.

Books for Reference:

1. Balakrishnan R and RanganathanK,*A Text Book on Graph Theory*, Springer Verlog, New York, 2000.
2. Gould R, *Graph Theory*, The Benjamin/Cummings Publishing Company, Inc, California, 1988.
3. Hartsfield N and RingelG, Pearls *in Graph Theory*, Academic Press,1990.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

https://nptel.ac.in/courses/111/106/111106102/

Course Designed by	Dr. S. SIVASANKAR	
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS3E7	Title	Batch:	2026 – 2028
		LATEX	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	4		Credits:	2

Course Objective

This course provides students with an introduction to technical writing and computer presentation with LATEX, which is the de-facto standard in computer science, mathematics and many of sciences**.**

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recollect the basic concepts of LaTeX, including text formatting, structure of a LaTeX document, commands, environments, and special characters.	PO1 (2), PO2 (1), PO3 (1), PO5 (1), PO8 (1), PO10 (1), PO15 (1), PSO1 (1), PSO2 (1)
CO2	Understand the use of commands, environments, document classes, and layout features for organizing and formatting LaTeX documents.	PO1 (2), PO2 (2), PO3 (2), PO4 (1), PO5 (2), PO8 (2), PO10 (2), PO11 (1), PO15 (1), PSO1 (1), PSO2 (1)
CO3	Apply LaTeX commands and environments to create structured documents with proper formatting, lists, tables, and displayed text.	PO1 (3), PO2 (2), PO3 (2), PO4 (3), PO5 (2), PO8 (2), PO10 (3), PO11 (1), PO15 (2), PSO1 (2), PSO2 (2)
CO4	Analyze and organize complex documents using advanced features such as theorem environments, tables, boxes, and document structuring tools.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO8 (3), PO9 (1), PO10 (2), PO11 (1), PO15 (2), PSO1 (2), PSO2 (2)
CO5	Evaluate and produce well-formatted documents involving mathematical expressions, ensuring clarity, accuracy, and professional presentation using LaTeX.	PO1 (3), PO2 (3), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO8 (3), PO9 (1), PO10 (3), PO11 (2), PO13 (1), PO15 (2), PSO1 (2), PSO2 (2)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	2	1	1	–	1	–	–	1	–	1	–	–	–	–	1		
CO2	2	2	2	1	2	–	–	2	–	2	1	–	–	–	1		
CO3	3	2	2	3	2	–	–	2	–	3	1	–	–	–	2		
CO4	3	2	3	3	3	1	–	3	1	2	1	–	–	–	2		
CO5	3	3	3	3	3	1	–	3	1	3	2	–	1	–	2		

3 POINT SCALE – 1, 2, 3.

Units	Content	Hrs.
Unit I	**Introduction:** Text formatting - TEX and its offspring - what's new in LATEX 2ε? - How to use this book - Basics of LATEX file. **Chapter 1: Sections: 1.1 - 1.5.**	12
Unit II	**Commands and Environments**: Command names and arguments - Environments - Declarations - *Lengths (Self study)* - Special characters - Fragile Commands. **Chapter 2: Sections: 2.1 - 2.6.**	12
Unit III	**Document layout and Organization**: Document class - Page style - Parts of the document - Table of contents - Fine-tuning text - Word division. **Chapter 3: Sections: 3.1 - 3.6**.	12
Unit IV	**Displayed Text:** Changing font - *Centering and indenting* (*Self study*)- Lists - Generalized lists - Theorem like declarations - Tabulator stops - Boxes - Tables - Printing source text- Footnotes and marginal notes - Comments within Latex. **Chapter 4: Sections: 4.1 - 4.11.**	12
Unit V	**Mathematical Formulas:** Mathematical environments - Main elements of math mode - Mathematical symbols - Additional elements - Fine-tuning mathematics. **Chapter 5: Sections: 5.1 - 5.5.**	12
	Total Contact Hrs.	**60**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

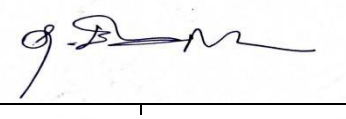
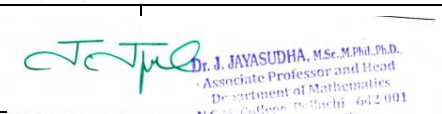
Kopka H and Daly P. W., *A Guide to Latex*, Third Edition, Addison Wesley, London, 1999.

Books forReference:

1. George Gratzer, *More Math into Latex*, Fourth Edition, Springer, 2007.
2. www.tug.org.in/tutorials.html,*A Latex primer*

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. **https://swayam.gov.in/nd2_aic20_sp17/**
2. **https://www.mooc-list.com/tags/latex**
3. **https://www.classcentral.com/course/edx-latex-for-students-engineers-and-scientists-15**

Course Designed by	Mr. S. EARNEST RAJADURAI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS3E8	Title	Batch:	2026 – 2028
		MATHEMATICAL MODELLING	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	4		Credits:	2

Course Objective

To enable the learners to obtain basic knowledge in Mathematical Modelling.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall fundamental concepts, definitions, and basic principles of mathematical modelling using ordinary differential equations of first and second order.	PO1 (3), PO3 (1), PO5 (1), PO8 (1), PO15 (1)
CO2	Explain the formulation of mathematical models for growth and decay, population dynamics, and compartment models using differential equations.	PO1 (3), PO2 (1), PO3 (2), PO4 (1), PO5 (2), PO8 (2), PO11 (1), PO15 (1)
CO3	Apply first and second order differential equations to construct and solve models in areas such as population, epidemics, economics, and physical systems.	PO1 (3), PO3 (3), PO4 (3), PO5 (2), PO6 (1), PO8 (3), PO11 (1), PO15 (2)
CO4	Analyze mathematical models involving systems of differential equations in real-world contexts such as medicine, international trade, and dynamical systems.	PO1 (3), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO11 (2), PO15 (2)
CO5	Evaluate and interpret solutions of differential equation models, and assess their effectiveness in representing real-life phenomena such as planetary motion and satellite dynamics.	PO1 (3), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (1), PO11 (2), PO15 (2)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	–	1	–	1	–	–	1	–	–	–	–	–	–	1		
CO2	3	1	2	1	2	–	–	2	–	–	1	–	–	–	1		
CO3	3	–	3	3	2	1	–	3	–	–	1	–	–	–	2		
CO4	3	–	3	3	3	2	–	3	–	–	2	–	–	–	2		
CO5	3	1	3	3	3	2	–	3	–	1	2	–	–	–	2		

3 POINT SCALE – 1, 2, 3.

Units	Content	Hrs.
Unit I	Mathematical Modelling through Ordinary Differential Equations of First order- Mathematical-Modelling through Differential Equations-Linear Growth and Decay Models-Non - Linear Growth and Decay Models.	12
Unit II	Compartment models.- Mathematical Modelling in Dynamics through Ordinary Differential Equations of First order. (Chapter - 2 : Sections 2.1 to 2.5)- Mathematical Modelling through systems of Ordinary Differential Equations of First order- Mathematical Modelling in Population Dynamics.	12
Unit III	Mathematical Modelling in Epidemics through Systems of Ordinary Differential Equations of First order - Compartment models through Systems of Ordinary Differential Equations - Mathematical Modelling in Economics through Systems of Ordinary Differential Equations of First order – Mathematical Models in medicine, Arms Race, Battles and International Trade in Terms of Systems of Ordinary Differential Equations.	12
Unit IV	Mathematical Modelling in Dynamics through Ordinary Differential Equations of First order. (Chapter - 3 : Sections 3.1 to 3.6) - Mathematical Modelling through Ordinary Differential Equations of second order- Mathematical Modelling of Planetary Motions.	12
Unit V	Mathematical Modelling of Circular Motion and Motion of Satellites- Mathematical Modelling through Linear Differential Equations of second order- Miscellaneous Mathematical Models through Ordinary Differential Equations of Second order. (Chapter - 4 : Sections 4.1 to 4.4)	12
	Total Contact Hrs.	**60**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

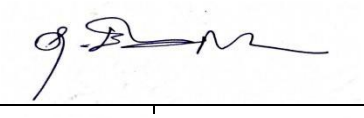
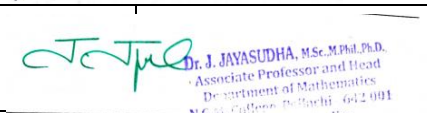
Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

J.N.Kapur, Mathematical Modelling, New Age International Publisher, 1988.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. https://www.youtube.com/watch?v=df5EK1P6Ph0
2. https://www.youtube.com/watch?v=-uCwgZUz51o

Course Designed by	Mr. S. EARNEST RAJADURAI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS3E9	Title	Batch:	2026 – 2028
		PROGRAMMING LAB IN LATEX	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	2		Credits:	2

Course Objective

This course is designed to provide a practical exposure to the students on LATEX.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall basic LaTeX commands, syntax, and environments used for formatting text, equations, tables, and images.	PO1 (2), PO3 (1), PO10 (2), PO11 (1), PO15 (1), PSO1 (2), PSO2 (2)
CO2	Explain the structure of LaTeX documents including title pages, section hierarchy, and different environments such as itemize and tabular.	PO1 (2), PO2 (1), PO3 (1), PO10 (2), PO11 (1), PO15 (1), PSO1 (2), PSO2 (2)
CO3	Apply LaTeX commands to create formatted documents including lists, tables (with multiple rows), and insertion of images.	PO1 (2), PO2 (1), PO3 (2), PO4 (2), PO10 (3), PO11 (2), PO15 (2), PSO1 (2), PSO2 (2)
CO4	Analyze and construct complex mathematical expressions such as systems of equations, binomial expressions, and special symbols like Christoffel symbols using appropriate LaTeX formats.	PO1 (2), PO2 (1), PO3 (2), PO4 (2), PO5 (1), PO10 (3), PO11 (2), PO15 (2), PSO1 (2), PSO2 (2)
CO5	Evaluate and produce well-structured LaTeX documents by integrating cross-references, graphics, and advanced formatting techniques effectively.	PO1 (2), PO3 (1), PO10 (2), PO11 (1), PO15 (1), PSO1 (2), PSO2 (2)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	2	–	1	–	–	–	–	–	–	2	1	–	–	–	1		
CO2	2	1	1	–	–	–	–	–	–	2	1	–	–	–	1		
CO3	2	1	2	2	–	–	–	–	–	3	2	–	–	–	2		
CO4	2	1	2	2	1	–	–	–	–	3	2	–	–	–	2		
CO5	2	–	1	–	–	–	–	–	–	2	1	–	–	–	1		

3 POINT SCALE – 1, 2, 3.

List of Programs:

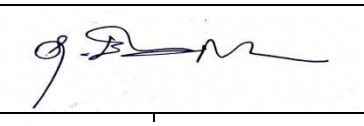
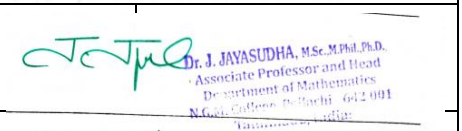
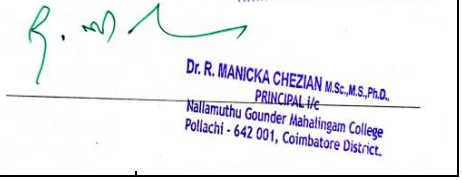
1. To illustrate different font sizes in Latex.
2. To prepare a title page in Latex document.
3. To understand the section hierarchy of book environment in Latex.
4. To prepare a list using itemize environment in Latex.
5. To prepare a table in Latex.
6. To prepare a table in Latex with multiple title row.
7. To split the equations in Latex.
8. To type a equations using both left cases and right cases in Latex.
9. To type a system of equations in Latex.
10. To type a Mathematical equations using different equation format.
11. To type a Binomial equations in Latex.
12. To type a Christoffel symbol in Latex.
13. To use a cross reference in Latex article.
14. To import '.eps' picture in Latex.
15. To import a picture using Latex draw in Latex.

Text Book:

Kopka H and Daly P. W., *A Guide to Latex*, Third Edition, Addison Wesley, London,1999.

Books for Reference:

1. George Gratzer, *More Math into Latex*, Fourth Edition, Springer, 2007.
2. www.tug.org.in/tutorials.html,*A Latex primer*

Course Designed by	Mr. S. EARNEST RAJADURAI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS3CC	Title	Batch:	2026 – 2028
		DATA ANALYTICS USING PYTHON	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	-		Credits:	2*

Course Objectives

Students will learn how to prepare data for analysis, perform simple statistical analysis, create meaningful data visualizations, predict future trends from data, and more.

Course outcomes (CO)

At the end of this course, the students will be able to

CO Number	CO Statement	
CO1	Recall fundamental concepts of data handling, data structures in NumPy and Pandas, data visualization techniques, and basic machine learning algorithms.	PO1 (3), PO2 (1), PO3 (2), PO4 (1), PO5 (2), PO8 (2), PO10 (3), PO11 (1), PO15 (2)
CO2	Explain the processes of data cleaning, data manipulation, aggregation, and visualization, and describe different types of machine learning models.	PO1 (3), PO2 (2), PO3 (3), PO4 (2), PO5 (2), PO6 (1), PO8 (3), PO10 (3), PO11 (2), PO15 (2)
CO3	Apply NumPy and Pandas operations to handle datasets, perform data visualization using various plots, and implement basic machine learning algorithms.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (3), PO10 (3), PO11 (2), PO14 (1), PO15 (2)
CO4	Analyze datasets using visualization and statistical methods, and interpret the results of machine learning models such as regression, classification, and clustering.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO7 (1), PO8 (3), PO9 (1), PO10 (3), PO11 (2), PO13 (1), PO14 (1), PO15 (2)
CO5	Evaluate the performance of machine learning models and apply appropriate techniques for prediction, recommendation systems, and data-driven decision making.	PO1 (3), PO2 (3), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO7 (2), PO8 (3), PO9 (2), PO10 (3), PO11 (3), PO12 (1), PO13 (2), PO14 (2), PO15 (3)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	1	2	-	-	2	-	3	1	-	-	-	2		
CO2	3	2	3	2	2	1	-	3	-	3	2	-	-	-	2		
CO3	3	2	1	3	3	2	1	3	-	3	2	-	-	1	2		
CO4	3	2	2	3	3	3	1	2	1	2	2	1	2	1	2		
CO5	2	1	3	3	3	3	2	2	2	2	3	1	2	2	3		

3 POINT SCALE – 1, 2, 3

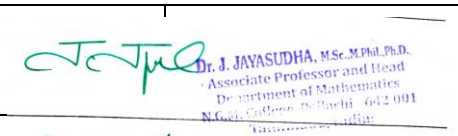
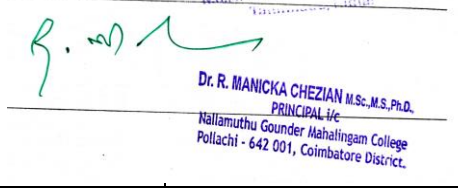
Units	Content	Hrs.
Unit I	Handling Raw Data using Numpy and Pandas: Arrays and operations on Arrays using NumPy – Data structure of Pandas - Inserting and Exporting data from CSV, XLS, JSON, database files – Datacleansing – Data Operations – Aggregation and Join operations.	6
Unit II	Data Visualization: Data mining – Presenting an analysis – Studying the Titanic dataset - Data Visualization - Charts – Multiple plots – Playing with text – Styling plots – Box plots – Heatmaps – Scatter plots with histograms – Area Plots – Bubble charts.	6
Unit III	Machine Learning: Types of machine learning – Decision trees – Linear regression – Logistic regression – Naïve Bayes Classifier – K means Clustering – Hierarchical clustering.	6
Unit IV	Case Studies: Performing predictions with a linear regression – Estimating the likelihood of events with Logistic regression.	6
Unit V	Case Studies: Generating recommendations with Collaborative Filtering – Applying Segmentation with k-means Clustering.	6
	Total Contact Hrs.	**30**

Text Books:

1. Samir Madhavan, Mastering Python for Data Science, PACKT Publishing, 2015. (ISBN 978-1-78439-015-0)
2. Wes McKinney, Python for Data Analysis, O'Reilly, 2013.(ISBN: 978-1-449- 31979-3)

Books for Reference:

1. Alberto Boschetti, Luca Massaron, Python Data Science Essentials, PACKT Publishing, Third Edition, 2018.
2. Gopi Subramanian, Python Data Science Cookbook, PACKT Publishing, 2015.
3. Jake VanderPlas, Python Data Science Handbook, O'Reilly, 2017. (ISBN: 978-1-491-91205-8).
4. Joel Grus, Data Science from Scratch, O'Reilly, 2015.

CourseDesignedby	PROFENAA INDUSTRIAL TRAINING CENTER	
Verifiedby HoD	DR .J. JAYASUDHA	
Approved by ChairmanAcademic Council	DR. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS413	Title	Batch:	2026 – 2028
		FLUID DYNAMICS	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objectives

The main objectives of this course are:

1. To introduce and explain fundamentals of Fluid Mechanics, which are used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.
2. To study the concepts such as kinematics of fluid, incompressible flows and boundary layer theory in one, two and three dimensions.
3. To determine volumetric flow rates, superposition's, shear and pressure, drag and lift forces for different geometric configurations.

Course Outcomes (CO)

On completion of the course the students will be able to

CO Number	CO Statement	
CO1	Recall and understand fundamental concepts of fluid kinematics, including Lagrangian and Eulerian methods, streamlines, path lines, streak lines, and vorticity in different coordinate systems.	PO1 (3), PO2 (1), PO3 (2), PO4 (3), PO5 (2), PO6 (2), PO8 (3), PO10 (2), PSO1 (2), PSO2 (3), PO15 (2)
CO2	Apply the fundamental equations of fluid motion, including continuity, Euler's and Navier-Stokes equations, to solve simple one-dimensional and inviscid incompressible flow problems.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PSO1 (2), PSO2 (3), PO15 (2)
CO3	Analyze laminar flow in different geometries such as parallel plates, pipes, and coaxial cylinders, and interpret boundary layer characteristics using computational or graphical methods.	PO1 (2), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (2), PSO1 (3), PSO2 (3), PO15 (2)
CO4	Examine and evaluate complex flow patterns using superposition methods, Rankine bodies, vortex systems, and stream function techniques in two- and three-dimensional flows.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (2), PSO1 (3), PSO2 (3), PO15 (2)
CO5	Construct and predict flow solutions using Laplace's equation, stream functions, flow nets, and boundary layer theory to design and optimize fluid systems in engineering applications.	PO1 (2), PO2 (1), PO3 (2), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO10 (3), PSO1 (3), PSO2 (3), PO15 (2)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	3	2	2	–	3	–	2	–	–	–	–	2		
CO2	2	1	3	3	3	2	–	3	–	2	–	–	–	–	2		
CO3	2	1	3	3	3	2	–	3	–	2	–	–	–	–	3		
CO4	2	1	2	3	3	3	–	3	–	2	–	–	–	–	3		
CO5	2	1	2	3	3	3	–	3	–	3	–	–	–	–	3		

3 POINT SCALE – 1, 2, 3

Units	Content	Hrs.
Unit I	**Kinematics of Fluids:**Methods of Describing Fluid Motion: Lagrangian Method, Eulerian Method-Translation, Rotation and Rate of deformation- Streamlines, Path lines and Streak lines- The Material Derivative and Acceleration- Vorticity, Vorticity in Polar Coordinates- Vorticity in Orthogonal Curvilinear Coordinates. **Fundamental Equations of the Flow of Viscous Compressible Fluids**: The Equation of Continuity - Conservation of Mass- Equations of Motion (Navier-Stokes Equations) - Conservation of Momentum. **Chapter 3: Sections: 3.1 - 3.5.** **Chapter 5: Sections:5.1 - 5.3.**	18
Unit II	**One Dimensional Invisid Incompressible Flow:**Equation of continuity- Stream Tube Flow- Equation of Motion- Euler's Equation-The Bernoulli's Equation- Applications of the Bernoulli Equation(a) -Flow from a Tank Through a Small Orifice, (b)-Trajectory of a Free Jet - The Momentum Theorem- Applications of the Momentum Theorem(a)-Pressure Exerted on a Plate by a Free Jet, (b)-Jet Discharge Propulsion. **Two and Three Dimensional InvisidIncompressible Flow**: Equation of Continuity - Eulerian Equation of Motion- Circulation Theorems-Velocity Potential - Irrotational Flow- Integration of the Equations of Motion - Bernoulli's Equation. **Chapter 6: Sections: 6.1 - 6.4, 6.6 - 6.7** **Chapter 7: Sections: 7.1 - 7.5.**	18
Unit III	**Two and Three Dimensional Invisid Incompressible Flow**:Laplace'sEquation,Laplace'sEquation in Cartesian Coordinates- Laplace'sEquation in Cylindrical Coordinates - Laplace'sEquation in Spherical Coordinates(derivations omitted) -Stream function in 2 Dimensional Motion- The Flow Net - Two Dimensional Flow Examples- Stream Function in Three Dimensional Motion - Three Dimensional Axially Symmetric Flow Examples. **Chapter 7: Sections: 7.8 - 7.13.**	18

Unit IV	**Two and Three Dimensional Invisid Incompressible Flow**: Motion of Solid Bodies in a Fluid,Rankine's Method of Constructing Streamlines- Superposition of Source and Rectilinear Flow- Superposition of Source and Sink with Rectilinear flow - The Rankine Body- Superposition of Rectilinear flow and Doublet- Superposition of Vortex, Rectilinear Flow and Doublet in a Two Dimensional Case. **Chapter 7: Sections: 7.14 - 7.16, 7.18- 7.19.**	18
Unit V	**Laminar Flow of Viscous Incompressible Fluids:** Flow Between Parallel Flat Plates- Steady Flow in Pipes, Flow Between Two Coaxial Cylinders- Flow Between TwoConcentric Rotating Cylinders. **The Laminar Boundary Layer:**TheBoundaryLayer Equations in Two-Dimensional Flows- The Boundary Layer Along a Flat Plate- The Blasius Solution, Shearing Stress and Boundary Layer Thickness. **Chapter 8:Sections: 8.3 - 8.5.** **Chapter 9:Sections:9.2 - 9.3.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

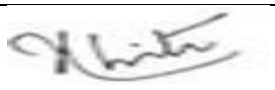
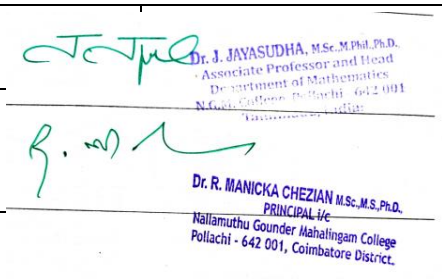
Yuan, S.W. ,*Foundations of fluid mechanics.*Prentice Hall of India Pvt. Ltd.,1988.

Books for Reference:

1. Frank Chorlton ,*Text book on Fluid Dynamics*, CBS Publishers and Distributors, Delhi., 2010.
2. M.D.Raisinghania, Fluid Dynamics, S.Chand and company Ltd, 2010.
3. ShanthiSwarup, *Fluid dynamics*, Krishna Prakasan media Pvt. Ltd., Meerut, 2000.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/115/106/115106124/
2. https://youtu.be/lfXDJKKPGfy

Course Designed by	Dr. V. CHITRA	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS414	Title	Batch:	2026 – 2028
		FUNCTIONAL ANALYSIS	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	5

Course Objective

This course will enable the students to learn about the essentials of functional analysis. The course imparts an in-depth analysis of normed linear spaces, Banach spaces, Hilbert spaces etc. Further the course analyzes various properties of continuous linear functional, continuous linear operators and closed linear operators.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	
CO1	Recall fundamental definitions, concepts, and key results related to normed linear spaces, Banach spaces, bounded operators, and Hilbert space operators.	PO1 (3), PO2 (1), PO3 (1), PO5 (1), PO8 (1), PO15 (1), PSO1 (2), PSO2 (1)
CO2	Explain the properties of normed and Banach spaces, bounded linear operators, and major theorems such as Hahn-Banach, Uniform Boundedness, and Closed Graph Theorem, and interpret their significance.	PO1 (3), PO2 (1), PO3 (2), PO4 (1), PO5 (2), PO6 (1), PO8 (2), PO11 (1), PO15 (1), PSO1 (2), PSO2 (1)
CO3	Apply the concepts of bounded operators, norms, spectral theory, and functional representation to solve problems in normed and Hilbert spaces.	PO1 (3), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (1), PO11 (1), PO15 (2), PSO1 (2), PSO2 (2)
CO4	Analyze advanced results such as Hahn-Banach Theorem, Open Mapping Theorem, spectral properties of operators, and adjoint operators, and examine their interrelationships.	PO1 (3), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO9 (1), PO10 (1), PO11 (2), PO15 (2), PSO1 (2), PSO2 (2)
CO5	Evaluate and justify results involving spectral theory, operator theory in Hilbert spaces, and major functional analysis theorems, and assess their applications in abstract mathematical contexts.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (3), PO8 (3), PO9 (1), PO10 (2), PO11 (2), PO15 (3), PSO1 (2), PSO2 (2)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	–	1	–	–	1	–	–	–	–	–	–	1		
CO2	3	1	2	1	2	1	–	2	–	–	1	–	–	–	1		
CO3	3	1	3	3	3	2	–	3	–	1	1	–	–	–	2		
CO4	3	1	3	3	3	3	–	3	1	1	2	–	–	–	2		
CO5	3	2	3	3	3	3	–	3	1	2	2	–	–	–	3		

3 POINT SCALE – 1, 2, 3.

Units	Content	Hrs.
Unit I	**Normed Linear Spaces:**Norm on a Linear Space - Examples of Normed Linear Spaces - Banach Spaces - Some Properties of Banach Spaces - Baire Category Theorem (Statement only) - Schauder Basis and Separability - Heine-Borel Theorem and Riesz Lemma **Chapter 2: Sections: 2.1, 2.2, 2.2.3, 2.3 - 2.4**	18
Unit II	**Operators on Normed Linear Spaces:** Bounded Operators - Some Basic Results and Examples - The Space ß(X, Y) (Self study)- Norm on ß(X,Y) - Riesz Representation Theorem -Completeness of ß(X, Y) (Self Study). **Hahn-Banach Theorem and its Consequences:**The Extension Theorem - Consequences - On Uniqueness of Extension **Chapter 3: Sections: 3.1, 3.1.1, 3.2,3.2.1, 3.3,3.4.1.** **Chapter 5: Sections: 5.1 - 5.3**	18
Unit III	**Uniform BoundednessPrinciple:**The Theorem and Its Consequences **Closed Graph Theorem and Its Consequences:** Closed Graph Theorem - Bounded Inverse Theorem - Open Mapping Theorem -A Stability Result for Operator Equations. **Chapter 6: Section: 6.1.** **Chapter 7: Sections: 7.1 - 7.3, 7.3.1.**	18
Unit IV	**Spectral Results for Banach Space Operators:**Eigenspectrum and Approximate Eigenspectrum - Spectrum and Resolvent Set - Spectral Radius - Spectral Mapping Theorem - Gelfand-Mazur Theorem and Spectral Radius Formula (In 10.2.3, Theorem 10.17 only). **Chapter 10: Sections: 10.1, 10.2, 10.2.1 - 10.2.3. (In 10.2.3, Theorem 10.17 only)**	18

Unit V	**Operators on Hilbert Spaces:** Adjoint of an Operator - Compactness of the Adjoint Operator - *SesquilinearFunctionals(Self study)* -Self-Adjoint, Normal and Unitary Operators - Numerical Range and Numerical Radius - *Some Characterizations (Self study).* **Chapter 11: Sections: 11.1, 11.1.1, 11.1.2, 11.2, 11.2.1, 11.2.2.**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Thamban Nair M, *Functional Analysis - A First Course,* Prentice Hall of India Pvt. Ltd, New Delhi, 2010.

Books for Reference:

1. Limaye B. V, *Functional Analysis,*Wiley Eastern, New Delhi, 1981.
2. Simmons G. F, *Introduction to Topology and ModernAnalysis,* McGraw Hill Kogakusha, Tokyo, 1963.
3. G. Bachman and L. Narici, *Functional Analysis,* Dover Publications, 2000.
4. Kreyszig E., *IntroductoryFunctional Analysis with Applications,* Johan-Wiley & Sons, NewYork, 2007.
5. Sunder V. S, *Functional Analysis: Spectral Theory,* Hindustan Book Agency, New Delhi, 1997.
6. Taylor A. E. and Lay D. C, *Introduction to Functional Analysis,* Second Edition, Wiley, New York, 1980.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. **https://nptel.ac.in/courses/111/106/111106147/#**
2. **https://www.youtube.com/watch?v=M1h9l5p95Yk&list=PL5022A32B9BCFE3E4&index=9**
3. **https://www.youtube.com/watch?v=pd3jUcTA5pA&list=PL5022A32B9BCFE3E4&index=10**

4. https://www.youtube.com/watch?v=88yGQpNf0_Q&list=PL5022A32B9BCFE3E4&index=14
5. https://www.youtube.com/watch?v=AlomQplmmdc&list=PL5022A32B9BCFE3E4&index=32
6. https://nptel.ac.in/courses/111/106/111106147/#
7. https://www.youtube.com/watch?v=D_B44KX_Lgc&list=PL5022A32B9BCFE3E4&index=37
8. https://www.youtube.com/watch?v=s5bCfENHg8&list=PL5022A32B9BCFE3E4&index=26
9. https://www.youtube.com/watch?v=IOHr1lc6CO8&list=PL5022A32B9BCFE3E4&index=18.

Course Designed by	Dr. J. JAYASUDHA	
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc., M.Phil., Ph.D. Associate Professor and Head Department of Mathematics
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS415	Title	Batch:	2026 – 2028
		OPTIMIZATION TECHNIQUES	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

- To acquire an in-depth knowledge of optimization methodologies and their applications in the fields of science, engineering, economics, and management.

- To evaluate and implement advanced linear programming, integer linear programming, and nonlinear programming techniques for solving complex decision-making problems across various domains.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall fundamental concepts of advanced linear programming, integer programming, inventory models, classical optimization, and nonlinear programming techniques.	PO1(3), PO2(1), PO3(1), PO4(1), PO5(2), PO8(2), PO10(1), PO11(1), PO15(1)
CO2	Explain the principles of the revised simplex method, bounded variables algorithm, Travelling Salesperson Problem (TSP), and deterministic inventory models, including EOQ and demand considerations.	PO1(3), PO2(2), PO3(2), PO4(2), PO5(2), PO6(1), PO8(2), PO9(1), PO10(1), PO11(1), PO15(1)
CO3	Apply appropriate algorithms such as revised simplex, integer programming techniques, EOQ models, and quadratic/separable programming methods to solve structured optimization problems.	PO1(3), PO2(1), PO3(3), PO4(3), PO5(3), PO6(2), PO7(1), PO8(3), PO9(1), PO10(2), PO11(2), PO14(1), PO15(2)
CO4	Analyze complex optimization problems by formulating appropriate mathematical models with relevant constraints and objective functions.	PO1(3), PO2(1), PO3(3), PO4(3), PO5(3), PO6(2), PO7(1), PO8(3), PO9(2), PO10(2), PO11(2), PO14(1), PO15(2)
CO5	Evaluate and compare different optimization techniques (linear, integer, and nonlinear programming methods) to determine the most efficient and feasible solution for real-world problems.	PO1(3), PO2(2), PO3(3), PO4(3), PO5(3), PO6(2), PO7(1), PO8(3), PO9(2), PO10(2), PO11(2), PO13(1), PO14(1), PO15(2)

Mapping

PO/PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	1	2	-	-	2	-	1	1	-	-	-	1		
CO2	3	2	2	2	2	1	-	2	1	1	1	-	-	-	1		
CO3	3	1	3	3	3	2	1	3	1	2	2	-	-	1	2		
CO4	3	1	3	3	3	2	1	3	2	2	2	-	-	1	2		
CO5	3	2	3	3	3	2	1	3	2	2	2	-	1	1	2		

3 POINT SCALE – 1, 2, 3

Units	Content	Hrs.
Unit I	**Advanced Linear Programming:** Revised Simplex Method - Bounded Variables Algorithm Chapter 7: Sections: 7.2, 7.3	18
Unit II	**Integer Linear Programming:** Integer Programming Algorithms – Travelling Salesperson problem Chapter 9: Sections: 9.2, 9.3	18
Unit III	**Deterministic Inventory Models:** General Inventory Model – Role of Demand in the Development of Inventory Models – Static Economic-Order-Quantity(EOQ) Models Chapter 11: Sections: 11.1 – 11.3	18
Unit IV	**Classical Optimization Theory:** Unconstrained Problems – Constrained Problems Chapter 18: Sections: 18.1, 18.2	18
Unit V	**Nonlinear Programming Algorithms:** Separable Programming – Quadratic Programming Chapter 19: Sections: 19.2.1, 19.2.2	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Hamdy A. Taha, Operations Research – An Introduction, 8th Edition, Prentice – Hall of India, New Delhi, 2007.

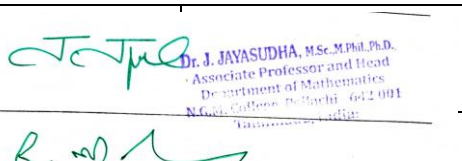
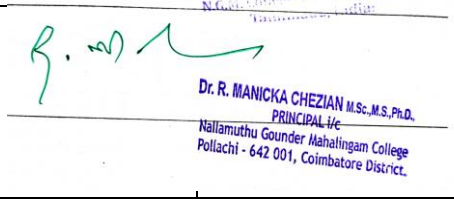
Books for Reference:

1. J. K. Sharma, Operations Research Theory & Applications, Macmillan India Ltd., New Delhi, 2006.

2. KantiSwarup, Gupta P. K. & Man Mohan, Operations Research, S. Chand & Sons, New Delhi, 1995.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. **https://www.youtube.com/watch?v=waoCHs84Ws8**
2. **https://www.youtube.com/watch?v=WO9NPOXl3aI**
3. **https://nptel.ac.in/courses/111105100**
4. **http://nptel.iitm.ac.in**

Course Designed by	Dr. R. SANTHI	
Verified by HoD	Dr. J. JAYASUDHA	
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS4E10	Title	Batch:	2026 – 2028
		COMBINATORICS	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

Combinatorial mathematics is concerned with counting the number of ways of arranging given objects in a particular way. Generating functions are used to solve a variety of combinatorial problems.

Course Outcomes (CO)

On successful completion of the course student will be able to

CO Number	CO Statement	
CO1	Recall fundamental concepts such as permutations, combinations, binomial coefficients, recurrence relations, and inclusion-exclusion principle.	PO1 (3), PO2 (1), PO3 (1), PO8 (1), PO11 (1), PO15 (1)
CO2	Explain the difference between ordered and unordered selections. Describe pairing methods, recurrence relations, and generating functions.	PO1 (3), PO2 (2), PO3 (2), PO4 (1), PO5 (1), PO8 (2), PO11 (1), PO15 (1)
CO3	Apply permutations and combinations to solve counting problems. Solve recurrence relations and apply generating functions to combinatorial problems.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (2), PO6 (1), PO8 (3), PO10 (1), PO11 (2), PO15 (2)
CO4	Analyze optimal assignment problems including Gale's method.	PO1 (3), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (3), PO9 (1), PO10 (1), PO11 (2), PO14 (1), PO15 (2)
CO5	Evaluate the efficiency of different counting techniques and combinatorial methods.	PO1 (2), PO2 (2), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (3), PO9 (2), PO10 (1), PO11 (3), PO12 (1), PO13 (1), PO14 (1), PO15 (3)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	1	-	-	-	-	1	-	-	1	-	-	-	1		
CO2	3	2	2	1	1	-	-	2	-	-	1	-	-	-	1		
CO3	3	2	3	3	2	1	-	3	-	1	2	-	-				
CO4														-	2		
CO5	3	2	3	3	3	2	1	3	1	1	2	-	-	1	2		

3 POINT SCALE – 1, 2, 3.

Units	Content	Hrs.
Unit I	**Introduction to basic ideas and Selections and Binomial coefficients**: Permutations - Ordered selections - Unordered selections - Further remarks on the binomial theorem - Miscellaneous. **Chapter 1, Chapter 2 : Sections: 2.1-2.5**	18
Unit II	**Pairings problems:** Pairings within a set - Pairings between sets - An optimal assignment problem - Gale's optimal assignment problem. **Chapter 3 :Sections : 3.1-3.4**	18
Unit III	**Recurrence:** Some miscellaneous problems - Fibonacci type relations - Using Generating Functions - Miscellaneous methods - Counting simple electrical networks. **Chapter 4 : Sections: 4.1-4.5**	18
Unit IV	**The Inclusion-Exclusion Principle:** The Principle- *The Rook Polynomials (Self study)* **Block Designs and Error correcting codes:***Block designs (Self study)* - Square block designs - Hadamard configurations - Error correcting codes. **Chapter 5:Sections: 5.1, 5.2** **Chapter 6:Sections: 6.1-6.4.**	18
Unit V	**Steiner Systems and Sphere Packings** - Introductory remarks - Steiner Systems -S(5,8,24) . **Chapter 7:Sections : 7.1-7.3**	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Ian Anderson, *A first course in Combinatorial Mathematics*, Oxford University press, 1974.New Delhi, 2010.

Books for Reference:

1. Balakrishnan V. K and Balakrishnan V, *Schaum's outline of Combinatorics*, McGraw Hill Publishers, 1984.
2. Krishnamurthy V, *Combinatorics*, Affiliated East West Press Pvt Ltd, New Delhi, 1986.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. **https://youtu.be/2CpODfjud3o**
2. **https://youtu.be/kd3gkcloXzo**

Course Designed by	Dr. M. AMSAVENI	HOD
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	Programme Title:	M.Sc. Mathematics	
Course Code:	26PMS4E11	Title	Batch:	2026 – 2028
		FUZZY LOGIC AND FUZZY SETS	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	6		Credits:	4

Course Objective

On completion of the course the learners are expected to have

1. Understood fuzzy sets, fuzzy relations and fuzzy measures
2. Developed knowledge on uncertainty and information
3. Studied several applications in science, arts and management.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Recall fundamental definitions, concepts, and terminology related to crisp sets, fuzzy sets, fuzzy relations, fuzzy measures, and uncertainty.	PO1 (3), PO3 (1), PO5 (1), PO8 (1), PO15 (1), PSO1 (2), PSO2 (1)
CO2	Understand the basic concepts of fuzzy sets, operations on fuzzy sets, types of fuzzy relations, and different measures of uncertainty and information.	PO1 (3), PO2 (1), PO3 (2), PO4 (1), PO5 (2), PO8 (2), PO11 (1), PO15 (1), PSO1 (2), PSO2 (1)
CO3	Apply the principles of fuzzy set theory, fuzzy relations, and fuzzy measures to solve problems in various domains.	PO1 (3), PO3 (3), PO4 (3), PO5 (3), PO6 (1), PO8 (3), PO10 (1), PO11 (1), PO15 (2), PSO1 (2), PSO2 (2)
CO4	Analyze different types of uncertainty, measures of fuzziness, and relationships among fuzzy measures, and interpret their significance in real-world contexts.	PO1 (3), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO8 (3), PO10 (1), PO11 (2), PO15 (2), PSO1 (2), PSO2 (2)
CO5	Evaluate the applications of fuzzy set theory in fields such as medical decision making, computer science, and system science, and justify appropriate methods for handling uncertainty.	PO1 (3), PO2 (1), PO3 (3), PO4 (3), PO5 (3), PO6 (2), PO7 (1), PO8 (3), PO10 (2), PO11 (2), PO13 (1), PO15 (3), PSO1 (2), PSO2 (2)

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	–	1	–	1	–	–	1	–	–	–	–	–	–	1		
CO2	3	1	2	1	2	–	–	2	–	–	1	–	–	–	1		
CO3	3	–	3	3	3	1	–	3	–	1	1	–	–	–	2		
CO4	3	–	3	3	3	2	–	3	–	1	2	–	–	–	2		
CO5	3	1	3	3	3	2	1	3	–	2	2	–	1	–	3		

3 POINT SCALE – 1, 2, 3.

Units	Content	Hrs.
Unit I	**Crisp Sets and Fuzzy Sets** Introduction, Crisp Sets :An over view, The Notion of Fuzzy Sets, Basic concepts of Fuzzy Sets, Classical Logic: Complement, Fuzzy union, Fuzzy intersection and Combination of operations.	18
Unit II	**Fuzzy Relations** Crisp and Fuzzy relations, Binary relations, Binary relations on a single set, Equivalence and similarity relations, Compatibility on Tolerance Relations, Orderings, Morphism and Fuzzy relations Equations.	18
Unit III	**Fuzzy Measures** General discussion, Belief and plausibility measure, Probability measures, Possibility and Necessity measures and Relationship among Classes of Fuzzy measures.	18
Unit IV	**Uncertainty and Information** Types of Uncertainty, Measures of Fuzziness, Classical Measures of Uncertainty, Measures of Dissonance, Measures of Confusion, Measures of Non-Specificity, Uncertainty and Information, Information and Complexity and Principles of Uncertainty and Information.	18
Unit V	**Applications** Natural, life and Social Sciences, Medical-Management and decision making, Computer Sciences, System Science and Other Applications.	18
	Total Contact Hrs.	**90**

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. George J.Klir and Tina A.Folger,Fuzzy Sets , Uncertainty and Information, Prentice-Hall of India Private Limited-Fourth Printing-June1995.
2. Georg J.Klir and Boyuan, Fuzzy Sets And Fuzzy Logic-Theory and ApplicationsPrentice-Hall of India Private Limited

Books for Reference:

1. CorduneanuC.,*Integral Equations and Applications*, Cambridge University Press, Cambridge, 1991.
2. Weinstock R., *Calculus of Variations with Applications to Physics and Engineering*, McGraw Hill Book Co. Inc. New York, 1952.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. https://nptel.ac.in/courses/111/107/111107103/
2. https://nptel.ac.in/courses/111/104/111104025/
3. https://nptel.ac.in/courses/111/102/111102129/

Course Designed by	Dr. M. AMSAVENI	HOD
Verified by HoD	Dr. J. JAYASUDHA	Dr. J. JAYASUDHA, M.Sc.,M.Phil.,Ph.D. Associate Professor and Head Department of Mathematics Pollachi - 642 001
Approved by Chairman Academic Council	Dr. R. MANICKACHEZIAN	Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D. PRINCIPAL i/c Nallamuthu Gounder Mahalingam College Pollachi - 642 001, Coimbatore District.

Programme Code:	PMS	**Programme Title:**	M.Sc., Mathematics	
Course Code:	26PMS4P1	**Title**	**Batch:**	2026 – 2028
		PROJECT	**Semester:**	IV
Lecture Hrs./Week or Practical Hrs./Week	6		**Credits:**	8

Components of the Project may be included the following

Review No.	Activity
I	Problem Identification and Related Literature collection
II	Analyzing or solving problems by applying different methodology
III	Giving conclusion