

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

347	B. Sc. Zoology	Ancillary Zoology Paper-II Economic Zoology	21UBY2A2	2021
348	B. Sc. Zoology	Non Major Elective (NME) : Ornamental Fish Culture	21UZY3N2	2021
349	B. Sc. Zoology	Biochemistry	21UZY510	2021
350	B. Sc. Zoology	Core Major Paper -X Ecology and Evolution	21UZY612	2021
351	B. Sc. Zoology	Core Major Paper-XI Microbiology and Immunology	21UZY613	2021
352	B. Sc. Zoology	Core Elective Paper-III Wild life Conservation	21UZY6E32	2021
353	B. Sc. Zoology	Core elective Paper VI- Dairy farming and management Technology	21UZY6E33	2021
354	B. Sc. Zoology	Core Elective Paper I Haematology and Clinical Pathology	21UZY5E3	2021
355	B. Sc. Zoology	Advanced Learner Course-I Bioinformatics	21UZY5AL1	2021
356	B. Sc. Zoology	Parasitology	21UZY6E6	2021
357	B. Sc. Zoology	Advanced learner course-II Immunotherapeutics	21UZY6AL2	2021
358	M.Sc. Mathematics	Core XVII: Algebraic Topology	21PMS417	2021
359	M.Sc. Mathematics	Major Elective I: Special Functions	21PM1E2	2021
360	M.Sc. Mathematics	Major Elective III: Mathematical Modelling	21PMS3E2	2021
361	M.Sc. Mathematics	Advanced Learner Course: Algebraic Number Theory	21PMS3AL	2021
362	M.Sc. Mathematics	Certificate Course: Data Analytics With Python	21PMS3CC	2021
363	M.Sc. Mathematics	Major Elective V:Fuzzy Logic and Fuzzy Sets	21PMS4E2	2021
364	M.Com	Business Environment	21PCO102	2021
365	M.Com	International Marketing	21PCO3E22	2021
366	M.Com	Direct Taxes	21PCO310	2021
367	M.Com	Financial Modeling	21PCO311	2021
368	M.Com	Industry 4.0	21PCO415	2021
369	M.Com	Advertisement and salesmanship	21PCO4E32	2021
370	Tamil Aided	Tamil Paper I	21UTL101	2021
371	Tamil Aided	Tamil Paper II	21UTL202	2021
372	B.A Tamil	Ikkala illakiyam	21UTM101	2021

BoS Minutes
Highlighted

Metric : 1.2.1



New Course Introduced

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PG AND RESEARCH DEPARTMENT OF MATHEMATICS
NALLAMUTHU GOUNDER MAHALINGAM COLLEGE
POLLACHI - 642001

12th Board of Studies Meeting conducted in an online mode
22.05.2021 & Time: 10.00 a.m.

Agenda

BoS / DM 12.1	:	Welcome address and Opening Remarks by Chairman, Board of studies, DEPARTMENT OF MATHEMATICS.
BoS / DM 12.2	:	Confirmation of the Minutes of the Previous meeting of Board of studies in the DEPARTMENT OF MATHEMATICS held on 22.02.20 and Action taken report of 11 th meeting of Board of studies
BoS / DM 12.3	:	12.3.1 Syllabus of I BSc MATHEMATICS under Regulation 2021.
	:	12.3.2 Syllabus of II BSc MATHEMATICS under Regulation 2021.
	:	12.3.3 Syllabus of III BSc MATHEMATICS under Regulation 2021.
	:	12.3.4 Syllabus of I MSc MATHEMATICS under Regulation 2021.
	:	12.3.5 Syllabus of II MSc MATHEMATICS under Regulation 2021.
	:	1. Decided to offer internship programme in schools for Undergraduate students during their summer vacation at the end of the fourth semester. 2. Decided to provide certificate course on Data Analytics and Python for PG students (Optional).
BoS / DM 12.4	:	Suggestion given by BOS Members
BoS / DM 12.5	:	Two more value added course for UG course.

DM – Short Form of Department of Mathematics.


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NALLAMUTHU GOUNDER MAHALINGAM COLLEGE, POLLACHI

DEPARTMENT OF MATHEMATICS

MINUTES OF BOS MEETING

The 12th Meeting of the Board of studies of the Department of Mathematics was held on 22.05.2021 at 10.00 a.m. conducted in an online mode. (<https://meet.google.com/sis-ruit-ixx>)

1. Members of the Board of Studies meeting:

1.	Dr. V. INTHUMATHI Associate Professor and Head	Chairman
2.	Dr. J. JAYASUDHA Assistant Professor	Internal Members
3.	Dr. V. CHITRA Assistant Professor	
4.	Dr. S. SIVASANKAR Assistant Professor	
5.	Mr. P. SIRAVANAN Assistant Professor	
6.	Dr. S. KALEESWARI Assistant Professor	
7.	Mrs. M. AMSAVENI Assistant Professor	
8.	Mrs. A. GNANASOUNDARI Assistant Professor	
9.	Dr. N. SELVANAYAKI Assistant Professor	
10.	Dr. M. MAHESWARI Assistant Professor	
11.	Mr. S. EARNEST RAJADURAI (SF Mathematics) Assistant Professor and Head	
12.	Mr. V. SREERAMAKRISHNAN (SF Mathematics) Assistant Professor	
13.	Ms. S. SENPAGAM(SF Mathematics) Assistant Professor	
14.	Ms. S. MAHALAKSHMI(SF Mathematics) Assistant Professor	
15.	Ms. A. ARUNADEVI(SF Mathematics) Assistant Professor	
16.	Dr. S. MONIKANDAN, Associate Professor, Department of Mathematics, M. S. University, Tirunelveli – 627 012	University Nominee

17.	Dr. NIVETHA MARTIN, Assistant Professor, Department of Mathematics, Arul Anandar College (Autonomous), Karumathur.	Academic Expert
18.	K. V. GAYATHRI (Ex) Administrative Officer, LIC of India.	Industrial Expert
19.	R.SUBASINI Assistant Professor and Head, Department of Science and Humanities, Pollachi Institute of Engineering and Technology, Pollachi – 642 205.	Alumni
20.	Dr. GOPALSEKAR, Associate Professor and Head, Department of Mathematics, KanchiMamunivarcenre for Post GraduateStudies, Pondicherry.	Academic Auditor
21.	C.KOWSALYAHARISHANTHI II M. Sc., Mathematics	Student Members
22.	V. S. RAMIDHA III B. Sc., Mathematics	


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**BoS/MA12.1 WELCOME ADDRESS AND OPENING REMARKS BY CHAIRMAN,
BOARD OF STUDIES, DEPARTMENT OF MATHEMATICS**

The Chairman, BoS of the Department of Mathematics welcomed and introduced the members of 12th Board of Studies and thanked each one of them for sparing their valuable time to attend the meeting.

BoS/MA 12.2 TO CONFIRM THE MINUTES OF 11th BOS MEETING HELD ON 22.02.2020.

The minutes of the 11th Board of Studies meeting held on 22.02.2020 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the 11th Academic council.

~Action Taken Report (Enclosed in Annexure I)



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BoS/MA 12.3

BoS/MA 12.3.1

I BSc MATHEMATICS (I & II SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

BoS/MA 12.3.2

II BSc MATHEMATICS (III & IV SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

BoS/MA 12.3.3

III BSc MATHEMATICS (V & VI SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

New Course Added:

The following Skill Based Elective papers for III B. Sc., MATHEMATICS were accepted by the experts fully without further suggestions.

V SEMESTER- 1.Financial Mathematics – I (21UMS5S11)

VI SEMESTER-2.Financial Mathematics – II (21UMS6S21)

These changes have been made effect for the students admitted in the academic year 2021-22 with V and VI Semesters accordingly.

BoS/MA 12.3.4

I MSc MATHEMATICS (I & II SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

BoS/MA 12.3.5

II MSc MATHEMATICS (III & IV SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

New Course Added:

The following Core paper for II M. Sc., MATHEMATICS was accepted by the experts fully without further suggestions.

IV SEMESTER

Algebraic Topology(21PMS417) instead of Control Theory.


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BoS/MA12.4 SUGGESTIONS GIVEN BY THE BoS MEMBERS (External)

12.4.1:Subject Expert Dr. Nivetha Martin gave the following suggestions for the syllabus based on OBE (Outcome Based Education).

1. The programme outcomes shall be given as overall outcome for all B. Sc. degree programmes offered by the college.
2. The programme specific outcomes should be specific to the concerned branch.
3. The knowledge level of the course outcomes shall be confined for B.Sc., programmes up to level K3 and K4.

12.4.2:University Nominee Dr. S. Monikandan mentioned the following comments and recommendations.

1. Appreciated the introduction of new course Algebraic Topology as it will be more useful for higher research in Topology.
2. The existing course Operator Theory at an advanced level to take up the students for research.
3. Pointed that the content of PG courses with standard prescribed text books are strong and promising to compete with the benchmarked Institutions.
4. Asked to prescribe problem oriented text books for some PG courses.
5. To offer group Project/Internships (for UG students).

12.4.3:Dr. GopalSekar, Academic Auditor

1. Recommends internship programmes at schools for Under Graduate students during their summer vacation at the end of the fourth semester.
2. Raised a question for offering Ancillary Mathematics course for Non-Mathematics students admitted in B. Sc., Chemistry programme.

12.4.4: K. V. Gayathri, Industry Expert, highlights the opportunities in the field of Insurance and Actuary further she recalled the confidence and the subject knowledge gained during her B.Sc., Mathematics programme offered by NGM College.

12.4.5: R. Subasini, Alumni, suggested one more value added course may be offered for PG degree.

12.4.6: KowsalyaharishanthiC., II M. Sc., Mathematics and Ramidha V.S., III B. Sc., Mathematics wished to

1. opt Projects for B. Sc. Programme.
2. have hands on training with some open source software.



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The members had a brainstorming discussion and interaction among themselves. After discussion, fruitful suggestions were incorporated appropriately in the Curriculum and Syllabi.

Based on the suggestions given by the members, BOS resolved to recommend the following to the Academic Council for further approval.

- a) The syllabus of First Year B. Sc., Mathematics under Regulation 2021-22.
- b) The syllabus of Second Year B. Sc., Mathematics under Regulation 2021-22.
- c) The syllabus of Third Year B. Sc., Mathematics under Regulation 2021-22.
- d) The syllabus of First Year M. Sc., Mathematics under Regulation 2021-22.
- e) The syllabus of Second Year M. Sc., Mathematics under Regulation 2021-22.



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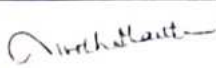
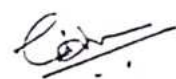
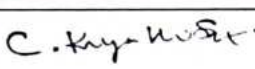
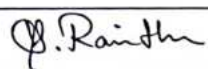


PRINCIPAL

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Members Present:

Chairman	
Dr. V. INTHUMATHI, Associate Professor and Head	V. Inthumathi
Internal Members	
Dr. J. JAYASUDHA, Assistant Professor	J. Jayasudha
Dr. V. CHITRA, Assistant Professor	V. Chitra
Dr. S. SIVASANKAR, Assistant Professor	S. Sivasankar
Mr. P. SIRAVANAN, Assistant Professor	P. Siravanan
Dr. S. KALEESWARI, Assistant Professor	S. Kaleeswari
Mrs. M. AMSAVENI, Assistant Professor	M. Amaveni
Mrs. A. GNANASOUNDARI, Assistant Professor	A. Gnanasoundari
Dr. N. SELVANAYAKI, Assistant Professor	N. Selvanayagi
Dr. M. MAHESWARI, Assistant Professor	M. Maheswari
Mr. S. EARNEST RAJADURAI, Assistant Professor and Head (SF)	S. Earnest Rajadurai
Mr. V. SREERAMAKRISHNAN, Assistant Professor (SF)	V. Sreeramakrishnan
Ms. S. SENPAGAM, Assistant Professor (SF)	S. Senpagam
Ms. S. MAHALAKSHMI, Assistant Professor (SF)	S. Mahalakshmi
Ms. A. ARUNADEVI, Assistant Professor (SF)	A. Arunadevi
University Nominee	
Dr. S. MONIKANDAN, Associate Professor, Department of Mathematics, M. S. University, Tirunelveli – 627 012	S. Monikandan
Academic Experts	

Dr. NIVETHA MARTIN, Assistant Professor, Department of Mathematics, Arul Anandar College (Autonomous), Karumathur.	
Industrial Experts	
GAYATHRI K. V. (Ex) Administrative Officer, LIC of India.	
Alumni	
R.SUBASINI Assistant Professor and Head, Department of Science and Humanities, Pollachi Institute of Engineering and Technology, Pollachi – 642 205.	
Academic Auditor	
Dr. GOPALSEKAR, Associate Professor and Head, Department of Mathematics, KanchiMamunivarcentre for Post GraduateStudies, Pondicherry.	
Student Members	
KOWSALYA HARISHANTHIC. II M. Sc., Mathematics	
RAMIDHA V.S. III B. Sc., Mathematics	


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ANNEXURE I

Minutes of the 11th Meeting – Action Taken Report

S.No	Suggestion given by expert members	Action taken
1	To implement Bharathiar University syllabus for both Allied Mathematics for Physics I & II, Allied Mathematics for Chemistry I & II as strongly recommended	Reviewed and Implemented
2	To enable the question setters, indications for theory questions(percentagewise) shall be detailed for core papers OR-I & OR-II	Implemented
3	Programming in PYTHON, R-software, MAPLE shall be included	Implemented
4	To include 1. 3D-Printing 2. Android App Development as value added programmes for B. Sc.	Implemented
5	To incorporate open electives	
6	Number Theory based paper – “Mathematics for Cyber Security” shall be considered	



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**List of Courses having focus on local, national, regional and global developmental needs
offered by the Department of Mathematics**

DEPARTMENT OF MATHEMATICS						
Programme: B. Sc., Mathematics					Year: 2021	
Course Code	Course Title	Need				Rationale
		Local	National	Regional	Global	
21UMS101	Classical Algebra			✓		School and College teaching
21UMS102	Calculus			✓		School and College teaching
21UMS1A1	Mathematical Statistics-I		✓			UGC, CSIR and NET exams
21UMS203	Trigonometry, Vector Calculus and Fourier Series			✓		School and College teaching
21UMS204	Analytical Geometry			✓		School and College teaching
21UMS2A2	Mathematical Statistics-II		✓			UGC, CSIR and NET exams
21UMS305	Dynamics			✓		School and College teaching
21UMS306	Numerical Techniques				✓	Employability in IT sector
21UMS3N11 / 21UMS3N12	Quantitative Aptitude-I/ Astronomy-I		✓			UGC, CSIR and NET exams
21UMS407	Statics			✓		School and College teaching
21UMS408	Operations Research-I				✓	Pursue research
21UMS4N21 / 21UMS4N22	Quantitative Aptitude-II/ Astronomy-II		✓			UGC, CSIR and NET exams
21UMS509	Modern Algebra				✓	Pursue research
21UMS510	Real Analysis-I				✓	Pursue research
21UMS511	Operations Research-II				✓	Pursue research
21UMS512	Theory of Numbers			✓		School and College teaching
21UMS5E11	Programming in C				✓	Employability in IT sector
21UMS5E21	Programming lab in C				✓	Employability in IT sector

21UMS5S11	Financial Mathematics-I		✓			UGC, CSIR and NET exams
21UMS613	Linear Algebra				✓	Pursue research
21UMS614	Real Analysis-II				✓	Pursue research
21UMS615	Complex Analysis				✓	Pursue research
21UMS6E31	Discrete Mathematics			✓		School and College teaching
21UMS6E41	OOP with C++				✓	Employability in IT sector
21UMS6E51	Programming lab in OOP with C++				✓	Employability in IT sector
21UMS6S21	Financial Mathematics-II		✓			UGC, CSIR and NET exams



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Programme: M. Sc., Mathematics						Year: 2021
Course Code	Course Title	Need				Rationale
		Local	National	Regional	Global	
21PMS101	Algebra				✓	Pursue research
21PMS102	Real Analysis				✓	Pursue research
21PMS103	Complex Analysis				✓	Pursue research
21PMS104	Ordinary Differential Equations				✓	Pursue research
21PMS1E1	Matlab				✓	Employability in IT sector
21PMS1E2	Programming Lab in Matlab				✓	Employability in IT sector
21PMS205	Linear Algebra				✓	Pursue research
21PMS206	Mathematical Statistics				✓	Pursue research
21PMS207	Partial Differential Equations				✓	Pursue research
21PMS208	Mechanics				✓	Pursue research
21PMS209	Numerical Analysis				✓	Employability in IT sector
21PMS210	Programming lab in Numerical Analysis using Matlab				✓	Employability in IT sector
21PMS2N1/ 21PMS2N2	Mathematical Statistics and Techniques/ Mathematics in Finance		✓			UGC, CSIR and NET exams
21PMS311	Topology				✓	Pursue research
21PMS312	Functional Analysis				✓	Pursue research
21PMS313	Combinatorics			✓		School and College teaching

21PMS314	Graph Theory		✓			UGC, CSIR and NET exams
21PMS415	Fluid Dynamics		✓			UGC, CSIR and NET exams
21PMS416	Operator Theory		✓			UGC, CSIR and NET exams
21PMS417	Algebraic Topology				✓	Pursue research
21PMS4E5	Mathematical Methods		✓			UGC, CSIR and NET exams



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**List of Courses having focus on employability/ entrepreneurship/ skill development offered
by the Department of Mathematics**

DEPARTMENT OF MATHEMATICS						
Programme: B. Sc. Mathematics					Year: 2021	
Course Code	Course Title	Employability (EM) / Entrepreneurship (EN) / Skill Development (SD)			Focus	Year of Introduction
		EM	EN	SD		
21UMS408	Operations Research – I	✓	✓	✓	Solving real life problems	2013
21UMS511	Operations Research – II	✓	✓	✓	Solving real life Problems	2013
21UMS3N11	NME - Quantitative Aptitude – I	✓		✓	Logical & Verbal reasoning	2013
21UMS4N21	NME - Quantitative Aptitude – II	✓		✓	Logical & Verbal reasoning	2013
21UMS1A1	Mathematical Statistics – I	✓	✓	✓	Survey, Data Analysis	2013
21UMS2A1	Mathematical Statistics – II	✓	✓	✓	Survey, Data Analysis	2013
21UMS5E11	Programming in C	✓		✓	Software Management	2013
21UMS6E41	OOP with C++	✓		✓	Software Management	2013
21UMS306	Numerical Techniques	✓		✓	Skill development (Problem Solving)	2017
21UMS5S11	Financial Mathematics-I	✓	✓	✓	Debit and credit management	2021
21UMS6S21	Financial Mathematics-II	✓	✓	✓	Debit and credit management	2021



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DEPARTMENT OF MATHEMATICS						
Programme: M. Sc., Mathematics					Year: 2021	
Course Code	Course Title	Employability (EM) / Entrepreneurship (EN) / Skill Development (SD)			Focus	Year of Introduction
		EM	EN	SD		
21PMS104	Ordinary Differential Equations	✓		✓	Skill development (Problem Solving)	2013
21PMS207	Partial Differential Equations	✓		✓	Skill development (Problem Solving)	2013
21PMS313	Combinatorics	✓		✓	Skill development (Problem Solving)	2013
21PMS3E3	Latex		✓	✓	Technical Skills to prepare Research Articles	2013
21PMS1E1	Matlab		✓	✓	Technical Skills on Software Management	2015
21PMS206	Mathematical Statistics	✓	✓	✓	Survey, Data Analysis	2015
21PMS209	Numerical Analysis	✓		✓	Skill development (Problem Solving)	2015
21PMS210	Programming Lab in Numerical analysis using Matlab	✓		✓	Software Management	2015
21PMS2N1	Mathematical Statistics & Techniques	✓	✓	✓	Survey, Data Analysis	2015


Head of the Department

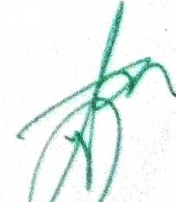
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Percentage of Revision of M. Sc. Mathematics Syllabus under Regulation 2021

S.No	Course Code	Course Title	Change Details	% of Changes	Reason for Change
1.	21PMS417	Core XVII: Algebraic Topology	Full Paper	100%	To pursue research in Algebraic Topology
2.	21PMS2VA	Value Added Course: Internet of Things	Full Paper	100%	IoT courses equip learners with the knowledge and skills to develop innovative solutions and to excel in the field of IoT. It will provide opportunity to get career in software development companies
3.	21PM1E2	Major Elective I: Special Functions	Full Paper	100%	To expertise and use the special functions in the fields of applied mathematics.
4.	21PMS3E2	Major Elective III: Mathematical Modeling	Full Paper	100%	To use the elementary functions to describe and explore real-world phenomena and data.
5.	21PMS3AL	Advanced Learner Course: Algebraic Number Theory	Full Paper	100%	To develop abilities to solve number-theoretic problems using
6.	21PMS3CC	Certificate Course: Data Analytics With Python	Full Paper	100%	To equip the students with essential skills in decision science using Python
7.	21PMS4E2	Major Elective V: Fuzzy Logic and Fuzzy Sets	Full Paper	100%	To learn about the concepts of fuzzy sets operations and fuzzy relations and fuzzification process.


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N.G.M COLLEGE - CURRICULUM DEVELOPMENT CELL
M. Sc. MATHEMATICSSCHEME OF EXAMINATION FOR (2021 – 2023 Batch)
CHOICE BASED CREDIT SYSTEM & OBES

Subject Code	Subjects	Ins Hrs/week	Examinations				Credits
			Dur. Hrs	CIA	ESE	Total	
SEMESTER I							
21PMS101	Core I: Algebra	6	3	50	50	100	4
21PMS102	Core II: Real Analysis	6	3	50	50	100	4
21PMS103	Core III: Complex Analysis	6	3	50	50	100	4
21PMS104	Core IV: Ordinary Differential Equations	6	3	50	50	100	4
21PMS1E1/ 21PMS1E2	Major Elective I : Matlab/Special Functions	4	3	25	25	50	3
21PMS1E3	Major Elective Practical II : Programming Lab in Matlab	2	3	25	25	50	2
TOTAL		30	-	250	250	500	21
SEMESTER II							
21PMS205	Core V: Linear Algebra	6	3	50	50	100	4
21PMS206	Core VI: Mathematical Statistics	6	3	50	50	100	4
21PMS207	Core VII: Partial Differential Equations	5	3	50	50	100	4
21PMS208	Core VIII: Mechanics	6	3	50	50	100	4
21PMS209	Core IX: Numerical Analysis	4	3	25	25	50	3
21PMS210	Core Practical X: Programming lab in Numerical Analysis using Matlab	2	3	25	25	50	2
21PMS2N1/ 21PMS2N2	Non-Major Elective: Mathematical Statistics and Techniques/Mathematics in Finance	1	3	50	50	100	2
21PMS2VA	Value Added Course: Internet of Things	-	-	-	-	-	2*
TOTAL		30	-	300	300	600	23

SEMESTER III

21PMS311	Core XI: Topology	6	3	50	50	100	4
21PMS312	Core XII: Functional Analysis	6	3	50	50	100	4
21PMS313	Core XIII: Combinatorics	6	3	50	50	100	4
21PMS314	Core XIV: Graph Theory	6	3	50	50	100	4
21PMS3E1/ 21PMS3E2	Major Elective III: Latex/ Mathematical Modelling	4	3	25	25	50	3
21PMS3E3	Major Elective Practical IV: Programming Lab in Latex	2	3	25	25	50	2
21PMS3AL	Advanced Learner Course (Optional) : Algebraic Number Theory	-	-	50	50	100	4*
21PMS3CC	Certificate Course: Data Analytics with Python	-	-	-	-	-	2*
TOTAL		30	-	250	250	500	21
SEMESTER IV							
21PMS415	Core XV: Fluid Dynamics	6	3	50	50	100	4
21PMS416	Core XVI: Operator Theory	6	3	50	50	100	4
21PMS417	Core XVII: Algebraic Topology	6	3	50	50	100	4
21PMS4E1/ 21PMS4E2	Major Elective V: Mathematical Methods/Fuzzy Logic and Fuzzy sets	6	3	50	50	100	5
21PMS4P1	Core XVIII: Project	4+ 2(Lab)	----	100	100	200	8
TOTAL		30	----	300	300	600	25
GRAND TOTAL		120		1100	1100	2200	90


Head of the Department

Dr. V. Inthumathi, Ph.D.,
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Principal i/c

Dr. R. MANICKA CHEZIAN M.Sc., M.S., Ph.D.,
PRINCIPAL i/c
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Programme Code:	M.Sc.	Programme Title:	M.Sc. Mathematics	
Course Code:	21PMS417	Title	Batch:	2021 - 2023
Lecture Hrs./Week or Practical Hrs./Week	6	ALGEBRAIC TOPOLOGY	Semester:	IV
			Credits:	4

Course Objective

To introduce the ideas of algebraic topology to other branches of Mathematics and to find algebraic invariants that classify topological spaces up to homeomorphism, though usually most classify up to homotopy equivalence.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	understand the basic algebraic and geometric ideas that underpin homology theory.	K2
CO2	apply knowledge of algebraic topology to formulate and solve problems of a geometrical and topological nature in mathematics.	K2
CO3	apply methods from algebraic topology to problems in a broader mathematical context.	K3
CO4	analyze the concept of homotopy with proof or counterexample as appropriate	K4
CO5	evaluate simplicial homology groups for applying in further research	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H
CO2	H	H	H	H	H	H	M	H	H
CO3	H	H	H	H	H	H	M	H	H
CO4	H	H	H	H	H	H	M	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	The Fundamental Group: Homotopy of paths-The fundamental group Text Book 1: Chapter 9: Sections: 51, 52	16
Unit II	The Fundamental Group: Covering spaces-The Fundamental group of the circle Text Book 1: Chapter 9: Sections: 53, 54	15
Unit III	The Fundamental Group: Retractions and Fixed Point- The Fundamental Theorem of Algebra- Deformation Retracts and Homotopy Type Text Book 1: Chapter 9: Sections: 55, 56 and 58	16
Unit IV	Cell Complexes and Simplicial Complexes: Abstract Simplicial Complexes – Geometric Realization of Simplicial Complexes – Barycentric Subdivision – Simplicial Approximation. Text Book 2: Chapter 2: Sections: 2.6-2.9	16
Unit V	Homology: Simplicial and Singular Homology-Complexes-Simplicial Homology-Homotopy Invariance. Text Book 3: Chapter 2: Section: 2.1	15
	Total Contact Hrs.	78

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

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

Text Books:

1. J. R. Munkres, Topology, Second Edition, Pearson Education, New Delhi, 2006.
2. Anant R. Shastri, Basic Algebraic Topology, CRC Press, 2003.
3. Allen Hatcher, Algebraic Topology, Cambridge University Press, 2002.

Books for Reference:

1. SatyaDeo, Algebraic Topology, Hindustan Book Agency (trim series), 2006.
2. Singer and Thrope, Lecture Notes in Elementary Topology and Geometry, Springer, 1967.

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

1. <https://nptel.ac.in/courses/111/101/111101002/>
2. <https://nptel.ac.in/courses/111/101/111101144/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. M. MAHESWARI  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

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Programme Code:	M.Sc.	Programme Title:	M.Sc. Mathematics	
Course Code:	21PMS1E2	Title	Batch:	2021 - 2023
Lecture Hrs./Week or Practical Hrs./Week	4	SPECIAL FUNCTIONS	Semester:	I
			Credits:	3

Course Objective

To enable the learnersto 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	Knowledge Level
CO1	Understand the concept of Bessel's functions with its properties like recurrence relations, generating functions, etc.	K2
CO2	Perform operations with Orthogonal polynomials, Legendre's polynomial with their differential equations along with the corresponding recurrence formula.	K3
CO3	Apply these techniques to solve and analyze various mathematical problems.	K3
CO4	Analyze the properties of special functions by their integral representations.	K4
CO5	Demonstrate how physical phenomena are modeled using special functions.	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	H	M	H
CO2	H	H	H	H	M	H	H	M	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L – LOW.

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.	10
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.	11
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	11
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	10
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 $\int x^{2m}/1+x^{2n} dx$	10
	Total Contact Hrs.	52

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

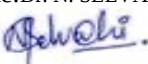
Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

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

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

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

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. N. SELVANAYAKI  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

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Programme Code:	M.Sc.	Programme Title:	M.Sc. Mathematics	
Course Code:	21PMS3E2	Title	Batch:	2021 - 2023
Lecture Hrs./Week or Practical Hrs./Week	4	MATHEMATICAL MODELLING	Semester:	III
			Credits:	3

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	Knowledge Level
CO1	represent the real world systems from Science and Technology in a mathematical frame work.	K1
CO2	acquire basic mathematical modeling skills to carry out simple tasks.	K2
CO3	apply the mathematical techniques of Differential Equations in dynamics and Epidemics to analyze specific problems and identify the appropriate solutions.	K3
CO4	formulate and qualitatively analyze mathematical models of a wide range of systems and processes in Engineering and the natural sciences	K4,K5
CO5	develop the experience of working both independently and collaboratively within the discipline to other contexts.	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	H	M	H
CO2	H	H	H	H	H	H	H	M	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L – LOW.

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.	10
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.	11
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.	10
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.	11
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)	10
	Total Contact Hrs.	52

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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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>

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Programme Code:	M.Sc.	Programme Title:	M.Sc. Mathematics	
Course Code:	21PMS3AL	Title	Batch:	2021 - 2023
Lecture Hrs./Week or Practical Hrs./Week	-	ADVANCED LEARNER COURSE (OPTIONAL): ALGEBRAIC NUMBER THEORY	Semester:	III
			Credits:	4*

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	Knowledge Level
CO1	Recall the fundamental concepts of Rings and Ideals	K1
CO2	Understand the structure of Noetherian rings and Dedekind rings through analysing examples	K2
CO3	Write minor proofs of Number theoretic results independently	K3
CO4	Analyze the logical arguments and to work in abstract concepts to increase the clarity and efficiency in algebraic number theory concepts	K4
CO5	Pursue further studies in number theory and related areas	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	M	H	M
CO2	H	H	H	H	H	H	H	H	M
CO3	H	H	H	H	H	H	M	H	M
CO4	M	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

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>

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CERFICATE COURSES

Programme Code:	M.Sc.	Programme Title:	M.Sc. Mathematics	
Course Code:	21PMS3CC	Title	Batch:	2021 - 2023
Lecture Hrs./Week or Practical Hrs./Week	2	DATA ANALYTICS USING PYTHON	Semester:	III
			Credits:	-

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	Knowledge Level
CO1	apply data cleansing, transformation techniques and obtain descriptive statistics on data.	K3
CO2	analyze datasets and Create simple visualization plots of data.	K4
CO3	compare the machine learning techniques.	K5
CO4	develop machine learning models for chosen problems of classification and prediction.	K5
CO5	create machine learning models for generating recommendations and clustering data.	K5

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.

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	M.Sc.	Programme Title:	M.Sc. Mathematics	
Course Code:	21PMS4E2	Title	Batch:	2021 - 2023
Lecture Hrs./Week or Practical Hrs./Week	6	FUZZY LOGIC AND FUZZY SETS	Semester:	IV
			Credits:	5

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	Knowledge Level
CO1	recall the concepts of set theory, crisp sets and Measure theory.	K1
CO2	understand the concepts of Fuzziness in various systems and fuzzy set theory.	K2
CO3	analyze the difference between crisp sets and fuzzy set theory.	K4
CO4	develop the knowledge to deal different types of uncertainties.	K4
CO5	apply the concepts of fuzzy logic to solve real life problems in the field of medicine, social sciences and decision making problems.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	H	H	H
CO2	H	H	H	M	H	H	H	H	H
CO3	H	H	H	M	H	H	H	H	H
CO4	H	H	H	M	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H – HIGH; M – MEDIUM; L – LOW.

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.	15
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, Morrhism and Fuzzy relations Equations.	16
Unit III	Fuzzy Measures General discussion, Belief and plausibility measure, Probability measures, Possibility and Necessity measures and Relationship among Classes of Fuzzy measures.	15
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.	16
Unit V	Applications Natural,life and Social Sciences, Medican-Management and decision making, Computer Sciences, System Science and Other Applications.	16
	Total Contact Hrs.	78

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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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. Corduneanu C.,*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/>

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