SACRED HEART COLLEGE (AUTONOMOUS)

Department of Mathematics

M.Sc. Mathematics

Course plan

Academic Year 2016 - 17

Semester 2

COURSE PLAN- ABSTRACT ALGEBRA

PROGRAMME	**MSc Mathematics**	**SEMESTER**	**2**
COURSE CODE AND TITLE	**16P2MATT06:ABSTRACT ALGEBRA**	**CREDIT**	**4**
HOURS/WEEK	**5**	**HOURS/SEM**	**90**
FACULTY NAME	**JEET KURIAN MATTAM**		

COURSE OBJECTIVES
To develop ideas of finitely generated abelian groups, Sylow theorems and applications
To understand the concept of rings of polynomials, factorisation of polynomials and ideal structure
To asssimilate the idea of extension fields, algebraic extensions and geometric constructions.
To develop ideas of automorphisms of fields, isomorphism extension theorem and Galois theory.

Text Book

1.A First Course in Abstract Algebra by John B Fraleigh 3rd Edition

Additional references

1) Contemporary Abstract Algebra by Joseph Gallian

2) Topics in Algebra by I.N.Herstein

3) Algebra by Michael Artin

4) Abstract Algebra by David S Dummit and Richard M Foote.

Proofs of theorems to be avoided in bridge course. Only concept and examples required

Sessions	Topic	Method	Remarks
1	Bridge Course: Chapter 1 of text	Group Discussion followed by a Lecture session.	
2	Bridge Course : Chapter 2 of text excluding direct products	Interactive session including GD	
3	Bridge Course: chapter 4 of text.	Lecture session with Examples	
4	Bridge Course: Chapter 5 of text.	Lecture session with Examples	
5	Bridge Course: Section 27.1-27.20	Lecture session	
5	Bridge Course: Section 27.1-27.20	Lecture session	
6 MODULE I BEGINS	Definition 11.1, Theorem 11.2 and example 11.3	Lecture session	
7	Example 11.4, Theorem 11.5, Corollary 11.6 and example 11.7	Interactive session and Lecture	
8	Definition 11.8, Theorem 11.9, Example 11.10, Example 11.11	Lecture	
9	Theorem 11.12, Example 11.13, Definition 11.14, Theorem 11.15	Lecture	
10	Theorem 11.16, Theorem 11.17 and selected exercises of Exercise 11	Lecture	
11	Exercise 11 continued	Lecture	
12	Definition 16.1, Example 16.2, Theorem 16.3	Interactive session	
13	Examples 16.4- 16.8	Assignment and seminar for the students.	
14	Example 16.11, Theorem 16.12, Definition 16.13 and Theorem 16.14	Lecture	
15	Definition 16.15 and theorem 16.16 and example 16.17	Lecture	
16	Theorem 36.1, Definition 36.2	Lecture	
17	Theorem 36.3 and Corollary 36.4	Lecture	

18	Definition 36.5, Lemma 36.6 and Corollary 36.7	Lecture	
19	The three Sylow Theorems (Statements only) Example 36.12 and Example 36.13	Lecture	
20	Theorem 37.1 and definition 37.2 and example 37.3	Lecture	
21	Theorem 37.4, Lemma 37.5 and Theorem 37.6	Lecture	
22	Theorem 37.7 and Lemma 37.8	Lecture	
23	Example 37.9- Example 37.12	Lecture	
24	Example 37.13-Example 37.15	Lecture	
25	Examples continued and selected exercises of Exercise 37	Lecture	
26	FIRST CIA	Written Test; Descriptive.	
27 MODULE 2 BEGINS	Definition 22.1 and Theorem 22.2	Lecture	
28	Example 22.3, R[x,y], and theorem 22.4	Lecture	
29	Examples 22.6-22.10	Lecture	
30	Theorem 22.11	Seminar	
31	Selected Exercises of Exercise 22	Seminar	
32	Selected Exercises of Exercise 22	Seminar	
33	Theorem 23.1		
34	Example 23.2 and Corollary 23.3	Lecture	
35	Example 23.4 and corollary 23.5	Lecture	
36	Corollary 23.6, Definition 23.7 and Example 23.8	Lecture	
37	Example 23.9, Theorem 23.10, Theorem 23.11 and Corollary 23.12	Lecture	
38	Example 23.13,23.14 and a similar problem in exercises	Lecture	
39	Theorem 23.15 and example 23.16	**Lecture**	

40	Corollary 23.17	Lecture	
41	Definition 27.21, Example 27.22,27.23 and Theorem 27.24	Lecture	
42	Theorem 27.25 and example 27.26	Lecture	
43	Example 27.26 and theorem 27.27 and selected exercises of exercise 27	Lecture	
44	Theorem 23.18, Corollary 23.19 and theorem 23.20	**Lecture**	
45	Example 23.21 and selected exercises of Exercise 23	Seminar	
46	Example 23.21 and selected exercises of Exercise 23	Seminar	
47	Definition 29.1 and Theorem 29.3	Lecture	
48	Example 29.4, 29.5, Definition 29.6,Examples 29.7-29.10.	Lecture	
49	Definition 29.11 and theorem 29.12, Theorem 29.13	Lecture	
50	Definition 29.14, Example 29.15, Simple Extensions	Lecture	
51	Example 29.16, Definition 29.17 and Theorem 29.18		
52	Example 29.19 and selected exercises of Exercise 29	Lecture	
53	selected exercises of Exercise 29	Seminar	
54	Theorem 30.23, Definition 31.1,31.2	Lecture	
55	Theorem 31.3,31.4	Lecture	
56	Corollary 31.6,31.7, Examp;e 31.8,31.9	Lecture	
57	Example 31.10, Theorem 31.11	Lecture	
58	Theorem 31.12, Corollary 31.13, Definition 31.14 and Theorem 31.15	Lecture	

59	Corollary 31.16, Theorem 31.17 and theorem 31.18	Lecture	
60	Selected exercises of Exercise 31		
61MODULE III BEGINS	Theorem 32.1 and Corollary 32.5	Seminar	
62	Theorem 32.6	Lecture	
63	Corollary 32.8, Theorems 32.9-32.11	Seminars	
64	Theorem 33.1, Corollary 33.2, Theorem 33.3	Lecture	
65	Definition 33.4, Theorem 33.5, Corollary 33.6 and Example 33.7	Lecture	
66	Lemma 33.8 and Lemma 33.9	Lecture	
67	Theorem 33.10, Corollary 33.11 and Theorem 33.12		
68	Definition 48.1, Example 48.2, Theorem 48.3	Lecture	
69	Corollary 48.5, Corollary 48.6 and Example 48.7	Lecture	
70	Definition 48.8, Example 48.9, 48.10, 48.11 and Definition 48.12	Lecture	
71	Example 48.13, Theorem 48.14, Theorem 48.15, Definition 48.16, Example 48.17		
72	Theorem 48.19, Selected Exercises of Exercise 48		
73	Theorem 49.3**(** Statement only) and Corollary 49.5		
74	SECOND CIA		
75 MODULE IV BEGINS	Definition 50.1, Example 50.2, Theorem 50.3	Lecture	
76	Definition 50.4, Example 50.5, Corollary 50.6, 50.7	Lecture	

77	Example 50.8 and 50.9. Selected Exercises of Exercise 50.	Lecture	
78	Definition 51.1, Theorem 51.2, Corollary 51.3.	Lecture	
79	Example 51.4, Theorem 51.6, Definition 51.7 and Example 51.8	Lecture	
80	Theorem 51.9 and Corollary 51.10	LECTURE	
81	Lemma 51.11, Definition 51.12 and Theorem 51.13	LECTURE	
82	Theorem 51.14	LECTURE	
83	Theorem 51.15	LECTURE	
84	Definition 53.1, Theorem 53.2	LECTURE	
85	Example 53.3, Definition 53.5	LECTURE	
86	Theorem 53.6	LECTURE	
87	Theorem 53.6 (Continued)	LECTURE	
88	Theorem 53.7 and Example 53.8	LECTURE	
89	REVISION		
90	REVISION		

COURSE PLAN- ADVANCED TOPOLOGY

PROGRAMME	**MSc Mathematics**	**SEMESTER**	**1**
COURSE CODE AND TITLE	**16P2MATT07: ADVANCED TOPOLOGY**	**CREDIT**	**4**
HOURS/WEEK	**5**	**HOURS/SEM**	**75**
FACULTY NAME	**JEENU KURIAN**		

COURSE OBJECTIVES
To understand Urysohn Characterization of Normality ,Tietze Characterization of Normality, Products and co-products.
To analyze embedding and Metrisation, Evaluation Functions in to Products, embedding Lemma and Tychnoff Embedding, The Urysohn Metrisation Theorem.
To develop the idea of convergence and related properties of nets and filters.
To understand compactness, variations of compactness.

Sessions	Topic	Method	Remarks
1.	Introductory Session – separation axioms	Lecture	
2.	Urysohn characterisation of normality	Lecture	
3.	Definition and proposition	Lecture	
4.	Urysohn’s Lemma	Lecture	
5.	Theorem and Lemma	Lecture	
6.	Theorems and Lemma	Lecture	
7.	Tietz characterisation of normality: proposition	Lecture	
8.	Proposition	Lecture	
9.	Definition and proposition	Lecture	
10.	Proposition	Lecture	

11.	Theorem and proposition	Lecture	
12.	Products and co products – Cartesian products of family of sets: Basic definitions	Lecture	
13.	Proposition	Lecture	
14.	Proposition	Lecture	
15.	Theorem	Lecture	
16.	Theorem	Lecture	
17.	Definition and Theorem	Lecture	
18.	Product topology – Basic definitions	Lecture Group Discussion, Problem Solving	
19.	Theorems	Lecture	
20.	Theorems and propositions	Lecture	
21.	Propositions and definitions	Lecture	
22.	Productive properties - Basic definitions	Lecture	
23.	Theorems and Lemma	Lecture	
24.	Theorems and Lemma	Lecture	
25.	Theorems and Lemma	Lecture	
26.	Theorems and Lemma	Lecture	
27.	Theorems and Lemma	Lecture	
28.	Module 2 – Embedding and metrisation	Lecture	
29.	Definitions	Lecture Group Discussion, Problem Solving	
30.	Theorems and Propositions on evaluation function	Lecture	
31.	Theorems and Propositions on evaluation function	Lecture	

32.	Theorems and Propositions on evaluation function	Lecture	
33.	Embedding Lemma and Tychonoff embedding – Basic Definitions	Problem Solving	
34.	Theorem	Lecture	
35.	Theorem	Lecture	
36.	Lemma	Lecture	
37.	Proposition	Lecture	
38.	Urysohn metrisation Theorem - Basic Definitions and theorem	Lecture	
39.	Corollary and problems	Lecture Group Discussion, Problem Solving	
40.	Module 3 – Nets and filters introduction, Basic definition	Lecture	
41.	Theorems and proposition	Lecture	
42.	Theorems and proposition	Lecture	
43.	Topology and convergence of nets – Basic definitions	Lecture	
44.	Theorems and corollaries	Lecture	
45.	Theorems and corollaries	Lecture	
46.	Theorems and Propositions	Lecture	
47.	Theorems and propositions	Lecture	
48.	Filters and their convergence – Basic definitions	Lecture	
49.	Theorems and corollaries	Lecture	
50.	Theorems and Propositions	Lecture	
51.	Theorems and Propositions	Lecture	
52.	Ultrafilter and compactness	Lecture	
53.	Ultrafilter and compactness	Lecture	
54.	Theorems and propositions	Lecture	

55.	Problems	Lecture	
56.	Module 4 - Introduction	Lecture	
57.	Variation of compactness - Basic definitions	Lecture	
58.	Theorems, corollaries and propositions	Lecture	
59.	Theorems, corollaries and propositions	Lecture	
60.	Theorems, corollaries and propositions	Lecture	
61.	Theorems, corollaries and propositions	Lecture	
62.	Theorems, corollaries and propositions	Lecture	
63.	Local compactness - Definitions	Lecture	
64.	Propositions and corollaries	Lecture	
65.	Propositions and corollaries	Lecture	
66.	Propositions and corollaries	Lecture	
67.	Compactification- Basic definitions	Lecture	
68.	Theorems and proposition	Lecture	
69.	Propositions and corollaries	Lecture	
70.	Theorems	Lecture	
71.	Theorems	Lecture	
72.	Propositions	Lecture	
73.	Propositions	Lecture	
74.	Problems	Group discussion	
75.	Problems	Group discussion	
76.	Problems	Group discussion	
77.	Problems	Group discussion	
78.	Problems	Group discussion	

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	10^{th} Jan 2017	Assisgnment product topology, Nets and Filters
2	19^{th} to 25^{th} Feb 2017	Seminar on theorems and problems in Compactness of topological spaces

References:

1. Munkers J.R, Topology – A first course, Prentice Hall of India Pvt.Ltd., New Delhi,2000.
2. J.L.Kelly, General Topology.Van Nostrand, Reinhold Co.,NewYork,1995.
3. Stephen Willard , General Topology,Addison – Wesley.
4. Dugundji, Topology, Universal Book Stall, New Delhi.
5. George F Simmons, introduction to Topology and Modern Analysis, Mc Graw-Hill Book Company,1963.

COURSE PLAN

PROGRAMME	MSC MATHEMATICS	SEMESTER	2
COURSE CODE AND TITLE	16P2MATT08: ADVANCED COMPLEX ANALYSIS	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	72
FACULTY NAME	PROF. SANIL JOSE		

Course Prerequisites:

Calculus, Analysis

Guidelines/Suggestions for Teaching Methods and Student Learning Activities:

This course is taught as a lecture course with student participation and use of computers

COURSE OBJECTIVES
To understand the concepts of power series to expand a complex function as Taylors and Laurantz series
To perceive entire functions, Jensen's formula, the genus and order of an entire function, Hadamard Factorization theorem.
To interpret Harmonic functions, Basic properties of harmonic functions and Harmonic functions on the disk and discuss Reiman Mapping theorem
To analyse Elliptic functions and Weistrass function

Basic Reference

1. AHLFORS V. LARS, COMPLEX ANALYSIS, McGRAW- HILL INTERNATIONAL EDITIONS, 3RD EDITION

Hour wise planning

Sessions	Topic	Method	REMARKS
1	INTRODUCTION	Lecture	
2	ELEMENTARY THEORY OF POWER SERIES	Lecture	
3	SEQUENCE AND SERIES	Lecture Group Discussion, Problem Solving	
4	UNIFORM CONVERGANCE	Lecture	
5	POWER SERIES	Lecture	
6	ABEL'S LIMIT THEOREM	Lecture	
7	POWER SERIES EXPNSION	Lecture	
8	WEISTRASS THEOREM	Lecture	
9	TAYLOR'S THEOREM	Lecture	
10	LAURENT'S THEOREM	Lecture Group Discussion, Problem Solving	
11	PARTIAL FRACTIONS	Lecture	
12	INFINITE PRODUCTS	Lecture	
13	CANNONICAL PRODUCTS	Lecture	
14	GAMMA FUNCTION	Lecture Group Discussion, Problem Solving	
15	GAMMA FUNCTION	Lecture	
16	SEMINAR	Lecture	
17	SEMINAR/ PROBLEM DISCUSSION	Lecture	
18	SEMINAR/ PROBLEM DISCUSSION	Lecture	

19	SEMINAR/ PROBLEM DISCUSSION	Lecture	
20	SEMINAR/ PROBLEM DISCUSSION	Lecture	
21	JENSON'S FORMULA	Lecture Group Discussion, Problem Solving	
22	HADAMARD'S THEOREM	Lecture	
23	THE REIMANN ZETAFUNCTION	Lecture	
24	EXTENSION TO THE ENTIRE PLANE	Lecture	
25	FUNCTIONLA EQUATION	Lecture	
26	THE ZEROS OF ZETA FUNCTION	Lecture	
27	THE ZEROS OF ZETA FUNCTION	Lecture	
28	THE ZEROS OF ZETA FUNCTION	Lecture Group Discussion, Problem Solving	
29	ARZELA'S THEOREM	Lecture	
30	ARZELA'S THEOREM	Lecture	
31	SEMINAR	Lecture	
32	SEMINAR/ PROBLEM DISCUSSION	Lecture	
33	SEMINAR/ PROBLEM DISCUSSION	Lecture	
34	SEMINAR/ PROBLEM DISCUSSION	Lecture	
35	SEMINAR/ PROBLEM DISCUSSION	Lecture Group Discussion, Problem Solving	
36	SEMINAR/ PROBLEM DISCUSSION	Lecture	

37	SEMINAR/ PROBLEM DISCUSSION	Lecture	
38	SEMINAR/ PROBLEM DISCUSSION	Lecture	
39	SEMINAR/ PROBLEM DISCUSSION	Lecture	
40	THEREIMANN MAPPING THEOREM	Lecture	
41	THEREIMANN MAPPING THEOREM	Lecture	
42	THEREIMANN MAPPING THEOREM	Lecture Group Discussion, Problem Solving	
43	BOUNDARY BEHAVIOUR	Lecture	
44	USE OF REFLECTION PRINCIPLE	Lecture	
45	ANALYTIC ARCS	Lecture	
46	CONFORMAL MAPPING OF POLYGONS	Lecture	
47	SCHWARZ CHRISTOFFEL FORMULA	Lecture	
48	MEAN VALUE PROPERTY	Lecture	
49	MEAN VALUE PROPERTY	Lecture Group Discussion, Problem Solving	
50	HARNACK'S PRINCIPLE	Lecture	
51	HARNACK'S PRINCIPLE	Lecture	
52	HARNACK'S PRINCIPLE	Lecture	
53	SUBHARMONIC FUNCTIONS	Lecture	
54	SUBHARMONIC FUNCTIONS	Lecture	
55	SEMINAR/ PROBLEM DISCUSSION	Lecture	

56	SEMINAR/ PROBLEM DISCUSSION	Lecture Group Discussion, Problem Solving	
57	SEMINAR/ PROBLEM DISCUSSION	Lecture	
58	SEMINAR/ PROBLEM DISCUSSION	Lecture	
59	SEMINAR/ PROBLEM DISCUSSION	Lecture	
60	SEMINAR/ PROBLEM DISCUSSION	Lecture	
61	SIMPLY PERIODIC FUNCTIONS	Lecture	
62	DOUBLY PERIODIC FUNCTIONS	Lecture	
63	THE FOURIER DEVELOPMENT	Lecture Group Discussion, Problem Solving	
64	THE PERIOD MODULE	Lecture	
65	UNIMODULAR TRANSFORMATIONS	Lecture	
66	CANNONICAL BASIS	Lecture	
67	WEISTRASS FUNCTION	Lecture	
68	WEISTRASS FUNCTION	Lecture	
69	WEISTRASS FUNCTION	Lecture	
70	WEISTRASS FUNCTION	Lecture Group Discussion, Problem Solving	
71	SEMINAR/ PROBLEM DISCUSSION	Lecture	
72	SEMINAR/ PROBLEM DISCUSSION	Lecture	
73	SEMINAR/ PROBLEM DISCUSSION	Lecture	

74	SEMINAR/ PROBLEM DISCUSSION	Lecture	
75	SEMINAR/ PROBLEM DISCUSSION	Lecture	
76	SEMINAR/ PROBLEM DISCUSSION	Lecture	
77	REVISION	Lecture Group Discussion, Problem Solving	
78	REVISION	Lecture	

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	4/1/2017	PROBLEMS ON POWER SERIES
2	28/1/2017	PROBLEMS IN HARMONIC FUNCTIONS

GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	2/2/2017	PROBLEMS IN ELLIPTIC FUNCTIONS
2	9/2/2017	PROBLEMS IN MODULE 2

References:

1. John. B. Conway, Functions of Complex Variables, SpringerVerlag, New York, 1973. (Indian Edition: Narosa)

2. S. Lang, Complex Analysis, McGraw Hill (1998).

3. S. Ponnusamy & H. Silverman, Complex Variables with Applications, Birkhauser

4. A. Priestley, Introduction to Complex Analysis, Oxford University Press Tristan Needham, Visual Complex Analysis, Oxford University Press(1999)

5. V. Karunakaran, Complex Analysis, Narosa Publishing House,

COURSE PLAN- FUNCTIONAL ANALYSIS

Course	**FUNCTIONAL ANALYSIS**
Course code	**16P2MATT09**
Semester	**2**
Total hours	**75**
Credits	**4**
Faculty	**Prof. M P Sebastian**

Course Objectives

To understand the basics of Functional analysis
To apply Functional analysis in the other disciplines.
To understand theory of Operators and Functionals using Linear Algebra.
To discover the link of Functional analysis with geometry , differential equations etc.

Sl.No	No. of Session s/hrs	Topics to be taught	Method of teaching	Value addition
1	1	Fundamentals of Linear Algebra and Metric spaces.	Lecture , Seminar , Assignment	
2.	3	Normed space and Banachspace , examples and their properties , problems.	Lecture , assignment	
3	2	Finite dimensional normed spaces and their sub spaces , problems.	Lecture	
4	2	Compactness and finite dimension , problems.	Lecture	
5	2	Linear operators, examples and their properties, problems.	Lecture assignment	
6		Test paper.		
7	2	Bounded and continuous linear operators and examples.	Lecture	

8	2	Problems based on bounded linear operators.	Lecture	
9	1	Linear functionals , examples.	Lecture	
10		First internal		
11	2	Bounded linear Functionals and their properties, problems.	Lecture	
12	2	Linear Operators andFunctionals on a finite dimensional normed space , problems.	Lecture , assignment	
13	2	Normed space of Operators and Functionals.	Lecture , assignment	
14	2	Examples of dual spaces.	Lecture	
15		Test paper on module 2		
16	2	Inner product spaces and Hilbert spaces , examples , problems.	Lecture	
17	2	Further properties of inner product spaces.	Lecture , seminar	
18	2	Orthogonal complement and direct sum , problems.	Lecture	
19	2	Orthogonal sets and sequences.	seminar	
20	2	Bessel inequality, Gram- Schmidt process for ortho normalisation.	Lecture seminar	
21	2	Total ortho normal sets and sequences , problems.	Lecture , seminar, assignment	
22	2	Rieszs theorem .	seminar	
23	2	Sesqui linear functional and Riesz representation theorem.	Lecture , seminar	
24	3	Problems based on Riesz theorem and Riesz representation theorem.	Lecture	
25	3	Hilbert adjoint and its properties.	Lecture , seminar	
2	3	Problems based on Hilbert adjoint operators.	Lecture , assignment , seminar	

27	3	Self adjoint , normal and unitary operators, problems.	Lecture , assignment	
28		Test paper on module 3.		
29	2	Zorns Lemma and its applications.	Lecture	
30	2	Hahn Banach theorem for real vector space.	Lecture	
31	2	Generalised Hahn Banach theorem, problems.	Lecture , assignment	
32	3	Hahn Banach theorem for a normed space.	Lecture	
33	3	Problems on Hahn Banach theorems	Lecture seminar	
34	3	Adjoint operator, relation between adjoint operator and Hilbert adjoint.	Lecture	
35	2	Reflexive spaces, canonical mapping.	Lecturesemi nar	
36	2	Important theorems and problems.	Lecture	
37	2	Bairs category theorem, Uniform boundedness theorem.	Lecture , seminar assignment	
38	3	Problems on Uniform boundedness theorem	Lecture , assignment	
39		Model examination		

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	2/1/2017	PROBLEMS FROM MODULE 1
2	29/1/2017	PROBLEMS FROM MODULE 2

GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	5/2/2017	PROBLEMS FROM MODULE-4

Text book : Introductory Functional Analysis with applications

AUTHOR: ERWIN KREYSZIG, Wiley Classic Library Edition Published 1989

REFERENCES: i) DAY M M , normed linear spaces 3rdedn

ii) TAYLOR A E , introduction to functional analysis

COURSE PLAN-REAL ANALYSIS

PROGRAMME	M.Sc. MATEMATICS	SEMESTER	2
COURSE CODE AND TITLE	16P2MATT10: REAL ANALYSIS	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	75
FACULTY NAME	Dr. DIDIMOS K. V.		

COURSE OBJECTIVES
To study functions of bounded variations, rectifiable curves, paths and equivalence of paths.
To develop ideas of Riemann-Stieljes integral and studying integration and differentiation.
To assimilate the ideas of uniform convergence and continuity, uniform convergence and integration, uniform convergence and differentiation.
To analyse power series, exponential and trigonometric functions.

No of Hours	Topic	Method	Remarks
1	A quick review on continuity, uniform continuity, convergence of sequence and series.	Lecture Group Discussion, Problem Solving Lecture	
2	A quick review on continuity, uniform continuity, convergence of sequence and series.	Lecture Group Discussion, Problem Solving Lecture	
3	A quick review on continuity, uniform continuity, convergence of sequence and series.	Lecture Group Discussion, Problem Solving Lecture	
4	A quick review on continuity, uniform continuity, convergence of sequence and series.	Lecture Group Discussion, Problem Solving Lecture	
5	A quick review on continuity, uniform continuity, convergence of sequence and series.	Lecture Group Discussion, Problem Solving Lecture	

6	Introduction properties of monotonic functions	Lecture Group Discussion, Problem Solving	
7	Introduction properties of monotonic functions	Lecture Group Discussion, Problem Solving	
8	functions of bounded variation	Lecture Group Discussion, Problem Solving	
9	functions of bounded variation	Lecture Group Discussion, Problem Solving	
10	total variation	Lecture Group Discussion, Problem Solving	
11	total variation	Lecture Group Discussion, Problem Solving	
12	additive property of total variation	Lecture Group Discussion, Problem Solving	
13	additive property of total variation	Lecture Group Discussion, Problem Solving	
14	total variation on (a, x) as a functions of x	Lecture Group Discussion, Problem Solving	
15	total variation on (a, x) as a functions of x	Lecture Group Discussion, Problem Solving	
16	functions of bounded variation expressed as the difference of increasing functions	Lecture Group Discussion, Problem Solving	
17	functions of bounded variation expressed as the difference of increasing functions	Lecture Group Discussion, Problem Solving	
18	continuous functions of bounded variation	Lecture Group Discussion, Problem Solving	
19	continuous functions of bounded variation	Lecture Group Discussion, Problem Solving	
20	curves and paths	Lecture Group Discussion, Problem Solving	
21	curves and paths	Lecture Group Discussion, Problem Solving	

22	rectifiable path and arc length	Lecture Group Discussion, Problem Solving	
23	rectifiable path and arc length	Lecture Group Discussion, Problem Solving	
24	additive and continuity properties of arc length	Lecture Group Discussion, Problem Solving	
25	equivalence of paths	Lecture Group Discussion, Problem Solving	
26	Definition and existence of the integral	Lecture Group Discussion, Problem Solving	
27	Definition and existence of the integral	Lecture Group Discussion, Problem Solving	
28	Definition and existence of the integral	Lecture Group Discussion, Problem Solving	
29	Definition and existence of the integral	Lecture Group Discussion, Problem Solving	
30	Definition and existence of the integral	Lecture Group Discussion, Problem Solving	
31	properties of the integral	Lecture Group Discussion, Problem Solving	
32	properties of the integral	Lecture Group Discussion, Problem Solving	
33	properties of the integral	Lecture Group Discussion, Problem Solving	
34	properties of the integral	Lecture Group Discussion, Problem Solving	
35	properties of the integral	Lecture Group Discussion, Problem Solving	
36	Integration and differentiation	Lecture Group Discussion, Problem Solving	
37	Integration and differentiation	Lecture Group Discussion, Problem Solving	
38	Integration and differentiation	Lecture Group Discussion, Problem Solving	
39	Integration and differentiation	Lecture Group Discussion, Problem Solving	

40	Integration and differentiation	Lecture Group Discussion, Problem Solving	
41	integration of vector valued functions	Lecture Group Discussion, Problem Solving	
42	integration of vector valued functions	Lecture Group Discussion, Problem Solving	
43	integration of vector valued functions	Lecture Group Discussion, Problem Solving	
44	integration of vector valued functions	Lecture Group Discussion, Problem Solving	
45	integration of vector valued functions	Lecture Group Discussion, Problem Solving	
46	Discussion of main problem	Lecture Group Discussion, Problem Solving	
47	Discussion of main problem	Lecture Group Discussion, Problem Solving	
48	uniform convergence	Lecture Group Discussion, Problem Solving	
49	uniform convergence	Lecture Group Discussion, Problem Solving	
50	uniform convergence	Lecture Group Discussion, Problem Solving	
51	uniform convergence	Lecture Group Discussion, Problem Solving	
52	uniform convergence	Lecture Group Discussion, Problem Solving	
53	uniform convergence	Lecture Group Discussion, Problem Solving	
54	uniform convergence and continuity	Lecture Group Discussion, Problem Solving	
55	uniform convergence and continuity	Lecture Group Discussion, Problem Solving	
56	uniform convergence and continuity	Lecture Group Discussion, Problem Solving	
57	uniform convergence and continuity	Lecture Group Discussion, Problem Solving	

58	uniform convergence and continuity	Lecture Group Discussion, Problem Solving	
59	uniform convergence and integration	Lecture Group Discussion, Problem Solving	
60	uniform convergence and integration	Lecture Group Discussion, Problem Solving	
61	uniform convergence and integration	Lecture Group Discussion, Problem Solving	
62	uniform convergence and differentiation	Lecture Group Discussion, Problem Solving	
63	uniform convergence and differentiation	Lecture Group Discussion, Problem Solving	
64	uniform convergence and differentiation	Lecture Group Discussion, Problem Solving	
65	uniform convergence and differentiation	Lecture Group Discussion, Problem Solving	
66	the Stone-Weierstrass theorem (without proof)	Lecture Group Discussion, Problem Solving	
67	Power series	Lecture Group Discussion, Problem Solving	
68	the exponential and logarithmic functions	Lecture Group Discussion, Problem Solving	
69	the exponential and logarithmic functions	Lecture Group Discussion, Problem Solving	
70	the trigonometric functions	Lecture Group Discussion, Problem Solving	
71	the algebraic completeness of complex field	Lecture Group Discussion, Problem Solving	
72	Fourier series.	Lecture Group Discussion, Problem Solving	
73	Revision	Group Discussion	
74	Revision	Group Discussion	
75	Revision	Group Discussion	

ASSIGNMENTS/EXERCISES – Details & Guidelines

	Date of submission/completion	**Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)**
1.	12 March 2017	Problems on Real analysis

Text Books:

1. Tom Apostol, Mathematical Analysis (second edition), Narosa Publishing House.
2. Walter Rudin, Principles of Mathematical Analysis (Third edition), International Student Edition.

Additional Reading List

1.Royden H.L, Real Analysis, 2nd edition, Macmillan, New York.

2. Bartle R.G, The Elements of Real Analysis, John Wiley and Sons.

3. S.C. Malik, Savitha Arora, Mathematical Analysis, New Age International Ltd.

4. Edwin Hewitt, Karl Stromberg, Real and Abstract Analysis, Springer International,

1978.