DON BOSCO ARTS & SCIENCE COLLEGE

ANGADIKADAVU

(Affiliated to Kannur University Approved by Government of Kerala)

ANGADIKADAVU P.O., IRITTY, KANNUR – 670706

COURSE PLAN

MSc Mathematics

(2019-21)

SEMESTER -IV

ACADEMIC YEAR- (2020-21)

IVSemester MSc Mathematics (2019 - 21)			
SL. No.	**Name of Subjects with Code**	**Name of the Teacher**	**Duty Hours per week**
1.	**MAT4C15: Operator Theory**	**Anil M.V &AthulyaP**	**2+3**
2.	**MAT4C16: Differential Geometry**	**Ajeena Joseph**	**5**
3.	**MAT4E06: Operations Research**	**Riya Baby&Ajeena Joseph**	**3+2**
4.	**Project Work**	**Prija V**	**5**
5.	**Viva-Voce**	**Prija V**	**5**
	Name of Class Incharge	**Ajeena Joseph**	

TIME TABLE

Day	09.50 Am - 10.45 Am	10.45 Am -11.40 Am	11.55 Am -12.50 Pm	01.40 Pm - 02.35 Pm	02.35 Pm - 03.30 Pm
1	MAT4C15: Operator Theory (Anil M V)	MAT4E06: Operations Research (Riya Baby)	Project work	Viva-Voce	MAT4C16: Differential Geometry
2	MAT4E06: Operations Research (Riya Baby)	MAT4C16: Differential Geometry	MAT4C15: Operator Theory (Anil M V)	Viva-Voce	Project work
3	MAT4E06: Operations Research (Riya Baby)	MAT4C15: Operator Theory (AthulyaP)	MAT4C16: Differential Geometry	Viva-Voce	Project work
4	MAT4C16: Differential Geometry	Project work	MAT4E06: Operations Research (Ajeena Joseph)	MAT4C15: Operator Theory (AthulyaP)	Viva-Voce
5	Project work	MAT4C16: Differential Geometry	Viva-Voce	MAT4C15: Operator Theory (AthulyaP)	MAT4E06: Operations Research (Ajeena Joseph)

Subject Code:	**MAT4C15**
Subject Name:	**Operator Theory**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Anil M V &Athulya P.**

Syllabus:

MAT4C15: OPERATOR THEORY

Text Book: Balmohan V Limaye; Functional Analysis (Third Edition); New Age International Publishers

Unit I

Spectrum of a Bounded Operator-Spaces of Bounded Linear Functionals; Duals and
Transposes Weak and Weak* Convergence
(Chapter-3 Section-12; Chapter-4 Sections 13; 13.1 to 13.6 and Sections 15; 15.1 to 15.4)

Unit II

Spaces of Bounded Linear Functionals; Reflexivity, Compact Operators on Normed Spaces: Compact Linear Maps, Spectrum of a Compact Operator.
(Chapter-4, Section 16.1 to 16.7 [Omitting Theorem 16.3]; Chapter-5, Sections 17,18)

Unit III

Bounded Operators on Hilbert Spaces; Bounded Operators and Adjoints, Normal, Unitary and Self Adjoint Operators, Spectrum and Numerical Range, Compact Self Adjoint Operators. (Chapter-7; Section 25, 26(omitting Fourier Plancherel Transform) and 27; Section 28: 28.1 to 28.5 (Proof of 28.5 is omitted)

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic	
1	16-11-2020 To 20-11-2020	1	Spectrum of a Bounded Operator-	
		2	Theorem	
		3	Definitions	
		4	Theorem	
		5	Lemma	
2	23-11-2020 To 27-11-2020	6	Example	
		7	Theorem	
		8	Theorem	
		9	Examples	
		10	Theorem	
3	30-11-2020 To 04-12-2020	11	Theorem	
		12	Theorem	
		13	Class Test	
		14	Duals and Transposes	
		15	Theorem	
4	07-12-2020 To 11-12-2020	16	Theorem	
		17	Theorem	
		18	Corollary	
		19	Examples	
		20	Theorem	
5	14-12-2020 To 18-12-2020	21	Theorem	
		22	Theorem	
		23	Theorem	
		24	Example	
6	21-12-2020 To 25-12-2020	21 December	**Christmas Vacation**	
		22 December	**Christmas Vacation**	
		23 December	**Christmas Vacation**	
		24 December	**Christmas Vacation**	
		25 December	**Christmas**	
7	28-12-2020	25	Class Test	

No of Weeks	Dates	Session	Topic	
	To 01-01-2021	26	Weak Convergence	
		27	Theorem	
		28	Theorem	
		29	Examples	
8	04-01-2021 To 08-01-2021	30	Weak* Convergence	
		31	Theorem	
		32	Bolzano Weierstrass Property	
		33	Theorem	
		34	Reflexivity	
9	11-01-2021 To 15-01-2021	35	Theorem	
		36	Lemma	
		37	Lemma	
		38	Examples	
		39	Uniform Convexity	
10	18-01-2021 To 22-01-2021	40	Lemma	
		41	Theorem	
		42	Class Test	
		43	Compact Linear Maps	
		44	Theorem	
11	25-01-2021 To 29-01-2021	45	Theorem	
		26 January	Republic Day - Holiday	
		46	Theorem	
		47	Examples	
		48	Theorem	
12	01-02-2021 To 05-02-2021	49	Theorem	
		50	Spectrum of a Compact Operator	
		51	Lemma	
		52	Lemma	
		53	Theorem	
13	08-02-2021 To 12-02-2021	54	Theorem	
		55	Lemma	
		56	Theorem	
		57	Theorem	
		58	Theorem	
14	15-02-2021 To	59	Examples	
		60	Class Test	
		61	Bounded operators	

No of Weeks	Dates	Session	Topic	
	19-02-2021	**62**	Continuity of bounded operators	
		63	Theorem	
15	22-02-2021 To 26-02-2021	64	Adjoint operator-definition and examples	
		65	Theorem	
		66	Theorem	
		67	Class test	
		68	Normal, unitary and self-adjoint operators	
16	01-03-2021 To 05-03-2021	69	Examples	
		70	Theorem	
		71	Theorem	
		72	Theorem	
		73	Positive operators	
17	08-03-2021 To 12-03-2021	74	Generalized Schwarz inequality	
		75	Examples	
		76	Eigen spectrum and approximate eigen spectrum	
		77	Spectrum of a bounded operator	
		11 March	MahaSivarathri - Holiday	
18	15-03-2021 To 19-03-2021	78	Theorem	
			VI Semester PG Internal Exam	
			VI Semester PG Internal Exam	
			VI Semester PG Internal Exam	
		79	Theorem	
19	22-03-2021 To 26-03-2021	80	Numerical range, its properties	
		81	Theorem	
		82	Examples	
		83	Finite dimensional spectral theorem	
		84	Compact operators	
20	22-03-2021 To 26-03-2021	85	Theorem	
		86	Hilbert-Schmidt operator	
		87	Theorem	
		88	Class test	
		89	Revision	
21	29-03-2021 To 02-04-2021	29 March	**Talent Hunt**	
		90	Revision	
		31 March	**Easter vacation**	
		01 April	**Easter vacation**	
		02 April	**Easter vacation**	
22	05-04-2021	05 April	**Easter vacation**	

No of Weeks	Dates	Session	Topic	
	To 09-04-2021	06 April	**Easter vacation**	
		07 April	**Easter vacation**	
			Study Leave	
			Study Leave	
23	05-04-2021 To 09-04-2021		**Study Leave**	
			Study Leave	
			Study Leave	
			Study Leave	
			Study Leave	
24	12-04-2021		**IV Semester PG University Exam Begin**	

Subject Code:	**MAT4C16**
Subject Name:	**Differential Geometry**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Ajeena Joseph**

Syllabus:

MAT4C16: DIFFERENTIAL GEOMETRY

Text Book: John A Thorpe; Elementary Topics in Differential Geometry ; Springer Verlag; NY Heidelberg, Berlin.

Unit I

Graphs and Level sets; Vector fields, The tangent space, Surfaces, Vector fields on surfaces, Orientation.
(Chapter 1,2,3,4,5)

Unit II

The Gauss map, Geodesics, parallel transport, the Weiengarten map, curvature of plane curves.
(Chapter 6,7,8,9,10).

Unit III

Arc length and line integrals, curvature of surfaces, Parametrized surfaces, local equivalence of surfaces and Parametrized surfaces.
(Chapters 11,12,14,15).

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic	
1	16-11-2020 To 20-11-2020	1	Level sets	
		2	Examples	
		3	Examples	
		4	Graph of a function	
		5	Examples	
2	23-11-2020 To 27-11-2020	6	Vector field	
		7	Examples	
		8	Definitions	
		9	Examples	
		10	Class test	
3	30-11-2020 To 04-12-2020	11	Theorem	
		12	Parametrized curve	
		13	Velocity vector	
		14	Smooth curve	
		15	Theorem	
4	07-12-2020 To 11-12-2020	16	Theorem	
		17	Integral curve	
		18	Problems	
		19	Problems	
		20	Tangent space , lemma	
5	14-12-2020 To 18-12-2020	21	Theorem	
		22	Examples	
		23	Problems	
		24	Class test	
6	21-12-2020	21 December	**Christmas Vacation**	
		22 December	**Christmas Vacation**	

No of Weeks	Dates	Session	Topic	
	To 25-12-2020	23 December	**Christmas Vacation**	
		24 December	**Christmas Vacation**	
		25 December	**Christmas**	
7	28-12-2020 To 01-01-2021	25	Smooth surfaces	
		26	Examples	
		27	Theorem	
		28	Problems	
		29	Orientation of surfaces	
8	04-01-2021 To 08-01-2021	30	Theorem	
		31	Problems	
		32	Gauss map	
		33	Theorem	
		34	Problems	
9	11-01-2021 To 15-01-2021	35	Problems	
		36	Theorem	
		37	Theorem	
		38	Examples	
		39	Geodesics	
10	18-01-2021 To 22-01-2021	40	Properties of Geodesics	
		41	Examples	
		42	Class Test	
		43	Examples	
		44	Theorem	
11	25-01-2021 To 29-01-2021	45	Theorem	
		26 January	Republic Day - Holiday	
		46	Examples	
		47	Covariant derivative	
		48	Properties of covariant derivative	
12	01-02-2021 To 05-02-2021	49	Examples	
		50	Levi – Civita parallel	
		51	Properties	
		52	Theorem	
		53	Corollary	
13	08-02-2021 To 12-02-2021	54	Parallel transport	
		55	Examples	
		56	Theorem	
		57	Class test	

No of Weeks	Dates	Session	Topic	
		58	Weingarten map	
14	15-02-2021 To 19-02-2021	59	Theorem	
		60	Examples	
		61	Curvature of plane curve	
		62	Curvature of plane curve	
		63	Arc length	
15	22-02-2021 To 26-02-2021	64	Theorem	
		65	Theorem	
		66	Differential one form	
		67	Examples	
		68	Examples	
16	01-03-2021 To 05-03-2021	69	Calss test	
		70	Decomposition theorem	
		71	Corollary	
		72	Theorem	
		73	Examples	
17	08-03-2021 To 12-03-2021	74	Parametrized surfaces	
		75	Curvature of surfaces	
		76	Examples	
		77	Examples	
		11 March	MahaSivarathri - Holiday	
18	15-03-2021 To 19-03-2021	78	Class test	
			IV Semester PG Internal Exam	
			IV Semester PG Internal Exam	
			IV Semester PG Internal Exam	
		79	Theorem	
19	22-03-2021 To 26-03-2021	80	Examples	
		81	Theorem	
		82	Examples	
		83	Principal curvature	
		84	Problems	
20	22-03-2021 To 26-03-2021	85	Gauss kronecker curvature	
		86	Examples	
		87	Theorem	
		88	Revision	
		89	Revision	
21	29-03-2021	29 March	**Talent Hunt**	
		90	Revision	

No of Weeks	Dates	Session	Topic	
	To 02-04-2021	31 March	**Easter vacation**	
		01 April	**Easter vacation**	
		02 April	**Easter vacation**	
22	05-04-2021 To 09-04-2021	05 April	**Easter vacation**	
		06 April	**Easter vacation**	
		07 April	**Easter vacation**	
			Study Leave	
			Study Leave	
23	05-04-2021 To 09-04-2021		**Study Leave**	
			Study Leave	
			Study Leave	
			Study Leave	
			Study Leave	
24	12-04-2021		**IV Semester PG University Exam Begin**	

Subject Code:	**MAT4E06**
Subject Name:	**Operations Research**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**5**
Name of the Teacher:	**Riya Baby &Ajeena Joseph**

Syllabus

MAT4 E06: OPERATIONS RESEARCH

Text book: KantiSwarup, P.K Gupta, Man Mohan; Operations Research; Sultan chand& sons, New Delhi (2007).

Unit I

Markov Analysis, Decision Analysis, Simulations.

(Chapter 15(all sections), chapter 16 (all sections), chapter 22(sections 22.1 to 22.9))

Unit II

Reliability and system failure rates, inventory control
(Chapter 18(section 18.6), chapter 19 (all sections except 19.8 and19.9)

Unit III

Information Theory
(Chapter 30 (sections 30.1 to 30.10))

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	16-11-2020 To 20-11-2020	1	Introduction to Markov Analysis
		2	Problems
		3	Definitions
		4	Problems
		5	Characteristics
2	23-11-2020 To 27-11-2020	6	Transition matrix
		7	Construction of Transition matrix
		8	Assignment
		9	n_ step probability
		10	Gain problem
3	30-11-2020 To 04-12-2020	11	Problems
		12	Problems
		13	Class test
		14	Payoff table
		15	Decision making process
4	07-12-2020 To 11-12-2020	16	Laplace criteria
		17	Problems
		18	Problems
		19	Problems
		20	Theorem
5	14-12-2020 To 18-12-2020	21	Maximin- minimax criterion
		22	Examples
		23	Hurwitz criterion
		24	Exmaples
6	21-12-2020	21 December	**Christmas Vacation**
		22 December	**Christmas Vacation**

No of Weeks	Dates	Session	Topic
	To 25-12-2020	23 December	**Christmas Vacation**
		24 December	**Christmas Vacation**
		25 December	**Christmas**
7	28-12-2020 To 01-01-2021	25	Problems
		26	Expected value
		27	Probability
		28	Examples
		29	Class test
8	04-01-2021 To 08-01-2021	30	Examples
		31	Problems
		32	Reliability
		33	Important aspects of reliability
		34	Failure rates
9	11-01-2021 To 15-01-2021	35	Problems
		36	Problems
		37	Hazard rate
		38	Mean time between failures
		39	Problems
10	18-01-2021 To 22-01-2021	40	Problems
		41	Types of inventories
		42	Class test
		43	Seminar
		44	Reasons for carrying inventories
11	25-01-2021 To 29-01-2021	45	Cost associated with inventories
		26 January	Republic Day - Holiday
		46	An inventory control problem
		47	The concept of EOQ
		48	Characteristics
12	01-02-2021 To 05-02-2021	49	Problems
		50	Problems
		51	Assignment
		52	Problem of EOQ with price break
		53	Problems
13	08-02-2021 To 12-02-2021	54	Problem of EOQ with more than price breaks
		55	Seminar
		56	Seminar
		57	Problems
		58	Problems

No of Weeks	Dates	Session	Topic
14	15-02-2021 To 19-02-2021	59	Dynamic order quantity
		60	Selective inventory control technique
		61	Problems
		62	Multi- item deterministic problems
		63	Problems
15	22-02-2021 To 26-02-2021	64	Class test
		65	Shannon theory
		66	Cyber Ethics
		67	Cyber Ethics
		68	Coding theory
16	01-03-2021 To 05-03-2021	69	Coding theory
		70	Problem
		71	Problems
		72	Problems
		73	Measure of information
17	08-03-2021 To 12-03-2021	74	Measure of information
		75	Problems
		76	Class test
		77	Problems
		11 March	MahaSivarathri - Holiday
18	15-03-2021 To 19-03-2021	78	Seminar
			IV Semester PG Internal Exam
			IV Semester PG Internal Exam
			IV Semester PG Internal Exam
		79	Seminar
19	22-03-2021 To 26-03-2021	80	Seminar
		81	Problems
		82	Theorem
		83	Theorem
		84	Problems
20	22-03-2021 To 26-03-2021	85	Binary system
		86	Problmes
		87	Definitions
		88	Revision
		89	Revision
21	29-03-2021	29 March	**Talent Hunt**
		90	Revision

No of Weeks	Dates	Session	Topic
	To 02-04-2021	31 March	**Easter vacation**
		01 April	**Easter vacation**
		02 April	**Easter vacation**
22	05-04-2021 To 09-04-2021	05 April	**Easter vacation**
		06 April	**Easter vacation**
		07 April	**Easter vacation**
			Study Leave
			Study Leave
23	05-04-2021 To 09-04-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	12-04-2021		**IV Semester PG University Exam Begin**