DEPARTMENT OF MATHEMATICS

FACULTY OF NATURAL SCIENCES

AMBROSE ALLI UNIVERSITY

EKPOMA, EDO STATE.

AMBROSE ALLI UNIVERSITY EKPOMA

Motto Knowledge For Advancement

DEPARTMENTAL HANDBOOK

FOR UNDERGRADUATE PROGRAM

DEPARTMENT OF MATHEMATICS
FACULTY OF NATURAL SCIENCE

AMBROSE ALLI UNIVERSITY
EKPOMA, EDO STATE.

DEPARTMENTAL HANDBOOK
2014/2015-2015/2016 SESSIONS

FOR UNDERGRADUATE PROGRAM

FORWARD

The Department of Mathematics is presently the department in the Faculty of Natural Science that runs three academic degree programmes in Mathematics, Industrial Mathematics, and Statistics.

This 2014/2016 edition of the Department Handbook is designed to provide an up-to- date information in the curriculum for the three degree programmes offered by the Department in line with the National University Commission (NUC) Regulation.

The handbook contains a brief history of the Department of Mathematics, Philosophy, Objectives and the admission requirement of the Department for each degree option as well as guideline on student assessment and examination regulations as provided in the course unit system.

Also included is the description of the various courses in the three degree option as well as the list of Academic, Non- academic and Technical staff of the Department.

It is no doubt, therefore, that the handbook will be very useful to all Staff and students of the Department. It is therefore strongly recommended for students and the various course level adviser and registration officers.

Finally, the Department Handbook is recommended for other Universities, both in Nigeria and oversea and other persons who may wish to obtain information on the undergraduate degree programmes in the Department of Mathematics, Ambrose Alli University Ekpoma.

Elakhe, A. O. (Ph.D)
Ag. Head of Department

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A BRIEF HISTORY OF DEPARTMENT OF MATHEMATICS

The Department came into existence right from the time the university was established in 1982. It was then known as Mathematical Science Department and it existed under the College of Natural Sciences while the University was then known as Bendel State University Ekpoma. At the inception the Department was accredited to offer B.Sc honours degree programmes in Pure Mathematics, Applied Mathematics and Statistics. Developmental changes which essentially were political and Academics led to restructuring of the college which today metamorphosed into the Faculty of Natural Sciences wherein we currently offer B.Sc honours Degree Programmes in Mathematics, Industrial Mathematics and Statistics. Those who had served as the Head of Department are:

i. Prof. Ofosu – a Ghanian (2 years) who left for Sandi Arabia
ii. Dr. J.T. Erimafa, a Senior Lecturer (3 years)
iii. Prof. U.S.U Aashikpelokhai (13 years)
iv. Prof. F. M. Okoro (4 years)
v. Mr. D.E.O. Akpome, Lecturer I (1 year)
vi. Dr. C. U. Onianwa, Reader (2 years)
vii. Mr. C. O. Inegbedion, Lecturer I (2 years)
viii. Dr. G. U. Agbeboh, Reader (2 years)
ix. Dr. C.E. Abhulimen Reader (2 years)
x. Dr. I.W. Edokpa, Reader (3 years)
xi. Dr. A. O. Elakhe, Senior Lecturer, present H.O.D.

The Department is well known outside the precincts of this university for the high quality of Mathematics graduate Output we released to the labour market. Quite a lot of our Graduate are currently managers in various Banks here in Nigeria amongst which are Mr. Evans Isioma – a Branch Manager of Zenith Bank in Lagos, Mr. Ikhiboya - Branch Managers in U.S.A. bank in Kaduna. Others are Professors and Senior Academics, amongst these are Prof. F. O. Ikpotokin, Prof I.B.A. Momodu, Dr. C.U. Onianwa, Dr. G.U. Agbeboh, Dr. C.E. Abhulimen, Dr. I.W. Edokpa and the current Head of Department Dr. A.O. Elakhe. If I have to list our high Academic track record, this brief history would be filled to the extent that before you could complete reading through, you would be fatigued.

Prof. U.S.U. Aashikpelokhai

A. DEPARTMENTAL ACADEMIC STAFF LIST

S/N	Name	Qualification	Status	Areas of Specialization
1.	Elakhe, A. O.	B.Sc., M.Sc., Ph.D (Ekpoma)	Snr Lecturer /Ag. Head of Dept	Numerical Analysis and Scientific Computing
2.	Aashikpelokhai U. S. U.	B.Sc (Ibadan), M.Sc Loughorough), Ph.D. (Benin)	Professor	Applied Analysis and Scientific Computing
3.	Okoro, F.M.	B.Sc. & M.Sc Ed (W. Oregon), M.Sc. Ph.D (Ilorin)	Professor	Optimization and Scientific Computing
4.	Agbeboh G.U.	B.Sc (Ed.) (Lagos) M.Sc. Ph.D (Ekpoma)	Reader	Applied Analysis and Scientific Computing
5.	Abhulimen C.E.	B.Sc,(Ed.), (Lagos) M.Sc (Ekpoma), Ph.D (Benin)	Reader	Numerical Analysis
6.	Edokpa, I. W.	B.Sc (Benin), M.Sc. (Ilorin)Ph.D (Ekpoma)	Reader	Statistics
7.	Ukpebor, L. A.	B.Sc. (Maiduguri), M.Sc (Benin)	Lecturer I	Numerical Analysis & Scientific Computing
8.	Isere, A. O.	B.Sc. M.Sc (Benin) Ph.D (Abeokuta)	Lecturer I	Algebra
9.	Ikpotokin O.	B.Sc (Ekpoma), M.Sc (Ilorin)	Lecturer I	Statistics
10.	Okoromi, A.	B.Sc (Abraka), M.Sc (Benin)	Lecturer I	Pure Mathematics
11.	Ogbeide, E. M.	B.Sc. (Ed.) Ekpoma, M.Sc. (Benin)	Lecturer I	Statistics
12.	Adoghe L.O.	B.Sc (Ekpoma) M.Sc. (Benin)	Lecturer II	Ind. Mathematics.
13.	Osabuohien Irabor O.	B.Sc. (Ekpoma) M.Sc. (Awka)	Asst. Lecturer	Statistics
14.	Ehiemua M.	B.Sc, M.Sc (Ekpoma)	Asst. Lecturer	Statistics
15.	Aigboje P.	B.Sc. (Ekpoma)	Grad Asst.	Statistics

B. Non-Academic Staff List

S/N	Name	Qualifications	Status
1	Mrs. M. Ikhine	35 W.P.M., 50 W.P.M. (Auchi) (Typwriting), Diploma in Desktop Publishing Secretarial, Ekpoma, 100 W.P.M., 120 W.P.M. (Shorthand) Advanced Office Management (ESGE).	Chief Assistant Secretary
2.	Mrs. S.O Elakhe	B.Sc. Statistics (Ekpoma), Diploma in Computer I.T (Ekpoma)	Technologist II
3.	Mrs. M. A. Okhanigbe.	WAEC, Diploma in Desktop publishing	Higher Executive Officer
4.	Mrs. T. Okedi	Primary School Leaving Certification	Messenger/Cleaner

ASSOCIATE ACADEMIC STAFF LIST

S/N	Name	Qualifications	Status	Department
1	Nmorsi, O.P.G	B.sc, M.sc. (Benin), Ph.D (Ekpoma)	Professor	Zoology
2	Ujuanbi, O	B.Sc., M.Sc, Ph.D (Ekpoma)	Professor	Physics
3	Ikpotokin, F.O.	B.Sc. (Bensu) M.Sc., Ph.D (Benin)	Professor	Computer Sciences
4	Aigbedion,I	B.Sc, M.Sc, (Ekpoma) Ph.D (Benin)	Professor	Physics
5	Momodu, I.B.A.	B.sc, M.Sc, Ph.D (Ekpoma)	Professor	Computer Sciences
6	Onianwa, C.U.	B.Sc, MBA (Benin), M.Sc. (Benin) Ph.D (Ekpoma)	Reader	Computer Sciences
7	Odia, O.A.	B.Sc, M.Sc, Ph.D (Ekpoma)	Snr lecturer	Chemistry
8	Eseigbe, D.A.	B.Sc (Ekpoma) M.Sc (Ibadan)	Lecturer I	Botany
9	Jatto,	B.Sc (Ed) Ekpoma, M.Sc (Benin)	Lecturer I	Chemistry
10.	M. A. Izibili	B.A., M.A., Ph.D	Professor	General Studies
11.	O. J. Imahe	B.A., M.A., Ph.D	Professor	General Studies

GUIDELINES ON COURSE UNIT SYSTEM

I. CATEGORIZATION OF COURSES

(a) Core course (C)

These are courses that must be mounted by the university taken by the student and passed in respect of the particular degree programme.

(b) Required courses (R)

These are course, which are mounted by the university taken by the student on the advice of the department in respect of a particular degree programme which the student may or may not pass.

(c) Elective courses (E)

These are courses student must take in respect of any degree programme but which he/she may not pass.

II. PRE-REQUISITE COURSE

(a) Pre-requisite courses are the knowledge of which are necessary prior to the taking of other specified (usually higher level) courses. A student is deemed to have obtained this pre-requisite knowledge if he/she obtains a mark not less than 30% but will not be credited with any grade points in the course concerned, except he/she scores a minimum mark of 45%

(b) Pre-requisite courses must be reflected where applicable. As much as possible no course should be a pre-requisite for a course at the same level. Rather, such a course should be termed a concurrent course, that is, a course that is taken at the same (session) as the specified course.

III. QUANTIFICATION OF COURSES

(a) Courses are quantified in credit units or units for short.
A unit equals: 15 units of lectures (i.e 1 hour a week for 1 semester) or 15 hours of tutorials or 45 hours of laboratory/field work.

(b) No course should be less than 2 units and no lecture courses should normally be more than 3 units.

(c) Courses that extend over both semesters (such as practical courses) will be credited at the end of the second semester.

IV. APPROVED DEPARTMENTAL CODES

BIO	for Biology
CHM	for Chemistry
CSC	for Computer Science
STA	for Statistics
MTH	for Mathematics
PHY	for Physics

V. COURSE ADVISER

A course adviser is a member of academic staff who approves student registration forms. He advise students individually and ensures that their choices are consistent with the degree regulations and requirement. Each department appoints one or more course advisers for her students.

VI. CLASS ADMIT/GRADE CARD

A class Admit/ Grade Card shall be issued to every registered student and for each course registered for during the session the card shall enable the lecturer in charge of a particular course exercise control over attendance at lecture. It shall also be used for the submission of grades in the examinations along with the grade points, Lecturers shall be required to certify that a student has attained 80% minimum contact hours before he /she is allowed to take the examination in the particular course.

VII EXAMINATION PROCEDURE

University examination shall be held at the end of each semester for all semester courses and at the end of each session for all sessional courses.

(a) Only students who are duly registered for courses in a given semester and have met their financial obligations to the university shall be eligible to sit for examination in those courses.
(b) Students who enter for examinations in courses for which they are not duly registered shall not be credited with grades or units for the courses.

VIII COURSE ASSESSMENT

(a) In every course, assessment must consist of continuous assessment (20%) and examination (80%).
(b) The pass mark for every course is 45%
(c) The grading system is as follows:

SCORES	GRADE	GRADE POINT
70-100	A	5
60-69	B	4
50-59	C	3
45-49	D	2
0-44	F	0

(a) Students results are to be prepared at the end of every semester, reflecting raw marks and grades, total units taken, total unit passed and total unit failed.

(b) At the end of every session a summary of students' results is prepared level by level, reflecting the units taken during the session, the units passes during the session, the sessional G.P.A, the course failed for the session, the cumulative units taken, the cumulative units passed, the CGPA and remarks of proceeding, or probation or withdrawal from the (degree) programme as the case may be.

(c) At the end of the degree programme, student's result are prepared reflecting details of the session performance, including list of courses failed for this session as well as the cumulative performance including the degree classification (where applicable) according to the following.

CGPA	CLASS OF DEGREE
4.50-5.00	1st Class
3.50-4.49	2nd Class Upper
2.40-3.49	2nd Class Lower
1.50-2.39	3rd Class
Less than 1.50	Fail

(g) Both the session GPA and CGPA are calculated using the weighted grade point. The weighted grade point for the course is the product of the point and the units for the course. Thus a student who scores 62% in a three-unit course has a grade point of 4 and a weighted grade point of 3x4=12 for that course. Thus the sessional G.P.A is calculated from the formula.

$$\text{Sessional G.P.A.} = \frac{\text{Total Weighted Points in the Session}}{\text{Total Units Taken}}$$

Similarly, the CGPA is calculated from the formula

$$\text{CGPA} = \frac{\text{Total Weighted points for all the Sessions}}{\text{Total Units Taken}}$$

Provided that all courses taken that are relevant to a particular degree programme are used in the computation of the various averages.

In computing on CGPA, performance in all courses registered for and taken in the course of a particular degree programme must be used.

The inclusion of the column (for cumulative taken) in each of the formulas for presentation of results to senate and to Faculty Board enables one to keep track of the weighted product expressed to the nearest integer, of the CGPA and the cumulative units taken) where applicable.

As an example, consider a student who takes seven courses in a semester with the following details;

	Unit (a)	Mark (b)	Grade (c)	Grade Point (d)	Weighted Grade Point (a) x (d)
Course 1	3	62	B	4	13
Course 2	3	51	C	3	9
Course 3	3	42	F	0	0
Course 4	2	33	F	0	0
Course 5	3	45	D	2	6
Course 5	2	66	B	4	8
Course 7	3	45	D	2	6

Total Units Taken = 19

Total Weighted Grade Point = 42

If the total units taken for the second semester is 25 with a total weighted grade point of 64 the sessional GPA is given by,

$$\text{Sessional G.P.A} = \frac{42 + 64}{19 + 25} = \frac{106}{44} = 2.409$$

A student may have the following results over four sessions.

	Weighted Grade Point	Total Units	Cumulative Weighted Grade Points	Cumulative Units	CGPA
Year I	92	38	92	38	2.421
Year II	144	40	206	78	2.641
Year III	122	44	328	122	2.689
Year IV	117	42	445	164	2.71

Thus, the CGPA at the point of graduation is 2.71 hence the students will come up with Second Class Lower Division Degree.

- There is no reference in any course examination, Long vacation semester has been abrogated
- There is no repeat in the course system; therefore, a student cannot re-register for a course already passed.
- A student must accumulate at least 30 units per level before graduation
- There is no weighting of sessional GPA in the computation of CGPA.
- In the computation of the CGPA all courses taken in the session will be used and therefore no course will be disregarded or discountenanced.

IX. STUDENT WORK LOAD

(a) A full-time student must register for a minimum of 30 units and a maximum of 48 units per session. This implies that a student should normally register for minimum 15 units and a maximum of 24 units per semester.

(b) A student who is unable to take a course examination in a particular course due to approved absence will require re-registering for the course at the next available opportunity. Such a student will not normally be allowed to take any course for which the incomplete course is a pre-requisite. Please note that a student cannot exceed the approved workload.

X. PROBATION

(a) A student who makes a CGPA of 1.50 or more at the end of the session will proceed to the level of degree programme for which he/she is registered.

(b) A student who makes a CGPA of less than 1.50 at the end of the session will be on probation for the following session to enable him/her improve on the CGPA. During that session he must register for the appropriate core courses failed and other courses he/she has the prerequisites.

(c) A student on probation during a session and obtain a CGPA of less than 1.50 in the second year must withdraw from the degree programme for which he/she is registered.

(d) If the student changes to a new degree and obtains a CGPA of less than 1.50 in the degree programme he/she will again be on probation. If however the student obtains a CGPA of less than 1.50 in the second year he/she will be asked to withdraw from the University.

XI. TRANSFER

a. Every student seeking transfer from one degree programme to another must complete the necessary forms within the stipulated time.
b. All courses taken in the previous degree programme that are deemed relevant to the new degree programme by the Department will be used for the computation of the CGPA for the new degree programme.
c. All regulations in respect of the new degree programme concerning core courses, required courses, etc, must be met before graduation.

XII HONUORS CLASIFICATION

(a) No student shall qualify for the award of an honours degree of the university if he/she spends more than two sessions (four semesters) beyond the normal period allowed for the degree programme.
(b) No student who has transferred more than twice will be qualified for an honours degree.

XIII. STUDENT REGISTRATION

(a) The First week of the period for course registration during the first semester of each session shall be lecture-free to enable all registration officials attend to all students fully.
(b) During this period the registration time will at least be from 9.00am to 2.00pm daily.
(c) Every level in the Department will be assigned one lecturer to act as registration officers for students in that level throughout the duration of the exercise.
(d) Student registration for any semester courses may be adjusted by the use of Add and Delete forms within the first two weeks of the commencement of lectures during the semester.
(e) Late registration may be allowed in the third week of the session upon payment of a penalty fee.

XIV. MISCELLANEOUS MATTERS

Students who had started their degree programme before the current NUC scheme will continue to be assessed according to regulation under that scheme until they are completely phrased out

XV. ABSENCE FROM EXAMINATION

(a) Candidates must present themselves at the examinations for courses for which they have registered

(b) Candidate who fail to do so for reasons other than certified ill-health or accident or for any other reason accepted to the Dean shall be deemed to have failed that examination. i.e. would have F grade.

(c) For the avoidance of doubt, failure to take cognizance of changes in the examination timetable, such lapses on the part of the candidate shall not be accepted as reasonable excuse for absence.

(d) A candidate who falls ill during an examination shall report to the Director of the University Health Services who shall subsequently submit a report in writing to the Dean of the Faculty after treating the candidate.

(e) A candidate who is unable to take an examination on grounds of illness confirmed by the University Director of Health services , on ground specified above may be allowed to sit for the examination at the next available opportunity.

(f) When necessary, on grounds of ill health and certified by the Director of Health services, an examination can be taken in the Hospital or related location as approved by the Dean and invigilated.

XVI IMPORTANT EXAMINATION REGULATIONS

(a) Students shall not be admitted into the examination hall if they have not been duly registered by the various officers having fulfilled the prescribed conditions of the course of study.

(b) Eligible candidates shall report at the stipulated examination halls fifteen minutes before the start of the examination.

(c) No candidate shall be allowed into the examination hall after 30 minute of the start of the examination.

(d) No candidate shall be allowed to leave the examination hall within 30 minutes of the conclusion of the examinations.

(e) No candidate shall be allowed to withdraw from the examination hall within 30 minutes of commencement of examination.

(f) Candidates may go to the toilet, etc, during examination, provided that they are accompanied throughout the period of absence by a suitable officer, such absence must not be unreasonably prolonged and the candidate shall not be allowed any extra time by reasons of such absence

(g) The chief invigilator may, under special circumstance accept a candidate into the examination hall after 30 minutes of the start of the examination if he/she is satisfied that there are reasonable grounds for the lateness. A report of this situation must be formally made to the Chief Examiner.

(h) Candidate shall not be allowed to bring into the examination hall any personal bag, electronic gadgets and organizer, textbooks, scrap note or such other personal effects except such material as may be permitted for use in the same examination.

(i) Candidates shall not walk out of the examination hall with any answer sheet/booklets used or unused.

(j) Candidates shall comply with any instruction given by the Chief Invigilator as to the submission of their answer sheets at the conclusion of the examinations.

(k) It shall be the responsibility of each candidate to ensure that his/her examination sheets are duly accounted for to the Chief Invigilator at the examination hall.

(l) All rough notes, scraps sheets, draft answer, etc which do not form part of the definitive answer sheets must be submitted after appropriate cancellation, to the invigilator with the definitive answer sheet at the conclusion of the examination.

(m) Candidates shall not talk to one another, give or receive from one another any form of assistance, pens, eraser, pencils, rulers, etc.

(n) All questions pertaining to the examination must be directed to the Chief Invigilator or any of the accredited invigilators

(o) The Chief Invigilator shall report any examination misconduct formally to the Chief Examiner/Dean of the appropriate Faculty as specified by Senate.

(p) Any contravention of any of the above rules and regulations shall constitute examination misconduct. All candidates shall comply with these regulations in their own interest

(q) Invigilators shall tell the candidates the exact time regulations of starting an examination and thereafter inform them of the time at reasonable intervals.

(r) Invigilators shall ensure that personal effects such as bags, electronic organizers, textbooks, scrap notes, etc are not brought into the examination hall by the candidates and that unused answer scripts are not taken out.

(s) Silence shall be maintained throughout the duration of an examination.

(t) Invigilator shall ensure that all candidates sign the Attendance Register.

(u) At the end of an examination, each invigilator shall collect and count the scripts before handing them over to the Chief Invigilator who shall sign the answer booklets.

XVII. CONFERNMENT OF DEGREE

After the recommended examination results from the Faculty Board have been approved by Senate, successful candidates shall be admitted either in person or in absentia to the degree of the University at the convocation for the award of degrees, and thereafter issued with certificates under the common seal of the University.

DEGREE PROGRAMME

The Department of Mathematics offers three degree programmes leading to the award of Bachelor of Science (B.Sc) degree in Mathematics, Industrial Mathematics and Statistics.

A. B.Sc MATHEMATICS

1. PHILOSOPHY

The philosophy of Mathematics in the Department of Mathematics is to produce graduates who are oriented in theory, application, innovations in the mathematical service to the nation (Nigeria) and human development.

II. OBJECTIVE

1. To produce mathematics graduates relevant to our national manpower needs.
2. To provide service course in Mathematics for students of other Department whose degree programmes require working knowledge of Mathematics.
3. To produce courses and supervise research leading to higher degree of this University.
4. To promote and encourage research in the various areas of mathematics.
5. To produces graduate that can work in supervisory/advisory capacities in Industries and other sectors of the economy.

III. ADMISSION REQUIREMENTS

UME-5 Credits in WASC, SSCE, NECO, GCE, O/L, at a maximum of two sittings. The 5 Credits must include English language, Mathematics, Physics plus any two Sciences subjects chosen from Chemistry, Biology, Agricultural Science, Economics and Geography.

WAIVER: None

DIRECT (200 LEVEL) ENTRY – (i) HSC or GCE Advance level with passes in any four of the following: Pure Mathematics, Applied Mathematics, Physics, Chemistry and General Paper (ii) UME plus HSC/GCE/A Level passes in Mathematics and any one of the following: Physics, Chemistry, Computer Science, and Statistics (iii) UME plus NCE or Ordinary Diploma with a grade not lower than merit or lower credit in any of the following: Mathematics, Statistics, Data Processing, Computer Science and any of the engineering programmes from a recognized University or Polytechnic for such Programmes.

COURSE DISTRIBUTION
B. Sc MATHEMATICS, 100 LEVEL
FIRST SEMESTER

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	101	Algebra & Trigonometry				3	C	
2	STA	101	Statistics for Physical Sciences & Engineering				3	C	
3	CSC	101	Introduction to Computer Science				2	R	
4	GST	101	Use of English & Library Studies				4	C	
5	GST	102	Philosophy & Logic				2	C	
6	PHY	101	General Physic I (Mechanics)				3	R	
7	PHY	102	General Physic II (Elec. & Mag)				3	R	
8	CHM	101	General Chemistry I (Inorganic)				3	R	
			Total				23		

SECOND SEMESTER

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	111	Vector & Coordinate Geometry				3	C	
2	MTH	112	Calculus				3	C	
3	MTH	113	Introduction to Mechanics				3	C	
4	MTH	114	Geometry in Rn, n>3				3	R	
5	GST	111	Nigeria People and Culture				2	C	
6	GST	112	History of Philosophy of Science				2	C	
7	PHY	111	General Physic III				2	R	
8	CHM	112	Chemistry II				2	R	
9	BIO	111	General Biology II				3	R	
			Total				23		

ELECTIVES

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	STA	111	Laboratory for Inference				3		
2	PHY	103	General Physics Laboratory				2		
3	ECO	101	Principles of Economics I				3		
4	ECO	111	Principles of Economics II				3		
5	ACC	101	Principles of Accounting I				3		
6	ACC	111	Principles of Accounting II				3		
7	GEE	112	Engineering Drawing				2		

200LEVEL
FIRST SEMESTER

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	201	Mathematical Method				3	C	MTH 112
2	MTH	202	Linear Algebra I				2	C	MTH 111
3	MTH	203	Set, Logic & Algebra				3	R	MTH 101

4	MTH	204	Real analysis I				3	C	MTH
5	MTH	205	Elementary Differential Equations I				3	C	MTH 112
6	STA	202	Statistical Inference I				3	C	STA 101
7	CSC	203	Computer Programming I				3	R	CSC 101
8	GST	222	Peace and Conflict Studies				2	C	
9	ENT	201	Entrepreneur Studies I				2	C	
			Total				24		

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SECOND SEMESTER

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	211	Introductory Numerical Analysis				3	C	
2	MTH	212	Linear Algebra II				2	C	
3	MTH	213	Complex Analysis I				3	C	
4	MTH	214	Mechanics				2	C	
5	MTH	215	Real Analysis II				3	C	
6	STA	211	Probability Theory II				3	R	
7	STA	213	Statistical Inference II				3	R	
8	ENT	211	Entrepreneur Studies II				2	C	
			TOTAL				21		

ELECTIVES:

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	CSC	215	Computer Programmell				3	E	
2	ECO	201	Microeconomics I				3	E	
3	ECO	211	Microeconomics II				3	E	

300 LEVEL
FIRST SEMESTER

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	301	Abstract Algebra I				3	C	
2	MTH	302	Metric Space Topology I				3	C	
3	MTH	303	Scientific Computing	2hrs	1hr	6hr	3	C	
4	MTH	304	Elementary Differential Equations II				3	C	
5	MTH	305	Vector and Tensor Analysis				3	C	
6	MTH	306	Applied Linear Algebra				3	C	
7	MTH	307	Differential Geometry				3	R	
			Total				21		

SECOND SEMESTER+ THE SESSION LONG VACATION

S/No	Course	Code	Title of Course	L	T	D	Unit	Status	Per-Req
1	MTH	399	Student Industrial Work Experience Scheme				15	C	

ELECTIVES:

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	STA	305	Probability Theory II				3		
2	MTH	308	Operations Research				3		
3	MTH	312	Metric Space Topology II				3		
4	MTH	313	Real Analysis III				3		
5	MTH	314	Discrete Mathematics				3		
6	STA	316	Number Theory				3		
7	STA	315	Introductory Modeling				3		
8	MTH	317	Dynamics of a Rigid body				3		
9	MTH	318	Introductory Integral Equations				3		
			TOTAL				27		

400 LEVEL
FIRST SEMESTER

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	401	Ordinary Differential Equations				3	C	
2	MTH	402	Modules				3	C	
3	MTH	403	Calculus of Variations				3	C	
4	MTH	404	General Topology I				3	C	
5	MTH	405	Functional Analysis				3	C	
6	MTH	407	Partial Differential Equations				3	C	
			Total				18		

SECOND SEMESTER

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	4I1	Project				6	C	
2	MTH	311	Abstract Algebra II				3	C	
3	MTH	412	Lebesgue Measure & Integration				3	C	
4	MTH	414	Computational Methods in Differential Equations				3	C	
5	MTH	415	Complex Analysis II				3	C	
6	MTH	417	General Topology II				3	C	
			Total				21		

ELECTIVES COURSE:

S/No	Course	Code	Title of Course	L	T	P	Unit	Status	Pre-Req
1	MTH	408	Seminar				2		
2	MTH	413	System Theory				3		
3	MTH	416	Introductory Homotopy				3		
4	MTH	419	Error Analysis				3		

3	STA	418	Bayesian Inferences				3	E	
4	STA	431	Computational methods in Statistics				3	E	
5	MTH	414	Computational Methods in Differential Equations				3	E	

COURSE DESCRIPTION

MTH 101: ALGEBRA AND TRIGONOMENTRY (3 Units)

Elementary Sets theory, subsets, union, inter-section, complements. Venn diagrams, Advance indicial and logarithmic equations. The use of notations. Real number, Integers, rational numbers mathematical inductions, equations, real sequences and methods of undermined coeffients theory of quadratic equations, binomial theorem. Complex numbers, Arrant Diagram, Demoivre's theorem, nth roots of unit. Circular measure, trigonometric functions of angles and magnitude, addition and factor formulae.

STA 101: STATISTICS FOR PHYSICAL SCIENCE AND ENGINEERING (3 Units)

Statistical data, their sources, collection and preliminary analysis by tables and graphs. Measure of location and dispensation of simple and grouped data exponential. Elements of probality distribution, binomial, poison, geometry, negative binomial distributions. Time series, demography measure and index numbers. Estimation and tests of hypothesis of means and variance. Contingency table. Non-parametric inference

MTH 111: VECTORS AND COORDINATE GEOMENTARY (3 Units)

Coordinate Geometry.

Rectangle Cartesian co-ordinates. Mid-point, gradient, distance between two points. Equation of a line, parallel and perpendicular lines, angle between two lines. Graphs of simple rational functions in one variable. Asymptotes of a graph at the origin an axis of symmentry, properties and Applications of: Circular, parabola, ellipse and Hyperbola. Paraboloid, Ellipsoids, Hyperbolids Statements, Proofs and associated Theorem and prepositions.

Vectors

Geometric representation of vectors in 1-3 dimensions, components, direction cosines, assertion Scale, Multiplication of Vectors, Linear independence Scalar and vector products of two vectors with respect to Scalars.

MTH 112: CALCULUS (Units)

Functions of a real variable, graphs, limits and idea of continuity. The devalue, as limit of rate of charge, Techniques of differentiation, Extreme curve sketching, integrations as an inverse of differentiation, methods of integration, Definite integrals Application to areas, volumes.

MTH 113: INTRODUCTORY MECHANICS (3 Units)

Statics

Triangle and parallelogram of force, resultant forces, Lamis theorem, polygon of force. Friction Smooth bodies, laws of friction, particles on forces, rough planes inclined or otherwise parallel force, moments, couples, centre of gravity of: Laminal of elementary shapes, joined rood, curved surfaces of core sphere and solids of elementary shapes Thrust on plane surfaces, centre of pressure, pressure intensity transmission of fluid pressure pascal's principle balancing columns of liquids.

Dynamics

Kinematics of a particle components of velocity and acceleration of a particle moving in a plane force momentum, motion, Angular momentum simple/harmonic motion, elastic strings, simple pendulum sphere on as smooth surface.

MTH 114: GEOMETRY IN R", n ≥3 (3 Units)

Coordinates in R^3 .Polar coordinates, Distances between points, surfaces and curves in space. Straight lines and planes in space direction cosines. Angles between lines and planes. Distance between a point and a plane. Distances between two skew lines. Basic project geometry, Affine and Euclidean geometries.

STA 111: LABORATORY FOR INFERENCE (2 Units)

Presentation and Analysis of data. Curve fitting and goodness of fit test. Construction of questionnaires and simple index numbers. Use of random numbers and statistical tables.

STA 112: INTRODUCTION TO STATISTICAL QUALITY CONTROL (3 Units)

Control chart for means, standard deviation, range and number of defective items. Procedures for acceptance. Sampling single, double and multiple sampling procedures. Lot-by-lot Sampling inspection. Continuous sampling plants.

200 LEVEL

MTH 201: MATHEMATICAL METHODS (3 Units)

Real-valued functions of a real variable, Review of differential and integration and their applications. Means value theorem Taylor series. Real-valued functions of two or three variables. Partial derivatives chain rule, extreme, lagranges multipliers, increments differential and linear approximations- Evaluation of line integrals multiple integrals.

Pre-requisite MTH 112

MTH 202: LINEAR ALGEBRA 1 (Units)

Vector space over the real field, subspaces, linear independence, basis and dimension, Linear transformations and their representation by matrices-rang Nll space rank singular and non-singular transformations and matrices Algebra of matrices.

Pre-requisite MTH 101, 111

MTH 203: SETS, LOGIC AND ALGEBRA (3 Units)

Introduction to the language and concepts of modern mathematics, Topics includes: Basic set theory, mapping relations, equivalence and other relations, Cartesian, products, Binary logic, methods of proofs, Integral domains, fields, Homomorphics, Numbers System properties of integers, rational, real and complex numbers.

Pre-requisite MTH 101

MTH 204: REAL ANALYSIS 1 (3 Units)

Bound of real numbers, convergence of sequence of numbers Monotone sequences, the theorem of tested intervals, Cauchy sequences, tests for convergences of series, Absolute and conditional convergence of series, and rearrangements, completeness of real and incompleteness, rational continuity and differentiability of real-Valued function R R, Rolle's and Means, value Theorems for differentiable functions, Taylor series, Uniform Continuity of Real-Valued Functions.

Pre-requisite MTH 101, 112

MTH 205: ELEMENTARY DIFFERENTIAL EQUATIONS 1 (3 Units)

First order ordinary differential equations, Existence and uniqueness. Second order ordinary differential equations with constant co-efficient. General theory of nth order linear equations, Laplace transform, solution of initial-value problems by Laplace transform method. Variation of parameters and Operator D methods of finding particular solutions of any nth order linear differential equations. Green Functions. Simple treatment of partial differential equations in two independent variables Applications of ODE and PDE to pure Sciences, Social Sciences and Engineering.

Pre-requisite MTH 112

STA 201: DISTRIBUTION THEORY 1 (3 Units)

Distribution Functions and Density functions. Moments and generating functions. Binomial. Negative binomial. Hyper geometric and multinomial distributions. Chebyshev's Inequality and large numbers. Central limit theorem. Distributions of functions and of a random variable. Multivariate theorem. Distributions associated with the normal (t, χ^2 and F).

STA 202: STATISTICAL INFERENCE I (3 Units)

Elements of statistical inference, Use of the Neymann Persons Lemma. Hypothesis testing, the power of a Point and interval estimation (testing and estimation of a large sample and in some standards, small sample situation) binomial, poison, normal contingency tables Goodness-of-fits-test.

MTH 211: INTRODUCTORY TO NUMERICAL ANALYSIS (3 Units)

Solution of algebraic and transcendent equations, Curve fitting, Error analysis. Interpolation and approximation, Zeros of non-linear equations in one variable, systems of linear equations, Numerical differentiation and integration, Initial value problems in ordinary differential equations

Pre-requisite MTH 101, 111

MTH 212: LINEAR ALGEBRA 11 (3 Units)

System of linear Equations change of basis, equivalence and similarity, Eigenvales and Eigenvecotrs, Minimun and Characteristic polynomials of a linear transformation, Caley-Hamiton theorem, Brilinear and quadratic forms, orthogonal diagonalisation and Canonical forms.

Pre-requisite MTH 101, 111

MTH 213: COMPLEX ANALYSIS I (3 Units)

Function a complex variable, Limits and continuity of a complex variable, Driving the Cauchy-Riemann Equations, Analytic functions, Brillinear transformation conform, maping, Contour integrals Cuch's Theorems and its main consequences, Convergences of Sequences' and series of functions of a Complex variable, power Series, Taylor Series.

Pre-requisite MTH 101, 112

MTH 214: MECHANICS (2 Units)

Static's, system of line vectors, couples and wrenches, principles of virtual work, stability of equilibrium, dynamics of a system of particles, elastic string, Hook Law, Motion in resisting media changing mass, motion along a curve, Frenets formulae, Coplanar Motion: energy equation, Motion in a vertical circle, simple pendulum, the Cycloidal motion Orbital motion-disturbed orbits and stability.

Pre-requisite MTH 101, 113

MTH 215: REAL ANALYSIS II (3 Units)

Riemann integral of function R...> R, Continuous mono-positive functions, Functions of bounded variable, The Riemann Stielgies integral, Point wise and uniforms convergence of

sequences and series of functions R...> R, Riesz representation theorem, Effects on limits (sums) when the functions are continuous differentiable or Riemann integrable, Power series, approximation waietras theorem.

Pre-requisite MTH 101, 112

STA211: PROBABILITY THEORY I (3 Units)

Combinatorial Analysis. Probability models for the study of random phenomena infinite sample spaces. Probability distribution of discrete and continuous random variables. Exceptions and moment generating functions. Chebyshev's inequality. Bivariate marginal and conditional distributions and momentary convolution of two distributions, central limits theorem and its uses.

STA 212: DESIGN AND ANALYSIS OF EXPERIMENTALS I (3 Units)

Principle of experimentation. Randomization, Replication and local control.ss Complete randomized Blocks and Latin squares. Two-factor experiments. Confounding and other problems. Application in industry, Biology and agriculture. Properties of balanced designs. Analysis of variance of complex nested and crossed classification Response surface problems.

STA 213: STATISTICAL INFERENCE II (3 Units)

Point estimation by least squares and maximum likelihood method. Properties of points estimation. Unbiasedness, sufficiency, consistent, efficient, best asymptotic normality confidence intervals and regions. Gauss markov and Fisher-cochrans. Test of hypothesis: Test of hypothesis: Neymann-

STA 214: INTRODUCTION TO OFFICIAL STATISTICS (2 Units)

Sample, census and Administration data. Design and administrations of questionnaires. Role of computer in the analysis of the Economics. Social data index number, theory, uses and construction. Application to problems in industrial production, prices, wages and cost of living.

STA 215: REGRESSION ANALYSIS I (3 Units)

Correlation and Regression analysis. Polynomial fitting Multiple linear regression models, polynomial regression. Test of independence and goodness-of-fit. Use of dummy variables. Non-linearity parameters requiring simple transformation.

300 LEVEL

MTH 301: ABSTRACT ALGEBRA I (3 Units)

Groups, definition, examples including permutation groups, sub-groups cosets, Lagrange's theorem ans application. Cyclic groups. Rings, definition, examples including z.z rings of

polynomial, matrices. Integral domains, Polynomials rings, factorization, Euclidena algorithm for polynomials (HCF and LCM of polynomials)

Pre-requisite MTH 203

MTH 302: METRIC SPACE TOPOLOGY I (3 Units)

Sets, metrics and examples, Open spheres (or balls), open Sets and Nieghborhoods, closed set interior, frontier, limts points and closure of a set.

Pre-requisite MTH 204

MTH 303: SCIENTIFIC COMPUTING (3 Units)

Advanced Practical Computer Programming in any Scientific Computing High level programming language. Subprograms, Optimizing programming, Two-point replacement technique, Ill conditioning Treatment on the Computer, Singularities and their treatment Advanced Algorithms Development and refinement of programming packages for scientific computing like WATFOR 77, MATLAB, SPSS etc.

Pre-requisite: CSC 101, CSC 203

MTH 304: ELEMENTARY DIFFERENTIAL EQUATIONS II (3 Units)

Series solutions of seconds order linear equations, Bessel legendre and hypogeomentric equations and functions, Gamma and Bata functions, Stumullouuvelle problems, Orthogonal polynomials and functions, Fou rier Fourier-Based Bessel and Fourier-Legendre Four Transformation solution of Laplace, wave and heat equations by Fourier method.

Pre-requisite MTH 112, MTH 205

MTH 305: VECTOR AND TENSOR ANALTSIS (3 Units)

Vector algebra, vector, dot and cross products, Equating of curves and surface, vector differentiation and applications, Gradient, divergence and curl, vector integrate, Line surface and volume integrals Green stoke and divergence, theorems, Tensor products of vector spaces

MTH 306: APPLIED LINEAR ALGEBRA (3 Units)

Gaussian Elimination, Jacobi Iteration and Gauss-Siedel Iteration methods, Decomposition methods for solving systems of equations. The Eigenvalue problem norms and ill-conditioning band matrices, transformation and Iterative methods for computing Eigenvalue, Over Determined Systems of Linear Equations.

Pre-requisite MTH 211

MTH 307: DIFFERENTIAL GEOMETRY (3 Units)

Vector functions of a reliable, Codedness Limits, Continuity and differentiability, functions of Class CM, Taylor's formulae Analytic functions curve regular, differentiable and smooth

STA 305: PROBABILITY THEORY II (3 Units)
Brief revision of basic concepts. Probability generating functions. Univeriate and brivariate moment generating functions. Univariate characteristic functions formula various modes of convergence. Laws of large numbers and the central limits theorem using characteristics functions, random walk and Markov chains introduction to poison process.

MTH 311: ABSTRACT ALGEBRA 11 (3 Units)
Normal subgroups quotient groups, Monomorphic Isomorphism theorems, Causley theorems, Direct products, groups of small order, Groups acting on sets Sylow theorems, ideals and quotient rings P.I.D'SU F.D is Euclidan rings, Irreducibility Field extensions degree of an extension minimum polynomial Algebraic and transcendental extensions, Straight edged and compass constructions.
Pre-requisite MTH 301

MTH 312: METRIC SPACE TOPOLOGY 11 (3 Units)
Dense subset and separable spaces, Convergence in metric space Homorphism, continuity and compactness

MTH 313: REAL ANALYSIS 111 (3 Units)
Double limits. Double sequences and series. Limits and continuous function of several variables. Derivative functions of several variables. Taylor's theorems. Inverse function and implicit function theorems. Function of Function theorems for functions of several variables.
Pre-requisite MTH 201, 204

MTH 314: REAL ANALYSIS 111 (3 Units)
The fundamental Algorithms, the integers, and matrices Mathematical Reasoning, Induction, and recursion Counting: Basic of counting, the pigeonhole principles permutations and combinations, Binomial coefficients. Graphs: Introduction to Graphs, Graph Technology Representing Graphs and Graph Isomorphism. Trees: Introduction to Trees and Applications.
Ref. Discrete Mathematics and its Application Fifth Edition. By Kenneth H. Rosen
Prerequisite: MTH 101, 103
Co-requisite: MTH 312

MTH 315: INTRODUCTORY MODELLING (3 Unit)
Methodology of model building: Identification, formulation, and solution of problems, causes-effect diagrams Equation Types: Algebraic, ordinary differential equations, partial differential equations, difference, integral and functional equations, Applications of mathematical models to physical, Biological, Social and behavioral Sciences.
Pre-requisite MTH 205, 304

MTH 316: NUMBER THEORY (3 Units)
Prime numbers. Theory of congruences, Division algorithm. Quadratic residues. Reciprocity theorems Arithmetical functions. Partitions Combinatories.

Pre-requisite MTH 101, 203

MTH 317 DYNAMICS OF A RIGID BODY (3 Units)
General motion of a rigid body as a translation plus a rotation, moment and products of inertia in three dimensions Parallel and perpendicular axes, theorems principle axes, Angular momentum, Kinethic energy of a rigid body, impulsive motion. Example involving one and two dimensional motion of simple surface- The Fouscault's pensulni, Euler's dynamical equations for motion of a rigid body with one point fixed. The symmetrical top procession.

Pre-requisite MTH213

MTH 318: INTRODUCTORY INTEGRAL EQUATIONS (3 Units)
Integral Equations; Tricomi, Dover, Definition and classification, methods of solutions, Integral Transforms, generating functions, Degenerate Kernels, contraction mappings and fixed points Non linera Integral equations, Linear Integral equations, Linear operators. Linear functional and integral equations, Momentum rep in Quantum physics, Neutron Transport theory Generalized Abel equations, convolution theorem. Neumann series, separable (Degenerate) kernels.

MTH 399/STA 399: STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (15 Units)

400 LEVEL

MTH 401: ORDINARY DIFFERENTIAL EQUATIONS 1 (3 Units)
Stum's separation and comparism theorems, Sominpolya theorems, Existence and Uniquencess of solution of systems of ordinary differential equations, Theory and properties of their solutions stability and phase portraits of systems, Floquent's theorem for periodic linear system.

Pre-requisite MTH 205.

MTH 402: MODULES (3 Units)
Modules special classes of modules submodules of free modules, Decomposition Theorems, Application of Decomposition of theorems, finitely generated abelian, linear transformation, Matrices and canonical forms, Computation of Canonical forms

Pre-requisite MTH 301

MTH 403: CALCULUS OF VARIATION (3 Units)
Calculus of variation, Lagranges functional and associated density, Necessary condition for a

week relative extremum Hamilton's principle, Language's equations and geodesic problems, The Du Bois-Raymond equation and corner conditions, Variable and points related theorem sufficient conditions for a minimum, Isoperimetric, Application to solution of differential equations.

Pre-requisite MTH 201, 215

MTH 404: GENERAL TOPOLOGY 1 (3 Units)

Topological spaces, definition, open and close sets neighourhoods, Coaster and Finer topologies bases, Separative axioms, compactness, and connectedness.

Pre-requisite MTH 302

MTH 405: FUNCTIONAL ANALYSIS (3 Units)

Definition and examples of normed linear spaces, continuity of linear transformations, Elements of Banarch and Hilbert space, Parallelogram law and polar identity in Hilbert space properties of operators, oprators, open mapping and closed graph theorems, Dual spaces, Hann-Banarch theorem and Fiesz representation theorem.

Co-requisite: MTH 302

MTH 406: OPTIMAZATION THEORY (Units)

Branch and bound methods I programming problems Decomposition of Large Progamming problems optimization of Functional with integral and differntail constraints, Optimization of sted systems, Dynamic inventory system, Inventory models with special cost assumption Markovian decision processs, Optimization under.

Pre-requisite MTH 308

MTH 407: PARTIAL DIFFERENTIAL EQUATIONS (3 Units)

Theory and solutions of first order equations, second linear equations, Classification Characteristics, Canonical forms,. Cauchy problem, Elliptic equations, Lappicae's and poisson's equations fundamental solutions. Green's functions, Poisson's formula properties of harmonic function. Hyperholic equation, Wave equation, retarded potential transmission line equation, Reimann method parabolic equations, Diffusion equation, singularity functions boundary and initial value problem.

Pre-requisite MTH 201, 205

STA 401: STOCHASTIC PROCESSES (3 Unit)

Random walk, simple and general random walk absorbing barriers, markovian processes with finit chains. Limits theorem. Poission branching, birth and death processes. Queuing processes, m/mlm/m/s/m/c/l quiues and their waiting time distribution relevant application.

STA 402: NON-PARAMETRIC METHODS 11 (3 Units)
Order statistics and their distributions. Kolmogrov type of test statistics. Common non-parametric test including runs, sign ranks order and rank correlation null distribution and their approximations. Efficiency properties Estimates based on test statistics.

STA 403: TIME SERIES ANALYSIS (3 Units)
Components of time series, measurement of tread, the seasoned index, the cyclical component and random fluctuations. Series correlation, correlation. Stationary time series estimation of mean and their covariance function. Linear prediction in time series, autogresive series Auto correlation and auto-correlation estimate. Auto covariance function and estimate of Auto covariance and auto correlation matrices analysis.

STA 404: STATISTICAL INFERENCE 111 (3 Units)
Advanced treatment of estimation and hypothesis testing especially converting tests based on several paramenters. General linear hypothesis.
Pre-requisite MTH 203,213

STA 405: ANALYSIS OF VARIANCE 11 (2 Units)
Analysis of variance involving unbalanced data, multivariate analysis of variance. Analysis of multifactor, multi, response of variance such as missing observation and non-normality, heterogeneity of variance. Etc.

STA 406: REGRESSION ANALYSIS 11 (3 Units)
Partial and conditional repression and correlation models. Canonical correlation. Tests of independence of regression coefficients. Multicollineary and other associated with 'Best regression Models'

MTH 408/STA 408 SEMINAR (2 Units)

MTH 411/STA 411: PROJECT (6 Units)
Each student is expected to write a project on an assigned topic.

MTH 412: LEBESGUE MEASURE AND INTEGRATION (3 Units)
Lebesgue measure, measurement and non-measurement sets, measurement functions, Lebesque intergrals, Intergration of non-nagative functions, the general integral convergence theorems.
Pre-requisites: MTH 215

MTH 413: SYSTEMS THEORY (3 Units)

Mathematical theory of optimal control for systems described by differential equations and subject of constraints of various, with constants co-efficient Topic in non- Linear Oscillations.

Pre-requisite MTH 305

MTH 414: COMPUTATIONAL METHOD IN DIFFERENTIAL EQUATIONS (3 Units)

Linear multistep methods, Rational integrators, and methods of Linear Derivation, Error analysis convergence and Stability analysis, application of Predictor-corrector pairs, the problems of stiffness and singularities, Introduction of Computational Methods in Partial differential equations.

Pre-requisite MTH 305, 211

MTH 415: COMPLEX ANALYSIS 11 (3 Units)

Laurent expansions, Isolated singularities and residue theorem, calculus of residues and application to evaluation of integrals and to summation of series, maximum a modulus principles, Liouville's theorem, Argument principles, Rouche's theorem, the fundamental theorem of algebra principles of analytic to continuation, multiples values functions and Riemann surfaces.

Pre-requisite: MTH 213

MTH 416: INTRODUCTORY HOMOTOPY (3 Units)

Paths, homortopic paths, paths composition, equivalence relation, null homotopic. The fundamental group. Calculating grpop. The fundamental group of (ii) Punctured plane (iii) surfaces.

Pre-requisites: MTH 302

MTH 417: GENERAL TROPOLOGY II (3 Units)

Local compactness, construction of new topological space from given ones subspaces, quotient spaces, continuous functions, pointwise and uniform convergence.

Pre-requisite MTH 302

MTH 419: ERROR ANALYSIS (3 Units)

Deginition, sources, condition, Accuracy, precissional classifications of errors, estimation of Errors. Effect of arithmetric operations on error. Loss of significant figures during computation. Powers and Roots, Logarithms and exponentials. application of Statistics to Error analysis Norms and error bounds. Polynomial approximal, Application in ODE, PDE, and IE, Eigenvalue and Eigenvectors.sss Direct error Estimators.