FEDERAL UNIVERSITY OYE-EKITI,

EKITI STATE, NIGERIA

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

UNDERGRADUATE ACADEMIC PROSPECTUS

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Prof. O. S. Lawal
Dean,
Faculty of Science

FOREWORD

This handbook showcases the Department of Mathematics concisely and almost exhaustively. In particular the philosophy, objectives and curriculum of the degree program in the
Department of Mathematics is presented in this handbook. Furthermore the lists of the staff in the Department are presented; other issues in it include regulations guiding examinations, academic atmosphere, course adviser-ship, administration, admission requirements, and result grading.
Arising from the above, an interested reader can find all the basic information about the degree program being run in the Department, the lists of different categories of staff, and the course synopses of the program with ease. The handbook is handier than that of the entire faculty and of course, affords one, a quicker access to its contents than does the faculty handbook. It is therefore an indispensable companion of every student and staff, in the Department, as well as an image maker of the department. It will however be updated from time to time to reflect the current developments in any of its contents.

Dr. Olusola Ezekiel Abolarin
Applied Mathematician
Ag. H. O. D. - Department of Mathematics,
Federal University Oye-Ekiti,
Oye-Ekiti, Nigeria.

Dr. Enoch Opeyemi Oluwole
E-mail: Opeyemi.enoch@fuoye.edu.ng
Area of Research: Complex Analysis and its applications in Number Theory (B.Sc./M.Sc.)
Numerical Computation and its application to point of Singularity in Ordinary Differential Equations (Ph.D.)

Dr. Lukeman 'Shina AKINOLA
E-mail: lukmanakinola@fuoye.edu.ng
Area of Research Interest: Fuzzy Group, Fuzzy bi-group, Group Algebra.

Dr. Emmanuel O. Adeyefa
E-mail: emmanuel.adeyefa@fuoye.edu.ng
Tel: +2348034150709
Dr Emmanuel Adeyefa attended the University of Ilorin and Obafemi Awolowo University for the degrees he has to date.
His area of specialization in the field of Mathematics is Numerical Analysis.

Udoye, Adaobi M.
Assistant Lecturer in the Department of Mathematics, Faculty of Science, Federal University, Oye – Ekiti, Ekiti State.
E-mail: adaobi.udoye@fuoye.edu.ng
Area of Interest: Financial Mathematics.

1.0 Name of Programme

BACHELOR OF SCIENCE DEGREE IN MATHEMATICS

2.0. History of the Department/Discipline/Sub discipline

The Department of Mathematics is one of the seven (7) Departments established in the Faculty of Science of the University at inception in September 2011 with eleven (11) students who were admitted through UTME and Post-UTME.

Our mission is to offer qualitative research and teaching by constantly introducing new courses and options since Mathematics as well as other pure scientific endeavours underpin technology.

The program also aims at bringing together the ingredients necessary for a well-paid career as required in the industries and other areas of the national economy as well as relevant government establishments. Opportunities for the attainment of academic excellence through effective teaching and research in all aspects of Applied Mathematics are also provided.

The prominent feature of our program is the exposure of all intending B.Sc. Mathematics graduate to compulsory and elective courses in all areas of Mathematics as well as other Science courses. This is to ensure a high level of competence of our graduates and to increase their flexibility in fitting into diverse careers and industries. At present, the Department has eighteen academic and seven non-academic staff members.

The Academic Programme is designed and/structured in line with the Nigerian University Commission (NUC) specification. The programme is in its seventh year and has graduated two sets of students i.e. 2014/15 and 2015/16 sets.

3.0. Philosophy, Aim and Objectives of the programme

3.1. Philosophy:

The undergraduate Programmers' of the Department of Mathematics is designed to help students develop competence in mathematical techniques and methods, to sharpen the students' mathematical intuition and abstract reasoning as well as their capability in numerical data analysis. The Department of Mathematics at the Federal University Oye-Ekiti (FUOYE) seeks to encourage and stimulate the type of independent thinking required for research beyond the confines of the textbook and provides students with basic knowledge and skills to make mathematical contributions to modern society.

3.2. Program Aim:

Our aim is to raise a group of mathematicians who can think logically and approach real life problems in analytical and creative ways, use development of Mathematics as a tool for innovations in science and technology. We also aim at providing our students with a broad-based knowledge of Pure and Applied Mathematics with emphasis on the following areas: Mathematical modeling, Biomathematics, Optimal Control, Optimization, Operations research, Computational Mathematics with software's like MATLAB, R Octave, Maple and Sage, applications in Statistics, Algebra, Stochastic processes, Probability and Measure Theory, Scientific Computing, Fluid Mechanics, Mathematical Physics, Differential equations(Partial and Ordinary).Our graduates are expected to apply their problem solving skills to a wide range of fields.

We plan to achieve our goals through intensive training in an excellent academic environment. The graduates of this programme will be suitable for employment in industries, the civil service and institutions of higher learning. They can also be self-employed.

3.3. The objectives are:

i. To provide the necessary training and exposure in all aspects of Mathematics so as to prepare graduates of the programme for employment in industries, government establishment and in the academia;
ii. To develop the necessary manpower in the area of Mathematics needed for industrial and technological development of the country;
iii. To produce mathematicians who are professionally competent enough to be self-employed; and
iv. To produce graduates who are qualified to pursue higher degrees in Mathematics and related courses.

4.0. Entry Requirement

Applicants seeking admission to study Mathematics must satisfy the University entry requirements into the Faculty of Science by possessing the following:

4.1. UTME entry requirements

(i) Five (5) credit level passes in Biology, Chemistry, Physics, Mathematics, English Language at O' Level GCE/SSCE/NECO/NABTEB and any other Science subject.

(ii) Satisfactory UTME and post-UTME scores in relevant subjects which include English Language, Mathematics, Physics, and Chemistry obtained in the year of admission. The five credits requirements should be obtained at one or two sittings. This is a statutory requirement for entry into the Nigerian Universities.

4.2. DIRECT entry requirements

(iii) Two 'A' level passes in Mathematics and any other Science subject. Such candidate may be exempted from the appropriate

courses in the programme. The candidate must also satisfy (i) above or

(iv) A minimum of Upper Credit (in OND/NCE Mathematics/ Statistics) from a recognized Polytechnic or College of Education.

5.0. Admission and registration

5.1 Admission

1. Candidate seeking admission to the university for first Degree Course must obtain and complete the Joint Admissions and Matriculation Board (JAMB) form
2. Candidate must satisfy the admission requirements of the University. For some courses, additional Faculty/Department requirement have to be satisfied
3. New admissions will normally be made only at the beginning of every academic session.
4. At the time of registration in the University, each candidate shall be required to present the originals of their certificates or any other acceptable evidence of qualifications on the basis of which the offer admission has been made.
5. Registration of fresh candidates will begin in the Admission office of the University and end in the Department.
6. If it is discovered at any time that a candidate does not possess any qualifications which he/she claims to have obtained, he/she will be expelled from the University.
7. Student shall, on admission pay to the University, the fees prescribed by the regulations.

5.2: Registration of courses

At the Department office, candidates shall be provided with the list of courses for t6he semester. He/she shall enter the appropriate course in the course registration forms online, download and print and submit them at the Departmental Office.

5.3 Dropping of courses

A student may drop a course or add a course provided he/she completes the prescribed form within four weeks of the commencement of lectures in the course and obtain the approval of his/her Head of Department.

6.0. Instructional methods and Assessment

6.1. Language of instruction

Language of instruction adopted in Federal University Oye-Ekiti is English.

6.2. Teaching method

Lecturing method, both manual and electronic with both class work and home assignment were employed. Academic atmosphere is cordial and encourages freedom of expression. Besides the University-wide lecture which is statutory, the department ensures a robust academic atmosphere for the staff and students by

- Organizing Staff and Students' Seminars which include MATLAB, MATHEMATICAL and MAPLE SOFTWARES' lectures.
- Students are also encouraged to give seminars on selected topics of relevance to the Department. These lectures are geared towards framing the students to imbibe the practice of writing research papers. The final year students will be mandated to write out their seminar presentations in a typed and bound forms.
- Our mandatory seminar policy encourages students' high punctuality and attendance of not less than 70% to lectures

6.3. Mode of assessment

(i) Continuous assessment:

Continuous assessment (CA) constitutes 40% of the total marks (100%) allocated to a course. The breakdown is as follows:

- Unannounced quizzes: 5%
- Take home assignments: 5%
- Mid-semester test: 25%
- Class attendance: 5%

(ii) Semester examinations:

There exists a written examination of 2-3 hours in each course at the end of every semester which carries 60% of the total marks (100%).

(iii) *Grading system:*

The grading system used for examination is classified as in Table 4.
The class of degree is awarded on the basis of Grade Point Average (GPA) as stated in Table 5.

(iv) Withdrawal

A student is compelled to withdraw from the Department if he or she fails to meet a cumulative grade point average of 1.00 at the end of two consecutive semesters.

6.4. Research project

MTH 499 PROJECTS: (6 Units)
Each student under the guidance of an approved supervisor is required to conduct research in an area approved by the Department, culminating in the submission of a project. 270h (p); C

6.5. Grading of courses

The grading format is as follows:

Measurement of performance: performance in a course is measured in terms of:

a) The result of prescribed theory and practical examination and/or
b) Assessment of such essays, practical exercises and reports prescribed for each course.

The rating of grades obtained in a course in terms of credit points per load unit is as follows:

Federal University Oye-Ekiti Grading System

Level of performance	**Grade**	**Rating (credit points per unit)**
70-100%	A = Excellent	5.0
60-69%	B = Very Good	4.0
50-59%	C = Good	3.0
45-49%	D = Satisfactory	2.0
40-44%	E = Poor	1.0
0-39%	F = Failure	0.0

Based on the above, a student who obtained a grade of' 'A' in a 4-unit course will score 20 (4x5) credit points and another who obtained a grade of C will score 12 (3x4) credit points.

A credit point is thus the product of the course units and the rating in each course. The Sum of all credit points for the semester is the Total Credit Point (TCP).

Using the example of a student who took 4 courses of 5 units each and obtained C, B, F, D grades respectively, the TCP will be 5x3 + 5x4 + 5x0 +5x2 = 45. The Grade Point Average (GPA) is the TCP divided by the Total Credit Units (TCU). Hence, this student has a GPA of 45 divided by 20, which is 2.5.

The highest GPA that can be earned is 5.0 and the lowest is 0 (zero). The Cumulative Grade Point Average (CGPA) is the summation of the TCP for all semesters divided by the summation of TCU's for the said semesters. Like the GPA, the CGPA obtained range from 0 to 5. The CGPA is calculated from all courses taken, including First year (i.e. 100 level).

Class Groups

CGPA	Class
>=4.5	First Class
>=3.5-4.49	Second Class Upper
>=2.5-3.49	Second Class Lower
>=1.5-2.49	Third Class
>=1.0-1.49	Pass (Abrogated)
<1.0	Fail

6.6. Collation of marks

The Grading System adopted is as stipulated by the National Universities Commission. Under this system, continuous assessment (including assignments, quizzes and mid-semester tests) accounts for 40% and Examinations 60%:

Description	Grade
Continuous Assessment	35%
Examination	60%
Attendance	5%
TOTAL	100%

6.7. Examination malpractices

Rule for the conduct of University Examination

6.7.1 General Rules

1) It is responsible of each individual student intending to take any University Examination to ascertain the date, time and venue of the particular examination as indicated in the examination time-table. Candidates must present themselves at the examination venue thirty (30) minutes to the scheduled time of commencement of the examination.
2) Candidate must not be admitted to the examination hall after the examination has been in progress for thirty (30) minutes. Candidate will not also be allowed to leave the examination hall during the first thirty minutes and the last fifteen (15) minutes of an examination.
3) Candidates will not be permitted to start an examination until formally instructed to do so by the examiner/invigilator in-charge of the examination. Candidates wishing to leave the examination hall must obtain the express permission of the examiner/invigilator before doing so.
4) Any candidate permitted to leave an examination hall temporarily must hand over his/her question paper(s) and answer script(s) to the examiner/invigilator and must be accompanied by the3 examiner/invigilator or a person appointed by the examiner/invigilator.
5) Candidates may take printer materials or manuscript in an examination hall when it has been previously announced in the examination timetable and when it is slated in the instructions to the question paper that such material may be used. All brief cases and other materials not associated with the examination must be deposited at a designated place. Candidates will, however, be

allowed to use their own mathematical instruments/table and such other aids for drawing as the examiner/invigilator may permit.

6) The use of mobile phone, electronic programmable calculator, information storage devices, calculator instruction manuals, textbooks, atlases, lectures notebooks, etc. shall not be allowed in the examination halls unless otherwise authorized.
7) Swapping of seat by candidates will not be condoned.
8) It is compulsory for candidate to sign the examination attendance register when the examination/invigilator present it to them during the examination.
9) Candidate must ensure that their answer scripts are handed over to the examiner/invigilators leaving the examination hall.
10) Smoking, chewing of gums, consumption of food and drinks are not permitted during the examination.

6.7.2 Procedures for the Handing of Suspected Examination Malpractice Cases

The following procedures shall apply in handling all suspected cases of examination malpractice in the University.

1) The attention of any other invigilator present should be drawn to the suspicious circumstance(s), if an invigilator suspects that a candidate has committed an examination malpractice offence, if another student suspects that there is misconduct he/she should alert the invigilator(s)
2) The invigilator(s) should approach the suspected candidate and inform him or her of the suspicion, and give the candidate an opportunity to make a written statement.
3) The invigilator(s) should withdraw the candidate's script and issue a fresh script for him/her to continue the examination. If any unauthorized material is discovered it should be confiscated by the invigilator(s) and tendered in the evidence against the candidate.

4) Within twenty-four hours the invigilator(s) should make a written report to the Chief Examiner, who is the Head of the Department.
5) Written account of the incident by the invigilator(s) suspect's script, any unauthorized materials by the invigilator(s), the Chief Examiner and other candidates (if appropriate in evidence) and the students statement must be submitted under confidential cover to the Registrar who shall forward it to the Central Student Disciplinary Committee within twenty-four(24) hours at the end of the course examination.
6) Suspension of an examination.
7) If however, during then marking, moderating or collating of examination materials, an Examiner or any member of staff suspects that malpractice has taken place, the Examiner or member of staff must confer with the Chief Examiner (Head of Department). As soon as a prima facie case has been established, the Examiner or member of staff must submit written reports with the student's script and other corroborating evidence to the Dean of Faculty through the Chief Examiner (Head of Department) within seventy-two hours. The student so affected must be informed immediately of the allegation and made to submit a written statement.
8) The suspect will be invited to appear before, and be heard by the Examination Misconduct Committee.
9) The decision of the Examination Misconduct Committee as approved by Senate shall be conveyed to the candidate.
10) All cases of examination malpractice must be disposed off within the shortest possible time but no longer than six(6) months.
11) All materials confiscated from students in proven cases of malpractice shall be kept by the University until punishment has been served.

Examination Regulations and Disciplinary Actions Requirements for the Examination

(1) In order to be eligible for a course examination, a student shall be expected to attend a minimum of 75% of the lecture, tutorials, practical and classes for the course in which he/she is registered. In this regard, course lecturers shall obtain and keep records of attendance.

(2) Once a student has registered for a course and he/she has not deregistered from the course by the sixth(6th) week into the semester, he/she is automatically deemed to have registered for the course examination.

(3) No student who has been admitted into the examination Hall shall postpone or withdraw from the examination except on acceptable medical grounds and in consultation with the Head of Department and the Dean of the Faculty.

(4) Candidates who fail to present themselves for an examination for reasons other than illness, accident or some exceptional circumstances shall be deemed to have failed the course. Any student absent on the ground of illness must produce a medical report certified by the University Director of Health Services.

6.8. Absence from examination

Candidates who fail to present themselves for an examination for reasons other than illness, accident or some exceptional circumstances shall be deemed to have failed the course. Any student absent on the ground of illness must produce a medical report certified by the University Director of Health services.

6.9. Graduation requirements

The curriculum which is compliant with the minimum academic standard of the National Universities commission (NUC-BMAS) is a four-year programme with the following categorization:

Summary of Minimum Requirements For B Sc. Degree in Mathematics

(Not less than 16 units of Electives must be taken)

Level	Semester	Compulsory courses		Required courses (General Studies)		Electives		Total	
		No. of courses	No. of credit units	No. of courses	No. of credit units	No. of courses	No. of credit units	No. of courses	No. of credit unit
	1st	02	06	09	18	0	0	11	24
100	2nd	02	06	09	18	0	0	11	24
	1st	05	14	04	08	0	0	9	22
200	2nd	06	12	03	06	0	0	10	20
	1st	06	18	0	0	01	03	7	21
300	2nd	05	15	0	0	02	04	7	19
	1st	05	12	0	0	02	06	7	18
400	2nd	03	12	0	0	01	03	4	15
TOTAL	**8th**	**34**	**95**	**25**	**50**	**06**	**16**	**66**	**161**

A student whose CGPA falls below 1.50 at the end of the first session shall be placed on probation in the following session. If he/she then fails to achieve a CGPA of at least 1:50 at the end of that session, he/she shall be required to withdraw from the University. A student will not be placed on probation until the end of the second semester of the first session; thereafter, it shall be from semester to semester. A student on probation shall not register more than the minimum load of 15 units for the semester for which he/she is on probation. A student who is unable to get out of probation at the end of the first semester shall be placed on extended probation till the end of the session, but a student who is out of probation at the end of the first semester shall be allowed to carry a maximum load unit during the following semester.

7.0. Quality Assurance:

Internal mechanism is being employed to ensure quality service delivery. For example departmental board of study meets regularly to evaluate service delivery using lecturer's notes, assignments, test and internal examination assessment. Also we interact with student for quality assurance purposes.

8.0. Programme Structure

8.1. Duration of Programme

The minimum number of units required for graduation and for the completion of class of degree beside Electives is **145** credit units for a four year program and **107** credit units for three year program.

The Federal University Oye-Ekiti shall require its undergraduate students to take and pass all courses specified and offered, including industrial attachment where applicable, by the faculty/department and approved by the senate before graduating from the chosen programme of study. The minimum pass mark shall be 40% (E) for all courses offered in the Federal University, Oye-Ekiti, except in selected professional courses where the pass mark shall be 50% (C). A student shall repeat a course in which he failed to obtain the minimum pass grade so as to be used in computation of CGPA. Other undergraduate graduation requirements are:

i. The Federal University Oye-Ekiti shall award its degrees on the authority of Senate only to students who have been found worthy in character and in learning;

ii. Students shall successfully complete and pass all prescribed examinations for courses required for a degree programme;

iii. Students shall not be involved in gross misconduct, such as, but not limited to: examination malpractice; conviction on felony; other convicted criminal offences; and association with or

membership of secret cult or of any organisation prescribed by the university or government;

iv. Students shall submit a research project which shall, as much as possible, develop the research skills of students;

v. Students shall be required to complete their studies in not more than one and a half times the normal duration of the programme to qualify for an Honour's degree except in cases of ill-health or as determined by Senate;

vi. For a student to be in good academic standing, the student must obtain a minimum cumulative grade point average of 1.0 at the end of each session. A student who fails to do so shall be placed on academic probation. If at the end of the probation year the CGPA still fall below 1.0, such a student shall be required to withdraw from the programme without prejudice to being admitted into another programme in the University;

vii. Students who attain a CGPA of less than 1.0 shall first register their backlog of required courses before they can, within the ceiling of 48 credit units, be allowed to register for other courses;

viii. Students who absent themselves for two consecutive semesters without a valid reason may be asked to withdraw from the University, irrespective of their CGPA;

ix. Students, for good reason and with the approval of Senate and upon recommendation by the Dean, may suspend their programme of study for a maximum of one calendar year; and

x. Students who transfer from one programme to another or from another University may be credited with those course credit units earned which are relevant to the curriculum of the new programme.

8.2. Summary of courses

Summary of 100 Level Courses

1	General Studies	9
2	Basic Science	26
3	Core Courses	12
4	Electives	0
5	SIWES	0
6	Entrepreneurship	1
	TOTAL	**48**

Summary of 200 Level Courses

1	General Studies	6
2	Basic Science	8
3	Core Courses	26
4	Electives	0
5	Fieldwork/SIWES/Seminar/Project	0
6	Entrepreneurship	0

Summary of 300 Level Courses

1	General Studies	0
2	Basic Science	0
3	Core Courses	33
4	Electives	7
5	Fieldwork/SIWES/Seminar/Project	0
6	Entrepreneurship	0

Summary of 400 Level Courses

1	General Studies	0
2	Basic Science	0
3	Core Courses	18
4	Electives	9
5	Fieldwork/SIWES/Seminar/Project	6
6	Entrepreneurship	0

8.3. Courses structure by semester

100 Level Courses 1st Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1	**General Studies**	GST 101	Communication in English I	Nil	2	0	0	R	2	**GST**
2		GST103	**Use of Library and ICT**	Nil	2	0	0	R	2	**GST**
3		GST 105	Intro to Entrepreneurship	Nil	1	0	0	R	1	**GST**
4	**Compulsory**	MTH 101	Elementary Mathematics I	Nil	2	0	1	C	3	Mathematics
5		MTH 103	Elementary Mathematics III	Nil	2	0	1	C	3	Mathematics
6		CSC 101	Introduction to computing I	Nil	2	0	0	R	2	Computer Sc.
7		PHY 101	General Physics I	Nil	3	0	0	R	3	Physics
8		PHY 107	Experimental Physics I	Nil	0	0	1	R	1	Physics
9		BIO 101	General Biology I	Nil	3	0	0	R	3	
10		CHM 101	General Chemistry I	Nil	3	0	0	R	3	Chemistry
11		CHM 107	Practical Chemistry I	Nil	0	0	1	R	1	Chemistry
			Total						**24**	

100 Level Courses 2nd Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1	**General Studies**	GST 102	Communication in English II	Nil	2	0	0	R	2	**GST**
2		GST 106	Evaluating, Opportunity & Business Concept	Nil	1	0	0	R	1	**GST**
3.		GST 108	Government, Society and Economy	Nil	2	0	0	R	2	**GST**
OR		GST 110	African culture civilization	Nil	2	0	0	R	2	**GST**
4	**Compulsory**	MTH 102	Elementary mathematics II	Nil	2	0	1	C	3	Mathematics
5		MTH 104	Elementary Maths IV	Nil	2	0	1	C	3	Mathematics
6		CHM 102	General Chemistry II	Nil	3	0	0	R	3	Chemistry
7		CHM 108	Practical Chemistry II	Nil	0	0	1	R	1	Chemistry
8		PHY 102	General Physics II	Nil	3	0	0	R	3	Physics
9		PHY 108	Practical Physics II	Nil	0	0	1	R	1	Physics
10		BIO 102	General Biology II	Nil	3	0	0	R	3	
11		CSC 102	Introduction to Computing II	Nil	2	0	O	R	2	Computer Sc.
			Total						**24**	

200 Level Courses 1st Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1	General Studies	GST 203	Feasibility Plan & Investment Decision-Making	Nil	1	0	0	R	1	GST
2		GST 205	Introduction to Philosophy, Logic and Human Existence	Nil	2	0	0	R	2	GST
3	Compulsory	MTH 201	Mathematical Methods I	MTH 101, 104	2	0	1	C	3	Mathematics
4		MTH 203	Sets, Logic and Algebra	MTH 101, 102	2	0	1	C	3	Mathematics
5		MTH 205	Linear Algebra I	MTH 101, 102	2	0	0	C	2	Mathematics
6		MTH 207	Real Analysis I	MTH 101	2	0	1	C	3	Mathematics
7		MTH 209	Intro to Numerical Analysis	MTH 101	2	0	1	C	3	Mathematics
8		MTH 231	Probability I	Nil	2	0	1	R	3	Mathematics
9		CSC 201	Computer Programming I	Nil	3	0	0	R	2	Computer Sc.
			Total						**22**	

200 Level Courses 2nd Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1	General Studies	GST 202	Peace Studies and Conflict Resolution	Nil	2	0	0	R	2	GST
2		GST 204	Resource Manag. and Organizational behavior	Nil	1	0	0	R	1	GST
3	Compulsory	MTH 202	Elementary Differential Equation	MTH 102	2	0	1	C	3	Mathematics
4		MTH 204	Linear Algebra II	MTH 101, 102	2	0	0	C	2	Mathematics
5		MTH 210	Vectorial Mechanics	MTH 104	2	0	1	C	3	Mathematics
6		MTH 214	Mathematical Packages I	Nil	0	0	1	C	1	Mathematics
7		MTH 216	Introduction to Complex Analysis	Nil	2	0	O	C	2	Mathematics
8		MTH 218	Mathematical Packages II	Nil	0	0	0	C	1	Mathematics
9		MTH 232	Statistics for Physical Sciences and Eng.	Nil	2	0	1	R	3	Mathematics
			Total						**18**	

300 Level Courses 1st Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1.	Compulsory	MTH301	Metric Space Topology	Nil	2	0	1	C	3	Mathematics
2.		MTH 307	Real Analysis II	MTH 207	2	0	1	C	3	Mathematics
3.		MTH 303	Vector and Tensor Analysis	MTH 210	2	0	1	C	3	Mathematics
4.		MTH 305	Complex Analysis I	MTH 216	2	0	1	C	3	Mathematics
5.		MTH 321	Abstract Algebra I	MTH 203	2	0	1	C	3	Mathematics
6.		MTH 319	Numerical Analysis I	MTH 209	2	0	1	C	3	Mathematics
7.	Elective	MTH 309	Discreet Mathematics:		2	0	1	E	3	Mathematics
		MTH 331	Probability Theory II		2	0	1	E	3	Mathematics
		MTH 333	Distribution Theory		2	0	1	E	3	Mathematics
		MTH 335	Statistical Inference		2	0	1	E	3	Mathematics
		MTH 315	Dynamics of a Rigid Body		2	0	1	E	3	Mathematics
		MTH 317	Geometry		2	0	1	E	3	Mathematics
									21	

At least 3 units from elective.

300 Level Courses 2nd Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1.	Compulsory	MTH 302	Ordinary Differential Equation	MTH 202	2	0	1	C	3	Mathematics
2.		MTH 304	Complex Analysis II	MTH 216	2	0	1	C	3	Mathematics
3.		MTH 306	Abstract Algebra II	MTH 203	2	0	1	C	3	Mathematics
4.		MTH 308	Introduction to Mathematical Modeling	MTH 210	2	0	1	C	3	Mathematics
5.		MTH 310	Mathematical Methods II	MTH 202	2	0	1	C	3	Mathematics
7.	Elective	MTH 324	Mathematical Packages III		0	0	1	E	1	Mathematics
		MTH 312	Optimization Theory		2	0	1	E	3	
		MTH 314	Analytical Dynamics:		2	0	1	E	3	
		MTH 316	Introduction to Operation Research		2	0	1	E	3	
									19	

At least 4 units from elective.

400 Level Courses 1st Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1		MTH 399	**Student Industrial Work Experience Scheme**		0	0	0	C	0	Mathematics
2	Compulsory	MTH 401	Theory of Ordinary Differential Equation	MTH 302	2	0	1	C	3	Mathematics
3		MTH 403	Functional Analysis	MTH 301	2	0	1	C	3	Mathematics
4		MTH 405	General Topology	MTH 301	2	0	1	C	3	Mathematics
5		MTH 407	Mathematical Methods III	MTH 310	2	0	1	C	3	Mathematics
6	Elective	MTH 411	Analytical Dynamics II		2	0	1	E	3	Mathematics
7		MTH 429	General Relativity		2	0	1	E	3	Mathematics
8		MTH 413	Fluid Dynamics		2	0	1	E	3	Mathematics
9		MTH 415	Systems Theory		2	0	1	E	3	Mathematics
10		MTH 417	Numerical Analysis II		2	0	1	E	3	Mathematics
11		MTH 427	Differential Geometry:		2	0	1	E	3	Mathematics
									18	

At least 6 units from elective.

400 Level Courses 2nd Semester

S/N	Groupings	Course Code	Course Title	Pre-req.	L	T	P	Status	Unit	Servicing Department
1	Compulsory	MTH 402	Theory of Partial Differential Equation	MTH 302 & 310	2	0	1	C	3	Mathematics
2		MTH 406	Lébesque Measure and Integrals	Nil	2	0	1	C	3	Mathematics
3		MTH 499	Research Project	Nil	0	0	6	C	6	Mathematics
4	Elective	MTH 408	Quantum Mechanics		2	0	1	E	3	Mathematics
5		MTH 430	Electromagnetism		**2**	**0**	**1**	**E**	**3**	Mathematics
6		MTH 412	Field Theory		**2**	**0**	**1**	**E**	**3**	Mathematics
7		MTH 414	Elasticity		**2**	**0**	**1**	**E**	**3**	Mathematics
8		MTH 416	Measure Theory		**2**	**0**	**1**	**E**	**3**	Mathematics
			Total						**15**	

At least 3 units from elective.

Note

(a) **Compulsory Course (C):** A course within the student's discipline that must be taken and passed. Marks scored will count towards graduation and student cannot graduate without passing it.

(b) **Required course (R**): A course within and /or outside the students discipline i.e a subsidiary course that must be taken and passed.

(c) **Elective course (E):** A course within and /or outside the student's discipline from which student may select a number for the purpose of fulfilling the minimum requirements for the award of the Degree. However, in order to graduate, a student must pass enough elective courses to meet the minimum number of credits require for the award of the degree.

(d) **Concurrent course (CC):** One that must be taken along with another stipulated one within the same session.

(e) **Prerequisite course (PR):** One that must be taken and at least 30% scored before another stipulated course can be registered for.

(f) **Hours (H)**

(g) **Practical (P)**

(h) **Theory (T)**

(i) **Pass:** Satisfactorily completing a course by scoring not less than 40% in the overall assessment of the course. This is necessary in order to obtain or earn the credit allotted to the course.

8.4. Course Description or synopsis

Detailed CourseDescription–100Level

FIRST SEMESTER– 100 LEVEL

MTH 101 Elementary Mathematics I (3+0+03Units)
(Elementary Set Theory and Numbers)
Elementary set theory; Subsets; Union; Intersection; Complements, Venn diagrams. Real numbers: integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers: algebra of complex numbers; the Argand Diagram. Demoivre's theorem, nth-roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae.

MTH 103 Elementary Mathematics III: (3 Units) (L30: P 0: T 15)
(Vectors, geometry and dynamics)
Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition and Scalar multiplication of vectors, linear independence. Scalar and vector products of two vectors. Differentiation and integration of vectors with respect to a scalar variable. Two-dimensional co-ordinate geometry. Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normal's. Impact of two smooth sphere, and of a sphere on a smooth sphere.

BIO 101: General Biology I (3 Units: LH 45)
The scope of Biology and its place in human welfare including characteristics of life, concepts in biology, topical issues in biology and career opportunities. Diversity and classification of living things. Cell structure and organization; functions of cellular organelles; diversity, general reproduction, interrelationship of organisms, heredity and evolution; elements of ecology and types of habitat. Differences between plants and animals. Variation and life cycles of plants to

include non-vascular plants like algae, fungi, bacteria, viruses, bryophytes and petridophytes. Varieties and forms or life cycles and functions of flowering plants.

CSC 101: Introduction To Computing I (Units 2: LH 30)
History of computers, functional components of a computer, characteristics of a computer, problem-solving, flowcharts and algorithms. The internet, social, ethical and professional issues of computing; software, hardware and networking development trend. Social application of computing; network communication, internet piracy, crime and computing technologies. Computer applications.

PHY 101 General Physics I: (3 Units) L 30: PO: T 15)
Space and Time, frame of reference, Invariance of physical law, relativity of simultaneity, relativity of time interval, relativity of length, Units and dimension, standard and units, unit consistency and conversions, Kinematics; `displacement, Time, and average velocity, instantaneous velocity, average acceleration, motion with constant acceleration, freely falling bodies, position and velocity vector, acceleration vector, projectile motion, motion in a circle and relative velocity. Vectors: units vectors, addition vectors, products vectors. Fundamental Laws of Mechanics; forces and interaction, Newton's laws of motion, mass and weight. Statics and dynamics: application of Newton's laws, dynamics of particles, frictional forces dynamics of circular motion. Galilean invariance; Universal gravitational; work and energy; Rotational dynamics and angular momentum; Conservation laws.

PHY 107 Experimental Physics I: (1 Units)
This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques will be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and

mechanical resonant systems, light, heat, viscosity, etc., covered in PHY 101, PHY 102 and PHY 103.

CHM 101 General Chemistry I 2 + 1 +0 (3 Credits)
Physical quantities and Units, Error treatments, States of matter: Derivation and calculations involving the use of the laws of gases. The mole concepts and determination of relative masses. Chemical equation and Stoichiometry: Modern electronic theory of atoms and electronic Configuration. Building up of periodic table and the periodicity. Chemical bonding and intermolecular bonds. Concept of Acid, Base and Salts. Chemical equlibria. Chemical Kinetics. Thermochemistry. Electrochemistry. Introduction to Nuclear Chemistry.

CHM 107 Practical Chemistry I 0+0+3 (1Credit)
A course designed to illustrate the principle covered in lecture course of CHM 101 Viz; Measurements using measuring Cylinder and use of the Top loading Balance, Data treatments; Volumetric Analysis: titration of strong acid against strong base/weak base, Standardization of Potassium tetraoxomaganate, Ethanoic acid; Back titration.

GST 101: Communication in English I 2 units
Effective communication and writing in English Language skills, essay writing skills (organization and logical presentation of ideas, grammar and style), comprehension, sentence construction, outlines and paragraphs.

GST 103: Use of Library, Study Skills and ICT (Units 2: LH 30)
Brief history of Library, Definition of library, Objectives of university library, Library Services, Types of Libraries, Components of Library (including Digital, Virtual and Electronic; Koha, OPAC and some of Academic Library Databases, Library Organisation, Library Catalogue, Cataloguing and Classification, Reference Sources and Services, Library Skills and Library Rules and Regulations.

GST 105: Introduction to Entrepreneurial Skills (Unit 1: LH 30)
History and background of entrepreneurship thought, definition of entrepreneurship and entrepreneur, relationship between entrepreneurship, entrepreneurship, technopreneurship, and management, entrepreneurship theory and Nigeria experience, approaches to entrepreneurship: psychological approach, sociological approach and distinctive competence. Understanding the entrepreneurial mindset. Business opportunities profile. Entrepreneurial case analysis/Training workshop.

SECOND SEMESTER 100Level

MTH 102 Elementary Mathematics II: (3 Units) (L30: P0: T 15)
Calculus: Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation. Extreme curve sketching; Integration as an inverse of differentiation. Methods of integration, Definite integrals. Application to areas, volumes (including approximate integration), and trapezium and Simpson's rules.

MTH 104 Elementary Mathematics IV (3+0+03Units)
(Elementary Algebra and Trigonometry)
Mapping, bijection, composition, inverse mapping, binary operations, associativity, identity elements and inverse element and distributivity. Relations: fundamental theorem of equivalence relations. Trigonometric ratios, sums and products formulae, multiple and sub-multiple angles, graphs of trigonometric functions and inverse circular functions. Solutions of triangles and trigonometric equations. Heights and distance in 2 and 3 dimensions geometry. Equations of line and planes, and other applications. Angles between two lines.

BIO 102: General Biology II (3 Units: LH 45)

A generalized survey of the animal kingdom based mainly on study of similarities and differences in the external features, ecological adaptation of these forms. Structural, functional and evolutionary study of Protozoans, Coelentrates, Platyhelminthes, Nematodes, Annelids, Arthropods, Echinoderms and Molluscs. Evolutionary sequence in the form and functions of Protochordates and various classes of vertebrates. Introduction to ecology to include simple ecological facts in terrestrial and aquatic habitat and the relationships between an organisms and its environment.

CSC 102 Introduction to Computing II 2 Units

System description techniques, flowcharts, algorithms, data flow diagrams, decision tables, etc. Program development life cycles, error. BASIC programming, statement, symbolic names, arrays, subscripts expression and control statements. Introduction to visual BASIC programming Language.

PHY 102 General Physics II: (3 Units) L 30: PO: T 15)

Electrostatics; conservation law of electric charges, electrons and electrostatics, Coulomb's law, electric field and forces, electric field line, electric dipoles charged particles in an electric field, charge and electric flux, Gauss's law and its applications, electric potential, electric potential due to a single charge, electric potential due to a dipole, electric potential due to continuous charge distribution equipotential surfaces. Conductors and currents: electric current, resistors and resistance, electric power, capacitors in series and parallel energy storage in capacitors and electric field energy, Gauss's law in dielectrics. Magnetism: magnetic field, magnetic force on a current carry conductor, Ampere's law, Bio-Savart law, electromagnetic induction, inductance, self-inductance, mutual inductance, Maxwell's equations; electromagnetic oscillations and waves; Applications.

PHY 108 Experimental Physics II: (1 Units)

This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques will be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc., covered in PHY 101, PHY 102 and PHY 103.

CHM 102 General Chemistry II 2+1+0 (3 Units).

Introduction to Organic Chemistry: Hybridization in carbon Sp^3, Sp^2 Sp. Nomenclature and classes of organic compounds. Homologous series of hydrocarbons, functional groups. Types of organic reactions: elimination, addition, substitution and rearrangement. Isomerism: structural and stereoisomerism. Chemistry of benzene, alcohols, phenols, aldehydes, ketones, acids, amines and amides. Structure of simple sugars, polysaccharides such as starch and cellulose, peptides and proteins, fats and oils. Isolation and purification of organic compounds.

CHM 108 Practical Chemistry (II) 0+0+3 (1Credit)

A course designed to illustrate the principle covered in lecture course of CHM 102 Viz; Test for Organic functional groups: Unsaturated hydrocarbons, alcohols, aldehydes and ketones., carboxylic acids, Ester, Phenol. Determination of melting point; determination of suitable solvent for recrystalization; separation by distillation

GST 102: Communication in English II (Units 2: LH 30)

Tale, Fable, Fairy Tale, Folklore, Elements of Drama, Elements of Prose, Elements of poetry, Figures of Speech.

GST 106: Evaluating Opportunities and Developing Business Concepts (Unit1: LH 30)

Perceiving market opportunities, sources of new ideas including census data. Method of generating ideas. Creative problem solving. Developing

the business concept. Conducting market research. Product planning development process. Legal issues in starting a business. Creativity, Business Innovation and Products Development.

GST 108: Government, Society and Economy (2 Units)
Concept of government, society, development and economy; The organization and structure of government; Evolution of the state; Political Philosophy; System of Government, The Rule of Law; Resources and Resource System; Social Mobility and Social Change; Environment and Culture; Social stratifications

GST 110: African Culture & Civilization (2 Units)
Concept of Nigeria, Culture and Civilization, History of the Nigeria nation, Pre-colonial Cultural Locations and Characteristics (Art, language, clothing and courtesy), Traditional 16 Concept of Economics, Peace and Development, Indigenous Administrative System and the Evolution of Nigeria's Political System, Indigene/Settler phenomenon and Conflict in Nigeria, Mores, Values, Norms and Nigerians' Perception of their World, Indigeneity/Citizenship and Nigeria National Identity Crises, Social Mobility and Social Change in Nigeria, Nigeria Environment and Culture.

FIRST SEMESTER– 200 LEVEL

MTH 201 Mathematical Methods 1 (3 Units) (L30: P 0: T 1)
Pre-requisite -MTH 101,104.

Real-valued functions of a real variable. Review of differentiation and integration and their applications. Mean value theorem. Taylor series. Real-valued functions of two or three variables. Partial derivatives chain rule, extrema, Lagrange multipliers. Increments, differentials and linear approximations. Evaluation of line, integrals. Multiple integrals.

MTH 203 Sets, Logic and Algebra I (3 Units) (L30: P 0: T 15)
Pre-requisite -MTH 101
Introduction to the language and concepts of modern Mathematics. Topics include; Basic set theory: mappings, relations, equivalence and other relations, Cartesian products. Binary logic, methods of proof. Binary operations. Algebraic structures, semi groups, rings, integral domains fields. Homeomorphism. Number systems; properties of integers, rational, real and complex numbers.

MTH 205 Linear Algebra II: (2 Units) (L15: P0: T 15)
Pre-requisite MTH 101, 102. Co-requisite MAT 203.
Systems of linear equation change of basis, equivalence and similarity. Eigenvalues and Eigenvectors. Minimum and characteristic polynomials of a linear transformation (Matrix).
Caley-Hamilton theorem. Bilinear and quadratic forms, orthogonal diagonalisation. Canonical forms.

MTH 207 Real Analysis I: (3 Units) (L30 P 0: T 15)
Pre-requisite -MTH 101
Bounds of real numbers, convergence of sequence of numbers. Monotones sequences, the theorem of nested Intervals. Cauchy sequences, tests for convergence of series. Absolute and conditional convergence of series and rearrangements. Completeness of real and incompleteness of rational. Continuity/and differentiability of functions R^n. Rolles and mean value theorems for differentiable functions Taylor series.

MTH 209 Introductions to Numerical Analysis (3 Units) (L.30 P0: T 15)
Pre-requisite - MTH 101
Solution of algebraic and transcendental equations. Curve fitting. Error analysis. Interpolation and approximation. Zeros or non- linear equations ‘to one variable’. Systems of linear equations. Numerical

differentiation and integration equations. Initial value problems for ordinary differential equation.

CSC 201 Computer Programming I 2 Credits Units

Introduction, The Basic rules of structural programming, programming steps, structural effects, I/O techniques, File management, Solution of selected problems objects, tools, properties and structure of applications using PASCAL.

MTH 231: Probability Theory I -3 UNITS

Further permutation and combination. Basic concepts, principles and laws of probability. Conditional probability. Bayes' theorem. Probability distributions of discrete and continuous random variables. Expectations and moment generating functions. Chebychev's Inequality. Bivariate, marginal and conditional distributions and moments. Convolution of two distributions. Central Limit Theorem and its uses.

GST 203: Feasibility Plan & Investment Decision-Making (Start your business/practical skills acquisition) (Unit 1: LH 30)

Executive Summary, Business Concept, Industry/ Market Analysis, Management Team,

Product /Service Development Analysis, Financial Analysis (Cash Flow), Sources of Raw

Materials, Sources of start-up Capital. (Case Studies: Snail rearing, Bee Keeping, Locust

Bean production, Homestead Fish Rearing and Soap Making).

different roles.

GST 205: Introduction to Philosophy, Logic and Human Existence (Units 2: LH 30)

Philosophy: Meaning, Method and application; Philosophical foundation of Human Existence; The Value of Philosophy to Man and Society; Ethics and Human Conduct; The Significance of Philosophy, Culture and Religion to National Development; Philosophy and Education; Philosophy of Language; The Nature of Logic; The Meaning, Structure and Types of Arguments; Fallacies and the use of Truth table; Symbolizing statements and argument in prepositional logic.

SECOND SEMESTER– 200 LEVEL

MTH 202 Elementary Differential Equations: (3 Units) (L30: P 0: T15):

Pre-requisite -MTH 104

Derivation of differential equations from primitive, geometry, physics etc. order and degree of differential equation. Techniques for solving first and second order linear and non-linear equations. Solutions of systems of first order linear equations. Finite linear difference equations. Application to geometry and physics.

MTH 204 Linear Algebra I: (2 Units) (L15 P 0: T 15)

Pre-requisite -MTH 101,102, 203

Vector space over the real field. Subspaces, linear independence, basis and dimension. Linear transformations and their representation by matrices - range, null space, rank. Singular and non-singular transformation and matrices. Algebra of matrices.

MTH 210 Vectorial Mechanics

Pre-requisite MTH 103

Vectors in Euclidean Spaces. Dot ad Vector products. Element of Vector Calculus. Gradients of Scalar functions. Curl and Divergence

of Vector fields. General Kinematics, momentum, angular momentum, fundamental equations of motion. Energy and conservation laws. Particle and rigid body Dynamics. Simple Harmonic oscillators and simple pendulum.

MTH 214 Mathematical Packages I -1UNIT

Algebraic computations using mathematical software's such as MATLAB, MATHCAD and MATHEMATICA. Introduction to LaTex and AMS-Tex. Some definitions. From Source code to Typeset conduct. Creating a simple LaTex document. Structuring your document. The graphic package. floats.

Defining Commands. Mathematics and Maths Extension with AMS-LaTex. Tabular Material. Placing figures

and Tables (Floats). Preparing a Bibliography. Document Layout.Workflow for creating a beamer presentation. Building a presentation. Changing the way things look. Creating supporting materials.

MTH 216 Introduction to Complex Analysis 2units

Complex number and Topology of complex plane. Limit and continuity of functions of complex variable. Properties and examples of analytic functions. Branch-Points. Cauchy-Riemann equations. Harmonic function.

MTH 218 Mathematical Packages II -1UNIT

Structures of a SAS program; writing a typical SAS program; navigating the SAS windows/virtual environment; employing tools in SAS for writing and debugging programs .Entering raw data internally in SAS and input raw data from external files to create SAS data sets. Manage SAS data sets by creating libraries – data exchanges between libraries. Working with SAS data sets. Output data from SAS, critically examine and interpret the outputs. Read data into SAS using various INFORMATS and various INPUT styles. Write SAS variables

with various FORMATS. Familiarity with several SAS numeric and character formats and informats; Subsetting data in SAS at the INPUT and OUTPUT stages; creating multiple data sets in a single DATA step. Exporting SAS data sets as raw data useful to other applications. Import data from, and export data to other applications using dynamic data exchange (DDE). Manipulation of data using the DROP and KEEP statements. Exercising DROP and KEEP options in appropriate statements in SAS. Familiarity with various SAS procedures as well as OPTIONS and ancillary statements within their OVERALL syntaxes. Applications in statistics/analytics.

MTH 232: Statistics for Physical Science- 3 UNITS

Measures of location, partition and dispersion in simple and grouped data. Elements of probability and probability distributions – Bernoulli, binomial, Poisson, geometric, negative binomial and normal distributions. Estimation and tests of hypothesis concerning parameters using t-, chi-square, and F- distributions. Regression and correlation coefficients. Analysis of Experiments using Analysis of Variance (ANOVA). Contingency tables and goodness of fit tests, Non-Parametric Inferences.

GST 202:Peace Studies and Conflict Resolution (Units 2: LH 30)

Peace and Conflict Studies: An overview of basic concepts, Conflict Analysis, Conflict Resolution and Transformation, Peace Education and Mediation process, Human Environment, Peace and Conflict, Human Right issues and conflict, Gender and Peace Process in Africa, Development and Peace building , Ethno-Religious Conflicts in Nigeria Peace and Conflict Theories

GST 204: Resources Management and Organisational Behaviour (Unit1: LH 30)

The Entrepreneur as a team leader and coach. Managerial skills and roles. Emerging trends in the workplace. Changing demographics and

the impact of technology. Emphasis on team-work. Job design. Behavioural consideration in job design. Physical consideration in job design. Practical: students of like minds work together in an organizational –like group performing

FIRST SEMESTER– 300 LEVEL

MTH321 Abstract Algebra I: (3 Units) (L30: P0: T 15)
Pre-requisite -MTH 101, 203
Group: definition, examples including permutation grounds. Subgroups, cosets. Lagrange theorem and applications. Cyclic, groups. Rings: definition examples including Z, Zn, rings of polynomials and matrices. Integral domains, fields. Polynomial rings, factorization. Euclidean algorithm for polynomials H.C.F. and L.C.M. of polynomials.

MTH 301 Metric Space Topology: (3 Units) (L30: P 0: T 15)
Sets, matrices, and examples. Open spheres (or balls). Open sets and neighbourhoods. Closed sets. Interior, exterior, frontier, limit points and closure of a set. Dense subsets and separable space. Convergence in metric space homeomorphisms. Continuity and compactness, connectedness. Pre-requisite -MTH 202.

MTH 303 Vector and Tensor Analysis: (3 Units) (L30: P0: T 15]
Pre-requisite -MTH 103, 201, 204
Vector algebra. Vector, dot and cross Products. Equations of curves and surfaces. Vector differentiation and applications. Gradient, divergence and curl. Vector integration, line surface and volume integrals Green, Stokes and divergence theorems. Tensor products of vector spaces. Tensor algebra. Symmetry. Cartesian tensors.

MTH 305 Complex Analysis I (3Units) (L30: P 0: T 15)

Pre-requisite - MTH 203, 207 Co-requisite - MTH 307

Functions of a complex variable. Limits and continuity of functions of a complex variable. Derivation of the Cauchy-Riemann equations. Analytic functions. Bilinear transformations, conformal mapping Contour integrals. Cauchy's theorems and its main consequences, Convergence of sequences and series of functions of a complex variable. Power series. Taylor series.

MTH 307 Real Analysis II: (3 Units) (L30: P0: T 15)

Pre-requisite - MTH 207

Riemann integral of functions in R^n, Continuous monopositive functions. Functions of bounded variation. The Riemann Stieltjes integral. Point wise and uniform convergence of sequences and series of functions in R. Effects on limits (sums) when the functions are continuous differentiable or Riemann integrable power series.

MTH 319 Numerical Analysis I: 3 Units (L 30: PO TIS)

Polynomial and splines approximation. Orthogonal polynomials and chebyshev approximations. Direct and interactive methods for the solution of systems of linear equations. Eigen value problem -power methods, inverse power methods. Pivoting strategies.

SECOND SEMESTER– 300 LEVEL

MTH 302 Ordinary Differential Equations II: (3Units) [L30: P 0: T 0 15]

Pre-requisite - MTH 202.

Ordinary differential equations: linear dependence, Wronskian, reduction order, variation of parameters, series solution about ordinary and regular points. Special functions: Gamma, Beta, Bessel, Legendre, Hyper geometric. Laplace transform and applications to initial value problems

MTH 304 Complex Analysis II: (3 Units) (L30: P 0: T 15)

Pre-requisite - MTH 203, 207

Laurent expansions. Isolated singularities and residues. Residue theorem. Calculus of residue, and application to evaluation of integrals and to summation of series. Maximum Modulus principle. Argument principle. Rouche's theorem. The fundamental theorem of algebra. Principle of analytic continuation. Multiple valued functions and Riemann surfaces.

MTH 306 Abstract Algebra II: (3 Units) (L30: P0: T 15)

Pre-requisite - MTH 203, 206

Normal subgroups and quotient groups. Monomorphic isomorphism theorems. Cayley's theorems. Direct products. Groups of sma1l order. Group acting on sets. Sylow theorems. Ideal and quotient rings. P.I.D. 8, U.F.D 'S Euclid's rings. Irreducibility; Field extensions, degree of an extension, minimum polynomial. Algebraic and transcendental extensions. Straight edged and compass constructions.

MTH 308 Introduction to Mathematical Modelling: (3 Units)

Pre-requisite - MTH 201, 202, 204, 303 (L 30: P 0: T 15), Co-requisite - MTH 302

Methodology of model building; Identification, formulation and solution of problems, cause-effect diagrams Equation types. Algebraic, ordinary differential, partial differential, difference, integral and functional equations. Application of mathematical models to physical, biological, social and behavioural sciences.

MTH 310 Mathematical Methods II (L30: P.O. T 15) 3units

Sturm – Liouville problem. Orthogonal polynomials and functions. Fourier series and integrals. Partial differential equations: general and particular solutions. Linear equations with constant coefficients, first and second order equations, solutions of the heat, wave and Laplace

equations by the method of separation of variables. Eigen function expansions. Methods of variation of parameters. Fourier transforms.

MTH 324 Mathematical Packages III (1+0+0) (1 Unit)
Pre-requisite - MTH 214
Programming with SAS numeric and character functions. DO groups-simple do, do loops and applications to repeated iteration; nested do loops. Joining and merging SAS data sets under different conditions. ARRAYS in SAS; applications in performing table-look-ups, rotating data sets, and performing repeated iterations using indexed variables. Accumulating totals –with the RETAIN, SUM and ASSIGNMENT statements. BY processing in SAS.

MTH 399 SIWES: Student Industrial Work Experience Scheme (0 Units)
During the SIWES each student will undergo practical on the job training in an engineering or banking industries approved for its relevance to the student's major for a minimum of 12 weeks starting immediately after the second semester examinations at 300 level.

FIRST SEMESTER 400 Level

MTH 401 Theory of Ordinary Differential Equations 3 Units
Differential equations: existence and uniqueness theorems dependence of solution on initial data and parameters. Properties of solutions. Sturm comparison and Sonin-Polya theorems. Linear and non-linear systems. Floquet's theory and stability theory. Integral equations: classification, Volterra and Fredlhom types Neumann series. Fredlhom alternative for degenerate Hilbert – Schmidt kernels. Reduction of ordinary differential equations to integral equations. Symmetric kernels, Eigen function expansion with application.

MTH 403 Functional Analysis 3 Units

Hilbert Spaces, bounded linear functional, operators an Banach spaces, topological vector spaces, Banach algebra.

MTH 405 General Topology: (3 Units) (L30: P0: T 15)

Pre-requisite - MTH 301.

Topological spaces, definition, open and closed setneighbourhoods. Coarser and finer topologies. Basis and Sub-Bases. Separatic axioms, compactness, local compactness, connectedness. Construction of new topological spaces from given ones; Sub-spaces, quotient spaces. Continuous functions, homeomorphism, topological invariants, spaces of continuous functions: Point wise and uniform convergence.

MTH 407 Mathematical Methods: (3 Units) (L30: PO: T 15)

Pre-requisite - MTH -201, 301, 405, Co-requisite - MTH 406

Calculus of variation: Lagrange's functional and associated density. Necessary condition for a weak relative extremum. Hamilton's principles. Lagrange's equations and geodesic problems. The Du Bois-Raymond equation and corner conditions. Variable end-points and related theorems. Sufficient conditions for a minimum. Isoperimetric problems. Variational integral transforms. Laplace, Fourier and Hankel transforms. Complex variable methods, convolution theorems. Application to solution of differential equations.

SECOND SEMESTER 400 Level

MTH 402 Theory of Partial Differential Equations 3 Units

Pre-requisite MTH 401

Theory and solutions of first-order and second order linear equations. Classification, characteristics, canonical forms, Cauchy problems. Elliptic equations; Laplace’s and Poisson’s formulae, properties of harmonic functions. Hyperbolic equations; wave equations, retarded

potential; transmission line equation, Riemann method. Parabolic equation. Diffusion equation, singularity function, boundary and initial – value problem.

MTH 406 Lebesque Measure and Integrals (3 Units) (L30: P0: T 15)

Pre-requisite - MTH 207, MTH 307.

Lebesque measure; measurable and non-measurable sets. Measurable functions. Lebesque integral: Integration of non-negative functions, the general integral convergence theorems.

MTH 499 Project: (6 Units)

Each student under the guidance of an approved supervisor is required to conduct research in an area approved by the Department, culminating in the submission of a project. 270h (p); C

LIST OF ELECTIVE COURSES:

MTH 309 Discreet Mathematics: (3 Units) (L45:PO:T15)

Pre-requisite - MTH - 201, 202, 308.

Groups and subgroups; Group Axioms, Permutation Group, Co-sets, Graphs; Directed and un-directed graphs, sub-graphs, cycles, connectivity, Application (flow Charts) and state transition graphs; lattices and Boolean Algebra, Finite fields: Mini-polynomials. Irreducible polynomials, polynomial roots, Application (error-correcting codes, sequences generators).

MTH 312 Optimization Theory: (3 Units) (L45 PO: TIS)

Pre-requisite - MTH 201, 202, 303. Co-requisite – MTH 302

Linear programming models. The simplex Method: formulation and theory. Quality integer programming; Transportation problem. Two-person zero-sum games. Nonlinear programming: quadratic programming Kuhn-tucker methods. Optimality criteria. Simple variable optimization. Multivariable techniques. Gradient methods.

MTH 314 Analytical Dynamics: (3 Units) (L30:PO: TIS)
Degrees of freedom. Holonomic and holonomic constraints. Generalized co-ordinates Lagrange's equations for holonomic systems; face dependent on co-ordinates only, force obtainable from a potential. Impulsive force.

MTH 315 Dynamics of a Rigid Body: (3 Units) (L 30: PO: TIS)
General motions of a rigid body as a translation plus a rotation. Moment, and products of inertia in three dimensions. Parallel, and perpendicular axes theorems. Principal axes, Angular momentum, kinetic energy of a rigid body. Impulsive motion. Examples involving one and two dimensional motion of simple systems. Moving frames of reference; rotating and translating frames of reference. Coriolis force. Motion near the Earth's Surface. The Foucault's pendulum. Euler's dynamical equations for motion of a rigid body with one point fixed. The symmetrical top. Procession.

MTH 316 - Introduction to Operation Research: (3 Units) (L 30: PO: TIS)
Phases of operation Research Study. Classification of operation Research models, linear Dynamics and integer programming. Decision Theory. Inventory Models, Critical Path Analysis and project Controls.

MTH 317 Geometry: (3 Units) (L30: PO: TIS)
Pre-requisite - MTH 104
Co-ordinate in R3. Polar co-ordinates; Distances between points, surfaces and curve in space. The plane, straight line. Basic projective Geometry, Affine and Euclidean Geometries.

MTH 408 Quantum Mechanics: (3 Units) (L30: PO: T 15)
Particle wave duality. Quantum postulâtes. Schrodinger equation of motion. Potential steps and wells in 1-dim Heisenberg formulation. Classical limit of Quantum mechanics. Computer brackets. Linear harmonic oscillator. Angular momentum. 3-dim square well potential.

The hydrogen atom collision in 3-dim. Approximation methods for stationery problems.

MTH 429 General Relativity: (3 Units) (L30: P 0: T 15)
Particles in a gravitational field: Curvilinear coordinates, intervals. Covariant differentiation; Chris-tofell symbol and metric tensor. The constant gravitational field. Rotation. The Curvature tensor. The action function for the gravitational field. The energy momentum tensor. Newton's law. Motion in a centrally symmetric gravitational field. The energy moment pseudo tensor. Gravitational waves. Gravitational fields at large distances from bodies. Isotropic space. Space-time metric in the closed and in the open isotropic models. The re shift.

MTH 430 Electromagnetism: (3 Units) (L30: PO: T 15)
Maxwell's field equations. Electromagnetic waves and Electromagnetic theory of lights. Plane electromagnetic waves in non -conducting media, reflection and refraction at place boundary. Waves guides and resonant cavities. Simple radiating systems. The Lorentz Einstein transformation. Energy and momentum. Electromagnetic 4-vectors. Transformation of (E.H.) fields. The Lorentz force.

MTH 411 Analytical Dynamics II: (3 Units) (L30: PO: T 15)
Lagrange's equations for non-holonomic systems. Lagrangian multipliers. Variational principles: Calculus of variation, Hamilton's principle. Lagrange's equation from Hamilton's Principles. Canonical transformations. Normal modes of vibrations. Hamilton-Jacobi equations.

MTH 412 Field Theory: (3 Units) (L30: PO: T 15)
Pre-requisite MTH – 300
Gradient, divergence and curl: Further treatment and application of the differential definitions. The integral definition of gradient, divergence and curl: Line, surface and volume integrals: Green's Gauss' and

Stroke's theorems. Curvilinear coordinates. Simple notion of tensors. The use tensor of notation.

MTH 413 Fluid Dynamics; (3 Units) (L30: PO: T 0)

Real and Ideal fluids. Differentiation following the motion of fluid particles. Equations of motion and continuity for incompressible inviscid fluids. Velocity potentials and Stokes Stream functions. Bernoulli's equation with application to flow along curved paths. Kinetic energy.

Sources, sinks, doubles in 2-and-3-dimensions, limiting streamlines. Images and rigid planes. MTH -314.

MTH 414 Elasticity (3 Units) (L30: PO: T 15)

Particle gravitational field: Curvilinear coordinates, intervals. Covariant differentiation. Christffel symbol and metric tensor. The constant gravitational field. Rotation.

MTH 415 Systems Theory (3 Units)

Lyapunov Theorems. Solution of Lyapunov stability equation ATP + PA = Q. Controllability and observability. Theorem on existence of solution of linear systems of differential operations with constant coefficients.

MTH 416 Measure Theory (3Units)

Abstract integration Lp-Spaces.

MTH 417 Numerical Analysis II (3 Units)

Finite difference equation and operations; Discrete variable methods for solution of IUPS -ODES. Discrete and continuous Tan methods for solving lLIP -ODES, error analysis. Partial differential equation. Finite difference and finite elements methods. Stability convergence and error analysis.

MTH 427 Differential Geometry: (3 Units) (L 30: PO: TIS)

Pre-requisite - MTH 317

Vector functions of a real variable. Boundedness. Limits. Continuity and differentiability. Functions Cm. Taylor's Formulae. Analytic functions. Curves: regular, differentiable and smooth. Curvature and torsion. Tangent line and normal plans Vector: Functions of Vector Variable: Linear continuity and limits. Directional functions of Class Cm. Taylor's theorem and inverse function theorem. Concept of a surface; parametric representation, tangent plane and normal lines. Topological properties of simple surfaces.

MTH 234: Statistics for Agricultural and Biological Sciences -3 Units

Uses of Statistics in Biology and Agriculture. Frequency distributions. Measures of location, partition and dispersion. Laws of probability. Probability distributions: binomial, Poisson, geometric, hyper-geometric, negative binomial and normal. Estimation and tests of hypotheses. Regression and correlation. Contingency tables. Introduction to Analysis of Experiments using Analysis of Variance (ANOVA).

(Not available for Mathematics/Statistics majors and not to be combined with MTH 232)

MTH 331: PROBABILITY THEORY II 3 UNITS

Brief revision of basic concepts. Probability generating functions. Univariate and bivariate characteristics functions. Various models of convergence. Laws of large numbers and the central limit theorem using characteristics functions. Random walk and Markov chains. Introduction to Poisson walk.

MTH 333: DISTRIBUTION THEORY 2 UNITS

Bivariate normal, Gamma, Chi-square, Beta, F- and t- distribution. Functions of random variables, cumulative distribution functions, moment generating functions and transformation techniques. Probability integral transformations. Order Statistics and their functions.

MTH 335: STATISTICAL INFERENCE 3 UNITS

Introduction to point and interval estimation theory. Point estimation by least squares and maximum likelihood methods. Properties of point estimator: unbiasedness, sufficiency, completeness, uniformly minimum variance. Rao-Cramer inequality, consistency, efficiency, best asymptotic normality. Confidence intervals and regions. General methods of finding a confidence bound for large sample confidence intervals. Guass-Markov and Fisher-Cochran theorems. Tests of hypotheses concerning population mean. Proportion and difference. Neyman-Pearson theorem.

9.0. Career outlets and job opportunities for graduates of the programme

FUOYE Mathematics' program is designed to also empower students to be able to manipulate developments in mathematics as part of the developments of several civilizations and which will ultimately lead to cultural and scientific development projected for modern societies. Our curriculum prepares students to enter graduate school, pursue careers in Pure and applied Mathematics and function as professional mathematicians in industries, research institutes and in the larger society.

10.0. Staffing

10.1. Academic staff

S/N	NAME	*ACADEMIC QUALIFI-CATION/ SPECIALIZATION*	RANK	STATUS
1	Dr. Olusola E. Abolarin	*B.Sc , M.Sc (Maths) and PhD*	Senior Lecturer/Ag. H.O.D	Full Time
2	Prof. Jacob A. Gbadeyan	*B.Sc , M.Sc (Maths) and PhD*	Professor	Sabbatical
3	Prof. Samson A. Olorunsola	*B.Sc , M.Sc (Maths) and PhD*	Professor	Adjunct
4	Dr.(Mrs) B. Ogunrinde	*B.Sc , M.Sc (Maths) and PhD*	Senior Lecturer	Adjunct
5	Dr. Opeyemi O. Enoch	*B.Sc ,M.Sc (Maths) and PhD*	Senior Lecturer	Full Time
6	Dr. Lukman S. Akinola	*B.Sc ,M.Sc (Maths) and PHD*	Senior Lecturer	Full Time
7	Dr. Emmanuel O. Adeyefa	*B.Sc ,M.Sc (Maths) and PHD*	Senior Lecturer	Full Time
8	Dr. John O. Kuboye	*B.Sc ,M.Sc (Maths) and PHD*	Lecturer I	Full Time
9	Dr. Emmanuel A. Bakare	*B.Sc ,M.Sc (Maths) and PHD*	Lecturer I	Full Time
10	Mr. O.A. Akintunde	*B.Sc and M.Sc (Statistics)*	Lecturer l	Full Time
11	Miss. A.M. Udoye	*B.Sc and M.Sc (Maths)*	Lecturer ll	Full Time
12	Mr. L.O. Salaudeen	*B.Sc and M.Sc (Maths)*	Assistant Lecturer	Full Time

10.2. Non-Academics Staff

S/N	NAME	*QUALIFICATION*	DESIGNATION /STATUS
1	Mr. O. S. Emegwara	*B.Sc (Cooperatives and Rural Development), 2006*	A.O II (Full Time)
2	Mrs. A. O. Oluwatoyin	*B.Sc (EDU. Economics), 2010*	A.O II (Full Time)
3	Mrs. R. E. Adeyemi	*B.Ed, Guidance and Counselling, 2009).(Pgd, Education, 2012).*	H.E.O (Full Time)
4	Mrs. O. Y. Ayeni-Fabamise	*NCE (2009)*	E.O (Full Time)
5	Mrs. Oluwatoyin D Ogundipe	*NCE*	S C.O (Full Time)
6	Mr. Kolawole Oyewusi	*HND (Statistics)*	Technologist II (Full Time)
7	Mr. Chidiebere C Onodugo	*B.Sc (Computer Science)*	Technologist II (Full Time)