FEDERAL UNIVERSITY LOKOJA

DEPARTMENT OF STATISTICS

B.Sc. STATISTICS

2020/2021 – 2023/2024

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Foreword

The information in this handbook is to acquaint students with the various opportunities offered by the Department of Statistics, Federal University Lokoja,Nigeria. It will also make the students know the various curricula leading to the award of Bachelor of Science (B.Sc.) Degree in Statistics, general academic regulations for degree course, examination regulations, offences and disciplinary actions, etc.

The Department aspires to drill students in Statistical theory, applications and computer knowledge that will equip them for career and job opportunities after graduation.

The Department also aspires to render consultancy services to Companies and Industries as part of its community service. The curriculum is structured in such a way that a graduate of B.Sc (Hons) Statistics of FUL will be able to achieve the above goals and be able to compete favourably with the graduate of Statistics of any University in the world. He/she will be able to pursue a postgraduate programme in Statistics.

Dr. B. Onoghojobi
Head, Department of Statistics

1. HISTORICAL BACKGROUND

The B.S. Statistics programme kicked off in the 2015/2016 academic session after the university Senate at its 27th meeting held on Wednesday 3rd June 2015 considered and approved the commencement of B.Sc. Statistics programme in the 2015/2016 academic session. The B.Sc. Statistics programme started under the the Department of Mathematical Sciences with Professor J. O. Omolehin as Head of Department using a curriculum that strictly follows the dictates of the approved NUC Benchmark for Minimum Academic Standards for undergraduate programmes in Nigerian Universities. The programme took-off in the 2015/2016 academic session with the admission of twenty eight (28) students. The B.Sc. Statistics programme was housed by the Department of Mathematical Sciences until 2019/2020 academic session.

The Department of Statistics was established and approved to take-off in the 2019/2020 Academic Session with the admission of thirty (30) students and Eight (8) Academic Staff, one (1) visiting professor and 2 non-academic staff, with Dr. B. Onoghojobi as the first Acting Head of Department who has been providing strong academic leadership and development towards the statistics programme.

2. PHILOSOPHY

The programme is designed to train students to be statistically literate and to be able to use statistical theory and practice to address Industrial matters and National Development.

3. AIM AND OBJECTIVES

3.1 AIM

The aim of the B.Sc. degree programme in Statistics is to train competent and versatile practicing statisticians who will lead in statistical systems as well as to contribute to the overall objectives of the Federal University Lokoja through excellence in scholarship and education in the statistical sciences.

3.2 OBJECTIVES

In order to accomplish the aim stated above, the objectives of the programme are to:

a. expose students to the knowledge of the fundamentals of statistics;

b. provide, promote and sustain sound theoretical and practical training in statistics as a foundation for technological development;
c. identify the basic scientific and technological problems in the areas of statistics and find appropriate solutions to them;
d. train students to be able to apply statistics to solve real life problems;
e. develop and offer academic and professional programmes as a foundation for postgraduate studies in Statistics;
f. provide consultation services concerning statistical methods and practices to the University community, Kogi State, Nigeria and the world and

4. RATIONALE/JUSTIFICATION

The rationale for introducing the programme is based on the need for broader training in mathematical sciences, freedom of wider choices in line with statistics students' core interest aimed at training competent statisticians for industrial requirements and national development.

5. LIST OF STAFF

5.1 Academic Staff

S/N	NAME	QUALIFICATION	STATUS	SPECIALIZATION
1	Prof. J. O. Omolehin	B.Ed. (ABU), M.Sc., Ph.D. (UNILORIN)	Professor	Optimization Theory
2	Prof. F. W. O. Saporu	B.Sc. (Ife), M.Sc. (Reading), Ph.D. (Bradford).	Professor	Applied Statistics
3	Dr. A. Tajudeen	B.Sc., M.Sc., Ph.D. (ABU).	Associate Professor	Solid State physical material
4	Dr. A. Wakili	B.Sc (ABU), M.Sc (UI), Ph.D (ATBU)	Associate Professor	Operation Research
5	Dr. B. Onoghojobi	B.Sc., M.Sc., Ph.D. (UI).	Senior Lecturer	Time Series and Regression Modelling
6	Dr (Mrs) H. O. Edogbanya	B.Sc. (UNIJOS), M.Sc. (UI), Ph.D. (UNILORIN)	Lecturer II	Modelling
7	Mr. D. A. Shobanke	B.Sc. (OAU), PGDS (UI), M.Sc. (ABU)	Lecturer I	Statistics
8	Dr. P. Otaru	B.sc., M.Sc., Ph.D.	Lecturer II	Statistics
9	Miss. C. P. Ezenweke	B. Tech. (FUTY), PGDE, M.Sc (Unilorin)	Lecturer II	Statistics
10	Mr. I. A. Adeniyi	B.Sc, M.Sc (UNILORIN)	Lecturer II	Big data Analytics Statistical Computing Statistical Modelling
11	Mrs. E. O. Upahi	B.Sc. (ABU), M. Sc. (UNILORIN).	Assistant Lecturer	Statistics (Survival Analysis)
12	Mr. Wilson	B.Sc., M. Sc.	Assistant Lecturer	Statistics

5.2 Administrative Staff

S/N	NAME	QUALIFICATION	STATUS
1.	Mr. H. Haruna	HND (Kogi Poly)	Assistant Registrar
2.	Mr. S. J. Udofa	OND (YABATECH)	Higher Executive Officer (Admin.)
3.	Mrs. R. O. Momoh	NCE (FCOE Okene)	Executive Officer (Admin.)
4.	Miss. J. Tsuzom	OND, HND (KADPOLY).	Senior Computer Operator
5.	Mr. Z. O. Idris	SSCE	Senior Clerical Officer
6.	Mr S. S. Agada	OND, HND (KADPOLY), PGD (ABU)	Principal Hardware Specialist II
7	Mrs. B. Abu	B.Sc. (ABU)	Laboratory Technician

6. EMPLOYMENT OPPORTUNITIES

Graduates of the Department are equipped with adequate and updated knowledge and skills in all areas of Statistics that will enable them fit into different sectors of the economy. There exist abundant job opportunities for our graduates in Industries (particularly Quality Control and research Units) such as Oil Companies, Banks and Financial Institutions, Automobile

Companies, Construction firms, Research Institutes, education sector, Aviation Industry, amongst others.

7. COMPUTING LABORATORY

The computing laboratory is with internet facility for Staff and Students to surf Academic information and materials. More so, programming and software applications are being taught to the students in the laboratory with installed software for Mathematics/Statistics such as SPSS, STATA, R, MATLAB, MAPLE, MATHEMATICA, LATEX, etc.

8. COURSE ADVISER

The Head of Department appoints for each level a Course Adviser, who is a member of Academic Staff. The course adviser approves Students' registration Forms, advises students individually and ensures right choice in line with the regulations and requirements for the award of degree.

9. WELFARE OF STUDENTS

The Department strives continually to provide very conducive atmosphere and conditions for the students to grow and study.

10. PROGRAMME OFFERED AND DURATION

The Department offers undergraduate courses leading to the award of the Bachelor of Science (B.Sc.) Honours Degree in Statistics. The duration for the award of B.Sc. (Hons.) degree in Statistics shall be for four (4) years (Eight Semesters) for Unified Tertiary Matriculation Examination (UTME) candidates and three (3) years (Six Semesters) for Direct Entry (DE) candidates. However, students that fail to graduate within the normal number of sessions will not be allowed to exceed a total of six (6) years (Twelve Semesters), if admitted through the UTME and five (5) years (Ten Semesters) if through DE.

11. ADMISSION REQUIREMENTS

In addition to the general requirements for admission into the University, candidates intending to study **B.Sc. Statistics** must fulfil any of the conditions below;

11.1 A. 4-year Full-Time Degree Programme

A Candidate must have at least five (5) credit passes in WAEC/NECO/SSCE/GCE or any relevant equivalent in not more than two (2) sittings. The O' Level must include English Language, Mathematics, Physics, and any two of Chemistry, Biology/Agricultural Sciences, Economics/Geography

UTME Subjects includes Use of English, Mathematics and any two of Physics, Chemistry, Biology, Economics/Geography

B. 3-years Full-Time Degree Programme

Candidates who possess any of the following qualifications may be considered for Direct Entry (D.E.) admission:

- In addition to **(11.1 (A))**, candidate must have at least two Advanced Level credit passes in the General Certificate of Education (GCE) in not more than two sittings. The subjects should include **Mathematics** and any other Science Subjects.

- In addition to **(11.1 (A)),** candidates possessing National Diploma with upper credit in Statistics or Computer Science from a NBTE approved institution.

12. REQUIREMENTS FOR AWARD OF DEGREE

For a candidate to be eligible for the award of a degree of Bachelor of Science in Statistics, the candidate must have successfully completed all prescribed courses as contained in the course description. The minimum number of units for the award of degree shall be 154 units and 117 units for a **4-year** and **3-year** degree programme respectively. These consist of;

4-year degree programme in Statistics

Compulsory courses:	132 units
Elective courses:	20 units
Total:	**152 units**

3-year degree programme in Statistics

Compulsory courses:	97 units
Elective courses:	20 units
Total:	**117 units**

13. REGISTRATION OF COURSES

(a) Course Listing

Compulsory Courses (**C**): These are courses that must be passed and used in computing the final result irrespective of the number of attempts so long as the programme permits

Elective Courses (**E**): These are courses which are chosen by a student according to his/her interest and on advice or guidance of his/her course adviser, in addition to those he must take to complete his/her degree requirement. It is advisable to pass the Electives because it will be used for computation of result.

Optional Courses (**O**): Candidate may not take it. It is mostly useful for Spill-Over students during registration

Pre-requisite and Co-requisite Courses: These courses must be taken and passed before the student can register for a more advanced course.

(b) General Registration Guidelines

1. Student must be aware of time schedule for registration and has to be in possession of proper identification at all times.
2. Student has to consult with his level coordinator before filling the course registration form.
3. Unrestricted elective courses chosen outside those listed must be approved by the Department.
4. At the point of registration, a student is expected to pay NAMSN and FOSSA dues and settle other charges as may be required from time to time.
5. De-registration of undergraduate project is not allowed beyond the second semester.
6. Registration problems associated with ill-health may be entertained (if supported with medical report that is authenticated by University Health Service).
7. A student is regarded as bonafide only when the necessary registration forms have duly been submitted to the Departmental Registration Officer. Students are therefore advised to strictly adhere to registration guidelines in their own interest.

(c) Work Load

A Student shall normally in any Semester be allowed to register for and take a minimum of 15 units and a maximum of 24 units. This means that no student can be credited less than 30 units or more than 48 units at the end of each academic year. Note that a course that carries 3 units implies a 3 hours of lecture and 1 hour of tutorial per week

14. Examination Guidelines

Examinations are normally held at the end of each semester. Examinations may take the form of written papers, oral examinations, practical, the submission of projects, any combination of these or any other form approved by senate. The Continuous Assessment (C.A.) of course work is normally included in determining examination results.

(a) Eligibility to Write End of Semester Examination

In order to be eligible for admission into any examination, a student must have been registered for the course unit to be examined and must have fulfilled the University requirements concerning residence, fees or other related matters. At least 75% attendance is required in all classes, tutorials, laboratories, etc. to qualify to sit for examinations.

(b) Examination Conducts

1. A student must be at the examination venue at least thirty (30) minutes before time of the examination. A student may be admitted up to thirty (30) minutes after the end of the examination but shall not be allowed extra time. On no account shall a student be allowed to leave the venue during the first hour or the last fifteen (15) minutes of the examination. A student must handover his/her scripts to the invigilator before leaving if he does not intend to come back.

2. A student who leaves the examination room shall not be admitted back unless during the absence, he has been continually under the surveillance of an invigilator/Assistant invigilator.

3. A student shall come along with his ID card and Examination Card in each examination and display them conspicuously on his desk. Each student shall complete an Attendance List bearing his name and matriculation number by signing, which shall be passed round during each examination.

4. No book, printed paper or written document or unauthorized materials shall be allowed into an examination room by any student, except as stated in the rules of the examination paper. A student must not during an examination directly or indirectly give assistance to any other student or permit any other student to copy from or otherwise use his papers. Similarly, a student must not directly accept assistance from any other student or use any other student's paper.

5. If any student is suspected to have infringed on any of the above provisions or in any

way to have cheated or disturbed the conduct of the examinations, a report shall be made as soon as possible from the Department to the Faculty Examination Officer and the Dean. The Dean will cause the circumstances to be investigated and reported to the Board of Examiners. The student involved shall be allowed to continue with the examination provided he does not cause any disturbance, however, the Board of Examiners may subsequently recommend to the Faculty Board and Senate whether his paper should be accepted and as to any other action that shall be taken on the matter.

6. A student shall write his examination number and not his name distinctly in the space provided at the top of the cover of every answer booklet or separate sheet of paper. The use of scrap paper is strictly prohibited as all rough work must be done in the answer booklet which must be submitted to the invigilator. Except for printed question paper, student may not remove from the examination room mutilate or any paper or other materials supplied. At the end of the time allotted for the examination, each student shall cease for from writing when instructed to do so and shall gather his scripts together for collection by the invigilator.

(c) Discipline

The examination regulation set out above binds all students, the breach of which carries serious punishments prescribed below;

(i) Expulsion from the University.

The following offences shall carry the punishment of expulsion.

(a) Impersonation at examinations. This may involve exchange of examination number, name/answer sheets or intentional use of someone else's examination number.
(b) Exchange of relevant materials in examination hall which may involve the exchange of question papers containing relevant jotting and materials.
(c) Exchange of answer scripts.
(d) Introduction of foreign materials to the examination hall.

(ii) Rustication for one academic year

The following offences shall carry the punishment of rustication for one academic session

(a) Non-submission or incomplete submission of answer scripts.
(b) Collaboration/copying from each other.

(iii) Written Warning

The following offences shall attract a written warning:

(a) Speaking/conversation during examination
(b) Writing on question papers.

(d) Deferment

A student who, for good cause, wishes to defer a semester or a whole session must put a formal application to the Vice Chancellor through the Head of Department and the

Dean of Faculty for consideration and approval by the Senate. This must be done in good time for such request to be tendered for consideration and final approval.

Deferment can be sought on the following ground:

- Admission related issue
- Ill health
- Emotional stress
- Other special circumstances

(e) Illness

While on campus, a student who falls sick should seek for immediate medical attention at the University Health Service. When necessary, the University Health Service may refer serious case elsewhere for further treatment. Whenever the medical condition of a student necessitates absence from academic activities, the Head of Department should accordingly be notified in writing and upon resumption for normal academic work, appropriate medical report must be presented. Any student who falls ill during an examination should immediately seek medical attention at the University Health Service and has to obtain appropriate medical report and forward it to the Department (HOD) as soon as possible. If the sick student must seek for further medical assistance outside the University Health Service, the Department (HOD) must be formally informed in writing before leaving the University or Lokoja. Outside the University Campus or Lokoja (e.g., while at home or holidays) if as a result of ill-health, a student is likely to be late for registration, the Department must be informed early enough. Upon resumption, supporting evidence(s) (e.g. medical report which has to be authenticated by the University Health Services) must be presented.

15. EXAMINATION AND GRADING SYSTEM

Beginning from the 2014/2015 Academic Session, the University adopted the 1.0 CGPA as the minimum requirement for good academic standing.

Each course is normally examined at the end of the Semester in which it is offered. Students' progress is assessed through continuous assessment (i.e. by way of test, written assignments, and other appropriate methods) consisting of 40% during the Semester. Examination at the end of the Semester carries 60%. Thus, the totality of every grade in each course is based on 100% marks. The score from each course is assigned appropriate letter grade as follows:

(i) Credit Units	**(ii) Percentile Scores**	**(iii) Letter Grades**	**(iv) Grade Points (GPA)**	**(v) Grade Point Average (GPA)**	**(vi) Cumulative Grade Point Average (CGPA)**	**(vii) Class of Degree**
Vary according to contact hours assigned to each course per week per semester and according to work load	70 – 100 60 – 69 50 – 59 45 – 49 40 – 44 0 – 39	A B C D E F	5 4 3 2 1 0	Derived by Multiplying (i) and (iv) and dividing by Total Credit Units	4.50 – 5.00 3.50 – 4.49 2.40 – 3.49 1.50 – 2.39 1.00 – 1.49	First Class 2nd Class Upper 2nd Class Lower Third Class Pass

carried by student						

Warning, Probation and Withdrawal

The academic standing of a student is being determined by the Cumulative Grade Point Average (CGPA). The minimum CGPA is 1.00.

(i) Warning

A student is warned if his/her CGPA drops below the minimum tolerable CGPA for the first time. This warning is usually in the form of Verbal advice by the Level Coordinator and the student should be made to be fully aware of the implication of dropping below the minimum tolerable CGPA in the next semester examinations.

(ii) Probation

A student is placed on probation for a period of two semesters if his/her CGPA at the end of a session is below the minimum tolerable level (1.00) i.e. CGPA less than 1.00.

(iii) Withdrawal

A student whose CGPA falls below 1.00 at the end of a probation period shall be required to withdraw from the program of study. Withdrawal from program can also be made on grounds of absence. A student who fails to register for two consecutive semesters without permission, automatically withdraws.

16. COMPUTATION OF RESULT

The following terminologies and abbreviations are commonly used in the computation of result. The

1. **Grade Point (GP):** Any awarded mark has a letter grade and a weight attached to it. Below is the grading system:

Table 1: Grading System

Mark	**Letter Grade**	**Grade Point** (P)
70 – 100	A	5
60 – 69	B	4
50 – 59	C	3
45 – 49	D	2
40 – 44	E	1
0 – 39	F	0

2. **Total Registered Credit Units (TRCU):** This is the summation of the Units' load $\left(\sum_{i=1}^{n} U_i\right)$ of all courses offered during the semester. For example a student who is taking 3 courses of 3 Units each as presented in table 2, has a

$$\text{TRCU} = 3{\times}3 = 9 \text{ Units for the semester}$$

3. **Cumulative Load Units (CLU):** This is the summation of Total Registered Credit Units (TRCU) over all the semesters from the beginning to date
4. **Total Credit Passed (TCP):** This is the sum of the product of course units and rating in each course for the entire semester, i.e. $\sum_{i=1}^{n} U_i P_i$ (where P is the Grade Point attached to the course and U is the unit of the course). Thus, from table 2,

   TCP$= (3\times5) + (3\times4) + (3\times2) = 33$ Units for the semester
5. **Cumulative Credit Point (CCP):** This is the summation of Total Credit Passed (TCP) over all semester from the beginning to date
6. **Grade Point Average (GPA):** This is the Total Credit Passed (TCP) divided by the Total Registered Credit Unit (TRCU). The highest possible GPA that can be earned is 5.0 after a student has earned a grade of 'A' in every course during the semester. The lowest GPA obtainable is 0.0.
7. **Cumulative Grade Point Average (CGPA):** This is the summation of TCP for all semester to date divided by the summation of TRCU for the said semesters

Numerical Example and Computation

Table 2: 100 Level Scores

Course Code	TRCU	Score	Points	TCP
STA 111	3	76	5	3 × 5 = 15
STA 112	3	65	4	3× 4 =12
STA 113	3	49	2	3× 2= 6

The calculation of **GPA** is as follows:

$$GPA = \frac{\sum_{i=1}^{n} TCP}{\sum_{i=1}^{n} TRCU} = \frac{(3\times5)+(3\times4)+(3\times2)}{3+3+3} = \frac{33}{9} = 3.67$$

where n is the number of courses and it is the turning variable.

Table 3: 200 Level Scores

Course Code	TRCU	Score	Points	TCP
STA 211	3	69	4	3 ×4 =12
STA 212	3	26	0	3 × 0 = 0
STA 213	3	56	3	3×3 = 9
STA 214	2	89	5	2× 5 =10
STA 215	3	63	4	3 × 4 =12

The GPA for 200 Level is calculated thus;

$$GPA = \frac{\sum_{i=1}^{n} TCP}{\sum_{i=1}^{n} TRCU} = \frac{(3\times4)+(3\times0)+(3\times3)+(2\times5)+(3\times4)}{3+3+3+2+3} = \frac{43}{14} = 3.07$$

While the **CGPA** for 100 – 200 level is calculated thus;

$$CGPA = \frac{\sum_{i=1}^{n} CCP}{\sum_{i=1}^{n} TRCU} = \frac{TCP\ (100L)+TCP\ (200L)}{TRCU\ (100L)+TRCU\ (200L)} = \frac{33+43}{9+14} = \frac{76}{23} = 3.30$$

** ***Note:*** $CGPA \neq \frac{GPA\ (100L)+GPA\ (200L)}{2} = \frac{3.37+3.07}{2} \neq 3.30$

All other rules and regulations are as contained in the Faculty of Science Handbook and in the University regulations and/or Students' Handbook.

17. LIST OF COURSES

The following are the courses to be offered and passed as part of the requirements for B.Sc. degree in Statistics. The courses with status labelled as C and E are compulsory and elective courses respectively.

100 LEVEL FIRST SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
MTH 101	Sets and Number System	C	2	O' Level Requirement
MTH 105	Differential and Integral Calculus	C	2	O' Level Requirement
MTH 103	Trigonometry and Co-ordinate Geometry	C	2	O' Level Requirement
STA 101	Descriptive Statistics	C	2	O' Level Requirement
STA 121	Statistical Inference I	C	2	O' Level Requirement
STA 131	Statistical Computing I	C	1	O' Level Requirement
STA 113	Probability Theory I	C	2	O' Level Requirement
CSC 101	Introduction to Computer Science	C	2	O' Level Requirement
GST 101	Communication in English and Use of Library	C	2	O' Level Requirement
GST 103	Nigeria Peoples and Culture	C	2	O' Level Requirement
GST 107	Logic, Philosophy and Human Existence	C	2	O' Level Requirement
PHY 111	General Mechanics	C	2	O' Level Requirement
	SUB-TOTAL		**23**	-

100 LEVEL SECOND SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
MTH 102	Algebra	C	2	O' Level Requirement
MTH 104	Conic Sections and Application of Calculus	C	2	O' Level Requirement
MTH 106	Vectors and Dynamics	C	2	O' Level Requirement
MTH 108	Introduction to Fuzzy Set Theory	C	2	O' Level Requirement

STA 124	Probability Theory II	C	3	O' Level Requirement
STA 114	Statistical Inference II	C	2	O' Level Requirement
STA 116	Statistical Computing II	C	1	O' Level Requirement
CSC 102	Introduction to Computer Applications	C	2	O' Level Requirement
GST 102	Communication in English	C	2	O' Level Requirement
GST 104	Communication in French/Arabic	C	1	O' Level Requirement
GST 110	History and Philosophy of Science	C	1	O' Level Requirement
PHY 122	Electricity, Magnetism and Modern Physics	C	2	O' Level Requirement
EDS 102	Introductory Entrepreneurship	C	2	O' Level Requirement
	SUB-TOTAL		**24**	-

GRAND TOTAL = $23 + 24 = 47$

200 LEVEL FIRST SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
MTH 211	Mathematical Methods I	C	3	MTH 103
MTH 217	Linear Algebra I	C	3	MTH 102
MTH 219	Numerical Analysis I	C	3	MTH 103
STA 231	Probability Theory III	C	3	STA 113 or STA 124
STA 219	Statistical Inference III	C	3	STA 121 or STA 114
STA 217	Statistical Computing III	C	1	-
GST 205	Environmental Health	C	1	-
CSC 211	Computer Programming I	C	2	CSC 101
MTH 213	Real Analysis I	E	3	MTH113
MTH 215	Abstract Algebra I	E	3	MTH 111
	SUB - TOTAL		**22**	

Minimum of three (3) credit units from Elective courses are required

200 LEVEL SECOND SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
MTH 210	Mathematical Package I (LATEX)	C	2	-
MTH 218	Linear Algebra II	C	2	MTH 102
MTH 220	Object Oriented FORTRAN Programme	C	2	CSC 101
STA 232	Social and Economic Statistics	C	2	-
STA 234	Design and Analysis of Experiments I	C	2	-
STA 236	Lab for experimental Design	C	1	-
CSC 202	Computer Programming III	C	3	
GST 202	Peace and Conflict Resolution	C	2	-
EDS 204	Enterprise Creation and Development	C	2	-
MTH 212	Ordinary Differential Equations	E	3	MTH 104
MTH 214	Real Analysis II	E	3	MTH 103
STA 222*	Statistical Methods for Biological Sciences		2	-
STA 202*	Statistics for Physical Sciences and Engineering		3	-
	SUB-TOTAL		**21**	

Minimum of three (3) credit units from Elective courses are required

GRAND TOTAL = 22 + 21 = 43

*Not for Statistics major

300 LEVEL FIRST SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
MTH 329	Introduction to Operations Research	C	3	MTH 217
STA 335	Design and Analysis of Experiment II	C	3	-
STA 333	Statistical Inference IV	C	3	STA 213
STA 317	Regression and Analysis of Variance I	C	2	-
STA 319	Survey Methods and Sampling Theory I	C	2	-
STA 329	Lab for Survey Methods and Sampling Techniques	C	1	-
STA 321	Statistical Quality Control	C	2	-
STA 327	Demography I	C	2	-
EDS 303	Entrepreneurship Mentorship	C	2	-
STA 323	Biometric Method I	E	2	-
STA 331	Psychometric Methods	E	2	-
	SUB-TOTAL		**22**	

Minimum of two (2) credit units from Elective courses are required

300 LEVEL SECOND SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
STA 300	SIWES	C	6	**Minimum of Sixty (60) and Thirty (30) Earned Credit Units for UTME and DE students respectively**
	SUB-TOTAL		**6**	

GRAND TOTAL = 22 + 6 = 28

400 LEVEL FIRST SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
STA 431	Distribution Theory	C	3	STA 231
STA 413	Non-Parametric Analysis	C	3	-
STA 419	Regression and Analysis of Variance II	C	3	STA 317
STA 421	Seminar	C	1	-
STA 427	Entrepreneurial and Professional Practice of Statistics	C	2	-
STA 411	Time Series Analysis	E	3	-
STA 423	Biometric Method II	E	3	STA 323
STA 425	Demography II	E	3	STA 327
STA 429	Introduction to Fuzzy Regression	E	3	-
STA 433	Actuarial Statistics	E	3	-
	SUB-TOTAL		**18**	

Minimum of 6 credit units from Elective courses are required

400 LEVEL SECOND SEMESTER

Course Code	Course Title	Status	Credit Units	Pre-requisite
STA 400	Research Project	C	6	-
STA 426	Logical Background of Statistics and Decision Theory	C	3	-
STA 414	Stochastic Processes	C	3	STA 231
STA 416	Multivariate Analysis	E	3	-
STA 418	Sampling Techniques II	E	3	STA 319
STA 420	Econometric Methods	E	3	STA 325
STA 422	Medical Statistics	E	3	-
STA 424	Environmental Statistics	E	3	-
	SUB-TOTAL		**18**	

Minimum of 6 credit units from Elective courses are required

GRAND TOTAL = $18 + 18 = 36$

18. SYNOPSES OF COURSES

CSC 101 – Introduction to Computer Science: (2 Units)
History of computer science and their generations. Computer Hardware; functional components Modern I/O units Software: Operating Systems, Application Packages. Program: Flow charts and algorithms, Number system and representation. Introduction to problem solving methods and algorithm development, designing, coding, debugging and documenting programmes using techniques of a good programming language style, programming language and programming algorithm development. Programming Fundamentals with BASIC (History of Programming), Programme Structure, Statement, Syntax and Semantics of programming.

GST 101 – Communication in English and Use of Library: (2 Units)
Study skills: Note- taking and Note- making, Techniques and Stages in Note- taking/making, Strategies on how to take/make notes, Organizing study time, Using the library, Examination techniques. Language skills: Listening, Speaking, Reading, Writing; Listening skills, Differences between listening and hearing, Reading: Meaning and type; scanning, skimming, study, critical, etc. Grammar: Definition, The canonical (8) Parts of speech, Nouns: description, types, pluralisation and functions, Verbs: description, forms, and types - Pronouns: description, types, function. Adverbs: description, identification, formation(comparison, order of adverbs) functions. Adjectives: description, identification, formation(comparison and order), function. Prepositions: description, types and functions. Conjunctions: description, types and functions. Interjection: description, uses. Tense: present/past. The Phrase: description (features), types and functions. The Clause: description (features), types and functions. The Sentence: description, elements, characteristics, types according to Structure and Function. Concord: description, principles and types. Ambiguity: definition, types; problems of ambiguity and how to overcome them. Punctuation: symbols/signs, uses; Capitalisation. Direct/Indirect speech; and Active/Passive Voice.
Lexis: Diction, synonyms, antonyms, homophones. Word formation: principles, roots/stems, affixes(prefix, infix, suffix), inflection, derivation, words without prefixes/suffixes, clipping, blending, reduplication, compounding. Vocabulary development/ Register: Transport, Journalism, Science/Technology, Photography, Religion, Politics etc. Figurative expressions and Idiomatic expressions: definition and types. Use of Dictionary. Literature: Introduction: a

synopsis, Functions of Literature, Genres of Literature, Appreciation of literary texts by students.

CSC 102: - Introduction to Computer Applications: (2 Units)
Operating Systems Fundamentals (definition, Functions, Features, and Examples) Microsoft Windows Operating Environment and Windows Accessories. Booting (Types) and shutting down the Computer, Using the Mouse and Keyboard, Files and Folders/Directories, Computer System Protection (Virus, Trojans, and Worms) Application Software (Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Microsoft Access, and Microsoft Publisher)

GST 102 – Communication in English: (2 Units)
Essay writing: Introduction: Overview, Components of Pre-writing Stage. Structure of an Essay (Introduction, Body, Conclusion), the Paragraph (Meaning, Types, Structure and Development), Essay Genres: Exposition, Narrative, Description, Argumentation. Elements of Effective Composition (Topic Sentence, Cohesion, Coherence, Unity, Completeness, etc., Letter Writing (with emphasis on the Formal Letter). Comprehension: Defining Comprehension, Comprehension Skills (context clues, reading between the lines, previous knowledge, identifying the writer's purpose), Types of Meaning (literal, implied/figurative[figures of speech]and conjectural meaning), Grammatical Structures and their Functions (Nominal, Adjectival and Adverbials), Comprehension Questions: Literal/Factual, Inferential/interpretative, Critical/judgemental, etc.,

Summary: Defining Summary, the link between Comprehension and Summary, Strategies for identifying the main idea(s)(thesis statement, topic sentence(s)), Hints for good summarising. Academic writing: Preliminary Considerations, Appropriacy of Registers, Citation (in text, footnotes, endnotes), Documentation (MLA and APA).

GST 103 – Nigerian Peoples and Culture: (2 Units)
Study of Nigerian history, culture and arts in pre-colonial times, Nigerian's perception of his world, Culture areas of Nigeria and their characteristics, Evolution of Nigeria as a political unit, Indigene/settler phenomenon, Concepts of trade, Economic self-reliance, Social Justice, Individual and national development, Norms and values, Negative attitudes and conducts (cultism and related vices), Re-orientation of moral and national values, Moral obligations of citizens, Environmental problems.

GST 104 – Communication in French/Arabic: (2 Units)
Introduction to French, alphabets and numeracy, for effectivecommunication (written and oral), Conjugation and simple sentence construction based on communication approach, Sentence construction, Comprehension and reading of simple texts.
OR
Introduction to Arabic alphabets and writing systems, Elementary conversational drills, Basic reading skills, Sentence construction in Arabic.

GST 107 – Logic, Philosophy and Human Existence: (2 Units)
A brief survey of the main branches of Philosophy, Symbolic Logic Special symbols in symbolic Logic-conjunction, negation, affirmation, disjunction, equivalent and conditional statements of law of tort. The method of deduction using rules of inference and

bi-conditionals qualification theory. Types of discourse, Nature of arguments, Validity and soundness; Techniques for evaluating arguments, Distinction between inductive and deductive inference, etc. (Illustration will be taken from familiar texts, including literature materials, Novels, Law reports and newspaper publications).

GST 110 – History and Philosophy of Science: (2 Units)
Man – His origin and nature, Man and his cosmic environment, Scientific methodology, Science and technology in the society and service of man, Renewable and non-renewable resources – man and his energy resources, Environmental effects of chemical plastics, textiles, wastes and other material; chemical and radiochemical hazards. Introduction to the various areas of science and technology. Elements of environmental studies.

EDS 102 – Introductory Entrepreneurship: (2 Units)
Introduction to entrepreneurship, GIST (Great Ideas for Starting Things); Market and Business Environment, Business Ethics, Financial Education, Small and Medium Enterprises in Nigeria, The Overview of Creativity and Innovation, Idea, Ideate, Ideation process and Opportunity Recognition; Creativity and Innovation in Modern Organization; Distinction between Creativity and Innovation; The Misinterpretation of innovation.
Skill acquisition/Training in any vocation/Technical field throughout the semester.

PHY 111 General Mechanics: (2 Units)
Units and dimensions; Dimensional check for correctness of equations and for deriving simple relations; Addition and Subtraction of vectors; Projectiles; Newton's Law; Conservation Laws; Elastic collisions; Work, energy and power; Circular motion, simple Harmonic motion; Motion of rigid bodies; Statics; Gravitation and Gravitational potential; Circular orbit and escape velocity.

STA 101 - Descriptive Statistics: (2 Units)
Statistical data; types, sources and methods of collection, Presentation of data; tables, chart and graphs, Errors and Approximations, Frequency and cumulative distributions, Measures of location, partition, dispersion, skewness and Kurtosis, rates, ration and index numbers

MTH 101 – Sets and Number System: (2 Units)
Sets: - Definition of a set; finite and infinite sets; equality of sets; subsets; union, intersection, universal set, complements, empty set, Venn diagram, symmetric difference, power sets and De-Morgan theorems, Inclusion-Exclusion principles, elements of relations and functions. Some Properties of number systems: - Natural numbers, integers, rational, irrational and real; Other relations in the set of real numbers, open and closed intervals on the number line. Complex Numbers: - Definition of a complex number, addition, multiplication and division, Geometric interpretation modulus and conjugation, Polar representation, De-Moivre's theorem, n^{th} roots of a complex number, n^{th} roots of unity.

MTH 103 – Differential and Integral Calculus: (2 Units)
Functions of a real variable: - Odd, even, periodic functions and their symmetries, graphs, composition of functions limits and continuity (Intuitive treatment only) concepts.
Differentiation: - First principle, techniques of differentiation in general, higher derivatives.
Integration: - Integration as the inverse of differentiation, techniques of integration in general, definite integral (evaluation only).

MTH 105 – Differential and Integral Calculus: (2 Units)

Circular Measures: - Trigonometric ratios of angles of any magnitude and inverse trigonometric functions.
Addition formulae: - $sin\ (A\pm B)$,$cos\ (A\pm B)$,$tan\ (A\pm B)$, multiple and half angles, solutions of simple trigonometric equations, factor formulae, solutions of triangles, heights and distances (including three-dimensional problems).
Plane Polar Coordinates: - Relation between polar and Cartesian coordinates, plotting and sketching of simple curves whose polar equations are known.
Coordinate Geometry of lines and Circles: - Pair of straight lines and system of circles (Emphasis on concepts rather than formulae).

STA 121 – Statistical Inference I: (2 Units)
Population and Sample; Random sampling; sampling distribution; Estimation (point and interval) and tests of hypothesis concerning population mean and proportion (one and two sample cases); Regression and Correlation Elementary.

STA 113 – Probability Theory I: (2 Units)
Permutation and Combination. Concepts and principles of Probability. Random variables. Probability and distribution Functions. Basic distributions: Bernoulli, Binomial, Hypergeometric, Poisson and Normal.

STA 124 – Probability Theory II: (3 Units)
Further permutation and combination, Probability laws, conditional probability, Bayes' theorem, Probability distribution of discrete and continuous random variables; Binomial, Poisson, geometric, hypergeometric, rectangular (uniform), negative exponential, normal, Expectations and moments of random variables, Chebyshev's inequality, Joint marginal and conditional distributions and moments, limiting distributions and moments

STA 121 Statistical Inference I: 2 Units
Population and samples. Random sampling Distribution, estimation (Point and interval) and Tests of hypotheses concerning population mean and proportion (one and two large sample cases). Regression and Correlation. Elementary time series analysis.

STA 131 Statistical Computing I: 2 Units.
Introduction to and use of calculators. Computations (using calculators), involving topics in STA 101, 121 and 131. Introduction to computer: structure, type, uses and applications. Introduction to computation using EXCEL, SPSS and R.

STA 114 Statistical Inference II: 4 Units (L 45)
Sampling and sampling distribution. Point and interval Estimation. Principles of hypotheses testing. Tests of hypotheses concerning population means, proportions and variances of large and small samples, large and small sample cases. Goodness –fit tests. Analysis of variance

STA 116 Statistical Computing II: 2 Units
Uses of computers in statistical computing. Introduction to basic computing and basic statistical analysis using packages such as EXCEL, SPSS, MINITAB, STATA and R. Use of statistical packages and programs in solving problems in probability theory and statistical inference.

MTH 102 – Algebra: (2 Units)
Quadratic and other polynomial functions: Elementary properties of quadratic expressions, general quadratic equation, roots of quadratic equations, the relationship between the roots of

a quadratic equation and its coefficients, application to symmetric functions, polynomial functions of third and fourth degrees, remainder theorem, location of roots.
Permutations and Combinations: Notion of Factorials, ${}^{n}P_{r}$, ${}^{n}C_{r}$, and simple applications, mathematical induction principle and applications.
Binomial Theorem: the general term of the binomial expansion, for positive integral index, expansion of all rational indexes, interval of convergence, approximations and errors.

MTH 104 – Conic Sections and Applications of Calculus: (2 Units)
Conics: Properties of parabola, ellipse, hyperbola, rectangular hyperbola, their Cartesian and parametric equations, problems involving elimination of parameters, tangents and normal.
Rate of Change: Velocity, acceleration and other rates.
Curve Sketching: Asymptotes, maxima and minima, Small increments, approximations and errors using differentiation, Newton's approximation, simple application of integration to areas and volumes.

MTH 106 – Vectors and Dynamics: (2 Units)
Vectors: Geometric representation of vectors in 1-3 dimensions, components, direction cosines, addition, scalar multiplication, linear independence and dependence of vectors, Scalar and vector products of vectors, Differentiation and integration of vectors with respect to a scalar variable.
Dynamics: Kinematics of a particle, Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of motion under gravity, projectiles, restricted vertical motion, elastic strings, simple pendulum, and impulse, Impact of two smooth spheres, of a restricted sphere and a smooth sphere.

MTH 108 – Introduction to Fuzzy Set Theory: (2 Units)
Fuzzy set theory: Introduction, Fuzzy versus Crisp, Fuzzy sets: Definition, Representation of fuzzy sets, different types, fuzzy -cuts and their properties, decomposition theorems. ✔-set basic concepts
Operations on Fuzzy sets: Extension principle for fuzzy sets, fuzzy compliments, t-norms and t-conorms, Definition of intersection and union by Hamacher, Yager's union and intersection of two fuzzy sets, intersection and union of two fuzzy sets as defined by Dubois and Prade, Combination of operations, Aggregation operations.
Fuzzy numbers and arithmetic: Introduction, Fuzzy numbers, Interval analysis, Fuzzy Arithmetic, Arithmetic operations on fuzzy numbers, lattice of fuzzy numbers and fuzzy equation.

PHY 122 – Electricity, Magnetism and Modern Physics: (3Units)
Electrostatics; conductors and currents; dielectrics; magnetic fields and induction; Maxwell's equations; electromagnetic oscillations and waves; Applications.

GST 202 – Peace and Conflict Resolution: (2 Units)
Basic concepts in peace studies and conflict resolutions, peace as vehicle of unity and development, Conflict issues, types of conflicts, e.g. ethnic/religious/political/economic conflicts, Root causes of conflicts and violence in Africa, Indigene/settler phenomenon, Peace – building, Management of conflict and security. Elements of peace studies and conflict resolution, Developing a culture of peace, peace mediation and peace-keeping, Alternative Dispute Resolution (ADR), Dialogue/arbitration in conflict resolution, Role of international organizations in conflict resolutions, e.g. ECOWAS, African Union, United Nations, etc.

EDS 204 – Enterprise Creation and Development: (2 Units)

Definition and conceptual of entrepreneurship; entrepreneurship mindset and behavioral traits; characteristics of entrepreneurship and success secret; new venture opportunities and ideas; the business start-up and new venture development; and practical registration of a business, future growth and new venture development; financial planning and management: sources of finance for start-up, savings and re-investment business model; managing money and business risk management; the sources of innovative opportunities; creativity and product development process; the market, the target, the consumer; creative management and the creative manager.
Skill acquisition/Training in any vocation/Technical field throughout the semester.

GST 205 – Environmental Health: (2 Units)
Introduction to Environmental health, environmental hazard and their effects on health, accident, contributions of students to environmental protection, violence and home and society, conservation of natural resources, HIV/AIDs.

CSC 211 – Computer Programming I: (3 Units)
Introduction to problem solving methods and algorithm development, designing, coding, debugging and documenting programmes using techniques of a good programming language style, programming language and programming algorithm development. A widely used programming language should be used in teaching the above. E.g. FORTRAN 92.

CSC 202 – Computer Programming III: (3 Units)
Python Basics, Basic types-Numerical types, Containers, Assignment operator, Control flow, if/else, for/range, while/break/continue, conditional expressions, advanced iteration, List Comprehensions. Defining functions-Function definition, Return statement, Parameters, Passing by value, Global variables, Variable number of parameters, Docstrings, Functions, objects, Methods. Reusing code: scripts and modules – Scripts, importing objects from modules, creating modules, "_main" and module loading, scripts or modules? How to organize your code, Packages, Good practices, Input and Output – Iterating over a file. Standard Library – os module: operating system functionality, shutil: high-level file operations, glob: Pattern matching on files, sys module: system-specific information, pickle: easy persistence. Exception handling in Python – Exceptions, Catching exceptions, Raising exceptions. Object-oriented programming (OOP).

STA 217 - Statistical Computing III: (1 Unit)
Use of computers in statistical computing, Use of statistical software/programs such as R, SPSS, STATA, and Python in solving problems in 200 level probability theory and statistical inference.

STA 219 - Statistical Inference III: (3 Units)
Sampling and Sampling Distribution; Point and Interval estimation; Principles of hypothesis testing; Tests of hypotheses concerning population mean, proportions and variance for large and small sample cases. Goodness of fit tests. Analysis of variance.

STA 231 - Probability Theory III: (3 Units)
Sample space, definitions and rules of probability, independence, Bayes' theorem, U_m models, Sampling with and without replacement, Inclusion-Exclusion theorem, Allocation and matching problems, Moment generating function, Probability generating function, Bernoulli trials, Binomial, Poisson, Hypergeometric, Negative binomial and multinomial distribution, Poisson process. Chebyshev's inequality. Law of large numbers. Central limit theorem. Distributions of functions of random variables. Bivariate normal distributions.

STA 232 –Social and Economic Statistics: (3 Units)
Statistics System: Nature, Types and Sources. Methods of collection and problems of official statistics. Design of questionnaires. Index number theory; construction and problems. Socio-economic indicators: nature, types, uses and computations. Nature, sources, content and problems of official statistics in selected sectors. Simple time series analysis: estimating trends and other components.

STA 234 - Design and Analysis of Experiments I: (2 Units)
Basic principles of experimentation, Randomization, replication and blocking, Local control, Basic designs: completely randomized, randomized blocks, Latin squares, Balanced incomplete blocks, split plot, Missing values, Relative efficiency, Estimation and tests of Variance components, Multiple comparisons, Departures from underlying assumptions, Applications to agriculture, biology and industry.

STA 236 - Laboratory/Field Work on Experimental Design I: (2 Units)
Computations based on field and laboratory appraisal of some of the techniques and problems on experimental design.

STA 222 - Statistical Methods for Biological Sciences (Not for Statistics Major): (2 Units)
Scope for statistical methods in Biological sciences. Sampling and sampling distribution. Point and interval Estimation. Principles of hypotheses testing. Tests of hypotheses concerning population means, proportions and variances of large and small samples, large and small sample cases. Goodness –fit tests. Analysis of variance.

STA 202 - Statistics for Physical Science and Engineering (Not for Statistics Major): (3 Units)
Scope for statistical methods in physical sciences and engineering. Measures of location, partition and dispersion. Elements of probability. Probability distribution: binomial, Poisson, geometric, hypergeometric, negative-binomial, normal. Estimation (Point and interval) and tests of hypotheses concerning population means proportions and variances. Regression and correlation. Contingency table analysis. Introduction to design of experiments. Analysis of variance.

MTH 210 – Mathematical Package I (LATEX): (1 Unit)
Introduction to LaTeX: Required components of LaTeX documents; error messages, typing LaTeX command
Document Structure: Page numbering and headings, creating title page, sections, cross references, table of content, abstract. Mathematical typesetting; Mathematical formulas, Greek letters, exponents and subscripts, fractions, sums, limit, operators, relations, roots, negation symbol, Spacing: Spacing between words, double spacing, sloppy line, breaks, enlarging pages. Accent and font styles: Accent, hyphenation, quotation marks, Tables, Arrays and lists: Constructing arrays, constructing tables
Multi-line equations: Multi-line equations, bracket symbols
Text formatting: Centering texts, special headers, bulleted lists, number list, bibliography and compound expressions. Slides: The slide class, how to use the slide class
Including graphics in your documents: Graphic file formats, graphics packages, including graphics within-your-document

MTH 211 – Mathematical Methods I: (3 Units)
Applications of Calculus: Revision of different techniques of differentiation, successive differentiation, Leibniz's theorem, Taylor's and Maclaurin's series. Tangents and normal to

plane curves, curvature, Definite integrals, Methods of integration, reduction formulae, lengths of arc of a plane curve, Area enclosed by a plane curve, Improper integrals
Partial Differentiation: Real valued functions of two and three variables. Partial derivatives, chain rule, Jacobian, Extrema, Lagrange's multipliers, increments, differentials and linear approximations

MTH 217 – Linear Algebra I: (3 Units)
Matrices: Definition, types of matrices, algebra of matrices, matrix as a sum of symmetric and skew Symmetric matrices. Elementary operations of matrices and echelon form, equivalence matrices. Inverse of a matrix
Systems of linear equations and matrices: Systems of m linear equations in n unknowns and their solutions. Gaussian elimination by pivot method and matrix representation, Solution of the system using Gaussian elimination and Gauss-Jordan reduction
Determinants: Definition, evaluation of determinants. Cofactor expansion, inverse of a non-singular matrix, Solution of systems of linear equations using Cramer's rule

MTH 219 – Numerical Analysis I: (3 Units)
Accuracy in numerical calculations: errors and their sources, error accumulation in different operations.
Finite differences: difference operators and difference table.
Evaluation of functions: using series approximation, solution of polynomial, algebraic and transcendental equations, curve fitting.
Interpolation: Newton's difference formulae, central difference formulae, Lagrange's formula. Numerical differentiation, numerical Integration

MTH 213 – Real Analysis I: (3 Units)
Preliminaries: Properties of real numbers, algebraic and topological properties, identity theorem, density theorem for Q and R. Ordering and properties
Boundedness: Boundedness and related simple results. Relations and Functions: Cartesian products of sets. Relations: relations, classes. Functions: injective, surjective, bijective, inverse, composition of functions, monotone functions, graph of functions, algebraic operations on functions.
Sequences and series of Real Numbers: Sequences of real numbers, subsequences, bounded and unbounded sequences. Limit of a sequence; limit superior and limit inferior, improper limits. Algebraic operations on sequences and their limits: Monotone sequences and properties. Cauchy sequences and related results, Series of real numbers: partial sums, convergence, absolute and conditional convergences. Convergence tests: comparison, ratio, Ra'abe, De-Morgan and Betrand, logarithmic, Cauchy root test. Cauchy condition for the convergence of series, rearrangement of series

MTH 215 – Abstract Algebra I: (3 Units)
Logic and Methods of Proof: Sentential logic; statements, sentential connectives (negation, disjunction, conjunction, implication) truth tables, tautologies (or valid statement formulae), quantifiers. Methods of proof; indirect (or proof by contradiction) method, contrapositive proof, natural deduction
Boolean algebra; basic definitions and some simple theorems
Elementary notion of Groups: Binary operations, closure, associativity, identity, inverse, group axioms, commutativity. Elementary properties of a group, Abelian groups, symmetric group of degree n, permutations and permutation groups, symmetric group of regular polygon

MTH 218 – Linear Algebra II: (3 Units)

Vector Spaces: Review of basic definitions and examples of vector spaces. Subspaces, linear dependence and independence, bases, dimension of a vector space. Homomorphism and quotient space, direct sum, Dual spaces
Linear Mappings and Matrices: General linear transformation of n-dimensional into m-dimensional space, matrix representation of a linear map, similar matrices and change of basis.
Eigenvalue and eigenvectors, Characteristic polynomial and characteristic equation, Cayley-Hamilton theorem, orthogonal diagonalization, Canonical Forms: Primary decomposition theorem, Triangular Jordan and Rational forms for linear operator (square matrices). Quadratic and bilinear forms

MTH 212 – Ordinary Differential Equations: (3 Units)
Order ordinary differential equations: Derivation of differential equations from primitives.
Differential Equations: Concept of differential equations. First order ordinary differential equations of the forms; variable separable, homogeneous, exact and linear. Second order ordinary linear differential equations with constant coefficients, auxiliary equation, and cases of auxiliary equations having distinct, equal, and complex roots, complementary functions and particular integrals in connection with non-homogeneous equations. Use of the operator $D=d/dx$ and the method of undetermined coefficients for calculating particular integrals, Differential equations of Euler's type of second order, Solutions of systems of two linear differential equations, Second order Ordinary Linear Differential Equations with variable coefficients; reduction of order, variation of parameters.
Series solution, Frobenius method, System of linear first order equations, Applications of differential equations to geometry and Physics, Partial differential equations: Solutions of one dimensional heat and wave equations.

MTH 214 – Real Analysis II: (3 Units)
Real Functions of one Variable: Limits of functions. Improper limits (limits at $+\infty$ and $-\infty$) Algebraic operations on limits of functions. Continuity of functions on sets and related results, Uniform continuity
Derivatives: derivative of functions and derivative of composition of functions. Higher order derivatives. Algebraic operations on derivatives of functions, Differentiability and some related results. Rolle's and Mean value theorems, Taylor's formula, L'Hospital's rule, local and global extrema, saddle points, monotonicity, and geometrical interpretations.
Riemann Integration: Partition of an interval, refinement, Riemann sums, Riemann integrals, uniqueness of Riemann integral, Darboux integral of a real valued function, relation between Riemann and Darboux integrals.

MTH 220 – Object Oriented FORTRAN Programme: (2 Units)
Structured programming elements, structured design principle, abstraction, modularity, stepwise refinement, structured design techniques, teaching of structured programming language
FORTRAN: Characters, constant and variables, Arithmetic assignment statement. FORTRAN standard functions. READ and WRITE statement, transfer of control, subscripted variables, DO statement. SUBPROGRAMS: Arithmetic function, function, Subroutine and Sub-program.
DECLARATIVE STATEMENTS: the DATA statement, the COMMON statement, etc.

STA 300 – Student Industrial Work Experience Scheme (SIWES): (6 Units)

EDS 303 – Entrepreneurship Mentorship: (2 Units)
Introduction, submission of mentorship report and grouping of students, entrepreneurship platform I, entrepreneurship platform II, entrepreneurship platform III, entrepreneurship innovations and opportunities in students specialized field of study, technopreneurship and IT

usage, Allocation of Mentors and group meetings, Group presentations, Global entrepreneurship Week (GEW).
Skill acquisition/Training in any vocation/Technical field throughout the semester.

STA 311 – Probability Distribution III: (3 Units)
Probability spaces measures and distribution, Distribution of random variables as measurable functions, Product spaces, Products of measurable spaces, product probabilities, Independence and expectation of random variable, Convergence of random variables, Weak convergence almost everywhere, convergence in path mean, Central limit theorem, laws of large numbers, Characteristic function and Inversion formula

STA 333 - Statistical Inference IV: (3 Units)
Criteria of Estimation: consistency, unbiasedness, efficiency, minimum variance and sufficiency. Methods of estimation: maximum likelihood, least squares and method of moments. Confidence intervals. Simple and composite hypothesis, likelihood ratio tests. Inferences about mean and variances.

STA 329 - Laboratory Field Work for Survey Methods and Sampling Theory: (2 Units)
Computations based on field and laboratory appraisal of some of the techniques and problems on sample survey.

STA 317 – Regression and Analysis of Variance I: (2Units)
Total, partial and multiple correlation ratios, Simple and multiple linear regression, Polynomial regression, Orthogonal polynomials, Simple non-linear way classification, Two-way classification, Three-way classification, balanced and unbalanced two factor nested (hierarchical) classifications, multiple comparisons component or variance estimates and tests

STA 319 – Sampling Techniques I: (2 Units)
Survey design, planning and programming, Methods of data collection, Design of form and questionnaires, Data processing, analysis and interpretation, Errors and biases, Probabilities and non-probability sampling: selection procedure. Estimation of mean, totals, ratios and proportions in simple random, systematic, stratified cluster and two-stage sampling, Probability proportion-to-size sampling, Nigeria's experience in sampling survey

STA 321 - Statistical Quality Control: (2 Units)
Basic concepts, Standardization and Specifications, Sources and detection of process variation, Control charts for attributes and variables and their properties: d, p, s and charts. Process capacity studies, Cumulative sum charts and their properties, Sampling inspection for attributes and variables and their properties: single, double, multiple and sequential plans. Continuous sampling plans

STA 323 - Biometric Methods I: (2 Units)
Purpose, history and structure of Biological assay, International standards, Statistical Science and Biological assays, Terminology and notation, types of biological assays, Nature of direct assays, Application to strophantus, Precision of estimates

STA 331 – Psychometric Methods: (2 Units)
The foundations of mental measurement theory: Measurement in Psychology and education. The Construction of true and error scores. The classical test theory model: fixed length, variables length: Some estimates of parameters of the classical model. Other weak type – score models: parallel measurements. Types of reliability co-efficient and their estimation. Some test theory for equivalent measurements. Item, sampling in test theory and in research design.

STA 327 – Demography I: (2 Units)
Data source, Population census, vital registration, demography, sample survey, International classification of diseases, injuries and causes of death, Birth and death rates, mortality indices, Measures of fertility, Reproduction rates, Standardization and vital statistics in Nigeria.

STA 335 - Design and Analysis of Experiments II: (3 Units)
Further split plot design and nested designs, unbalanced designs, incomplete block designs, 2! Factorial designs, Yates – Algorithm, confounding and fractional replication, Diallel cross analysis, Introduction to response surface methodology.

MTH 329 – Introduction to Operation Research: (3 Units)
Phases of operation research study, classification of operation research models, linear, dynamic and integer programming, decision theory, inventory models, critical path analysis and project controls. *Pre-requisite – MTH 221, 224*

STA 400 – Research Project: (6 Units)

STA 411 – Time Series Analysis: (3 Units)
Estimation and isolation of components of time series, Non-stationary and stationary processes, Theoretical moments, auto-correlation and partial auto-correlation, Sample moments: auto-correlations and partial auto-correlations, Univariate time series model, identification and estimation – auto-regressive (AR), moving (MA) and auto-regressive moving (ARMA), Diagnostic checking of models, Linear prediction and forecasting spectral (Harmonic) analysis

STA 413 – Non-Parametric Analysis: (3 Units)
Order statistics and their distributions, Test based on runs, Tests of Goodness of Fit, One sample and two sample linear ranks tests for location and scale, Tests for independent samples, Measure of association for bivariate samples and multiple classifications

STA 414 – Stochastic Processes: (3 Units)
Generating functions: tail probabilities and convolutions, Recurrent events, Random walk (unrestricted and restricted), Gamblers ruin problem, Markov processes in discrete and continuous time, Poisson, branching, birth and death processes, Queuing processes: $M/M/I$, $M/M/s$, $M/a/I$ queues and their waiting time distributions

STA 416 – Multivariate Analysis: (3 Units)
Multivariate normal and related distributions, Inference about mean vectors, Hotellings T^2 and Mahalanotis D^2 statistics, Multivariate analysis of variance, Tests of independence and homogeneity, Discrimination and classification, Principal components and factor analysis, Canonical correlation analysis, Cluster analysis.

STA 417 – Statistical Inference IV: (3 Units)
Criteria of estimation consistency unbiasedness, efficiency, minimum variance and sufficiency, Methods of estimation; maximunlikehood, least squares and method of moments, Confidence intervals, Simple and composite hypotheses, Likehood ratio test, Inferences about means and variance

STA 418 – Sampling Techniques II: (3 Units)

Ratio, Regression and Difference estimation procedures, Double sampling, Interpreting scheme, Multiphase and multistage sampling, cluster sampling with unequal sizes; problem of optimal allocation with more than one item, Further stratified sampling

STA 419 - Regression and Analysis of Variance II: (3 Units)
Multi-collinearity, autocorrelation and hetero-scedasticity, Residual analysis. Transformations, Comparison of intercepts and slopes, Simple non – linear regression, Logistic regression, Use of dummy variables, Departures from ANOVA assumptions, Transformations, Missing values, Analysis of covariance in one-way, two-way, three-way and nested (hierarchical) classifications. Analysis of covariance with two concomitant variables

STA 420 - Econometric Methods: (3 Units)
Nature of econometric. Econometric models: nature types and characteristics. Econometric problems related to single equation models. Construction estimation and tests. Models involving lagged variables. Simultaneous equation systems; structural form, reduced form, identification, estimation and test. Application of econometric models: demand analysis, production functions, consumption and investment function

STA 421 – Seminar: (1 Unit)
Seminar topic will be given to the Student by their Supervisor(s), which will be delivered by the student under the evaluation of the Departmental Board of Studies. The seminar report must be in soft biding

STA 422 – Medical Statistics: (3 Units)
Scope and nature of medical statistics. Epidemiology methods: relative risks and odds ratios, adjustment of data with and without use of multivariate models, cohort studies (life tables). Competing risks, survival analysis. Sequential methods in clinical trials. Stochastic models epidemiology

STA 423 – Biometric Method II: (3 Units)
Stability models, simultaneous selections models. Path analysis. Discriminant analysis. Parallel line and slope ratio assays in completely randomized block and incomplete block designs. Logistic curve and logic transformations in relation to bio-assays.

STA 426 – Logical background of Statistics and Decision Theory: (3 Units)
Empirical sources of knowledge. Scientific attitude. The concept of causation. Probability. A brief of historical treatment to show conflicting definition. The place of statistical methods in science. Principles of decision making. Utility functions and their properties. Role of uncertainty. Bayes strategies. Problems of prior and posterior distribution: value of prior information. Minimax strategies. Statistical inference. Theory of Game.

STA 427 – Entrepreneurial and Professional Practice of Statistics: (2 Units)
Introduction to statistical practice. Use of computers in statistical computing, using statistical software/programs such as MINITAB, SPSS, EViews and R in solving real life problems. Formulating research problems in statistical terms. Common study designs and corresponding analysis plans. Interpretation and communication of results from statistical analysis and report writing. Predictive modelling and Machine learning techniques using R and Python. Introduction to simulation and empirical studies.

STA 424 – Environmental Statistics: (3 Units)
Scope, nature and sources of environmental statistics. Assessment of environmental quality and measurement of air and water pollution. Sampling methods in natural and applied sciences. Environmental Impact Assessment. Requirement for environmental reporting

system. Characteristics and uses of the United Nations frame work for the development of environmental statistics. Capacity development for environmental reporting system.

STA 425 – Demography II: (3 Units)
Estimating fertility, mortality and nuptiality from limited and defective data. Stationary, stable and quasi-stable population models: theory and applications. Multiple decrement life tables. Population projections: mathematical models, component methods and matrix analysis. Path analysis and multiple classification analysis.

STA 429 - Introduction to Fuzzy Regression: (3 Units)
Fuzzy linear regression basics; the possibilistic regression model; fuzzy least-squares regression (FLSR) model; hybrid fuzzy regression; fuzzy estimate of the TSIR.

STA 431 - Distribution Theory: (3 Units)
Distribution of quadratic forms. Fisher – Cochran theorem, Special univariate distributions, Multivariate normal distributions. Distribution of order Statistics from continuous populations. Characteristic and moment generating functions. Uniqueness and inversion theorems. Limit theorems. Distributions of functions of random variables. Distribution associated with normal, χ^2, t and F distributions. Bivariate normal distributions. Bivariate moment generating functions.

STA 433 – Actuarial Statistics: (3 Units)
The time value of money; compound interest and discounting; present values and Accumulated values of streams of payments. Decremental rates and other indices; Annities and sinking funds; solving equations of value; Investment and Appraisal Techniques; Analysis of experiments data and derivation of exposed to risk formulae. Graduation methods (and their applications to curve fitting). Construction of mortality, sickness, multiple decrements and similar tables with applications to life insurance. National social security and pension schemes.