BAUCHI STATE UNIVERSITY,

GADAU

FACULTY OF SCIENCE

DEPARTMENT OF

MATHEMATICS

STUDENTS HANDBOOK

1 CHAPTER ONE: INTRODUCTION

1.1 The University logo

The approved logo of Bauchi State University is an artist effort to capture the University's vision, mission, philosophy and objectives.

- Stretched hide skin …….. Livestock
- Green colour……Crops
- Yellow colour é é é é é é é é é é Mining
- Flameé é é é é é é é é é é é ...Learning and Energy

Motto The Hausa inscription *IlimiTushenCigaba*is the motto, it simply means *Knowledge is the foundation of progress*.

1.2 Philosophy and Objectives of the University

Vision

The vision of Bauchi State University is to become a center of excellence in scholarship in as many academic disciplines as may be needed in response to intellectual and other development needs of the people of Bauchi State in particular and nation at large.

Mission

Through its teaching and research activities Bauchi State University is expected to be a significant contributor in extending the various frontiers of knowledge for the benefit of its student and society at large.

Philosophy

Bauchi State University will be an environment conducive for freedom of thoughts expression of enquiry for all. To this end, its doors will be open to all staff and students irrespective of creed, gender and religious belief. The overall philosophy is to endeavour in seeking the truth and disseminating same for the good of all mankind.

Objectives

To realize its vision and mission, Bauchi State University must work assiduously to achieve the following objectives as pre-condition:

- Identify, recruit and or attract the finest staff manpower to carry out its vital traditional functions of teaching, research and community service.
- To encourage the advancement of learning and to hold out all person without distinction of race, creed, sex or political conviction, the opportunity of acquiring higher and liberal education.
- To provide courses of instruction and other facilities for the pursuit of learning in all its campuses, and to make those facilities available on proper terms to such persons as are equipped to benefit from them.
- To encourage, promote scholarship and conduct research in all field of learning and human endeavour.
- To relate the activities to the social and economic needs of the people of Nigeria.

- To undertake any other activities appropriate for a University of the highest other.

1.3 Brief History of the Department

The Department of Mathematics was established in February 2012 as one of the pioneer Departments in Faculty of Science with Dr SaminuIliyasuBala as the first Head of Department. The Department started with 10 academic staff of which four are Computer Scientists, one statistician while the remaining are Pure/Applied Mathematicians. The number of staff has increased over the past two years to 26 including one female.At its inception, the Department started with 13 students. The number of students has now risen to 25 with two females. The number of students can be broken down as:

LEVEL 100	10 STUDENTS
LEVEL 200	7 STUDENTS
LEVEL 300	8 STUDENTS

Table1.1: Number of Students per Level

Figure 1.1: Two Hundred Level Students,*(2013/2014 Session)*

Figure 1.2: Three Hundred Level Students(Pioneer Students) *(2013/2014 Session)*

Figure 1.3: Two Hundred Level Students (2013/2014) with some staff members

Figure 1.4: Three Hundred Level Students (2013/2014) with some staff members.

2.1 Philosophy and Objectives of the programme

The philosophy of this programme is based on the belief that :

1. Education is a tool for national growth;
2. Education fosters the worth and development of an individual into a sound and effective citizen for the sake of the individual, and society in general;
3. Through provision of usable education, an individual can be fully integrated into the society;
4. Mathematics furnishes the knowledge and skills needed in the quest of technological advancement in modern era;

also considering;

A. the relevance of Mathematics in providing a solid base upon which scientific knowledge is built;
B. the importance of Mathematics in providing the necessary skills and training for the attainment of societal development;
C. necessity to train Mathematicians for the purpose of pursuance of interdisciplinary studies/research;

together with the

a. importance of the government's policy in the training of Mathematicians at all levels of education;
b. the high demand of Mathematicians in both public and private sectors of the society;

The BSc Mathematics programme has the following objectives :

i. To give high-level manpower training in the field of Mathematics with a view to producing the much needed human resources.

ii. produce highly skilled individuals who would be self-reliant and utile members of the society

iii. Further popularize the importance of Mathematics knowledge and its relevance to personal/national progress.

iv. Groom students intellectually to pursue graduate studies to become researchers and in all fields of Mathematics.

2.2 Admission Requirements

Candidates with the following qualifications are eligible for admission:

2.2.1 LEVEL 100

Five passes at credit level two of which must be in Mathematics and English, and the remaining from Biology/Agricultural science, Chemistry, Geography, or Physics. In addition, an acceptable pass in the Unified Tertiary Matriculation Examinations (UTME) into 100-level is required.

1. Diploma in Mathematics Education
2. Diploma in Statistics
3. IJMB (relevant subjects- Mathematics/Physics)
4. N.C.E. (relevant subjects -- Mathematics/Physics)
5. Any other equivalent qualification.

2.3 Regulations for the BSc Mathematics Programme

The concurrent General Regulations of the University and the Regulations of the Faculty of Science apply. In addition to such regulations, the following regulations also apply for the B.Sc. (Mathematics) Programme:

1. In addition to the compulsory Mathematics courses, each Level One Mathematics student takes Mathematics and Physics among his/her three subjects. In exceptional circumstances, a student may be allowed to take Chemistry in place of Physics.

2. Every Level One student is to take the Level I General Studies Programme course (GSP 1201-Use of English, GSP 1202-Use of Library and Computer) offered by the General Studies Unit. Level Two students are to take the Level two GSP course open to Science students (GSP 2201- Foundation of Nigerian Culture, GSP2202 -- Nigerian Government and Economy and GSP 2222- Peace Studies and Conflict Resolution). Level three student are take the Entrepreneurship Studies at that Level.

3. Unless the contrary is stated, all Mathematics courses are core courses. All GSP courses are also core courses.

4. CSC 2302 and CSC 2201 are service courses for other Departments, and are not to be taken by Mathematics students. If taken, they would not be counted towards a degree in Mathematics.

5. The minimum duration of the programme is four academic sessions and the maximum is six academic sessions. Where a student fails to satisfy the minimum graduation requirement after exhausting the maximum time, he/she is withdrawn from the programme.

6. To get the B.Sc. (Mathematics) degree, a student must pass all core courses and obtain at least 24 credits each from Levels III and IV Mathematics courses. This is in addition to the normal University Requirement of obtaining a minimum of 30 credits per level.

The summary of the minimum requirements is as follows:

	MTH/STA Credits	CSC Credits	GSP Credits	Other Science Courses Credits	Total
Level I	12	02	04	16	34

Level II	25	06	06		37
Level III	41	00	02		43
Level IV	30	00	00		30

Table2.1: Minimum requirement per Level

2.4 List of Courses

Courses are designed to incorporate the NUC minimum standard benchmark. However, the course numbering differs slightly.

2.4.1 Level 100

FIRST YEAR (100 LEVEL) **First Semester**

Course Code	Course Title	Credit Units
*MTH 1301	Elementary Mathematics I (Algebra & Trigonometry)	3
MTH 1303	Elementary Mathematics III (Vectors Geometry and Dyanmics)	3
CSC1201	Introduction to Computer Science	2

Table 2.2 Level I First Semester Courses

FIRST YEAR (100 LEVEL) **Second Semester**

Course Code	Course Title	Credit Units
*MTH 1304	Elementary Mathematics II (Calculus)	3
STA 1312	Probability I	3

Table 2.3 Level I Second Semester Courses

* These courses are compulsory for every Level One student in the Faculty of Science.

2.4.2 Level 200

SECOND YEAR (200 LEVEL) **First Semester**

Course Code	Course Title	Credit Units
CSC 2301	Computer Programming I	3
*CSC 2201	Introduction to Computer Science	2
MTH 2301	Mathematical methods I	3
MTH 2203	Linear Algebra I	2
MTH 2303	Sets, Logic & Algebra I	3
MTH 2307	Real Analysis I	3
STA 2211	Probability II	2

Table 2.4 Level II First Semester Courses

SECOND YEAR (200 LEVEL) **Second Semester**

Course Code	Course Title	Credit Units
*CSC 2302	Application of Computers to Science.	3
CSC 2320	Computer Programming II	2
MTH 2302	Elementary Differential Equations	3
MTH 2204	Linear Algebra II	2
MTH 2308	Introduction to Numerical Analysis	3
MTH 2210	Vector Analysis	2
STA 2212	Probability III	2

Table 2.5 Level II Second Semester Courses

* This course is not open to students from the Department of Mathematics and all other students who have taken CSC1201.

** This course is not open to students from the Department of Mathematics.

2.4.3 Level 300

THIRD YEAR (300 LEVEL) **First Semester**

Course Code	Course Title	Credit Units
MTH 3301	Abstract Algebra I	3
MTH 3303	Numerical Analysis I	3
MTH 3305	Complex Analysis I	3
MTH 3307	Vector & Tensor Analysis	3
MTH 3309	Real Analysis II	3
MTH 3311	Ordinary Differential Equations I	3
MTH 3413	Geometry	4

Table 2.6 Level III First Semester Courses

THIRD YEAR (300 LEVEL) **Second Semester**

Course Code	Course Title	Credit Units
MTH 3302	Abstract Algebra II	3
MTH 3304	Complex Analysis II	3
MTH 3306	Metric Space Topology	3
MTH 3308	Introduction to Mathematical Modelling	3
MTH 3310	Mathematical Methods II	3
MTH 3412	Optimization Theory	4

Table 2.7 Level III Second Semester Courses

2.4.4 Level 400

FOURTH YEAR (400 LEVEL) **First Semester**

Course Code	Course Title	Credit Units
MTH 4301	Theory of Ordinary Differential Equations	3
MTH 4303	Functional Analysis	3
MTH 4305	General Topology	3
MTH 4307	Mathematical methods III	3
MTH 4309	Linear System theory	3

Table 2.8 Level VI First Semester Courses

FOURTH YEAR (400 LEVEL) **Second Semester**

Course Code	Course Title	Credit Units
MTH 4302	Theory of Partial Differential Equations	3
MTH 4304	Lebesgue Measure & Integrals	3
MTH 4306	Numerical Analysis II	3
MTH 4600	Project	6

Table 2.9 Level IV Second Semester Courses

2.5 THE SYLABI

2.5.1 Level I Courses

CSC 1201. Introduction to computer Science

Prerequisite ï None, Core-requisite -- MTH 1301

History of Computers. functional components of computer; characteristics of a computer; Hardware and software; problem solving; flow charts, Algorithms; Computer languages, programming and packages, statements symbolic names; arrays, subscripts, expressions and control statements. Introduction to BASIC programming Language, computer application.

Textbooks. Any introductory book on computers, such as Anderson, R. E. and Sullivan D. R. (1988) World of computing, Houghton Mifflin Company, Boston.

MTH 1301. Elementary Mathematics I (Algebra and Trigonometry)

Prerequisite ï None, Core-requisite -- None

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.De-Moivre's theorem, nth roots of unity.Circular measure, trigonometric functions of angles of any magnitude, addition and factor formalae.

Textbook. Backhouse, S.P.T. et al (1975), Pure Mathematics, A first course.

MTH 1303. Elementary Mathematics III (Vector and Analytic Geometry)

Prerequisite ï None, Core-requisite -- MTH 1301

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition, 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, normals. Impact of two smooth sphere, and of a sphere on a smooth sphere.

Textbook.Thomas, G. B. and Finny R.I. (1987), Calculus and Analytic Geometry; Addison-Wesley, Reading, Chapters 8, 11 and 17.

MTH 1304. Elementary Mathematics II(Calculus I)

Prerequisite ï None, Core-requisite -- MTH 1301

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.

Textbook. Thomas, GB and finny, RL (1987), Calculus and analytic Geometry; Addison-Wesley, Reading Chapter 1, 2, 3, 4, 5 and 7

STA 1312. Probability I

Prerequisite ï None, Core-requisite -- MTH 1301

Generation of statistical events from set-theory and combinatorial methods. Elementary principles of probability types and distribution of random variables; the binomial, passion, hyper-geometric and normal distributions exceptions and moments of random variables; probability sampling from tables of random numbers, selected applications. Correlation and regression.

2.5.2 Level II Courses
MTH 2203. Linear Algebra I

Prerequisite -- MTH 1301, 1302, Core-requisite -- MTH 2303

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 2204. Linear Algebra II

Prerequisite -- MTH 1301, 1302, Core-requisite -- MTH 2303, 2203

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 2210: VECTOR ANALYSIS

Elementary Vector Algebra, Vector and Triple vector Products (more application solution of vector equation, plain curves and space curves. Geometrical equation of lines and planes.Linear independence of vectors; components of vectors, direction cosines; position vector and scaler products; senentfrenent formulae; differential definition of gradients, divergent and simple multiplication).

MTH 2301 Mathematical Methods (Calculus II)

Prerequisite -- MTH 1302, 1303.

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.

Textbook.Thomas G. B and Finny R. L. (1987), calculus and Analytic Geometry.Addison-Wesley, Reading Chapters 12, 13, 14, 15 and 16.

MTH 2302. Elementary differential Equations (Calculus III)

Pre/Core-requisite -- MTH 2301

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.

Textbook. Spiegel, M. R. (1981), Applied Differential Equations; Prentice-Hall, New Jersey, Chapters 1 to 6

MTH 2303. Sets, Logic and Algebra

Pre-requisite -- MTH 1301

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, semigroups, rings, integral domains fields. Homeomaphics.Number systems; properties of integers, rationals, real and complex numbers.

MTH 2307 REAL ANALYSIS I

Pre-requisite -MTH 1301, 1303

Bounds of real numbers, convergence of sequence of numbers. Monotone sequences, the theorem of nested Intervals. Cauchy sequences, tests for convergence of series. Absolute and conditional convergence of series and rearrangements.Completeness of reals and

incompleteness of rationals. Continuity/and differentiability of functions. Rolles's and mean value theorems for differentiable functions Taylor series.

MTH 2308 INTRODUCTION TO NUMERICAL ANALYSIS

Pre-requisite -MTH 1301, 1303

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 integral equations.Initial value problems for ordinary differential equation.

CSC 2201. Introduction to Computer Science

Pre-requisite ï None, Core-requisite -- MTH 1301

History of computers; functional components of computer; characteristics of a computer; Hardware and software; problem solving; flow charts, Algorithms; computer languages, programming and packages, statements symbolic names; arrays, subscripts, expressions and control statements. Introduction to BASIC Programming Language, computer application.

Textbooks. Any introductory book on computer such as Anderson, R. E and Sullivan D. R (1988), Word of computing, Houghton Mifflin Company, Boston.

CSC 2301. Computer Programming I (FORTRAN)

Introduction to problem solving methods and algorithm development; designing, coding, coding, debugging and documenting program using a good programming language style.Computer organization programming languages and programming algorithm development. FORTRAN would be used to teach this course.

CSC 2302. Application of Computers to Science

Pre-requisite -- CSC 1201/2201

Application of computer in science by user programming and by ready-made (application programs. BASIC Programming and Spreadsheets will be covered in details. Applications of computers in medical and paramedical professions; computers in teaching and research.

CSC 2320. Computer Programming II (C++)

Principles of good programming structured programming concepts; debugging and testing; string processing internal searching and sorting; data structures; recursion, C++ is to be used for this course.

STA 2211. Probability II

Pre-requisite -- STA 1311 and MTH 1301

Combinatorial analysis, probability models for study of random phenomena in finite sample spaces. Probability distributions of discrete and continuous random variables.Expectations and moment generating functions.Chebychev's inequality.

STA 2212. Probability III

Pre-requisite -- STA 2211 and MTH 1301

Expectations and moment generating functions.Chebychev's inequality.Bivariate, marginal and conditional distributions and moments.Convolution of two distributions, the central limit theorem, and its uses.

2.5.3 Level III Courses

MTH 3301 ABSTRACT ALGEBRA I

Pre-requisite -MTH 1301, 2303

Group: definition, examples including permutation grounds. Subgroups, cosets.Legranges 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 3302. ABSTRACT ALGEBRA II

Pre-requisite -MTH 2303

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 euclides rings. Irreducibility; Field extensions, degree of an extension, minimum polynomial. Algebraic and transcendental extensions.Straight edged and compass constructions.

MTH 3303 Numerical Analysis I

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

MTH 3304 COMPLEX ANALYSIS II Pre-requisite MTH 2303, 2307, Co-requisite -MTH 3309 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 3305 COMPLEX ANALYSIS I

Pre-requisite MTH 2303, 2307

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 3306 METRIC SPACE TOPOLOGY

Pre-requisite -MTH 2302.

Sets, matrics, and examples. Open spheres (or balls). Open sets and neighborhoods. 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.

MTH 3307 VECTOR AND TENSOR ANALYSIS

Pre-requisite -MTH 2301, 2204

Vector algebra.Vector, dot and cross Products.Equating of curves and surfaces.Vector differentiation and applications.Gradient, divergence and curl. Vector integrate, line surface and volume integrals Greens Stoke's and divergence theorems. Tensor products of vector spaces.Tensor algebra.Symmetry.Cartesian tensors.

MTH 3308 INTRODUCTION TO MATHEMATICAL MODELLING

Pre-requisite -MTH 2301, 2302, 2204, Co-requisite -MTH 3311, 3307

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 population, biological, social and behavioural sciences.

MTH 3309 REAL ANALYSIS II

Pre-requisite -MTH 2307

Riemann integral of functions real variables, continuous monopositive functions. Functions of bounded variation.The Riemann Stieltjes integral.Pointwise and uniform convergence of sequences and series of functions.Effects on limits (sums) when the functions are continuous differentiable or Riemann integrable power series.

MTH 3310 MATHEMATICAL METHODS II

Pre-requisite -MTH 2301, 2302

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. Eigenfunction expansions.Methods of variation of parameters. Fourier transforms.

MTH 3311 Differential equations I

Pre-requisite MTH 2301, 2302

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

MTH 3412 OPTIMIZATION THEORY

Pre-requisite MTH 2301, 2302, 3311

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 3413 Geometry

Co-ordinate in R3. Polar co-ordinates; Distances between points, surfaces and curve in space. The plane, straight line.Basic projective Geometry, Affine and Eucidean Geometries.

MTH 4301. Differential Equations II

Co-requisite -- MTH 3311

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.Floguet's theory and stability theory. Integral equations: classification, volterra and fredlhomtypes Neumann series. Fredholm alternative for degenerate Hilbert - Schmidt kernels.Reduction of ordinary differential equations to integral equations.Sysmmetric kernels, eigen function expansion with application.

MTH 4302. Differential Equation III

Co-requisie -- MTH 4301

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 4303. Functional Analysis

Co-requisite -- MTH 3309, MTH 2307

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

MTH 4304.Lebesgue Measure and Integrals

Co-requisite -- MTH 2307, MTH 3309

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

MTH 4305. General Topology

Pre-requisite -- MTH 3306

Topological spaces, definition, open and closed sets neighborhoods. 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, homeomorphons, topological invariants, spaces of continuous functions: Point-wise and uniform convergence.

MTH 4306. Numerical Analysis II

Co-requisite -- MTH 4307

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

MTH 4307. Mathematical Methods III

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. Isoperimeric problems.Variational integral transforms. Laplace, Fourier and Hankel transforms. Complex variable methods convolution theorems.Application to solution of differential equations.

MTH 4309. System Theory

Liapunov theorems, solution of Liapunov stability equation ATP + PA = 0. Controllability and observability.Theorems on existence of solution of linear systems of differential equations with constant coefficients.

MTH 4600. PROJECT

This course gives students the opportunity to study in depth a topic in Mathematics or statistics that particularly interest them. This may include reading Mathematical or statistical works, using advanced methods to solve a given problem, explore new topics, etc.

CHAPTER 3

OTHER INFORMATION

3.1.1 Academic

The Department has 26 academic staff majority of which are on training within and outside the country. Tables 3.1 and 3.2 give the list of staff currently on ground and those on fellowship respectively.

S.NO	NAME	QUALIFICATION	RANK
1	DrSaminuIliyasuBala	BSc,MSc,PhD (Maths)	Senior Lecturer
2	Dr Sabo Hamma	BSc,MSc,PhD (Maths)	Reader
3	DrBalaMaaji	BSc,MSc,PhD (Maths)	Senior Lecturer
4	DrAdamu Y. Magaji	BSc,MSc,PhD (Maths)	Senior Lecturer
5	Dr Mohammad Waziri Yusuf	BSc,MSc,PhD (Maths)	Lecturer I
6	Dr Abbas JaafaruBadakaya	BSc,MSc,PhD (Maths)	Lecturer I
7	TahirAbubakarHussain	BSc,MSc (Comp Sci)	Assistant Lecturer
8	AbdulkadirDatti	BSc (Maths)	GA
9	Jamila Abdul -Hadi	BSc (Comp Sci)	GA
10	Zia-Ul-RahmanAbubakar	BSc (Comp Sci)	GA
11	MuhammedGarba	BSc Ed (Maths)	GA
12	IdrisBabaji Mohammad	BSc (Maths)	GA
13	Salaudeen Adebayo Abdulwaheed	BSc (Maths)	GA
14	BabaniAbdullahi Umar	BSc (Maths)	GA
15	Bashir Ahmad Muhammad	BSc (Info Tech)	GA

Table 3.1: List of staff not on fellowship.

S.NO	NAME	QUALIFICATION	RANK	COUNTRY OF STUDY
1	*Edeghagba E. Elijah	BSc, MSc (Maths)	LII	Serbia
2	*Lawan M. Bulama	BSc, MSc (Maths)	AS	Malaysia
3	Ibrahim Gambo	BSc (Maths)	GA	Malaysia
4	Arzuka Ibrahim	BSc (Maths)	GA	Malaysia
5	Adamu M. Adamu	B.TECH (Statistics)	GA	Malaysia
6	AdamuG.Tahiru	B.TECH (Maths)	GA	Nigeria
7	UsmanWaziri	BSc (Maths)	GA	China
8	Ahmad Aliyu	B.TECH (Comp Sci)	GA	China
9	Mohammad J. Usman	BSc (Comp Sci)	GA	China
10	Adamu M. Noma	B.TECH (Comp Sci)	GA	Malaysia
11	Ibrahim Rabiu	B.TECH (Comp Sci)	GA	Ghana

Table 3.2: Staff on fellowship.
GA (Graduate Assistant), LII (Lecturer II), AS (Assistant Lecturer).
* arePhd students while the remaining are MSc students.

3.1.2 Non-Academic

MalamIdrisGadau: Casual staff (cleaner).

The Head	Dr SaminuIliyasuBala
Assistant Head	Zia-Ul-RahmanAbubabar
Examinations officer	TahirAbubakarHussain
Level I coordinator	Jamila Abdul-Hadi
Level II coordinator	Bashir Ahmad Mohammad
Level III coordinator	AbdulkadirDatti
Departmental Board Secretary	Salaudeen AdebayoAbdulwahed

3.3 Examinations and Assessments

All courses are examined at the end of the semester. Examinations are set by the course lecturers. All question papers are moderated externally. Examinations are conducted in conjunction with the faculty examinations office. Students are assessed by combination of class test, assignments and end of semester examinations. Semester *grade point average* (GPA) and *cumulative grade point* averages (CGPA) appear on each student semester/session report form and also the final academic record (transcript). The information given below illustrates how the GPA and CGPA are calculated.

3.3.1 Grading system

Bauchi state University adopts the following grading system:

Range of Marks	Lettered Grade	Grade
0-39	F	0
40-44	E	1
45-49	D	2
50-59	C	3
60-69	B	4
70-100	A	5

Table3.3:Gradingsystem

To calculate a student's GPA, the score for each course is first converted to grade (see Table 3.3). The credit value for each course is then multiplied by the corresponding grade point to get the weighted grade point (WGP) for that course.

The sum of the WGP for all the courses is then divided by the sum of the Credits for all courses to get the GPA. Table 3.4 gives an illustrative example for a hypothetical 100 Level student, Mr Basug.

STUDENT NAME Mr Basug

COURSE CODE	CREDIT VALUE	SCORE (%)	GRADE	GRADE POINT	WEIGTED GRADE POINT
MTH 1301	3	75	A	5	15
STA 1311	3	80	A	5	15
CSC 1201	2	47	D	2	4
CHM 1201	2	44	E	1	2
BIO 1201	2	55	C	3	6
GSP 1401	4	40	E	1	4
PHY 1101	1	33	F	0	0
TOTAL	**17**				**46**

Table 3.4: Sample GPA calculation

GPA = 46/17=2.71

Suppose in the second semester Mr Basug obtained the results tabulated in Table 3.5.

STUDENT NAME Mr Basug

COURSE CODE	CREDIT VALUE	SCORE (%)	GRADE	GRADE POINT	WEIGTED GRADE POINT
MTH 1304	3	69	B	4	12
MTH 1302	3	80	A	5	15
CHM 1202	2	47	D	2	4
CHM 1204	2	33	F	0	0
BIO 1204	2	50	C	3	6
PHY 1202	2	60	B	4	8
TOTAL	**14**				**45**

GPA = 45/14 = 3.21

CGPA=(46+45)/(17+14)=2.94

Table 3.5: sample CGPA calculation

Generally, CGPA is calculated as $\text{CGPA}=\frac{\text{sum of grade points for all semesters}}{\text{sum of credit valuess for all semesters}}$

3.3.2 Academic Probation

Any student whose CGPA is below 1.00 in a given session, is said to be in academic probation. He/She will be given one more session to make it up above 1.00 otherwise the student is withdrawn.

3.3.3 Degree classification

Degrees are classified based on the CGPA at the point of graduation. Bauchi state University adopts the following system.

CGPA	DEGREE CLASS
4.5-5.0	First Class
3.5-4.49	Second Class Upper
2.40-3.49	Second Class Lower
1.50-2.39	Third Class
1.00 -1.49	Pass
Below 1.00	Fail
Table 3.6: Degree classification	

CHAPTER 4

Career for Mathematics Graduates

A degree in mathematics does not train students for a specific job. Rather it gives them a range of skills which gives them the opportunity to enter a wide range of careers. It is therefore a versatile qualification. Employers tend to be keen on mathematics students because they are regarded as logical, numerate and committed. All of these are highly sought-after skills in the jobs market. In short a mathematics graduate can fit into everything from computer programming to accountancy, and biomedical research to business management.

Majority of all jobs requiring graduates are open to students of any discipline. of course, mathematicians are eligible for these jobs. In addition, there are careers for which a degree in mathematics is either essential or a strong advantage. These fall into a number of general areas:

1. **Computing**
   Mathematicians are in high demand from software companies. If you can prove you can program, you are likely to be in as strong a position as a computer science or IT graduate when applying for roles with these organisations.

2. **Financial work**
   In recent years, many mathematics graduates have taken up a career in finance.

a. **Accountancy**
Firms of chartered accountants - the main employers - do not normally specify degree disciplines of entrants. They are particularly keen though to recruit mathematics graduates, because of their numeracy skills and logical thought, because they are normally very successful in the professional examinations. *So to become an accountant, you do not need to take a degree in accountancy.* A mathematics degree allows many openings in accountancy, should you wish to follow them after graduation, as well as all the other opportunities.

b. **Actuarial work**
This has long been a popular field for mathematics graduates. The work involves the application of probability and statistics to financial affairs such as life assurance, pensions and social security.

c. **Other openings in finance**
There are some opportunities in banking, particularly with the head offices of major banks, or with merchant banks. Mathematicians have frequently been successful candidates for the Tax Inspectorate.

3. **Postgraduate Study**
A sizeable proportion of graduates choose to continue for higher qualifications such as MSc and PhD before entering the job market. A good honours degree is normally required for entry to such courses. The course provides training in the fundamental processes of research and so is particularly useful for those aiming to work in industrial research and academic environments.
4. **Scientific research, design and development**Large companies and government research establishments are actively involved in research and development. They employ mathematicians and statisticians, usually along with other scientists in interdisciplinary research teams. The problems being solved require a flexible approach and speedy solutions. Projects of this type require high mathematical skill, ability to analyse complex problems in order to formulate them mathematically and to use computers in their solution (a skill developed during mathematics degree courses), willingness to work to deadlines, and ability to communicate findings to others.
5. **Aircraft Industry**
In the aircraft industry, there is work on aerodynamical design, providing theoretical results which predict or complement those from (for example) experimental wind tunnels.
6. **Pollution Control**
In pollution control, mathematicians would develop ``models'' (mathematical equations) predicting dispersal rates of chimney effluents under different meteorological conditions.
7. **Telecommunications** In telecommunications, mathematicians may work on improved communications links, computer-recognition of handwriting and speech patterns, and distortion in digital transmission.
8. **Statistical work**
Statistical work is carried out in many organisations - the Civil Service (economics and agriculture in particular), research establishments, large industrial firms and market research agencies. The work involves analyses and interpretations of data, collection of

information and analysing it using statistical methods and computer programs such as SPSS.

9. **Medical Statistics**
   This is also another large area with some major hospitals having statistical units.
10. **Biometrists**
    A Biometrists work as statisticians in the pharmaceutical industry, as researchers in medical schools and hospitals and in agricultural institutes.
11. **ManagementServices**
    The problems of coping with rapid changes in technology and market conditions in large and complex organisations make it essential for managers to call on specialist services. Management services are often mathematical, involving an area of mathematics known as *Operational Research*. It might involve designing a more efficient transportation programme for deliveries to a supermarket chain, warehouses, or a stock control pattern for a car franchise holder.
12. **Forecasting**
    Maths graduates can also put their skills to good use in planning and forecasting of various sorts, such as meteorology, logistics or transport planning, as well as careers such as quantity surveying and IT.

13. **Epidemiologist**
    Developing and using mathematical models to reduce public health risks by studying the pattern of spread of diseases or health risks in populations.

Finally, there are many people with mathematics training working in NNPC, plant biology, finance, energy, defence, computer game design etc. In short **the possibilities for mathematicians are endless.**