Academic Programs Booklet

College of Science

2021

Prepared By: VP For Academic Programs and Graduate Studies Office

College of Science

College of Science

List of B.Sc. Programs

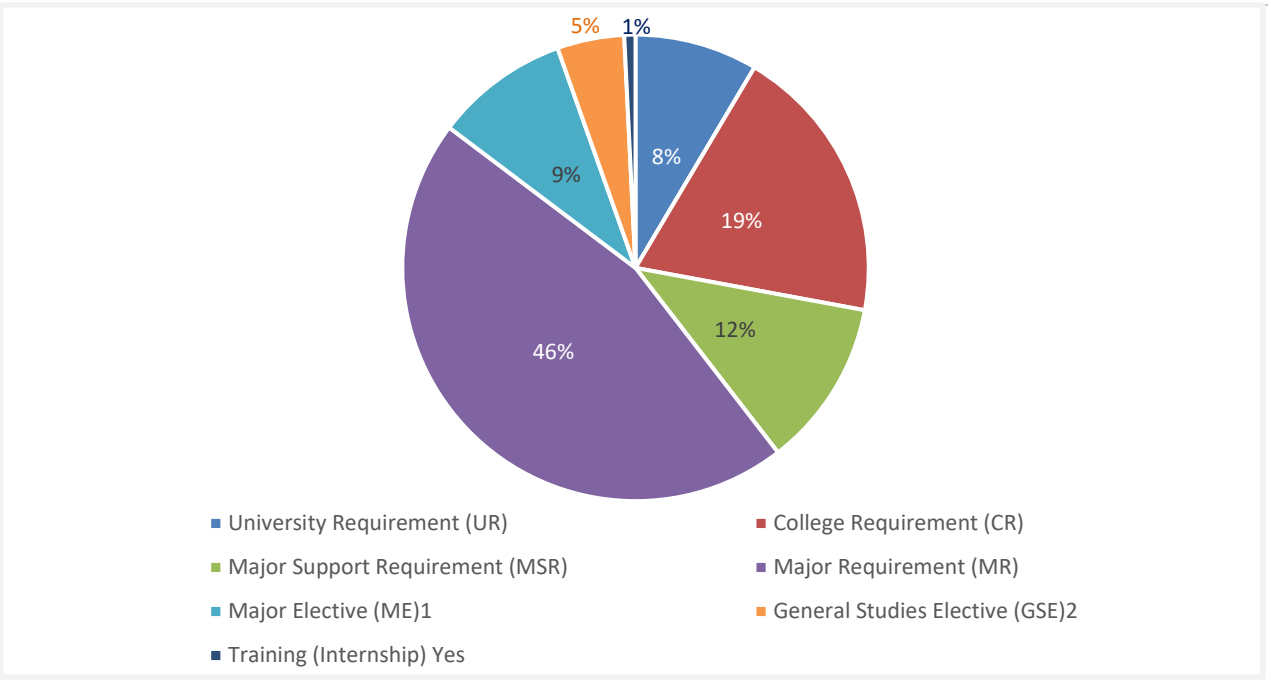
1- B.Sc. in Mathematics
2- B.Sc. in Actuarial Science
3- B.Sc. in Statistics and Data Science

List of College Requirement Courses

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ENGL 125	English For Science I (SCI.)	3	0	3	CR	None	No
ENGL 126	English For Science II (SCI.)	3	0	3	CR	ENGL 125	No
ITCS 113	Computer Programming I	3	2	3	CR	NONE	No
MATHS 131	Calculus I	4	0	4	CR	None	No
PHYCS 101	General Physics I	3	2	4	CR	None	No
CHEMY 101	General Chemistry I	3	2	4	CR	None	No
BIOLS 102	General Biology I	3	2	4	CR	None	No
Total		**22**	**8**	**25**			

B.Sc. in Statistics and Data Science

Program Components



University Requirement (UR)	11
College Requirement (CR)	25
Major Support Requirement (MSR)	15
Major Requirement (MR)	59
Major Elective (ME)[1]	12
General Studies Elective (GSE)[2]	6
Training (Internship) Yes	1
Total Credit (CRD)	127

Teaching Language: **English**

[1] Student must select four courses from Major Elective (ME) List.

[2] Student must select one course from General Studies Electives (GSE).

Note:

- Free Elective Courses any UOB course excluding:(1) courses offered for special students, (2) courses covered in the B.Sc. curriculum, (3) courses equivalent or lower than those already taken in the curriculum and should not be a science course prepared by College of Science for other colleges.

- HU/SS Courses - Humanities and Social Science Component: Any course from the following:
  Humanities: Fine Arts, History, American Studies, Classics, Communications, English, (Foreign Language) French, Music, Philosophy, Theatre, Literature (Arabic), Religion (comparative).
  Social Science: Anthropology, Economics, Education, Geography, History, Psychology, Sociology, Women's Studies, Political Science.

Detailed Study Plan

Year 1 – Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ISLM 101	Islamic Culture	3	0	3	UR	None	No
ENGL 125	English for Science I	3	0	3	CR	None	No
ITCS 113	Computer Programming I	3	2	3	CR	None	No
MATHS 131	Calculus I	4	0	4	CR	None	Yes
PHYCS 101	General Physics I	3	2	4	CR	None	No
Total		**16**	**4**	**17**			

Year 1 – Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
CHEMY 101	General Chemistry I	3	2	4	CR	NONE	No
ENGL 126	English for Science II	3	0	3	CR	ENGL 125	No
ITCS 114	Computer Programming II	3	2	3	MSR	ITCS 113	No
MATHS 132	Calculus II	4	0	4	MR	MATHS 131	Yes
STAT 271	Introduction to Probability	3	0	3	MR	MATHS 131	Yes
Total		**16**	**4**	**17**			

Year 2 – Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 102	General Biology I	3	2	4	CR	NONE	No
ENGL 226	Scientific Report Writing	3	0	3	MSR	ENGL 126	No
ITCS 214	Data Structures	3	2	3	MSR	ITCS 114	No
MATHS 211	Linear Algebra	3	0	3	MR	MATHS 131 (OR MATHS 121)	Yes
STAT 277	Statistics and Data Science I	2	2	3	MR	STAT 271 ITCS 113	Yes
Total		**14**	**6**	**16**			

Year 2 – Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
STAT 288	Data Visualization	2	2	3	MR	STAT 277	Yes
ITCS 285	Database Management Systems	3	2	3	MSR	ITCS 214	No
STAT 371	Probability and Statistics I	3	0	3	MR	MATHS 132 STAT 271	Yes
MATHS 233	Calculus III	4	0	4	MR	MATHS 132	Yes
MATHS 205	Differential Equations	3	0	3	MR	MATHS 132	Yes
Total		**15**	**4**	**16**			

Year 3 – Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
HIST 122	Modern History of Bahrain and Citizenship	3	0	3	UR	NONE	No
ECON 140	Microeconomics	3	0	3	MSR	NONE	No
STAT 377	Statistics and Data Science II	2	2	3	MR	STAT 277	Yes
STAT 372	Probability and Statistics II	3	0	3	MR	STAT 371	Yes
STAT 384	Bayesian Inference	3	0	3	MR	STAT 371	Yes
Total		**15**	**0**	**15**			

Year 3 – Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ARAB 110	Arabic Language Skills	3	0	3	UR	NONE	No
HRLC 107	Introduction to Human Rights	2	0	2	UR	NONE	No
STAT 374	Regression Analysis	3	0	3	MR	STAT 372 MATHS 211	Yes
STAT 381	Time Series Analysis	3	0	3	MR	STAT 372	Yes
STAT 473	Introduction to Multivariate Analysis	3	0	3	MR	STAT 372 MATHS 211	Yes
Total		**13**	**2**	**14**			

Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
STAT 398	INTERNSHIP	0	0	0	MR-Training	Passes 75 credit hours	Yes
Total		**0**	**0**	**1**			

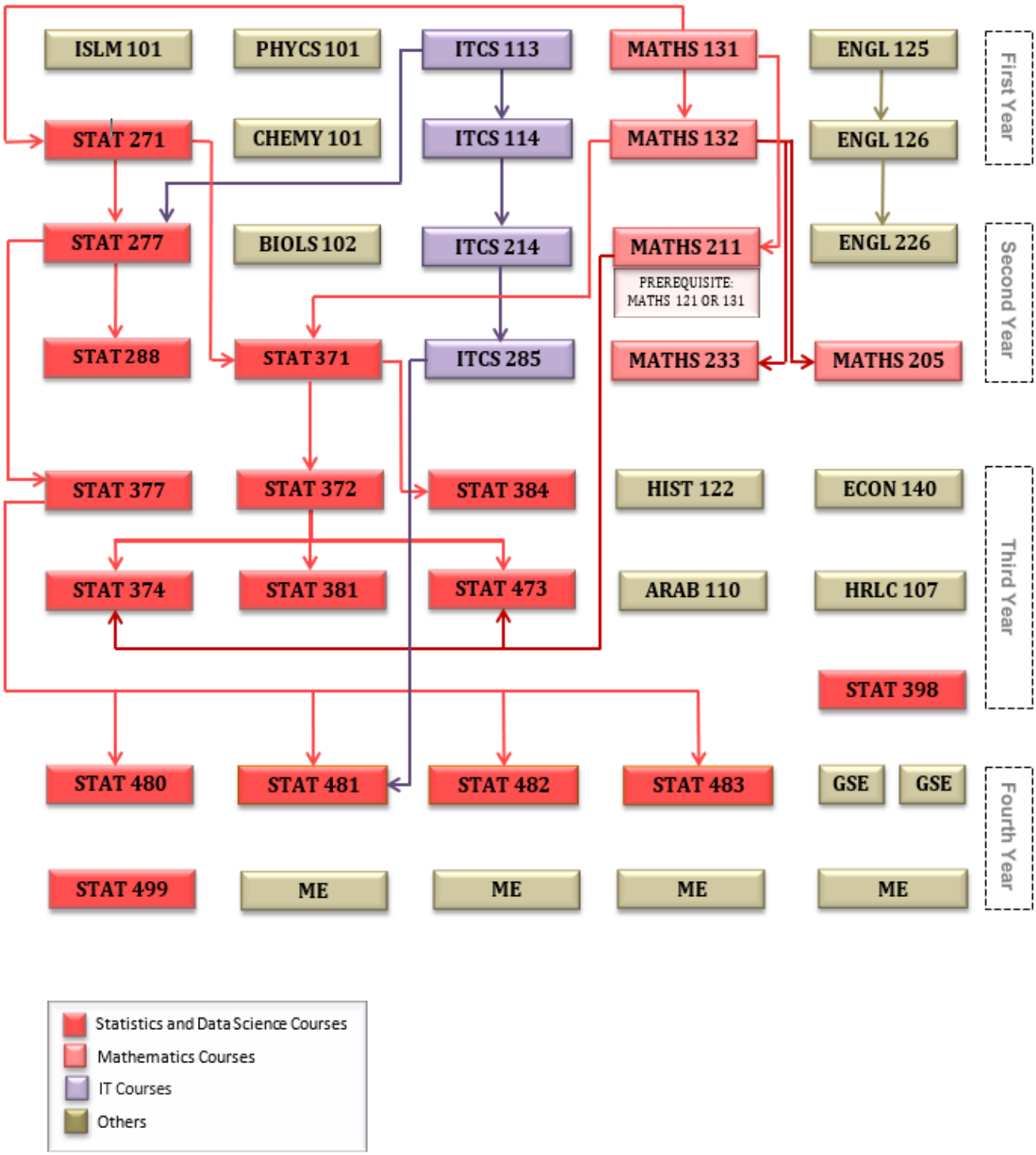
Year 4 – Semester 7

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
GSE xxx	Free Elective Course	X	X	3	GSE	X	No
GSE xxx	Humanities / Social Science	X	X	3	GSE	X	No
STAT 480	Advanced Statistical Models	2	2	3	MR	STAT 377	Yes
STAT 481	Fundamentals of Data Mining	2	2	3	MR	ITCS 285 STAT 377	Yes
STAT 482	Fundamentals of Machine Learning	2	2	3	MR	STAT 377	Yes
STAT 483	Introduction to Big Data Technologies	2	2	3	MR	STAT 377	Yes
Total		**X**	**X**	**18**			

Year 4 – Semester 8

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
STAT 499	Senior Research Project	0	6	3	MR	COMPLETING 85 CREDITS	Yes
STAT XXX	Major Elective Course	X	X	3	ME	X	No
STAT XXX	Major Elective Course	X	X	3	ME	X	No
STAT XXX	Major Elective Course	X	X	3	ME	X	No
STAT XXX	Major Elective Course	X	X	3	ME	X	No
Total		**X**	**X**	**15**			

Flowchart of Study Plan



Major Elective Courses

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
STAT 382	Biostatistics and Epidemiology	3	0	3	ME	MATHS 131	Yes
STAT 383	Demography and Population Studies	3	0	3	ME	MATHS 131	Yes
STAT 390	Principles of Operations Research	3	0	3	ME	STAT 271	Yes
STAT 394	Linear Programming	3	0	3	ME	MATHS 132 STAT 271	Yes
STAT 471	Decision Theory	3	0	3	ME	STAT 372	Yes
STAT 476	Queuing Systems	3	0	3	ME	STAT 372	Yes
STAT 478	Introduction to stochastic Processes	3	0	3	ME	STAT 372	Yes
STAT 479	Reliability	3	0	3	ME	STAT 372	Yes
STAT 484	Computational Statistics	2	2	3	ME	STAT 377 STAT 384	Yes
STAT 485	Business Analytics	2	2	3	ME	STAT 377	Yes

General Studies Elective (GSE)

Course Code	Course Title	Course Hours			Course Type	Pre-Requisite
		LEC	PRAC	CRD		
ARAB 141	Modern Arabic Lit.	3	0	3	GSE	------
ARAB 242	Arabic Poetry In The Renaissance Period	3	0	3	GSE	------
ART 133	Fundamentals of Music and Its Appreciation	3	0	3	GSE	------
ART 141	Drawing and Painting	2	1	3	GSE	------
ART 221	Traditional Music of Bahrain and Its Application	3	0	3	GSE	------
CHL 101	Introduction to Chinese Language	3	0	3	GSE	------
CHL 102	Basic Chinese Language	3	0	3	GSE	CHL 101
EDAR 126	Playing on Piano and Org 1	3	0	3	GSE	------
EDPS 144	Psychology of Learning and Memory	3	0	3	GSE	------
EDTC 100	Teaching and Learning Technology	3	0	3	GSE	------
ENGL 130	Introduction to Literature	3	0	3	GSE	------
FREN 141	French I	3	0	3	GSE	------
FREN 142	French II	3	0	3	GSE	FREN 141
GERM 101	Introduction to German	3	0	3	GSE	------
HISTO 212	Contemporary History of The Arab World	3	0	3	GSE	------
HISTO 281	Landmarks of Islamic Civilisation	3	0	3	GSE	------
ISLM 114	Quranic Sciences	3	0	3	GSE	------
ISLM 136	Biography of The Prophet	3	0	3	GSE	------
ISLM 141	Introduction to Shari'A	3	0	3	GSE	------
ISLM 252	Islamic Doctrine	3	0	3	GSE	------
JAPN 101	Japanese Level I	3	0	3	GSE	------
JAPN 102	Japanese Level II	3	0	3	GSE	JAPN 101
KL 101	Korean Language I	3	0	3	GSE	------
KL 102	Korean Language II	3	0	3	GSE	KL 101
LAW 101	Introduction to Legal Studies	3	0	3	GSE	------
LAW 102	History of Law	3	0	3	GSE	------
LAW 106	Constitutional Law I	3	0	3	GSE	------
PHEDE 214	Principles of Educational Statistics	3	0	3	GSE	------
PSYC 103	Introduction to Psychology	3	0	3	GSE	------
PSYC 120	Psychology of Marriage	3	0	3	GSE	------
PSYC 211	Educational Psychology	3	0	3	GSE	------

Course Code	Course Title	Course Hours			Course Type	Pre-Requisite
		LEC	PRAC	CRD		
PSYC 281	Thinking Skills	3	0	3	GSE	PSYC 103 or EDPS 241
SOCIO 161	Introduction to Sociology	3	0	3	GSE	-----
SOCIO 181	Introduction to Anthropology	3	0	3	GSE	-----
SOCIO 191	Citizenship, Identity and Globalization	3	0	3	GSE	-----
SOCIO 224	Sociology of Health	3	0	3	GSE	-----
SOCIO 226	Sociology of Arabian Gulf	3	0	3	GSE	-----
TL 101	Turkish Language	3	0	3	GSE	-----
SPAN 101	SPANISH I	3	0	3	GSE	-----
GSE XXX	Other Electives	X	X	E	GSE	Department Approval

Course Description

University Requirements Courses Descriptions

Course Code:	**HRLC 107**	Course Credits:	(2-0-2)	Course Title:	**Human Rights**
Course Description:	This course deals with the principles of human rights in terms of the definition of human rights, scope, sources with a focus on the International Bill of Human Rights; The Charter of the United Nations; Universal Declaration of Human Rights; The International Covenant on Economics, Social and Culture rights; Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment; Mechanics and the Constitutional Protection of Rights and Public Freedoms in Kingdom of Bahrain.				
Course Code:	**HIST 122**	Course Credits:	(3-0-3)	Course Title:	**Modern History of Bahrain and Citizenship**
Course Description:	Spatial identity of Bahrain: Brief history of Bahrain until the 18th century; the historical roots of the formation of the national identity of Bahrain since the 18th century; the modern state and evolution of constitutional life in Bahrain; the Arabic and Islamic dimensions of the identity of Bahrain; the core values of Bahrain's society and citizenship rights (legal, political, civil and economic); duties; responsibilities and community participation; economic change and development in Bahrain; Bahrain's Gulf, Arab and international relations.				
Course Code:	**ARAB 110**	Course Credits:	(3-0-3)	Course Title:	**Arabic Language Skills**
Course Description:	This course focuses on basic Arabic skills including form, function, and meaning. It also helps the student to appreciate and understand structures and approach them from a critical point of view, through various genres in literature.				
Course Code:	**ISLM 101**	Course Credits:	(3-0-3)	Course Title:	**Islamic Culture**
Course Description:	An introduction to the general outline and principles of Islamic culture, its general characteristics, its relationships with other cultures, general principles of Islam in beliefs, worship, legislation and ethics.				

College Requirement Courses Descriptions

Course Code:	**ENGL 125**	Course Credits:	(3-0-3)	Course Title:	**English for Science I** (**SCI**)
Course Description:	This is the first of two integrated language courses designed specifically for science majors. Special attention is given to scientific vocabulary and the unique features of technical writing. The course includes an extensive reading programme via a self-access lab.				
Course Code:	**ENGL 126**	Course Credits:	(3-0-3)	Course Title:	**English for Science II** (**SCI**)
Course Description:	English for Science is the second of two integrated language courses designed specifically for Science majors. Special attention is given to scientific vocabulary and the unique features of technical writing.				
Course Code:	**ITCS 113**	Course Credits:	(3-2-3)	Course Title:	**Computer Programming I**
Course Description:	This course introduces problem solving and fundamental programming concepts and techniques implemented by a high-level programming language. Topics include primitive and compound data types, syntax, semantics, expressions, assignment, input, output, conditional and iterative control structures, and functions.				
Course Code:	**MATHS 131**	Course Credits:	(4-0-4)	Course Title:	**Calculus I**
Course Description:	Limits, Derivatives of Algebraic and Transcendental Functions, Related Rates, the Mean Value Theorem, Graphing Techniques, Optimization, Integrals, and the Fundamental Theorem of Calculus.				
Course Code:	**CHEMY 101**	Course Credits:	(3-2-4)	Course Title:	**General Chemistry I**
Course Description:	Atomic structure; formulas and names of chemical molecules; Avogadro's number and the mole; stoichiometry of chemical reactions; acid-base and redox reactions, solutions, concentration units, and colligative properties; gases and gas laws; electronic structure and the electron configuration; periodic properties and chemical bonding: ionic and covalent; Lewis structures and formal charge; molecular geometry and hybridization. Related practical work.				
Course Code:	**PHYCS 101**	Course Credits:	(3-2-4)	Course Title:	**General Physics I**
Course Description:	Units and Measurements. Brief Review of Vectors. Newton's Laws of Motion. Projectile Motion. Work and Energy. Impulse and Momentum. Rotational Dynamics. Equilibrium of a Rigid Body. Periodic Motion.				
Course Code:	**BIOLS 102**	Course Credits:	(3-2-4)	Course Title:	**General Biology I**
Course Description:	Properties of life; atoms, molecules, and chemical bonds; biomolecules; cell structure and function; bioenergetics (intermediary metabolism); cell reproduction; Mendelian genetics; structure of DNA; RNA and protein synthesis; molecular genetics.				

Major Requirement Courses Descriptions

Course Code:	**MATHS 132**	Course Credits:	(4-0-4)	Course Title:	**Calculus II**
Course Description:	Applications of Definite Integrals, L'Hopital's Rule, Integration Techniques, Infinite Series, Taylor and Maclaurin Series, Parametric Equations and Polar Coordinates.				
Course Code:	**MATHS 233**	Course Credits:	(4-0-4)	Course Title:	**Calculus III**
Course Description:	Vectors. Vector-valued functions. Partial differentiation. Optimization. Multiple integrals, Change of variables, line and surface integrals, Green's and Stokes' theorems.				
Course Code:	**MATHS 205**	Course Credits:	(3-0-3)	Course Title:	**Differential Equations**
Course Description:	Differential equations of first order and their solution. Separable and exact equations. Equations convertible to separable type. Higher order linear equations with constant coefficients (homogeneous and nonhomogeneous). Variation of parameters. Laplace transform technique. Applications of differential equations.				
Course Code:	**MATHS 211**	Course Credits:	(3-0-3)	Course Title:	**Linear Algebra**
Course Description:	Fields. Vector Spaces. Linear Dependence and Independence. Bases. Dimensions. Subspaces. Quotient Spaces. Linear Transformations. Connection with Matrices. Change of Bases (PAQ and PAP). Eigen-Values. Characteristic Polynomial. Minimal Polynomial. Canonical Forms in Simple Cases. Real and Complex Inner-Product Spaces. Orthonormal Bases. Orthogonal and Complex Unitary Matrices and their Eigen-Values. Orthogonal and Unitary Reduction of Real Symmetric and Complex Hermitian Matrices.				
Course Code:	**STAT 271**	Course Credits:	(3-0-3)	Course Title:	**Introduction to Probability**
Course Description:	Descriptive Statistics. Sample Spaces. Probability Functions. Conditional Probability. Independence. Combinatorics. Random Variables and their Distributions. Distribution Functions. Geometric. Binomial. Poisson and other Discrete Distributions. Uniform. Normal and other Continuous Distributions. Some Limit Theorems.				
Course Code:	**STAT 277**	Course Credits:	(2-2-3)	Course Title:	**Statistics and Data Science I**
Course Description:	Introduction to R and Python (software installation, libraries, scripts), Computational and Programming Skills, Data Types (static, temporal, spatial), Data Structures (lists, vectors, matrices, frames), Data Science Process (Problem Understanding, Data Acquisition and Processing, Modelling, Deployment).				
Course Code:	**STAT 377**	Course Credits:	(2-2-3)	Course Title:	**Statistics and Data Science II**
Course Description:	Statistical Inference, Parameter Estimation, Hypothesis Testing, Confidence Intervals, Simulation and Resampling, Continuous and Categorical Data, Linear and Nonlinear Regressions, Logistic Regression.				
Course Code:	**STAT 288**	Course Credits:	(2-2-3)	Course Title:	**Data Visualization**
Course Description:	Visualizing Tools and Techniques for Univariate and Multivariate Data, Data Summary and Transformation, Data Dashboards and Interactive Displays, Graphical Modelling and Visual Representation, Results Interpretation and Communication, Model Evaluation.				
Course Code:	**STAT 371**	Course Credits:	(3-0-3)	Course Title:	**Probability and Statistics I**
Course Description:	Random Variables and Probability Distributions. Moment Generating Functions. Joint Probability Distributions. Normal. Gamma. Chi Square and other Distributions. Central Limit Theorem.				
Course Code:	**STAT 372**	Course Credits:	(3-0-3)	Course Title:	**Probability and Statistics II**
Course Description:	Point and Interval Estimation. Sampling Distributions. T-distribution. Chi-Square distribution and F-distribution. Test of Hypotheses. Likelihood Ratio Test. Neyman-Pearson Lemma. Correlation and Regression.				

Course Code:	**STAT 374**	Course Credits:	(3-0-3)	Course Title:	**Regression Analysis**
Course Description:	Simple Linear Regression. Multiple Linear Regression. Analysis of Residuals. Multicollinarity. Biased Estimation. Sensitivity Analysis. Selection of Variables. Non-Linear Regression. Response Surface and Correlation Analysis.				
Course Code:	**STAT 381**	Course Credits:	(3-0-3)	Course Title:	**Time Series Analysis**
Course Description:	Introduction to Linear and Stationary Time Series. Autocorrelation Modeling. Autoregression Modeling. Moving Average. ARMA models. ARIMA models. Introduction to Spectral Analysis of a Time Series. Introduction to Non-Linear Time Series.				
Course Code:	**STAT 384**	Course Credits:	(3-0-3)	Course Title:	**Bayesian Inference**
Course Description:	Bayes Theorem. Prior and Posterior Distributions. Loss and Risk Functions. Baye's Risk. Bayesian Estimation of Parameters of Binomial, Poisson, Geometric, Gamma, Beta and Normal Distributions. Bayesian Intervals. Bayesian Procedures for Testing Hypothesis. Bayesian Analysis of Linear Models.				
Course Code:	**STAT 398**	Course Credits:	(0-0-1)	Course Title:	**INTERNSHIP**
Course Description:	The Internship course is designed to provide an opportunity to gain work experience related to the student's specified field of science, in a supervised workplace environment for a period of 8 consecutive weeks. The student shall submit a report upon completion.				
Course Code:	**STAT 473**	Course Credits:	(3-0-3)	Course Title:	**Introduction to Multivariate Analysis**
Course Description:	Aspects of Multivariate Analysis. Matrix Algebra and Random Vectors. Sample Geometry and Random Sampling. The Multivariate Normal Distribution. Inference about a Mean Vector. Comparisons of Several Multivariate Means. Principal Components. Factor Analysis and Inference for Structured Covariance Matrices. Discrimination and Classification. Clustering.				
Course Code:	**STAT 480**	Course Credits:	(2-2-3)	Course Title:	**Advanced Statistical Models**
Course Description:	Exponential Family, Generalized Linear Models, Generalized Additive Models, Nonparametric Regression (kernel, spline, local polynomials).				
Course Code:	**STAT 481**	Course Credits:	(3-2-3)	Course Title:	**Fundamentals of Data Mining**
Course Description:	Concepts and Techniques of Data Mining, Knowledge Discovery, Pattern Recognition, Outlier Detection, Algorithms for Association Rule Mining, Regression, Classification, Clustering.				
Course Code:	**STAT 482**	Course Credits:	(3-2-3)	Course Title:	**Fundamentals of Machine Learning**
Course Description:	Machine Learning Algorithms: Supervised Learning and Unsupervised Learning, Regressions Methods, K-Nearest-Neighbor, Naïve Bayes, Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Support Vector Machine, Decision Tress, K-Means Clustering, Hierarchical Clustering. Model Building, Training, Validation, and Testing.				
Course Code:	**STAT 483**	Course Credits:	(3-2-3)	Course Title:	**Introduction to Big Data Technologies**
Course Description:	Data Science Process (data collection, managing, storing, sharing, cleansing, exploring, analyzing data, interpreting and communicating results), Big Data Tools including Hadoop, Map-Reduce, Spark.				
Course Code:	**STAT 499**	Course Credits:	(0-6-3)	Course Title:	**Senior Research Project**
Course Description:	The student will work with a member of the academic staff on a statistical topic not covered in the regular curriculum. The student is expected to present one or more talks before the department.				

Major Support Requirement Courses Descriptions

Course Code:	**ITCS 114**	Course Credits:	(3-2-3)	Course Title:	**Computer Programming II**
Course Description:	This course covers key concepts of object-oriented programming. Topics include object oriented design, encapsulation, event handlers, memory management, arrays, exception handlers, searching algorithms, programming applications.				
Course Code:	**ITCS 214**	Course Credits:	(3-0-3)	Course Title:	**Data Structure**
Course Description:	This course covers data structures and their implementations in an object-oriented programming language. Topics include sub-typing, abstract base class, lists, stacks, queues, trees, graphs, hash tables, strategies for choosing appropriate data structure.				
Course Code:	**ITCS 285**	Course Credits:	(3-2-3)	Course Title:	**Database Management Systems**
Course Description:	This course exposes the fundamental concepts of database management systems. Topics include information management concepts, database architecture and data independence, conceptual models, relational and object-oriented data models, query mechanisms, database recovery, security, integrity, backup, transaction processing, indexing.				
Course Code:	**ENGL 226**	Course Credits:	(3-0-3)	Course Title:	**Scientific Report Writing**
Course Description:	This course aims to enable students in the College of Science to write professional and academic reports (between 2000-3000 words) related to their areas of specialization and intended work. It also deals with vocabulary and language structures essential for producing a full-length formal research report.				

Major Elective Courses Descriptions

Course Code:	**STAT 382**	Course Credits:	(3-0-3)	Course Title:	**Biostatistics and Epidemiology**
Course Description:	Descriptive Statistics. Some Basic Probability Concepts. Discrete and Continuous Probability Distributions. Estimation. Hypothesis Testing: One and Two-Sample Inference. Analysis of Variance. Inference of Categorical Data. Simple Linear Regression and Correlation. The Uses of Epidemiology. Mortality Rates. Age Adjusted Rates. Incidence and Prevalence Rates. Cross-Sectional versus Longitudinal Looks at Data. Measurements of Relative Risks. Odds Ratio. Confounding Variables. Multiple Logistic Regression. Survival Analysis. Cox Proportional Hazard Model. Prerequisites: MATHS 131				
Course Code:	**STAT 383**	Course Credits:	(3-0-3)	Course Title:	**Demography and Population Studies**
Course Description:	Vital Statistics. Definitions and Uses. Methods of Obtaining Vital Statistics. Measurements of Fertility. Reproduction Rates. Measurements of Mortality. Life Tables. Uses and Construction of Modified Life Tables. Static and Dynamic Demography. Collection of Demographic Data. Population Census. Measures of Population. Growth of Population and Population Density. Prerequisites: MATHS 131				
Course Code:	**STAT 390**	Course Credits:	(3-0-3)	Course Title:	**Principles of Operations Research**
Course Description:	Origins and Nature of Operations Research. Phases of Operations Research Study. Linear Programming and its Applications. Integer Programming and its Applications. Graphical Analysis of Linear and Integer Programming. Use of Optimization Packages to Solve Linear and Integer Programming. Decision Analysis. Prerequisites: STAT 271				
Course Code:	**STAT 394**	Course Credits:	(3-0-3)	Course Title:	**Linear Programming**
Course Description:	Review of Linear Algebra. Convex Sets. Assumptions and Formulation of Linear Programming Problems. Simplex Algorithm. Sensitivity Analysis. Duality and Feasibility. Revised Simple Algorithm. Large-Scale Problems. Interior Point Methods. Transportation Assignment and Transshipment Problems as Linear Programming Problems. Network Models as Linear Programming Problems. Prerequisites: MATHS 132, STAT 271				
Course Code:	**STAT 471**	Course Credits:	(3-0-3)	Course Title:	**Decision Theory**
Course Description:	Elements of Decision Problems. Risk Profiles. Sensitivity Analysis. Modeling Uncertainty. Probability Assessment. Value of Information. Risk Attitudes. Expected Utility. Utility Models and Sequential Decisions. Prerequisites: STAT 372				
Course Code:	**STAT 476**	Course Credits:	(3-0-3)	Course Title:	**Queuing Systems**
Course Description:	Introduction. Exponential Distribution and its Properties. Markov Chains. Markovian Systems. Birth and Death Processes. Poisson Processes. Renewal Processes. Queue Discipline. M/M/1 System. The Model M/G/1 Multiserver Queues. M/M/k. Prerequisites: STAT 372				
Course Code:	**STAT 478**	Course Credits:	(3-0-3)	Course Title:	**Introduction to stochastic Processes**
Course Description:	Introduction to Stochastic Processes, (3-0-3) Random Walks. Renewal Theory. Markov Processes. Continuous and Discrete Stochastic Processes. Prerequisites: STAT 372				
Course Code:	**STAT 479**	Course Credits:	(3-0-3)	Course Title:	**Reliability**
Course Description:	The Use of Probability Functions in Reliability Evaluation. Catastrophic Failure Models and Reliability Functions. Combinatorial Aspects of System Reliability. Markov Models and the Evaluation of Reliability. Approximate Methods. Reliability and Economics. Accelerated Testing and Models. Prerequisites: STAT 372				

Course Code:	**STAT 484**	Course Credits:	(2-2-3)	Course Title:	**Computational Statistics**
Course Description:	Random Number Generation, Computer Experiments, Resampling Techniques (bootstrap, cross-validation), Monte Carlo (MC) Simulations, EM algorithm, Data Augmentation, Markov Chain Monte Carlo (MCMC) methods. Wide Range Examples (biostatistics, environmental sciences, engineering). Prerequisites: STAT 377, STAT 384				
Course Code:	**STAT 485**	Course Credits:	(2-2-3)	Course Title:	**Business Analytics**
Course Description:	Overview of Business Analytics (Descriptive, Predictive, Prescriptive). Data Mining and Machine Learning to Derive Insights from Large Scale Business Data. Optimization and Simulation Methods to Support Decision-Making in the Presence of Business Constrains and Alternatives. Prerequisites: STAT 377				