

## DEPARTMENT OF INFORMATION TECHNOLOGY



**Dr. AJAEGBU Chigozirim**  
**Head of Department**

### LIST OF STAFF

S/N	NAME	RANK	SPECIALIZATION
<b>Full-Time</b>			
1.	A.O Adebayo PhD	Professor	Information Systems/Security
2.	O.D Alao PhD	Professor	Human Computer Interaction
3.	C. Ajaegbu PhD	Ass. Professor	Wireless Communication and Networking
4.	S.O Ogunlere PhD	Ass. Professor	Digital Electronics
5.	E.C Ogu PhD	Senior Lecturer	Cybersecurity
6.	A.A Izang PhD	Senior Lecturer	Data Science
7.	A. Adegbenjo PhD	Senior Lecturer	Networking and Telecommunications
8.	O. Akande PhD	Senior Lecturer	Bioinformatics
9.	O. Ajayi PhD	Senior Lecturer	Networking and Telecommunications
10.	U. Nzewata PhD	Lecturer II	Artificial Intelligence

11.	B. Owho	PhD	Lecturer II	Networking
12.	E. Oyerinde	M.Sc	Assistant Lecturer	Cybersecurity
13.	O. Adediran	M.Sc	Assistant Lecturer	Information Technology
14.	J. Adelowo	M.Sc	Assistant Lecturer	Cybersecurity
15.	O. Famodimu	M.Sc	Assistant Lecturer	Machine learning

### **Non-Academic Staff**

S/N	Name	Degree	Position
1	E. Agbolade	B.Sc	Secretary
2	T. Fakanle	B.Sc, PGD	Technologist
3	I. Obebe	B.Sc	Technologist
4	M. OSundina	B. Tech.	Technologist
5	O. Bamidele	B.Sc.	Technologist

## **CORE CURRICULUM AND MINIMUM ACADEMIC STANDARDS (CCMAS) BSc. (Hons) INFORMATION TECHNOLOGY**

### **Overview**

Information Technology (IT) is an expanding field that organizations of all types rely on today. This highlights the importance of having appropriate systems that function correctly and are secure. The B.Sc. Information Technology program aims to produce graduates who have the right mix of knowledge and practical, hands-on expertise to manage both an organization's Information Technology infrastructure and its end users. IT specialists are responsible for selecting hardware and software products suitable for an organization, integrating these products with the organization's needs and infrastructure, and installing, customizing, and maintaining these applications.

### **Philosophy**

The program's philosophy is to produce Information Technology graduates who are well-versed in theory and practice in the analysis, design, implementation, and management of Information Technology solutions and resources, and who also understand the impact of this technology on individuals, organizations, and society as a whole.

### **Objectives**

The objectives of the Bachelor of Science in Information Technology Program are to:

- i. Provide students with a broad and balanced foundation of Information Technology knowledge and practical skills;
- ii. Equip students with the necessary professional skills to practice as successful IT professionals and compete effectively in a world of rapid technological change;
- iii. Develop in students a range of transferable skills of Information Technology in all aspects of human endeavor;
- iv. Prepare students for self-employment and job placement in government and industries serving the needs of the local and global community; and
- v. Develop skills for career development and lifelong learning.

## **Admission Requirements and Program Duration Overview**

Our programs in this discipline offer two distinct pathways for admission:

1. Unified Tertiary Matriculation Examination (UTME)
2. Direct Entry

Additionally, we provide an option for Inter-University Transfer Mode.

### **UTME Pathway Requirements:**

- Candidate must have appropriate UTME score.
- Five SSC credit passes are required, including English Language, Mathematics, Physics, and any other relevant Science subjects, in not more than two sittings.

### **Direct Entry (3-Year Degree Programme) Requirements:**

- Minimum of a credit at the University/National Diploma or NCE.
- Five SSC credit passes in relevant science subjects, with three of them being in English Language, Mathematics, and Physics.

### **Inter-University Transfer Mode:**

- Students can transfer into 200-Level courses if they have the relevant qualification.
- Universities must certify that students meet the minimum requirements for the inter-university transfer.

### **Minimum Duration:**

- For UTME Mode: Four academic sessions or eight consecutively-run semesters.
- For Direct Entry into 200 level: Three academic sessions or six consecutively-run semesters.

### **Graduation Requirements:**

- Passed all core courses, university and faculty/school required courses, and electives.
- Accumulated a minimum of 148 course units for UTME students and 117 course units for Direct Entry students.
- Completed successfully students' industrial training (SIWES), seminar, and research project.
- Must be found worthy in character throughout the period of studentship.
- Must accumulate the total prescribed units for the program from Core, Faculty and General Studies courses, SIWES, Seminar, and Final Year Project.
- Must attain a minimum CGPA of 2.50

## **B.Sc Information Technology: Empowering Tomorrow's Tech Leaders**

In our B.Sc Information Technology program, students embark on a transformative journey fuelled by innovation and excellence. Our cutting-edge curriculum offers dynamic courses spanning programming, cybersecurity, data analytics, and artificial intelligence, ensuring graduates are equipped with the latest skills demanded by the industry. With access to state-of-the-art facilities, including modern labs and software tools, students engage in hands-on learning experiences that

mirror real-world scenarios. Through strategic industry partnerships, students gain invaluable insights and opportunities for internships, co-op programs, and collaborative projects, paving the way for seamless transitions into their careers. Employment opportunities abound in diverse sectors such as technology firms, financial services, healthcare, and government agencies, where our graduates are highly sought after for their expertise and proficiency. We foster a culture of research and innovation, empowering students to pursue their passions and make meaningful contributions to the field. Beyond the classroom, our vibrant community offers a plethora of extracurricular activities, including hackathons, workshops, and guest lectures, providing students with networking opportunities and enhancing their overall learning experience. Join us in shaping the future of technology as we empower tomorrow's tech leaders through our B.Sc Information Technology program.

### **Graduation Requirements**

To earn a B.Sc. degree in Information Technology, a minimum of 148 credits is required. Direct entry candidates may accumulate fewer credits than this stipulated number. The distribution of credit requirements by level is as follows:

#### **B.SC. INFORMATION TECHNOLOGY**

<b>LEVEL</b>	<b>1ST SEMESTER</b>	<b>2ND SEMESTER</b>	<b>TOTAL</b>
100	17	20	37
200	17	19	36
300	22	17	39
400	20	16	36
<b>TOTAL</b>	<b>76</b>	<b>72</b>	<b>148</b>

**Note:**

C = Compulsory

E = Elective

**B.SC. INFORMATION TECHNOLOGY  
GLOBAL COURSE STRUCTURE**

**100 Level Courses**

<b>Course Code</b>	<b>Course Title</b>	<b>Core/Elective</b>	<b>1<sup>st</sup> Semester</b>	<b>2<sup>nd</sup> Sem.</b>
			Credit	Credit
BU-GST 011	Citizenship Orientation	C	0	
BU-GST 012	Citizenship Orientation	C		0
GST 111	Communication in English	C	2	
GST 112	Nigerian Peoples and Culture	C		2
MTH 101	Elementary Mathematics I	C	2	
MTH 102	Elementary Mathematics II	C		2
PHY 101	General Physics I	C	2	-
PHY 102	General Physics II	C		2
PHY 107	General Practical Physics I	C	1	
PHY 108	General Practical Physics II	C		1
STA 111	Descriptive Statistics	C	3	
COS 101	Introduction to Computing Sciences	C	3	
COS 102	Problem Solving	C		3
BU-COS 107	Introduction to Scripting Languages	C	2	
BU-IFT 106	Information Technology in Business	C		3
BU-IFT 108	Introduction to Operations Research	C		3
BU-GST 105	Use of Library and Study Skills	C	2	
BU-GST 126	Life and Teachings of Christ the Messiah	C		3
BU-GST 112	Health Principles	C		1
	<b>TOTAL (37 Units)</b>		<b>17</b>	<b>20</b>

**200 Level Courses**

<b>Course Code</b>	<b>Course Title</b>	<b>Core/Elective</b>	<b>1<sup>st</sup> Sem.</b>	<b>2<sup>nd</sup> Sem.</b>
			<b>Credit</b>	<b>Credit</b>
BU-GST 021	Citizenship Orientation	C	0	
BU-GST 022	Citizenship Orientation	C		0
GST 212	Philosophy, Logic, and Human Existence	C		2
ENT 211	Entrepreneurship and Innovation	C	2	
COS 201	Computer Programming I	C	3	
COS 202	Computer Programming II	C		3
IFT 203	Introduction to Web Technologies	C	2	
IFT 205	Introduction to Information Technology	C	2	
IFT 211	Digital Logic Design	C	2	
IFT 212	Computer Architecture and Organisation	C		2
INS 202	Human-Computer Interface	C		2
BU-COS 209	Innovation in Web Design and Development	C	2	
CYB 202	Introduction to Cybersecurity and Strategy	C		2
BU-IFT 220	Introduction to Information Security	C		3
INS 204	System Analysis and Design	C		3
BU-GST 215	Adventist Heritage	C	3	
BU-GST 200	Communication in French	C		1
BU-GST 221	Introduction to Agriculture	C	1	
BU-GST 220	Origins and Science	C		1
	<b>TOTAL (36)</b>		<b>17</b>	<b>19</b>

**200 Direct Entry Level Courses**

<b>Course Code</b>	<b>Course Title</b>	<b>Core/Elective</b>	<b>1<sup>st</sup> Sem.</b>	<b>2<sup>nd</sup> Sem.</b>
			<b>Credit</b>	<b>Credit</b>
BU-GST 021	Citizenship Orientation	C	0	
BU-GST 022	Citizenship Orientation	C		0
GST 212	Philosophy, Logic, and Human Existence	C		2
ENT 211	Entrepreneurship and Innovation	C	2	
IFT 203	Introduction to Web Technologies	C	2	
IFT 205	Introduction to Information Technology	C	2	
IFT 211	Digital Logic Design	C	2	
IFT 212	Computer Architecture and Organisation	C		2
INS 202	Human-Computer Interface	C		2

BU-COS 209	Innovation in Web Design and Development	C	2	
CYB 202	Introduction to Cybersecurity and Strategy	C		2
BU-IFT 220	Introduction to Information Security	C		3
INS 204	System Analysis and Design	C		3
BU-GST 215	Adventist Heritage	C	3	
BU-GST 200	Communication in French	C		1
BU-GST 221	Introduction to Agriculture	C	1	
BU-GST 220	Origins and Science	C		1
COS 101	Introduction to Computing Sciences	C	3	
COS 102	Problem Solving	C		3
<b>TOTAL (36)</b>			<b>17</b>	<b>19</b>

### 300 Level Courses

Course Code	Course Title	Core/Elective	1 <sup>st</sup> Sem.	2 <sup>nd</sup> Sem.
BU-GST 031	Citizenship Orientation	C	0	
BU-GST 032	Citizenship Orientation	C		0
GST 312	Peace and Conflict Resolution	C		2
ENT 312	Venture Creation	C		2
IFT 301	Web Application Development	C	2	
IFT 304	Web Development Using Content Management Systems	C		2
IFT 307	Ethics and Legal Issues in IT	C	2	
IFT 310	Mobile Application Development	C	2	
IFT 322	IT Innovation and Entrepreneurship	C		2
IFT 342	Network Servers and Infrastructures	C		2
IFT 350	SIWES	C		6
CSC 308	Operating Systems	C		3
ICT 305	Data Communications Systems and Network	C	3	
BU-IFT 323	Database Design and Programming	C	2	
BU-IFT 315	Penetration Testing and Ethical Hacking	C	3	
BU-GST 317	Fundamentals of Christian Faith	C	3	
BU-GST 312	Family Life			1
BU-COS 325	Introduction to Machine Learning	C	2	
CSC 309	Artificial Intelligence	C	2	
<b>TOTAL (41 Units)</b>			<b>21</b>	<b>20</b>

### 300 LEVEL DIRECT ENTRY

Course Code	Course Title	Core/Elective	1 <sup>st</sup> Sem.	2 <sup>nd</sup> Sem.
BU-GST 031	Citizenship Orientation	C	0	
BU-GST 032	Citizenship Orientation	C		0
GST 312	Peace and Conflict Resolution	C		2
ENT 312	Venture Creation	C		2
COS 201	Computer Programming I	C	3	
COS 202	Computer Programming II	C		3
IFT 302	Web Application Development	C	2	
IFT 304	Web Development using Content Management Systems	C		2
IFT 308	Ethics and Legal Issues in IT	C	2	
IFT 310	Mobile Application Development	C	2	

IFT 322	IT Innovation and Entrepreneurship	C		2
IFT 342	Network Servers and Infrastructures	C		2
IFT 350	SIWES	C		6
CSC 311	Operating Systems	C	3	
ICT 305	Data Communications Systems and Network	C	3	
BU-IFT 323	Database Design and Programming	C	2	
BU-IFT 315	Penetration Testing and Ethical Hacking	C	3	
BU-GST-317	Fundamentals of Christian Faith	C	3	
BU-GST-312	Family Life			1
	<b>TOTAL (43 Units)</b>		<b>23</b>	<b>20</b>

SIWES takes place during the long vacation of 300 Level

### 400 Level Courses

Course Code	Course Title	Core/Elective	1 <sup>st</sup> Sem.	2 <sup>nd</sup> Sem.
BU-GST 041	Citizenship Orientation	C	0	
BU-GST 042	Citizenship Orientation	C		0
COS 409	Research Methodology and Technical Report Writing	C	3	
IFT 403	Mobile and Pervasive Computing	C	2	
IFT 410	System Integration and Architecture	C		2
IFT 442	Wireless Communications and Networking	C		2
IFT 490	Research Project	C		6
INS 401	Project Management	C	2	
BU-COS 419	Agile Development and Scrum	C	2	
BU-IFT 413	Data Analytics	C	2	
BU-IFT 407	Linux System Administration	C	3	
BU-GST 400	Religion and Social Ethics	C		3
BU-IFT 406	Applied Network Security	C		3
BU-IFT 405	Enterprise Architecture	C	3	
	<b>Elective Courses (Select Any 1 for first semester)</b>			
BU-IFT 411	Web Design Aesthetics	E	3	
BU-IFT 415	Data and Application Security	E	3	
BU-IFT 417	Web server administration	E	3	
	<b>TOTAL (36 Units)</b>		<b>20</b>	<b>16</b>

**400 DIRECT ENTRY COURSES**

<b>Course Code</b>	<b>Course Title</b>	<b>Core/Elective</b>	<b>1<sup>st</sup> Sem.</b>	<b>2<sup>nd</sup> Sem.</b>
BU-GST 041	Citizenship Orientation	C	0	
BU-GST 042	Citizenship Orientation	C		0
COS 409	Research Methodology and Technical Report Writing	C	3	
IFT 403	Mobile and Pervasive Computing	C	2	
IFT 410	System Integration and Architecture	C		2
IFT 442	Wireless Communications and Networking	C		2
IFT 490	Research Project	C		6
INS 401	Project Management	C	2	
BU-COS 427	Agile Development and Scrum	C	2	
BU-IFT 413	Data Analytics	C	2	
BU-IFT 407	Linux System Administration	C	3	
BU-GST 400	Religion and Social Ethics	C		3
BU-IFT 406	Applied Network Security	C		3
BU-IFT 405	Enterprise Architecture	C	3	
BU-COS 325	Introduction to Machine Learning	C	2	
CSC 309	Artificial Intelligence	C	2	
	<b>Elective Courses (Select Any 1 for first semester)</b>			
BU-IFT 411	Web Design Aesthetics	E	3	
BU-IFT 415	Data and Application Security	E	3	
BU-IFT 417	Web server administration	E	3	
	<b>TOTAL (36 Units)</b>		<b>24</b>	<b>16</b>

## **Course Contents and Learning Outcomes 100 Level**

### **GST 111: Communication in English (2 Units C: LH 30; PH 45)**

#### **Learning Outcomes**

At the end of this course, students should be able to:

1. identify possible sound patterns in English Language;
2. list notable Language skills;
3. classify word formation processes;
4. construct simple and fairly complex sentences in English;
5. apply logical and critical reasoning skills for meaningful presentations;
6. demonstrate an appreciable level of the art of public speaking and listening; and
7. write simple and technical reports.

#### **Course Contents**

Sound patterns in English Language (vowels and consonants. Phonetics and phonology). English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations). Sentence in English (types: structural and functional, simple and complex). Grammar and Usage (tense, mood, modality and concord, aspects of language use in everyday life). Logical and Critical Thinking and Reasoning Methods (Logic and Syllogism, Inductive and Deductive Argument and Reasoning Methods, Analogy, Generalisation and Explanations). Ethical considerations, Copyright Rules and Infringements. Writing Activities: (Pre-writing, Writing, Post-writing, Editing and Proofreading; Brainstorming, outlining, Paragraphing, Types of writing, Summary, Essays, Letter, Curriculum Vitae, Report writing, Note making, etc. Mechanics of writing). Comprehension Strategies: (Reading and types of Reading, Comprehension Skills, 3RsQ). Information and Communication Technology in Modern Language Learning. Language skills for effective communication. Major word formation processes. Writing and reading comprehension strategies. Logical and critical reasoning for meaningful presentations. Art of public speaking and listening. Report writing.

### **GST 112: Nigerian Peoples and Culture (2 Units C: LH 30)**

#### **Learning Outcomes**

1. analyse the historical foundation of the Nigerian culture and arts in pre-colonial times;
2. list and identify the major linguistic groups in Nigeria;
3. explain the gradual evolution of Nigeria as a political unit;
4. analyse the concepts of Trade, Economic and Self-reliance status of the Nigerian peoples towards national development;
5. enumerate the challenges of the Nigerian State towards Nation building;
6. analyse the role of the Judiciary in upholding people's fundamental rights;
7. identify acceptable norms and values of the major ethnic groups in Nigeria; and
8. list and suggest possible solutions to identifiable Nigerian environmental, moral and value problems.

#### **Course Contents**

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and culture; peoples and culture of the ethnic minority groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; Colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914; formation of political parties in Nigeria; Nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concept of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigeria people; trade, skill acquisition and self-reliance). Social justices and national development (law definition and classification). Judiciary and fundamental rights. Individual norms and values (basic Nigeria norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes and conducts. Cultism, kidnapping and other related social vices). Re-orientation, moral and national values: The 3Rs – Reconstruction, Rehabilitation and Re-orientation; Re-orientation Strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAI), War Against Indiscipline and Corruption(WAIC), Mass Mobilisation for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

### **MTH 101: Elementary Mathematics I (Algebra and Trigonometry) (2 Units C: LH 30)**

#### Learning Outcomes

At the end of the course students should be able to:

1. understand basic definition of Set, Subset, Union, Intersection, Complements and use of Venn diagrams;
2. solve quadratic equations;
3. solve trigonometric functions;
4. understand various types of numbers; and
5. solve some problems using the Binomial theorem.

#### **Course Contents**

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 formulae.

### **MTH 102: Elementary Mathematics II (Calculus) (2 Units C: LH 30)**

#### Learning Outcomes

At the end of the course students should be able to:

1. carry out differentiation and Integration according to the rules thereof;
2. understand the meaning of the function of a real variable, graphs, limits and continuity; and
3. solve some applications of definite integrals in areas and volumes.

### **Course Contents**

Function of a real variable. graphs. limits and idea of continuity. The derivative is the 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 and volumes.

### **PHY 101: General Physics I (Mechanics) (2 Units C: LH 30)**

#### **Learning Outcomes**

At the end of the course students should be able to:

1. identify and deduce the physical quantities and their units;
2. differentiate between vectors and scalars.;
3. describe and evaluate motion of systems on the basis of the fundamental laws of mechanics;
4. apply Newton's laws to describe and solve simple problems of motion;
5. evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;
6. explain and apply the principles of conservation of energy, linear and angular momentum;
7. describe the laws governing motion under gravity; and
8. explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

### **Course Contents**

Space and time. units and dimensions. Vectors and Scalars. Differentiation of vectors: displacement, velocity and acceleration. kinematics. Newton laws of motion (Inertial frames, Impulse, force and action at a distance, momentum conservation). Relative motion. Application of Newtonian mechanics. Equations of motion. Conservation principles in physics. Conservative forces. conservation of linear momentum. Kinetic energy and work. Potential energy. System of particles. Centre of mass. Rotational motion. Torque. vector product. moment. rotation of coordinate axes and angular momentum. Polar coordinates. conservation of angular momentum. Circular motion. Moments of inertia. gyroscopes and precession. Gravitation: Newton's Law of Gravitation, Kepler's Laws of Planetary Motion, Gravitational Potential Energy, Escape velocity, Satellites motion and orbits.

### **PHY 102: General physics II (Electricity & magnetism) (2 Units C: LH 30)**

#### **Learning Outcomes**

At the end of the course, students should be able to:

1. describe the electric field and potential, and related concepts, for stationary charges;
2. calculate electrostatic properties of simple charge distributions using Coulomb's law, Gauss's law, and electric potential;
3. describe and determine the magnetic field for steady and moving charges;
4. determine the magnetic properties of simple current distributions using Biot-Savart and Ampere's law;
5. describe electromagnetic induction and related concepts and make calculations using Faraday and Lenz's laws;
6. explain the basic physical of Maxwell's equations in integral form;
7. evaluate DC circuits to determine the electrical parameters;

8. determine the characteristics of ac voltages and currents in resistors, capacitors, and Inductors.

### **Course Contents**

Forces in nature. Electrostatics (electric charge and its properties, methods of charging). Coulomb's law and superposition. Electric field and potential. Gauss's law. Capacitance. Electric dipoles. Energy in electric fields. Conductors and insulators. DC circuits (current, voltage and resistance. Ohm's law. Resistor combinations. Analysis of DC circuits. Magnetic fields. Lorentz force. Biot-Savart and Ampère's laws. Magnetic dipoles. Dielectrics. Energy in magnetic fields. Electromotive force. Electromagnetic induction. Self and mutual inductances. Faraday and Lenz's laws. Step up and step down transformers. Maxwell's equations. Electromagnetic oscillations and waves. AC voltages and currents applied to inductors, capacitors, and resistance.

### **PHY 107: General Practical Physics I (1 Unit C: PH 45)**

#### **Learning Outcomes**

At the end of the course, students should be able to:

1. conduct measurements of some physical quantities;
2. make observations of events, collect and tabulate data;
3. identify and evaluate some common experimental errors;
4. plot and analyse graphs; and
5. draw conclusions from numerical and graphical analysis of data.

#### **Course Contents**

This introductory course emphasizes quantitative measurements, the treatment of measurement errors and graphical analysis. A variety of experimental techniques should be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity etc., covered in PHY 101 and PHY 102. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

### **PHY 108 - General Practical Physics II (1 Unit C: PH 45)**

#### **Learning Outcomes**

On completion, the student should be able to:

1. conduct measurements of some physical quantities;
2. make observations of events, collect and tabulate data;
3. identify and evaluate some common experimental errors;
4. plot and analyse graphs;
5. draw conclusions from numerical and graphical analysis of data; and
6. prepare and present practical reports.

#### **Course Contents**

This practical course is a continuation of PHY 107 and is intended to be taught during the second semester of the 100 level to cover the practical aspect of the theoretical courses

that have been covered with emphasis on quantitative measurements, the treatment of measurement errors, and graphical analysis. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

### **STA 111: Descriptive Statistics (3 Units C: LH 45)**

#### **Learning Outcomes**

At the end of the course, students should be able to:

1. explain the differences between permutation and combination;
2. explain the concept of random variables and relate it to probability and distribution functions;
3. describe the basic distribution functions; and
4. explain the concept of exploratory data analysis.

#### **Course Contents**

Permutation and combination. Concepts and principles of probability. Random variables. Probability and distribution functions. Basic distributions: Binomial, geometric, Poisson, normal and sampling distributions; exploratory data analysis.

COS 101: Introduction to Computing Sciences (3 Units C: LH 30; PH 45)

#### **Learning Outcomes**

At the end of the course, students should be able to:

1. explain basic components of computers and other computing devices;
2. describe the various applications of computers;
3. explain information processing and its roles in the society;
4. describe the Internet, its various applications and its impact;
5. explain the different areas of the computing discipline and its specializations; and
6. demonstrate practical skills on using computers and the internet.

#### **Course Contents**

Brief history of computing. Description of the basic components of a computer/computing device. Input/Output devices and peripherals. Hardware, software and human ware. Diverse and growing computer/digital applications. Information processing and its roles in society. The Internet, its applications and its impact on the world today. The different areas/programs of the computing discipline. The job specializations for computing professionals. The future of computing.

Lab Work: Practical demonstration of the basic parts of a computer. Illustration of different operating systems of different computing devices including desktops, laptops, tablets, smart boards and smart phones. Demonstration of commonly used applications such as word processors, spreadsheets, presentation software and graphics. Illustration of input and output devices including printers, scanners, projectors and smartboards. Practical demonstration of the Internet and its various applications. Illustration of browsers and search engines. How to access online resources.

### **COS 102: Problem Solving (2 Units C: LH 30; PH 0)**

#### **Learning Outcomes**

At the end of this course, students should be able to:

1. explain problem solving processes;
2. demonstrate problem solving skills;
3. describe the concept of algorithms development and properties of algorithms;
4. discuss the solution techniques of solving problem;
5. solve computer problems using algorithms, flowcharts, pseudocode; etc.; and
6. solve problems using programming language using C, PYTHON, etc.

### **Course Contents**

Introduction to the core concepts of computing. Problems and problem-solving. The identification of problems and types of problems (routine problems and non-routine problems). Method of solving computing problems (introduction to algorithms and heuristics). Solvable and unsolvable problems. Solution techniques of solving problems (abstraction, analogy, brainstorming, trial and error, hypothesis testing, reduction, literal thinking, means end analysis, method of focal object, morphological analysis, research, root cause analysis, proof, divide and conquer). General Problem-solving process. Solution formulation and design: flowchart, pseudocode, decision table, decision tree. Implementation, evaluation and refinement. Programming in C, Python etc.

Lab Work: Use of simple tools for algorithms and flowcharts; writing pseudocode; writing assignment statements, input-output statements and condition statements; demonstrating simple programs using any programming language (Visual Basic, Python, C)

**BU-CSC107 Introduction to Scripting Languages** (2 Units; Core; LH=30; PH=Nil)

### **Senate-approved relevance**

A Scripting Language is a logically organised collection of commands, within an interpreted or executable file, used to control the facilities of an existing system. It is used to incorporate interactive features that enhance the productivity of the system users in several ways. This course will expose students to a wide range of scripting languages and enable them to identify, appreciate and understand the advantages and disadvantages of each one of them. This will equip them with knowledge and skills necessary to select suitable ones per project, to integrate interactivity into developed applications that solve problems and remove barriers for the benefits of humanity. In particular, this course, which provides BU IT graduates with competence in selecting optimal scripting languages, is consistent with BU's emphasis on excellence and whole-person education towards essential service for contemporary society.

### **Overview**

Scripting languages are mostly used to automate processes at the application level. At the command line or through a web server, they are able to execute programs running on a web server and to display appropriate results to the users. A scripting language is an open-source language with limited number of data structures, which makes it easy to write and edit, beneficial for developing new applications in web browsers and creating plug-ins and extensions.

This course will address origin, characteristics and types of scripting languages. It will discuss classifications of users along modern applications and traditional users. It will also discuss web scripting. Students will learn about scripting language features and facilities, optimizing applications with Modules, and offline compilation of high-end scripting languages. They will also learn how to deploy an application, and explore component-based approach. This will equip students with knowledge and skills necessary to select suitable scripting language per project.

### **Objectives**

The objectives of this course are to:

1. Explain the origin and meaning of scripting language
2. Describe types of scripting languages
3. Explore the characteristics of scripting languages which differentiate them from proper programming languages
4. Explain visual scripting and scripting components
5. Illustrate main usage areas of scripting languages
6. Describe the different areas of web scripting
7. State front-end technologies as described in the various scripting languages explained

### **Learning Outcomes**

On completion of this course, students should be able to:

1. Describe at least six (6) scripting languages
2. Explain at least four (4) types of scripting languages
3. List at least 5 characteristics of scripting languages
4. Clarify visual scripting and scripting components
5. Summarise four (4) main areas of usage of scripting languages
6. Illuminate web scripting

### **Course Contents**

Origin of Scripting Languages (SLs). Basic concepts of SLs. Scripts and programs. Types of scripting languages. Advantages and disadvantages SL. Development environment for SL. Front-end and Back-end SLs. Characteristics of SLs. Classification of SLs and users. Visual scripting. Scripting components. Applications of traditional SL. Applications of contemporary SLs. Command SLs. Mark-Up SLs. Universal SLs. Applications developed using SLs. Concepts of Web scripting. Dynamic web pages. Dynamically generated HTML.

### **Minimum Academic Standard**

Software Laboratory

### **Senate-approved relevance**

Information Technology (IT) in Business addresses the role IT plays within the business environment. Relevance for this course is found in its emphasis in nurturing competent God trusting IT graduates in building successful business information systems that will help businesses to thrive, and thereby improve the society's standard of living. This is in harmony with Babcock University's philosophy of education that provides ethical principles of excellence and integrity requisite in preparing IT graduates for positive societal impact.

### **Overview**

IT in Business exposes students to concepts of Business Information Systems (BIS). This is a course that would help students understand the role of information technology within the business environment, and how it helps organisations achieve competitive advantage. Without this exposure, IT graduates would be deficient, in this essential regard, for their professional practice.

This course gives an overview of e-business, from design to operations, of organisations engaging in contemporary highly competitive, global environment. The strategic use of e-business, use of information technology for competitive advantage, e-business impact on organisation, globalisation and the impact on options created through applied information technology, will be examined. This would support having more productive IT-based enterprises.

### **Objectives**

The objectives of this course are to:

1. Explain the basic concept of information technology related to e-business
2. Explicate information technology infrastructure
3. Discuss business information systems
4. Expound on concept of e-Business
5. Clarify e-Commerce as subset of e-Business
6. Expound on five (5) e-Business Strategic tools
7. Discuss four (4) e-business payment systems
8. Describe strategic planning of business information systems

### **Learning Outcomes**

At the end of this course, the students should be able to:

1. Explain the value of information
2. Discuss information technology within an organisation and how it is developed
3. Prescribe technology hardware based on clear requirement
4. State at least three (3) importance of information technology and its usefulness in organisations
5. Explain how information technology drives competitive advantage in a business environment
6. Describe at least four (4) e-business strategies in place within an organisation
7. Clarify procurement management and the role of e-Procurement in facilitating swift procurement of information technology infrastructures within the business environment
8. Illuminate supply chain management within a business environment

9. Discuss at least one (1) strategic information systems in e-Business
10. Present at least three (3) models of Information System types

### **Course Contents**

Information concepts. Information Systems. Hardware and Software Basics. Information Technology Infrastructure and its evolution. e-Business definition and objectives. E-Commerce as a subset of e-Business. Types of E-commerce and e-Business models. Internal and external factors of e-Business. Strategic planning and Systems design for E-Business. Strategic decision-making. Implementation and performance assessment of e-business. Strategic Tools (SWOT, SLEPT and CSF). E-Business Payment System. Supply chain management. Strategic information system. Procurement and Back-office processes. Information system for back-end operations. Global Strategic Information Systems. Competitive advantage within the e-Business environment. Transaction Processing Systems. Enterprise Resource Planning. Management Information Systems. Decision Support Systems.

### **Minimum Academic Standard**

Software Laboratory

**BU-IFT 108 Introduction to Operations Research** (3 Units; Core; LH=45; PH=Nil)

### **Senate-approved relevance**

Operations Research (OR) is a multidisciplinary field of study that seeks optimal ways to perform operations. Mathematicians, economists and physicists, among others, participate in finding optimal solutions to operational challenges. Where no counsel is, the people fall: but in the multitude of counsellors there is safety (Proverbs 11: 14). Computerising conceived OR models for tests, trials and simulation for validation before deployment requires knowledgeable and skilled computing graduates. A course that prepares BU Information Technology graduates to work cooperatively with other professionals for the benefit of the society aligns with BU's educational policy and mission aimed at whole-person education and positive impact in the society.

### **Overview**

OR focuses upon scientifically helping professionals perform operations optimally. This course is designed to equip computing students with basic OR enlightenment and design techniques by demonstrating how OR helps determine certain policies and actions scientifically. This course is also to encourage students to be creative and innovative in deploying systems to exploit jointly derived awareness, in order to lower operating costs and improve profitability, among others.

This course entails basic materials on Decision Analysis, Linear Programming, Inventory Models, Critical Path Analysis and Program Evaluation and Review Technique, presented from computing perspective to strengthen the students towards their future role in OR study and eventual deployment of outcomes. This course will also serve as a springboard for easier understanding and appreciation of more intricate OR discourse and role. Early exposure of IT

students to OR would encourage appreciation of contributions of other fields of study essential for IT to succeed.

### **Objectives**

The objectives of this course are to:

1. Explain Operations Research (OR) from computing perspective
2. Discuss basic concepts of OR from computing perspective
3. Stimulate students' interest in OR
4. Illustrate four (4) methods of Decision Analysis algorithmically
5. Expound on three (3) basic techniques and procedures of solving Linear Programming problems
6. Discuss two (2) deterministic and two (2) probabilistic inventory models
7. Illuminate basic concepts of Critical Path Analysis
8. Expound on basic concepts of Program Evaluation and Review Technique

### **Learning Outcomes**

On successful completion of this course, students should be able to:

1. Discuss procedure of Operational Research (OR) study and three (3) OR challenges
2. Solve a decision making problem using Naïve decision criteria, Maximum Likelihood, and Expected Value approaches
3. Explain the general and standard forms of a Linear Programming model
4. State the procedures of Graphical, Algebraic and Simplex methods of solving Linear Programming models
5. Solve a Linear Programming problem that resolves naturally into its standard form using any applicable procedure
6. Graphically present deterministic and non-deterministic inventory time graphs
7. Derive the Economic Order Quantity and Production Lot Size models
8. Solve a deterministic inventory problem
9. Estimate inventory Safety Stock and Reorder Point at a predetermined satisfaction level for a non-deterministic inventory
10. Solve at least three (3) marginal inventory analysis problems
11. Draw at least three (3) project Network diagrams
12. Determine at least three (3) project duration and Critical Path(s)
13. Compute activity Expected Time and the Standard Deviation (risk) of a non-deterministic activity duration

### **Course Contents**

Typical features of Operations Research (OR). Phases of OR. Challenges of OR. Basis of Decision Analysis. Naïve Decision Making approaches. Maximum Likelihood and Bayes Decision Making approaches. Linear Programming (LP) problem basis. LP problem Graphical Method of solution. LP problem Algebraic Method of solution. LP problem Simplex method of solution. Inventory and its challenges. Inventory Economic Order Quantity (EOQ) model.

Inventory Economic Production Lot Size (EPLS) model. Safety Stock and Reorder Point Determination for Stochastic Inventory. Inventory Marginal Analysis. Network Critical Path Analysis. Program Evaluation and Review Technique basis. Clarification of the OR process.

### **Minimum Academic Standard**

Software Laboratory

### **Course Contents and Learning Outcomes**

#### **200 Level**

#### **GST 212: Philosophy, Logic and Human Existence (2 Units C: LH 30)**

##### **Learning Outcomes**

At the end of this course, students should be able to

1. know the basic features of philosophy as an academic discipline;
2. identify the main branches of philosophy & the centrality of logic in philosophical discourse;
3. know the elementary rules of reasoning;
4. distinguish between valid and invalid arguments;
5. think critically and assess arguments in texts, conversations and day-to-day discussions;
6. critically assess the rationality or otherwise of human conduct under different existential conditions;
7. develop the capacity to extrapolate and deploy expertise in logic to other areas of knowledge, and
8. guide his or her actions, using the knowledge and expertise acquired in philosophy and logic.

##### **Course Contents**

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic— the first nine rules of inference. Informal fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content — deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character molding, etc.

#### **ENT 211: Entrepreneurship and Innovation (2 Units C: LH 30; PH 45)**

##### **Learning Outcomes**

At the end of this course, students should be able to:

1. explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation, and risk-taking;
2. state the characteristics of an entrepreneur;
3. analyse the importance of micro and small businesses in wealth creation, employment, and financial independence;
4. engage in entrepreneurial thinking;
5. identify key elements in innovation;
6. describe stages in enterprise formation, partnership, and networking including business planning;
7. describe contemporary entrepreneurial issues in Nigeria, Africa, and the rest of the world; and
8. state the basic principles of e-commerce.

### **Course Contents**

Concept of Entrepreneurship (Entrepreneurship, Intrapreneurship/Corporate Entrepreneurship,). Theories, Rationale, and relevance of Entrepreneurship (Schumpeterian and other perspectives, Risk-Taking, Necessity, and opportunity-based entrepreneurship and Creative destruction). Characteristics of Entrepreneurs (Opportunity seeker, Risk-taker, Natural and Nurtured, Problem solver and change agent, innovator and creative thinker). Entrepreneurial thinking (Critical thinking, Reflective Thinking, and Creative thinking). Innovation (Concept of innovation, Dimensions of innovation, Change, and innovation, Knowledge and innovation). Enterprise formation, partnership, and networking (Basics of Business Plan, Forms of business ownership, Business registration, and Forming alliances and joint ventures). Contemporary Entrepreneurship Issues (Knowledge, Skills and Technology, Intellectual property, Virtual office, Networking). Entrepreneurship in Nigeria (Biography of inspirational Entrepreneurs, Youth and women entrepreneurship, Entrepreneurship support institutions, Youth enterprise networks, and Environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

## **IFT 203: Introduction to Web Technologies (2 Units C: LH 15; PH 45)**

### **Learning Outcomes**

At the end of the course, the students should be able to:

1. State the origin of the internet and the world wide web.
2. Create simple web content using HTML, CSS, and JavaScript.
3. Use simple application frameworks to develop web content.
4. Appraise the impact of the world wide web on people's lives over time.

### **Course Contents**

Introduction to the internet, the world wide web (WWW), and web development. WWW as a platform for interactive applications, content publishing, and social services. The role of HTTP and HTTPS in the context of web applications. Roles and operations of web browsers and the

webserver. Interacting with web applications through forms, and using style sheets to separate document structure and document formatting. Web development tools and frameworks. Build a simple website that: organises information effectively, uses valid HTML and CSS, and applies appropriate web standards from standards bodies such as W3C. HTTP communication protocol, the mark-up languages HTML, XHTML, and XML, the CSS and XSLT standards for formatting and transforming web content. Interactive graphics and multimedia content on the web, client-side programming using JavaScript. Impact of the world wide web on people's lives over time.

### **Lab Work**

Using simple form-based web applications; developing simple websites using web development tools and frameworks; using the mark-up languages HTML, XHTML and XML; using JavaScript. Illustration of the use of interactive graphics and multimedia content.

### **IFT 205: Introduction to Information Technology (2 Units C: LH 30)**

#### **Learning Outcomes**

At the end of the course, the students should be able to:

1. Explain the history and development of information technologies.
2. Describe information technology application domains.
3. Identify information technology and its related disciplines.
4. Analyse security, privacy, policy, and other social issues inherent in information technology.
5. Compare the fundamental structures of computer networks and the internet.

#### **Course Contents**

Introduction to computer software, hardware, and networking technologies. Information technology systems model. A brief introduction to information technologies – human-computer interaction, information management; networking, platform technologies, programming, and web systems and technologies. Data versus information. History of information technology and the internet. Information technology application domains. Security, privacy, policy, and other social issues inherent in Information technology development and use. Future trends in information technology, problems on mining, visualisation, natural language processing, and Blockchain.

Sure, here is the information you provided, rewritten with the necessary headings in bold:

### **IFT 211: Digital Logic Design (2 Units C: LH 15; PH 45)**

#### **Learning Outcomes**

At the end of this course, students will be able to:

1. Explain why everything is data, including instructions, in computers.

2. Describe how negative integers, fixed-length numbers, and non-numeric data are represented.
3. Convert numerical data from one format to another.
4. Describe computations as a system characterised by a known set of configurations with transitions from one unique configuration (state) to another (state).
5. Describe the distinction between systems whose output is only a function of their input (combinational) and those with memory/history (sequential).
6. Describe a computer as a state machine that interprets machine instructions.
7. Articulate that there are many equivalent representations of computer functionality, including logical expressions and gates, and be able to use mathematical expressions to describe the functions of simple combinational and sequential circuits.
8. Design the basic building blocks of a computer: arithmetic-logic unit (gate-level), registers (gate-level), central processing unit (register transfer-level), and memory (register transfer-level).

## **Course Contents**

Introduction to information representation and number systems. Boolean algebra and switching theory. Manipulation and minimisation of completely and incompletely specified Boolean functions. Physical properties of gates: fan-in, fan-out, propagation delay, timing diagrams and tri-state drivers. Combinational circuits design using multiplexers, decoders, comparators and adders. Sequential circuit analysis and design, basic flip-flops, clocking and timing diagrams. Registers, counters, RAMs, ROMs, PLAs, PLDs, and FPGAs.

## **Lab Work**

Simple combinational gates (AND, OR, NOT, NAND, NOR); Combinational circuits design using multiplexers, decoders, comparators and adders. Sequential circuit analysis and design using basic flip-flops (S-R, J-K, D, T flip-flops); Demonstration of registers, counters, RAMs, ROMs, PLAs, PLDs, and FPGAs.

## **CYB 201: Introduction to Cybersecurity and Strategy (2 Units C: LH30)**

### **Learning Outcomes**

At the end of this course, students should be able to:

1. explain cybersecurity concepts, its methods, elements, and terminologies of cybersecurity -cyber, security, threat, attack, defence, and operations;
2. describe common cyber-attacks and threats, cybersecurity issues, challenges and proffered solutions, and build an enhanced view of main actors of cyberspace and cyber operations;
3. apply the techniques for identifying, detecting, and defending against cybersecurity threats, attacks and protecting information assets;
4. explain the impact of cybersecurity on civil and military institutions, privacy, business and government applications;

5. identify the methods and motives of cybersecurity incident perpetrators, and the countermeasures employed by organisations and agencies to prevent and detect those incidences and software application vulnerabilities; and
6. state the ethical obligations of security professionals, evaluate cybersecurity and national security strategies to the typologies of cyber-attacks that require policy tools and domestic response, and define the cybersecurity requirements and strategies evolving in the face of big risk.

### **Course Contents**

Basic concepts: cyber, security, confidentiality, integrity, availability, authentication, access control, non-repudiation and fault-tolerant methodologies for implementing security. Security policies, best current practices, testing security, and incident response, Risk management, disaster recovery and access control. Basic cryptography and software application vulnerabilities. Evolution of cyber-attacks. Operating system protection mechanisms, intrusion detection systems, basic formal models of security, cryptography, steganography, network and distributed system security, denial of service (and other) attack strategies, worms, viruses, transfer of funds/value across networks, electronic voting, secure applications. Cybersecurity policy and guidelines. Government regulation of information technology. Main actors of cyberspace and cyber operations. Impact of cybersecurity on civil and military institutions, privacy, business and government applications; examination of the dimensions of networks, protocols, operating systems, and associated applications. Methods and motives of cybersecurity incident perpetrators, and the countermeasures employed by organisations and agencies to prevent and detect those incidences. Ethical obligations of security professionals. Trends and development in cybersecurity. Software application vulnerabilities. Evolution of cybersecurity and national security strategies, requirements to the typologies of cyber-attacks that require policy tools and domestic response. Cybersecurity strategies evolving in the face of big risk. Role of standards and frameworks.

### **INS 202 Human-Computer Interface (HCI) (2 Units)**

#### **Learning Outcomes**

At the end of this course, students should be able to:

1. Discuss the foundations and concept of the human-computer interface
2. Explain principles of human-computer interface
3. Explain the design and development of the human-computer interface
4. Explain the importance of user feedback

#### **Course Contents**

Foundations of HCI. The concept underlying the design of HCI. Principles of GUI. GUI toolkits. System design methods. User conceptual models and interface metaphors. Human cognitive and physical ergonomics. Human-centred software evaluation and development. GUI design and programming.

#### **Lab Work:**

Illustration of the principles of HCI design. Practice on GUI design and programming. Demonstration of some GUI toolkits. Practical evaluation of GUIs

### **IFT 203: Introduction to Web Technologies (2 Units)**

#### **Learning Outcomes**

At the end of the course, the students should be able to:

1. State the origin of the internet and the world wide web
2. Create simple web content using HTML, CSS, and JavaScript
3. Use simple application frameworks to develop web content
4. Appraise the impact of the world wide web on people's lives over time

#### **Course Contents**

Introduction to the internet, the World Wide Web (WWW), and web development. WWW as a platform for interactive applications, content publishing, and social services. The role of HTTP and HTTPS in the context of web applications. Roles and operations of web browsers and the webserver. Interacting with web applications through forms, and using style sheets to separate document structure and document formatting. Web development tools and frameworks. Build a simple website that: organises information effectively, uses valid HTML and CSS, and applies appropriate web standards from standards bodies such as W3C. HTTP communication protocol, the mark-up languages HTML, XHTML, and XML, the CSS and XSLT standards for formatting and transforming web content. Interactive graphics and multimedia content on the web, client-side programming using JavaScript. Impact of the world wide web on people's lives over time.

#### **Lab Work:**

Using simple form-based web applications; developing simple websites using web development tools and frameworks; using the mark-up languages HTML, XHTML and XML; using JavaScript.

### **BU-COS 209 Innovation in Web Design and Development (2 units; Core; LH=15; PH=45)**

**Learning Outcomes:** Upon completion of this course, students should be able to:

1. Explain the role of a Back-end developer.
2. Describe the relationship between the Front-end and Back-end aspect of web development.
3. Develop Server-side (back-end) applications using NodeJS JavaScript runtime.
4. Discuss extension of NodeJS applications by adding MongoDB solutions to manage DBs.
5. Perform CRUD operations on the Database.
6. Develop asynchronous callbacks or promises to complete asynchronous.

**Course Contents:** The course covers the following topics:

## **Minimum Academic Standard**

Software Laboratory

### **BU-IFT 220 Introduction to Information Security (3 Units; Core; LH=45; PH=Nil)**

#### **Senate-approved relevance**

Information is essential for the continued growth of any society. Information security is ensuring that information systems function as desired, despite oppositions, errors and system failures, among others. This course will equip students with knowledge and skill to secure information systems. A society is fitter with more knowledge and understanding, towards which information security contributes in guarantying that information systems are secured. Production of BU IT graduates, who are competent in securing information systems, is invaluable to the society, and aligns with BU's mission of impacting the society for positive change.

#### **Overview**

Information Security is taking useful precautions to ensure that information systems perform according to stipulation and retain optimum performance, even in the face of clever wrongdoers. The security processes cover the life cycle of every piece of information, from the information need conception to its destruction. This course is designed to familiarize students with fundamental challenges of information systems, and defences to ensure their continued usefulness and availability. Early introduction of this subject would contribute to building competent Information Technology graduates who are creative and innovative in deploying secure systems used to derive and exploit joint awareness, in order to lower operating costs and improve profitability, among others.

This course presents basic information security issues. It discusses basic threats to information security and their defence outlooks. It presents approaches to identifying high-level security threats. It also explains security risk reduction through technological and human-based approaches. These are to acquaint students with information security knowledge and understanding that would be useful to their future information or other computing security roles in building enduring systems. This course will also serve as springboard to easier understanding and appreciation of more intricate information security discourse and role.

#### **Objectives**

The objectives of this course are to:

1. Discuss necessity for secure information systems
2. Expound on basic information security issues
3. Discuss basic threats to information security and defences to those threats
4. Illuminate identifying high-level security threats
5. Explain physical and logical access restriction basis
6. Expound on perimeter security
7. Describe encryption
8. Discuss procedures for malware prevention, and making hacking more difficult
9. Expound on backup regimes and healthy network environment
10. Explain three (3) human-based approaches to information security risk reduction.

## **Learning Outcomes**

On successful completion of this course, students should be able to:

1. Explain why it is necessary to secure information systems
2. Reviews four (4) primary information security issues and basis for secondary information issues
3. Discuss three (3) basic threats to information security.
4. Explain two (2) basis of defences to information security threats
5. Identify high-level security threats
6. Perform security risk analysis towards application of selective controls
7. Explain three (3) logical access restriction basis
8. Discuss a deep filter firewall
9. Evaluate encryption
10. Recommend what to do to prevent malware
11. Discuss two (2) intrusion detection techniques
12. Recommend a backup regime, and
13. Discuss one (1) human-based approach to information security risk reduction.

## **Course Contents**

Necessity for Information and Its System Security. Primary Information Security Issues. Secondary and other Information Security Issues. Basic Threats to Information Security. Basis of Defences to Information Security Threats. First Steps to Approaching Information Security and Related Issues. Identifying High-level Security Threats. Prioritizing Assets and Threats for Controls. Information Security Risk Reduction Basis. Physical and Logical Access Restriction Basics. Firewall. Encryption. Monitoring and Prevention of Malware. Audit-control. Protection of corporate data from hackers. Intrusion Detection and Prevention systems. Intrusion detection techniques. Backups and fault-tolerance. Other technological Approaches to Information Security Risk Reduction. Security of Information System Infrastructure. Some Human-based Approaches to Information Security Risk Reduction.

## **Minimum Academic Standard**

Software Laboratory

## **INS 204: Systems Analysis and Design (3 Units C: LH 30; PH 45)**

### **Learning Outcomes**

At the end of this course, students should be able to:

1. Describe system requirements gathering techniques
2. Explain data modelling technique (entity relationship modelling)
3. Explain process modelling technique (data flow diagram)
4. Describe system architectural design
5. Describe process and database design
6. Explain user interface design

### **Course Contents**

Structured approach to analysis and design of information systems for businesses. Software development life cycle. Structured top-down and bottom-up design. Dataflow diagramming. Entity relationship modelling. Computer aided software engineering. Input and output, prototyping design and validation. File and database design. Design of user interfaces. Comparison of structured and object-oriented design.

### **Lab Work**

System requirements gathering techniques, data modelling techniques (entity relationship modelling), process modelling techniques (data flow diagram), use of UML diagrams, system architectural design, user interface design.

## **GST 312: Peace and Conflict Resolution (2 Units C: LH 30)**

### **Learning Outcomes:**

Learning Outcomes At the end of the course, students should be able to:

1. analyse the concepts of peace, conflict and security;
2. list major forms, types, and root causes of conflict and violence;
3. differentiate between conflict and terrorism;
4. enumerate security and peacebuilding strategies; and
5. describe roles of international organisations, media, and traditional institutions in peacebuilding.

### **Course Contents:**

Concepts of Peace. Conflict and Security in a multi-ethnic nation. Types and Theories of Conflicts: Ethnic, Religious, Economic, Geo-political Conflicts. Structural Conflict Theory. Realist Theory of Conflict. Frustration-Aggression Conflict Theory. Root causes of Conflict and

Violence in Africa. Indigene and settlers Phenomenon. Boundaries/border disputes. Political disputes. Ethnic disputes and rivalries. Economic Inequalities. Social disputes. Nationalist Movements and Agitations. Selected Conflict Case Studies – Tiv-Junkun; Zangon Kataf. Chieftaincy and Land disputes, etc. Peace Building. Management of Conflicts and Security: Peace & Human Development. Approaches to Peace & Conflict Management --- (Religious, Government, Community Leaders, etc.). Elements of Peace Studies and Conflict Resolution. Conflict dynamics assessment Scales. Constructive & Destructive. Justice and Legal framework. Concepts of Social Justice. The Nigeria Legal System. Insurgency and Terrorism. Peace Mediation and Peacekeeping. Peace & Security Council (International, National, and Local levels) Agents of Conflict resolution – Conventions, Treaties Community Policing. Evolution and Imperatives. Alternative Dispute Resolution. ADR. a. Dialogue. b. Arbitration. c. Negotiation. d. Collaboration, etc. Roles of International Organisations in Conflict Resolution. (a) The United Nations, UN, and its Conflict Resolution Organs. (b) The African Union & Peace Security Council (c) ECOWAS in Peacekeeping. Media and Traditional Institutions in Peace Building. Managing Post-Conflict Situations/Crisis. Refugees. Internally Displaced Persons, IDPs. The role of NGOs in Post-Conflict Situations/Crisis

### **ENT 312: Venture Creation (2 Units C: LH 15; PH 45)**

#### **Learning Outcomes:**

1. Describe the key steps in venture creation;
2. Spot opportunities in problems and in high potential sectors regardless of geographical location;
3. State how original products, ideas, and concepts are developed;
4. Develop a business concept for further incubation or pitching for funding;
5. Identify key sources of entrepreneurial finance;
6. Implement the requirements for establishing and managing micro and small enterprises;
7. Conduct entrepreneurial marketing and e-commerce;
8. Apply a wide variety of emerging technological solutions to entrepreneurship; and
9. Appreciate why ventures fail due to lack of planning and poor implementation.

#### **Course Contents:**

Opportunity Identification (Sources of business opportunities in Nigeria, Environmental scanning, Demand and supply gap/unmet needs/market gaps/market research, Unutilised resources, Social and climate conditions, and technology adoption gap).

New business development (business planning, market research).

Entrepreneurial finance (venture capital, equity finance, microfinance, personal savings, small business investment organisations, and business plan competition).

Entrepreneurial marketing and e-commerce (Principles of marketing, customer acquisition & retention, B2B, C2C and B2C models of e-commerce, first mover advantage, e-commerce business models and successful e-commerce companies,).

Small business management/family business: Leadership & Management, basic bookkeeping, nature of family business and family business growth model.

Negotiation and business communication (Strategy and tactics of negotiation/bargaining, traditional and modern business communication methods).

Opportunity discovery demonstrations (business idea generation presentations, business idea contest, brainstorming sessions, idea pitching).

Technological solutions (the concept of market/customer solution, customer solution, and emerging technologies, business applications of new technologies- Artificial Intelligence (AI), Virtual/Mixed Reality (VR), Internet of Things (IoT), Blockchain, Cloud Computing, renewable energy, etc. digital business and e-commerce strategies).

## **IFT 302: Web Application Development (2 Units C: LH 15; PH 45)**

### **Learning Outcomes**

At the end of the lecture, the students should be able to:

1. Design and implement simple client-side and server-side web applications.
2. Demonstrate hands-on skills in PHP and Python programming uses open-source software.
3. Compare and contrast web programming with general-purpose programming.
4. Develop a fully functioning website and deploy it on a web server.

### **Course Contents**

Introduction to framework-based web development using a contemporary language like PHP and ASP.net. Principles of web pages (dynamic and static) and website design. The tool used in web development. Client-side and server-side languages. Creation of interactive, dynamic websites using a common web architecture and object-based database access. Design, implementation, and testing of web-based applications including related software, databases, interfaces, and digital media. Standard object models, and the use of server-side programmes for database and file access; testing, software quality assurance; and the process of publishing Web sites. Hands-on PHP and Python programme using open-source software (Apache, PHP, Python, JavaScript, and MySQL). Programming for web development includes control structures, objects, functions, and the use of composite data types. Deploying dynamic content using JavaScript. Designing and developing dynamic web pages and creating, validating, transforming, and formatting data using PHP.

### **Lab Work**

Simple PHP programming. Design of simple web pages. Creation of dynamic websites. Design of client-side and server-side programmes. Demonstration of web-based applications with database access. Use of JavaScript to develop dynamic content. Use of Python to develop dynamic web pages.

## **IFT 304: Web Development using Content Management Systems (2 Units C: LH 15; PH 45)**

## **Learning Outcomes**

At the end of the course, students should be able to:

1. Develop a basic knowledge of web technology.
2. Acquire skills necessary to develop and manage websites.
3. Analyse Web content management techniques.
4. Appraise the role of dynamic sites as the future of web design.
5. Convert a static design into a dynamic CMS-powered site.

## **Course Contents**

Web development techniques using content management systems (CMS) (e.g., Joomla, MS SharePoint 2013). Design and creation of websites using specialised CMS tools. Review and evaluation of CMS tools and technologies in terms of client requirements. Development of Web sites using front-end (client-side) and back-end (server-side). Use of a CMS to set up, deploy, and maintain websites. Programming while considering issues of interface and user experience design, accessibility, and Web standards. Methods, languages, tools related to developing web-based content management systems. Development of plugins or extensions that integrate with existing systems to extend their functionality. Audit content for a website. Choose an appropriate CMS, and convert a static design into a dynamic CMS-powered site.

## **Lab Work**

Basic features of Content Management Systems. Developing websites using CMS. Developing front-ends and back-ends. Using various tools in CMS. Developing plugins and extensions. Converting static designs to dynamic websites.

## **IFT 308: Ethics and Legal Issues in IT (2 Units C: LH 30)**

### **Learning Outcomes**

By the end of the course, the students should be able to:

1. Describe laws and regulations related to ethics;
2. Recall relevant codes of ethics for computing practice;
3. Interpret consequences of violating ethical provisions;
4. Explain the ethical issues associated with intellectual property; and
5. Develop a strategy for resolving conflict in the workplace.

### **Course Contents**

Social, ethical, legal, and managerial issues in the application of information technology in government, organisations, and industry. Foundations of intellectual property. Ownership of

information. Plagiarism, Software piracy. Fairness in the workplace. Digital millennium copyright act. Patents. Trademarks and trade secrets. Legal issues in computing. Organisational context; professional and ethical issues and responsibilities. Relationships with professional societies. Codes of professional conduct. Ethics and history of ethics. Whistle-blowing. Workplace issues (harassment, discrimination). Identify theft. Ethical hacking. Privacy and civil liberties organisations.

## **CSC 309: Artificial Intelligence (2 Units C: LH 15; PH 45)**

### Learning Outcomes

At the end of this course, students should be able to:

1. explain AI fundamentals, concepts, goals, types, techniques, branches, applications, AI technology and tool discuss intelligent agents, their performance, examples, faculties, environment and
2. architectures, and determine the characteristics of a given problem that an intelligent system must solve;
3. describe the Turing test and the “Chinese Room” thought experiment, and differentiate between the concepts of optimal reasoning/behaviour and human-like reasoning/behaviour;
4. describe the role of heuristics and the trade-offs among completeness, optimality, time complexity, and space complexity;
5. analyse the types of search and their applications in AI and describe the problem of combinatorial explosion of search space and its consequences;
6. demonstrate knowledge representation, semantic network and frames along with their applicable uses;
7. practice Natural Language Processing, translate a natural language (e.g., English) sentence into a predicate logic statement, convert a logic statement into clause form, apply resolution to a set of logic statements to answer a query; and
8. analyse programming languages for AI and expert systems technology, and employ application domains of AI.

### Course Contents

Overview of Artificial Intelligence. History of AI. Goals of AI. AI Technique. Types of AI. Branches and applications of AI. Advantages and Disadvantages. Introduction to Intelligent Agents. Agent Performance, Examples of Agents, Agent Faculties, Rationality, Agent Environment. Agent Architectures. Search. General Classes of AI Search Algorithm Problems. Problem Solving by Search. Types of AI Search Techniques and Strategies. Introduction to the types of problems and techniques in AI. Problem-Solving methods. Major structures used in AI programmes. Knowledge Representation. KR and Reasoning Challenges. KR Languages. Knowledge representation techniques such as predicate logic, non-monotonic logic, and probabilistic reasoning. Semantic Network - types of relationships, semantic network

inheritance, types and components. Introduction to Frames. Natural Language Processing (NLP). Introduction to natural language understanding and various syntactic and semantic structures. Introduction to Expert Systems - characteristics, components, types, requirements, technology, development. Programming Languages for AI. Introduction to computer image recognition.

**Lab work:** Group practical in (i) Turing test practical - Students can act out their own version of the Turing test (ii) Facial recognition practical to aid in teaching students how machine learning works with students simulating a facial recognition algorithm. Practical applications of NLP in groups – (i) Question Answering focuses on building systems that automatically answer the questions asked by humans in a natural language (ii) Spam detection application for detecting unwanted e-mails getting to a user's inbox (iii) Sentiment analysis/opinion mining should be used on the web to analyse the attitude, behaviour, and emotional state of the sender, implemented through a combination of NLP and statistics (iv) Practical exercise of machine translation used to translate text or speech from one natural language to another natural language such as the Google Translator (v) Developing a model to provide word processor software for the spelling correction (vi) Developing a model for speech recognition for converting spoken words into text (vii) Implementing a Chatbot to provide the staff/student's chat services. OR Group Practical exercise on agents and its environment using simulation of a colony of ants foraging for food; model simulating a message between agents; model simulating the flocking behaviour of birds; model to apply standard search algorithm to the classic search problem of missionaries and cannibals, and how to use communicating agents for searching networks. Some computer AI animation exercises for any branch of AI. Practical exercise on simple robots coupling and programming. Group project of building a lawn robot for trimming grasses, or any simple design and implementation of robotics.

### **CSC 308 Operating System (3 Units C: LH 30; PH 45)**

#### **Learning Outcomes**

At the end of this course, students should be able to:

1. recognise operating system types and structures;
2. describe OS support for processes and threads;
3. recognise CPU scheduling, synchronisation, and deadlock;
4. resolve OS issues related to synchronisation and failure for distributed systems;
5. explain OS support for virtual memory, disk scheduling, I/O, and file systems;
6. identify security and protection issues in computer systems; and
7. use C and Unix commands, examine behaviour and performance of Linux, and develop various system programmes under Linux to make use of OS concepts related to process synchronisation, shared memory, mailboxes, file systems, etc.

#### **Course Contents**

Fundamentals of operating systems design and implementation. History and evolution of operating systems. Types of operating systems. Operating system structures. Process management: processes, threads, CPU scheduling, process synchronisation. Memory

management and virtual memory. File systems; I/O systems; Security and protection; Distributed systems; Case studies.

**Lab work:** Practical hands-on engagement to facilitate understanding of the material taught in the course. All the process, memory, file and directory management issues will be demonstrated under the LINUX operating system. Also, UNIX commands will be briefly discussed. Alternatively, hands-on exposure may be through the use of operating systems developed for teaching, like TempOS, Nachos, Xinu or MiniOS. Another possibility is through programming exercises that implement and simulate algorithms taught. Simulation of CPU scheduling algorithms, producer-consumer problem, memory allocation algorithms, file organisation techniques, deadlock algorithms and disk scheduling algorithms.

## **IFT 310: Mobile Application Development (2 Units C: LH 15; PH 45)**

### **Learning Outcomes**

At the end of the course the students should be able to:

1. Identify the basic knowledge on mobile application environment and technology;
2. Explain the concepts and processes of mobile application development;
3. Discuss design and development issues specific to mobile applications;
4. Design and develop mobile applications, using development tools and environments;
5. Evaluate the performance of a mobile application and give its result; and
6. Appreciate perspectives of mobile applications and their impact.

### **Course Contents**

Introduction to developing mobile applications. Mobile operating systems capabilities, application architecture, and major components, such as activities, services, broadcast receivers, etc. Development of interactive applications using widget libraries, web-based services. Basic concepts of 2D graphics and animation. An SQL database engine, and multithreading. Multiplatform mobile application development. Mobile application basics and features; Android application basics, UI design. Data storage; networking application design. Advanced application design (sensors, camera, GPS, Audio, etc.), graphics and games, web-based hybrid application design. Design and implement a simple mobile application for a given mobile platform. Metrics and methods to evaluate the performance of mobile applications. Mobile application perspectives and impact.

**Lab Work:** Demonstration of a Simple Mobile Application. Design and Development of interactive mobile applications. Demonstration of multiplatform mobile application development. Development of Android applications including UI design and data storage design. Demonstration of advanced mobile application design. Illustration of metrics for measuring the performance of mobile applications.

## **IFT 322: IT Innovation and Entrepreneurship (2 Units C: LH 15, PH 45)**

### **Learning Outcomes**

At the end of this course, students should be able to:

1. Explain business models;
2. Identify some entrepreneurial opportunities available in IT;
3. Describe business plan and business start-ups process;
4. Explain business feasibility and strategy;
5. Explain marketing strategies; and
6. Discuss business ethics and legal issues.

### **Course Contents**

Fundamental concepts of innovation and business ideas in general. Product development. Business leadership. Digital marketing. Entrepreneurial opportunities in IT. Legal issues and business ethics. New venture creation process. Business feasibility planning. Market research. Business strategy. Business models and business plans. Technical presentations. Report on a successful entrepreneurial outfit.

## **IFT 342: Network Servers and Infrastructures (2 Units C: LH 15;PH 45)**

### **Learning Outcomes**

At the end of the course, the students should be able to:

1. Analyse IPv6 networking concepts and practices for communications over VPNs.
2. Explain the fundamental concept of Virtual Computing, Cloud Computing, VoIP.
3. Demonstrate through practical examples how protocols are used to enable communication between computing devices connected.
4. List the opportunities of virtual computing service provision models, such as cloud computing for organisations.
5. Identify, connect and install applications on virtual servers.

### **Course Contents**

IP networking concepts and practices for IPv6 addressing. DHCP and DNS in IPv.6 networks. Secure communication over VPNs, VoIP architecture. Concept of Virtual Computing, Cloud Computing, VoIP. Traffic monitoring and network connectivity between operating systems. Overview of latest technologies of IP networks and understand application-level services used in the internet. Multi-Protocol Label Switching (MPLS). VPN Secure Network Connectivity. VoIP Architecture. Network Neutrality.

## **Lab Work**

Demonstration of IPv6 networks including DHCP and DNS configuration. Basics of VPNs. Simple applications of VPNs. Installation of applications on virtual servers. Monitoring traffic on virtual servers. Working with Multiple Servers. Balancing traffic on servers. Testing the security of VPNs. Illustration of VOIP architecture.

## **IFT 350: SIWES (6 Units C: PH 160)**

### **Learning Outcomes**

Upon the completion of the training, the students should be able to:

1. Interact with experts, thus making them gain extra knowledge outside the school environment.
2. Compare classwork with real-life working experience in their various areas of specialisation.
3. Determine their level of competence.
4. Acquire the more practical knowledge and skills.
5. Provide a detailed written report on their industrial experience.
6. Defend their project to a panel of examiners.

### **Course Contents**

Students are attached to private and public organisations for three months to make them acquire practical experience and to the extent possible, develop skills in all areas of computing. Students are supervised during the training period and shall be expected to keep records designed to monitor their performance. They are also expected to submit a report on the experience gained and defend their reports.

## **ICT 305: Data Communication Systems and Network (2 Units C: LH 15; PH 45)**

At the end of this course, students should be able to:

1. define various terminologies relating to Data communication;
2. explain the Seven Layer ISO-OSI standard protocols and network architecture;
3. describe different error-detection methods;
4. describe Internet Technologies and Protocols; and

5. list the features and benefits of Network Operating System.

**Course Contents:**

Types and sources of data. simple communications network. transmission definitions. oneway transmission. half-duplex transmission. transmission codes. transmission modes. parallel transmission. serial transmission. bit synchronisation. character synchronisation. character synchronisation. synchronous transmission. asynchronous transmission. the efficiency of transmission. Protocols: Introduction to network protocol. Seven Layer ISO-OSI standard protocols and network architecture. Transport protocols, session services protocols, and other protocols. Institute of Electrical and Electronics Engineering 802 standards. Error control and Data Compression. Forward Error Control. error detection methods. parity checking. linear block codes. cyclic redundancy checking. feedback error control. data compression. Huffman coding and dynamic Huffman coding. Local Area Networks. medium access control techniques – Ethernet, token bus, and token ring. LAN standards. fibre distributed data interface. metropolitan area network. Peer-to-peer. Client-Server. Client-Server Requirements. GUI design standards. interface independence. platform independence. transaction processing. connectivity. reliability. backup. recovery mechanisms. Information Network Software: features and benefits of major Network Operating Systems. Network OS. TCP/IP and Network OS.

**.Lab Work:**

Demonstration of simple communications networks. Illustration of applications at the various levels of the OSI model. Demonstration of different types of Local Area Networks (LANs). Illustration of Metropolitan Area Networks. Illustration of Error Detection and Error Correction techniques. Demonstration of Network Operating Systems.

**CSC 308: Operating Systems (3 Units C: LH 30; PH 45)**

**Learning Outcomes:**

1. Recognise operating system types and structures.
2. Describe OS support for processes and threads.
3. Recognise CPU scheduling, synchronisation, and deadlock.
4. Resolve OS issues related to synchronisation and failure for distributed systems.
5. Explain OS support for virtual memory, disk scheduling, I/O, and file systems.
6. Identify security and protection issues in computer systems.
7. Use C and Unix commands, examine behaviour and performance of Linux, and develop various system programmes under Linux to make use of OS concepts related to process synchronisation, shared memory, mailboxes, file systems, etc.

**Course Contents:**

Overview of O/S: Role & Purpose, Functionality Mechanisms to Support Client-server models, hand-held devices, Design Issues influences of Security, networking, multimedia, Windows. Process management: processes, threads, CPU scheduling, process synchronisation. Memory management and virtual memory. File systems. I/O systems. Security and protection. Distributed systems. O/S Principles: Structuring methods Abstraction, processes and of recourses, Concept of APIS Device organization interrupts. Lab work: Practical hands-on engagement to facilitate understanding of the material taught in the course. All the process, memory, file and directory management issues will be Computing 140 New demonstrated under the LINUX operating system. Also, UNIX commands will be briefly discussed. Alternatively, hands-on exposure may be through the use of operating systems developed for teaching, like TempOS, Nachos, Xinu, or MiniOS. Another possibility is through programming exercises that implement and simulate algorithms taught. Simulation of CPU scheduling algorithms, producer-consumer problem, memory allocation algorithms, file organisation techniques, deadlock algorithms, and disk scheduling algorithms.

### **Lab Work:**

Practical hands-on engagement to facilitate understanding of the material taught in the course. All the process, memory, file and directory management issues will be demonstrated under the LINUX operating system. Also, UNIX commands will be briefly discussed. Alternatively, hands-on exposure may be through the use of operating systems developed for teaching, like TempOS, Nachos, Xinu, or MiniOS. Another possibility is through programming exercises that implement and simulate algorithms taught. Simulation of CPU scheduling.

## **BU-IFT 324 Database Design and Programming (2 Units; Elective; LH = 15; PH = 45)**

### **Learning Outcomes**

At successful completion of this course, students should be able to:

1. Discuss the idea of a database
2. Create a physical model from a logical model (ERD)
3. Write, execute, and save SQL statements in Oracle Application Express
4. Develop an entity relationship diagram (ERD) to model data
5. Use Oracle SQL Developer Data Modeler to build ERDs
6. Map a physical model from an ERD
7. Explain relational database
8. Describe four (4) key business requirements when developing a database
9. Use data modelling to architect a relational database
10. Develop a real-life database system using Oracle SQL Database
11. Demonstrate administration of a functional database system

### **Course Contents**

Introduction to databases. Database models. Determining business requirements. Database and data modelling. Relational database. Conceptual and physical data models. Entities and

attributes. Relationships and entity relationship modelling. Refining data model. Tracking data changes. Normalization and business rules. Data modelling terminology and mapping. Oracle SQL developer data modeler. Converting logical to relational model. Mapping entities and attributes to physical model. Mapping primary and foreign keys. Introduction to SQL using Oracle Application Express. Data Definition Language. Data Manipulation Language. Transaction Control Language. Retrieving data using SELECT statements. Restricting data using WHERE clause. Sorting data using ORDER BY. Joining tables using JOIN.

### **Minimum Academic Standard**

Software laboratory

## **BU-COS 325 Introduction to Machine Learning (2 units; Core; LH=15; PH=45)**

**Learning Outcomes:** Upon successful completion of this course, students should be able to:

1. Discuss at least three underlying issues and challenges that Machine Learning faces, relating to data, model selection, and model complexity.
2. Describe at least five benefits and drawbacks of two Machine Learning techniques.
3. Expound on fundamental mathematical relationships that exist between supervised and unsupervised learning paradigms.
4. Demonstrate the use of at least three Machine Learning algorithms in a practical situation.
5. Develop Python codes that implement at least three Regression models: Ordinary Linear Regression, Ridge Regression, and Decision Tree regression models.

**Course Content:** The course begins with an introduction to Machine Learning and its applications. It then uncovers Supervised versus Unsupervised learning, Linear versus Non-Linear Regression, and Simple Regression. Classification methods, K-Nearest Neighbour (KNN), Decision Trees, and Logistic Regression are discussed and demonstrated. Clustering algorithms are also addressed. Students are introduced to developing Machine Learning assisted applications. The course also covers Python libraries suitable for Machine Learning, model evaluation methods, Support Vector Machines, Model Evaluation, and various types of Unsupervised Learning. The course concludes with a project on Recommender Systems, including content-based recommender systems and collaborative filtering.

### **Minimum Academic Standard**

Software Laboratory.

## **BU-IFT 315 Penetration Testing and Ethical Hacking (3 Units; Core; LH=30; PH=45)**

**Learning Outcomes:** Upon successful completion of this course, students should be able to:

1. Outline five industry expectations for ethical computer security operations.
2. Explain three stages and procedures undertaken in ethical penetration testing and hacking.
3. Use one tool to conduct penetration testing and ethical hacking operations.
4. Explain three expectations and utility of non-disclosure agreements (NDA) in the ethical hacking process.
5. Develop one functional toolkit each for ethical hacking and penetration testing operations.

**Course Content:** The course is designed to introduce students to the basics of computer security, covering the discovery of system vulnerabilities and solutions to cyberattacks. It covers all five stages of the ethical hacking protocol: Reconnaissance, Scanning, Gaining Access, Maintaining Access, and Covering Tracks. The course also covers foot-printing, scanning, enumeration, system hacking, Trojan horses, viruses and worms, sniffing traffic, social engineering, denial of service, session hijacking, hacking web servers, web applications, SQL injection, wireless and mobile hacking, intrusion detection systems (IDS), firewalls, and honeypots, buffer overflow, and cryptography. Students are introduced to ethical hacking, ethics, and legality. They learn how to gather target information, as well as host and network information. They also learn various techniques for ethical system hacking, web hacking, and applications hacking. They are taught how to penetrate secure wireless and network defences to conduct ethical security operations in an organisational context. In the course of undertaking this class, learners develop a toolkit for executing ethical hacking for businesses and organisations within a professional dispensation.

**Minimum Academic Standard:** The course requires knowledge and skills in Penetration Testing and Ethical Hacking (PTEH). It is designed to equip students with the ability to operate as ethical computer security professionals. Penetration testing and ethical hacking involve conducting an analysis of a target computing environment's vulnerabilities to exploitation and attack, in order to militate against them. Finding computing system weaknesses and guarding against their exploitation is essential for organisations to derive computing benefits. BU Senate approved this course in order to prepare graduates, who would become competent in penetrating, testing and ethical hacking, founded in integrity, accountability and quality assurance to provide services towards secure computing systems required for societal growth and prosperity.

### **COS 409: Research Methodology and Technical Report Writing (2 Units C: LH 30)**

**Learning Outcomes:**

1. Distinguish qualitative and quantitative research methodologies and their applications.
2. Identify and define a research problem in a given area.

3. Identify different methods of data collection and select methods appropriate to a given situation.
4. Design and conduct simple research, including analysis and interpretation of research results.
5. Document research problems, methodology, all the way to research report writing.
6. Defend the written research report.
7. Be familiar with ethical issues in the conduct of research.

**Course Contents:**

Foundations of Research. Types of Research. Research Approaches. Significance of Research. Research Methods versus Methodology. Research Process. Criteria and Strategy for Good Research. Problems Encountered by Researchers in Nigeria. Principles of Scientific Research. Scientific investigation. Problem formulation. Definition and technique of the Research Problem. Selection of Appropriate Method for Data Collection- Primary Data and Secondary Data. Guidelines for Constructing Questionnaire/Schedule. Guidelines for Successful Interviewing. Difference between Survey and Experiment. Eloquent Research Proposal and Research Plan. Formulation of working hypothesis and Testing. Literature review. Procedure for reviewing related relevant studies and referencing cited works. Types of Reports. Technical Report Writing. Layout and Mechanics of Writing a Research Report. Standard Techniques for Research Documentation. Sampling Design. Different Types of Sample Designs. Steps in Sampling Design. Criteria of Selecting a Sampling Procedure. Methods of analysis. Processing and Analysis of Data Elements/Types of Analysis. Interpretation and Presentation of results. How to prepare References and Bibliography.

**IFT 403: Mobile and Pervasive Computing (2 Units C: LH 15; PH 45)****Learning Outcomes**

At the end of the course, students should be able to:

1. Describe the concepts of programming mobile devices and pervasive computing.
2. Define open protocols and context-aware sensor networks.
3. Evaluate techniques, needs, and requirements for pervasive systems.
4. Describe security protocols for sensor networks.

**Course Contents**

Definitions and motivations: mobile, pervasive and ubiquitous computing. Physical interaction. Theoretical foundations of pervasive computing. Context-aware interaction, resource and device constraints. Implementing pervasive systems: sensor, actuators, and embedded systems. Applications, programming languages, and approaches, device types, and choices. Capturing needs and requirements for pervasive systems: techniques and challenges. Multisensory

communication using pervasive computing. Sensor Networks. Security Protocols for Sensor Networks. Introduction to cloud computing technologies and its services.

### **Lab Work**

Developing simple mobile applications. Design of simple pervasive computer systems. Design of context-aware sensor networks. Testing the security of mobile and pervasive computer systems. Using security protocols for sensor networks.

### **IFT 410: System Integration and Architecture (2 Units C: LH 30)**

#### **Learning Outcomes**

At the end of this course, students should be able to:

1. Discuss systems integration activities as a part of the development lifecycle.
2. Explain and apply key systems integration architecture, methodologies, and technologies.
3. Apply integration technologies to implement system integration solutions.
4. Describe Interplay between IT applications roll-out and related organisational processes.

#### **Course Contents**

System architecture, testing, evaluation, and benchmarking. Contracts, RFPs, and quality. System integration and deployment. System release. Pilot and acceptance testing and defect repair. System support strategies and user support plans, and enterprise integration approaches, standards, and best practices. Testing and quality assurance. Role of systems architecture in systems integration, performance, and effectiveness. Principles and concepts of DevOps. The interplay between IT applications roll-out and related organisational processes. The concept of Enterprise Architecture. Developing an Enterprise Architecture.

### **BU-IFT 407 Linux System Administration (3 Units C: LH 45; PH 45)**

#### **Learning Outcomes:**

1. Understand the core architecture and functionality of Linux distributions, mastering essential command-line operations for system navigation, file manipulation, and text processing.
2. Manage user accounts, groups, and permissions to ensure secure access control across the system.
3. Gain competency in file system management, including mounting drives, configuring partitions, and setting appropriate file permissions.
4. Configure and manage network settings, troubleshoot connectivity issues, and understand network protocols relevant to Linux environments.
5. Monitor system processes, manage resources, and control services to optimize performance and ensure reliability.

6. Implement security fundamentals, including firewall configuration, user authentication, and secure SSH access.
7. Develop basic automation skills, using shell scripting and task scheduling (e.g., cron) and explore virtualization and containerization to manage isolated environments.

**Course Content:**

This course will focus on practical issues in Linux system administration to provide students with skills and capabilities to work as a system administrators: Deployment and Installation, general system administration-user and group administration, basic Linux commands, booting up and shutting down, software management. Linux shell utilities, file system management, core system daemon, kernel and compilation concepts. Networking: TCP/IP and network configuration, local and network security with applications of Internet protocols like HTTP, SMTP, and DNS.

**Pre-requisite: CSC311**

**Lab work:** The Linux System Administration lab covers setting up a Linux VM, managing users, permissions, and file systems, and handling processes with tools like `top` and `ps`. Students will configure network settings, secure SSH, and troubleshoot with commands like `ping`. Service management includes controlling applications with `systemctl`, while scripting and `cron` are used for task automation. Security labs focus on firewall setup and authentication policies, and backup exercises cover creating and restoring files with `tar` or `rsync`. Finally, students will use Docker to set up and run containers, gaining hands-on skills in essential Linux administration.

Software Laboratory

**IFT 442: Wireless Communications and Networking (3 Units C: LH 45; PH 45)****Learning Outcomes:**

1. Describe the principles underlying wireless data communications.
2. Design and implement a wireless network environment for any application using the latest wireless protocols and standards.
3. Diagnose and troubleshoot faulty PCs and wireless devices.
4. Install, configure, and upgrade wireless communications systems.
5. Develop hands-on experience installing, configuring, and upgrading wireless communications components and software.

**Course Contents:**

Fundamental principles underlying wireless data communications. Wireless transmission basics. radio propagation issues. antennas. digital modulation. spread spectrum techniques and their applications. Popular standards: Wi-Fi, WiMAX and Bluetooth. Also presents practical knowledge to enable the design, testing, deployment, debugging and commissioning of WiFi, WiMAX networks, and point-to-point microwave systems. Discussions on cellular network technologies are also included.

**Lab Work:** Basics on wireless transmission, design of simple Wi-Fi and Wi-Max networks, demonstration of GSM networks, deployment and testing of wireless networks, working with LTE, demonstration of IPv6, illustration of Wireless Personal Area Networks (PANS).

### **IFT 490 Research Project (6 Units C: PH 135)**

#### **Learning Outcomes**

Upon completion of the project, students should be able to:

1. Demonstrate technical skills in Information Technology;
2. Demonstrate generic transferable skills such as communication and team work.
3. Produce a technical report in the chosen project;
4. Defend the written project report; and
5. Appreciate the art of carrying out full-fledged research.

#### **Course Contents**

This is a continuation of IFT 497. This contains the implementation and the evaluation of the project. A formal written report, chapters 4 - 5 has to be approved by the supervisor. A final report comprising chapters 1 - 5 will be submitted to the department for final grading. An oral presentation is required.

### **INS 401: Project Management (2 Units C: LH 30)**

#### **Learning Outcomes:**

1. Describe project management planning.
2. Describe project scheduling.
3. Explain the management of project resources.
4. Discuss project procurement, monitoring, and execution.
5. Explain project communication and time management.

#### **Course Contents:**

Introduction to Project Management. The Project Management Lifecycle. Project Execution, Control and Closure. Project management and systems development or acquisition. The project management context, technology and techniques. Project management processes. Managing Project Teams: Project team planning, Leadership in project management. Power and conflict in project teams. Communication among project stakeholders. Scope management. Managing Project Scheduling: Common problems in project scheduling. Resource management. Project quality management. Managing project risk and tools for managing project risk. Managing

Project Procurement: Alternatives to systems development, External acquisition, Outsourcing-domestic and offshore, Steps in the procurement process. Project auditing.

## **BU-IFT 402 Enterprise Architecture (3 Units; Elective; LH=45; PH=Nil)**

### **Senate-approved relevance**

Enterprise Architecture (EA) is a multidisciplinary field of study designed to help organisations proactively and productively respond to disruptive enterprise forces, by identifying and analysing execution of changes towards desired business vision and outcomes. EA describes overall blueprint for a large organisation's IT infrastructure that provides long-term view of its IT systems development, with focus on successful business strategy implementation. This course would equip students with knowledge and skills necessary to translate business strategy into business change and technical delivery through IT based systems. This is important for IT based organisations to sustain provision of products and services to the society. Production of competent IT graduates in EA is in agreement with BU's vision of impacting society for positive change.

### **Overview**

EA is the methodology by which an organisation plans and arranges IT infrastructure. It is the way by which businesses plan to adopt and utilise technology to meet their desired business vision. Large organisations need a framework to understand new technology and how it relates to business strategy. The course is designed for students to develop IT professionalism as leaders working across different levels within an organisation. This course would also encourage students to be innovative in deploying IT staff time to mission-specific projects and in providing stronger technology infrastructure at the central technology core.

This course will explore some vital knowledge and skills necessary to adopt and utilise technology for business vision and aspirations. It discusses lucidly factors that can help organisations determine how to effectively support its current and future objectives with IT based systems. It will present the evolution, components and architecture of Enterprise Systems and help students understand the benefits and drawbacks of implementing such systems, and how they can assist IT and non-IT organisations improve their overall effectiveness and efficiency.

### **Objectives**

The objectives of this course are to:

1. Describe five (5) Enterprise Systems modules and how they are applied in an IT business context.
2. List five (5) benefits and five (5) drawbacks of implementing EA systems
3. Describe four (4) IT-Architecture drivers and explain their benefits
4. Discuss the following IT issues: planning, design, selection, implementation and management of enterprise information technology solutions.
5. Expound on how development of IT research skills through communication skills and group work skills and software packages help improve IT EA

6. State three (3) IT EA frameworks, their concepts and principles
7. Expound on five (5) benefits of using Service-Oriented Architecture (SOA)
8. Demonstrate Total Cost of Ownership calculation
9. Explain information technology investment analysis
10. Describe five (5) challenges associated with implementing enterprise systems and their impacts on IT organisations
11. Discuss why managers need to pay attention to capacity planning and scalability of Technology Resources

### **Learning Outcomes**

At the end of this course, the students should be able to:

1. Explain why Enterprise Architecture (EA) is essential for running and managing a business in IT context
2. Illustrate how organisations, with absent or unclear business strategies, can benefit from using EA
3. Describe four (4) IT–Architecture drivers and explain their benefits
4. Discuss Enterprise Systems package that support business operations and decision making.
5. List five (5) important EA Frameworks and explain their goals.
6. State five (5) basic benefits of using Service-Oriented Architecture (SOA)
7. Calculate Total Cost of Ownership
8. Explain three (3) challenges associated with implementing enterprise systems and their impacts on IT organisations
9. State five (5) direct benefits resulting from proper use of EA artefacts.
10. Discuss why managers need to pay attention to capacity planning and scalability of Technology Resources

### **Course Contents**

Enterprise Architecture (EA) perspective. Evolution of EA. EA concepts and principles. Enterprise Systems modules. EA applications in IT business context. Components of Enterprise Systems. Benefits and drawbacks of EA. IT EA systems for efficiency. IT EA for communication and group work. IT Infrastructure Systems tools. IT site planning. IT EA design and selection. IT EA implementation and management. EA frameworks. EA frame selection best practices. Strategies for infrastructure management. Distributed computing and middleware. Management of Legacy systems. Total cost of ownership calculation. Information technology investment analysis. EA Emerging technologies.

### **Minimum Academic Standard**

Software Laboratory

### **BU-IFT 417 Web server administration (3 Units; Elective; LH=30; PH=45)**

**Learning Outcomes:** Upon successful completion of this course, students should be able to:

1. Understand web server architecture, components, and protocols like HTTP and HTTPS, and differentiate between popular web servers (e.g., Apache, Nginx, IIS).
2. Install and configure web servers, set up virtual hosts, custom ports, and server aliases, and manage server configurations.
3. Configure DNS settings, integrate web servers with hosting environments, and manage domain records (e.g., A, CNAME, MX).
4. Install SSL/TLS certificates, configure HTTPS, and manage secure connections, including certificate management and renewal.
5. Configure load balancers, caching, and compression techniques for web server performance optimization.
6. Implement access control, firewall rules, and security best practices to protect web servers and ensure secure authentication.
7. Monitor server performance, analyze logs, and troubleshoot issues using logs and monitoring tools.
8. Automate server tasks with scripts, scheduling tools, and configuration management tools like Ansible or Puppet.
9. Set up regular backups, recovery scenarios, and configure redundancy and failover mechanisms for high availability.
10. Deploy web applications and manage server-side scripting and environment setup for integration with web servers.

**Course Content:** Basic web server concept to the advanced topics in Apache. Covers Http protocol, Installation and configuration of apache, Directory Structure, Virtual hosts aliases and redirecting, Logging, Security best practice, Performance and Troubleshooting. Configuration and Administration, best practices and security considerations of other servers such as FTP, DNS and DHCP servers.

### **Minimum Academic Standard**

Software Laboratory

### **BU-IFT 406 Applied Networks and Security (3 Units; Elective; LH=30; PH=45)**

**Learning Outcomes:** Upon successful completion of this course, students should be able to:

1. Explain how a WAN is installed and configured.
2. Differentiate between Shielded Twisted Pair, Unshielded Twisted Pair and fibre-optic cables.
3. Demonstrate how to configure Hardware and Software for a LAN.
4. Explain implementation of a Wireless Network Systems to achieve global acceptable standard.
5. State how businesses use Network Information Systems to achieve competitive advantage.
6. Discuss three problems relating to network security in the management of an organisation.

7. State three reasons why a network could be vulnerable to destruction, error, and abuse.
8. Illustrate host hardening.
9. Describe virtual private network.

**Course Content:** The course focuses on both theory and practice in building and securing network communications. It aims to help students build sound knowledge and practical skills to build Small Office Home Office (SOHO), and to identify, analyse and mitigate network security issues. The course covers a wide range of defensive and offensive network security techniques for Internet communication. General threat classifications will be discussed as they relate to confidentiality, man-in-the-middle, and denial-of-service. Real-world attack incidents and countermeasure implementations will be used to tie concept to reality. Defensive technologies and techniques, including authentication/authorization, access control, segmentation, log/traffic monitoring, reputation-based security, and secure protocol usage will be discussed and demonstrated. The course provides a practical overview of network installation, security and related topics. Hands-on labs and exercises will be used to reinforce lectures and provide practical implementation experience.

### **Minimum Academic Standard**

Software Laboratory

### **BU-IFT 408 Web Design Aesthetics (3 Units; Elective; LH=30; PH=45)**

#### **Learning Outcomes**

On successful completion of this course, students should be able to:

1. Develop formalistic (aesthetic) aspects of design and visual communication.
2. Exhibit cross-platform (web, mobile, broadcast, print) storytelling skills.
3. Demonstrate graphic design and/or game theory to a real world project.
4. Discuss information design and usability as it applies to an interactive media project.
5. Utilise a coding or/and software tools to analyse and present data in a professional manner that could be translated to web-based or app-based media.
6. Write at a level suitable for a public audience in an area related to interactive media
7. Compare objective and subjective analysis of a website
8. Differentiate between personalised and dynamic web pages
9. Develop aesthetic website for a specified client.

#### **Course Contents**

Basic principles of good design. Understanding aesthetics. Unity and balance for aesthetic websites. Web page anatomy. Grid theory. Selecting harmonious colours. Layout and composition. Usage of space to organise. Design and Texture. Typography and Imagery. Communication with fonts. Aligning objects for balance. Adding movement with scrolling. Animation. Achieving proportion by scaling objects and text. Creating CSS for different devices. Usability and Aesthetic Requirements Recognition. Navigation Design.

### **Minimum Academic Standard**

Software Laboratory

## **BU-IFT 412 Data and Application Security (2 Units; Core; LH=30; PH=Nil)**

### **Learning Outcomes**

At the end of this course, the students should be able to:

1. Outline three (3) basic concepts of data and application security.
2. Explain the threat landscape of the data and application security domain
3. Discuss three (3) principles that are applied in the domain of data and application security.
4. Illustrate utility of a selected protocol for data and application security, as prescribed in a best practice framework
5. Explain two (2) business implications of data and application security.
6. Describe governance and regulatory expectations for data and application security, as embodied in Nigeria Data Protection Regulation (NDPR).

### **Course Contents**

Overview of data security. Overview of application security. Introduction to cryptography. Access control basics. Access control models. Integrity models. Data security threat landscape. Application security threat landscape. Threat modelling for data and application security. Authentication models. Database security. Database design principles. Access control for distributed systems. Introduction to data privacy: GDPR. Introduction to data privacy: NDPR. Introduction to malware. Malicious logic. Economics of data security. Economics of application security.

### **Minimum Academic Standard**

## **BU-IFT 413 Data Analytics (3 Units; Core; LH=30; PH=45)**

### **Learning Outcomes**

At the end of this course, the students would be able to:

1. Discuss two (2) basic concepts of data, data analysis and data analytics
2. Illustrate the ETL process
3. Develop visualisation dashboard to perform scientific data analytics connected to a real-world problem
4. Perform data Summarisation and visualisation, to provide constructive guidance in decision making for case business organisations, using R programming tool
5. Discuss two (2) techniques for model building and selection
6. Conduct analysis and interpret the results using classification algorithms
7. Execute three (3) hypothesis testing and mark inferential conclusions

8. Perform one (1) deep data analysis with explanation, using Microsoft PowerBI.

### **Course Contents**

Data Analysis basics and types. Data analytics basics and types. Foundation of statistical analysis. Installation of Comprehensive R Archive Networks (CRAN) software. Installation of RStudio software. Statistical Tests and Procedures. Hypothesis Testing. Probability Theorem. Data Summarisation and Visualisation in R. The ETL concept data analytics approach. Data Summarisation and Visualisation in Microsoft PowerBI. Correlation Analysis. Linear Regression analysis. Nonlinear Regression analysis. Model Selection. Classification algorithms for model building and validation. Model Selection using Logistic Regression algorithms. Model Selection using Clustering algorithms. Model Selection using Decision Tree algorithms. Introduction to Microsoft PowerBI. Data modelling and Data Analysis Expression (DAX). Data visualisation using charts and graphs in R.

### **Minimum Academic Standard**

Software laboratory