

MAKERERE UNIVERSITY

COLLEGE OF COMPUTING AND INFORMATION SCIENCES

SCHOOL OF COMPUTING AND INFORMATICS TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

P.O. BOX 7062, KAMPALA, UGANDA

CURRICULUM FOR BACHELOR OF INFORMATION TECHNOLOGY

(BIT) DEGREE PROGRAMME

REVISED DECEMBER 2012

(DAY/ EVENING PROGRAMME)

## Table of Contents

Bachelor of Information Technology .....	5
1. Background to the Bachelor of Information Technology Programme.....	5
2. Rationale for Reviewing the BIT Programme.....	6
3. The Programme .....	6
3.1. Target group.....	6
3.2. Nature of the Programme.....	6
3.3. Duration .....	7
3.4. Tuition Fees.....	7
4. Regulations .....	7
4.1. Admission Requirements .....	7
4.2. Progression .....	7
4.2.1. Normal Progress .....	7
4.2.2. Probationary .....	7
4.2.3. Discontinuation .....	8
4.2.4. Retaking a Course.....	8
4.3. Weighting System .....	8
4.4. Minimum Graduation Load .....	8
4.5. Course Assessments.....	8
4.6. Grading of Courses .....	8
4.7. Minimum Pass Mark .....	9
4.8. Calculation of Cumulative Grade Point Average (CGPA).....	9
4.9. Knowledge Areas Covered in the Program .....	9
4.9.2 Content Distribution by Knowledge Area.....	9

5.	The Curriculum .....	11
5.1.	Course Outline.....	11
5.1.1.	Year 1 Semester I (5 courses) .....	11
5.1.2.	Year 1 Semester II (5 courses) .....	11
5.1.3.	Year I Recess Term.....	12
5.1.4.	Year 2 Semester I (5 courses).....	12
5.1.5.	Year 2 Semester 2 .....	12
5.1.6.	Year II Recess Term: 4CU .....	13
5.1.7.	Year 3 Semester 1 .....	13
5.1.8.	Year 3 Semester 2 .....	13
6.	Detailed Curriculum.....	14
5.1	Semester I .....	14
5.2:	Semester II .....	19
5.3:	Semester III.....	26
5.4	Semester IV.....	35
5.5:	Semester V .....	41
5.6 :	Semester VI .....	49
7.	Resources and Infrastructure .....	56
7.1.	Source of Funds.....	56
7.2.	Staff.....	56
7.3.	Lecture Space .....	56
7.4.	Computer Laboratories and Software .....	57
7.5.	Library Services .....	57
8.	Quality Assurances .....	57
8.1.	Feedback from students enrolled.....	57

8.2.	Class meetings .....	58
8.3.	Use of ICT in availing lecture materials.....	58
8.4.	Peer review .....	58
8.5.	External examiners' reports.....	58
8.6.	Tracer studies.....	58
	Appendix A.....	59

## **Bachelor of Information Technology**

### **1. Background to the Bachelor of Information Technology Programme**

The Bachelor of Information Technology (BIT) is a three year full-time degree programme open to all prospective students. This programme was first launched in August 2004 and later revised in 2009. The programme offers flexibility while providing the level of knowledge and skills required by industry and professional bodies. The current curriculum was designed with emphasis on having the student acquire the business, media, computing and communication skills necessary for employment and career opportunities in today's ICT industries and business organizations. Students on the BIT Degree Programme develop conceptual and practical IT skills in integrating financial, organizational, marketing and production/service function with an overall business strategy. The majority will take up Managerial positions in Information and Communication Technology (computing and ICT-based) sectors, and other positions such as Web-Designers, Web-Programmers, Information Technology Planners, Systems Analysts, Systems Auditors, IT Project Managers, IT Company Secretaries, Information Systems Specialists and IT Lecturers. Others will take up further studies in Information Technology like a Master of Information Technology (MIT). The objectives of the programme are to: -

1. Develop professionals with theoretical and practical skills in the Information Technology (IT) sector.
2. Address the increasing demand for ICT training and professionals.
3. Strengthen capacity and institutional building in IT discipline in tertiary institutions, private and public sectors.

The Bachelor of Information Technology Degree Programme is offered to give an opportunity to prospective students to undertake training in Information Technology (IT). This programme also provides an avenue to those already engaged in the IT-sector without formal degree qualifications in IT to join the BIT Degree Programme through either direct or diploma schemes. Since Information Technology is a new discipline, this programme provides a pool of IT Professionals that are much needed in today's IT industry.

#### **1.1 Who is a BIT Graduate?**

The BIT graduate is going to be able to function as a user advocate and select, create, apply, integrate and administer computing technologies to meet the needs of users within a societal and organizational context. A Student that graduates with a BIT Degree on this Programme should therefore have acquired a skill set that enables him/her to play certain roles in the information technology industry.

##### **1.1.1 The skills should enable the graduate to:**

- Analyze a problem, identify and define the computing requirements appropriate to its solution. Then design, implement, and evaluate a computer-based system, process, component to meet desired needs
- function effectively on teams to accomplish a common goal
- understanding of professional, ethical, legal, security and social issues and responsibilities
- communicate effectively with a range of audiences and engage in continuing professional development
- Apply current technical concepts and practices in the core information technologies.
- identify and analyze user needs and take them into account in the selection, creation, evaluation and
- Administer computer-based systems and effectively integrate IT-based solutions into the user environment.
- Understand best practices and standards and their application and assist in creating effective project plans.

1.1.1 Roles: The BIT graduate shall be able to take up Managerial positions in Information and Communication Technology (computing and ICT-based) sectors, and other positions such as Web-Designers, Web-Programmers, Information Technology Planners, Systems Analysts, Systems Auditors, IT Project Managers, IT Company Secretaries, Information Systems Specialists and IT Lecturers.

## **2. Rationale for Reviewing the BIT Programme**

With the technology shifts and an economy that is based on different skills, we realized a need for revising the curriculum for our program so as to mitigate some of the obvious catastrophes and also provide the best for our graduates. We understand that for us to achieve an effective curriculum revision, it requires a thorough understanding of the processes and principles of the changing paradigms affecting curriculum development. In lieu of this, we considered various aspects in this process including:

*Cohort: requirement of national council to review.* The current Bachelor of Information Technology (BIT) curriculum has been running for three years from 2009/2010 academic year to date. It was designed as a three year full-time degree programme open to all prospective students. The BIT programme, first launched in August 2004 was meant to offer flexibility while providing the level of knowledge and skills required by industry and professional bodies. As a requirement from the National Council for higher education, the curriculum has to be revised after every three years.

*Market analysis:* We undertook a preliminary market analysis to evaluate the attractiveness and the dynamics of the Information Technology market within East Africa. Special attention was paid on the kind of jobs/roles being advertised within this market segment and the different skills set that are being sought. We compared this with the Internship feedback obtained from our industrial partners where our students get posted. With this information, we were able to identify the opportunities, strengths, weaknesses and threats of our program.

*Industrial and Alumni feedback:* We also held a workshop with our industrial partners to generate input into this process. In particular, key stakeholders and experts from regulatory authorities, industry and academia were invited to evaluate our current program. The feedback generated in this final phase of this process was very important in reconsidering certain content of the courses we have been offering. Feedback from the public and private sectors pointed to the current curriculum as inadvertently graduating knowledgeable but poorly skilled ICT job seekers than skilled job creators

*Student sample:* A sizable sample of our students was also sampled. In here, we were testing their understanding of what we are offering against their expectations. These respondents pointed us to various areas which they considered a duplication of effort or redundancy in the program. Their feedback was thus important in helping us to eliminate duplicates and also for strengthening certain areas of our program.

*External examiners' and Quality Analysis reports:* These reports were also a great input into this review process. Although some of the comments given were majorly on assuring quality of students' learning experiences and also the fair assessment, other comments given to improve the program were very significant in highlighting areas which were found lacking in our program.

The new BIT programme therefore addresses these issues in various ways. It drops some old courses while retaining others. It modifies the content in some existing courses. Above all it introduces eleven new courses. All this is done in such a way as to provide our graduates with the knowledge and practical skills that can enable them to start up new ICT ventures of their own and thus become job creators rather than job seekers. It also retains an avenue to those already engaged in the IT-sector without formal degree qualifications in IT to join the BIT Degree Programme through either direct or diploma schemes.

## **3. The Programme**

### **3.1. Target group**

The programme targets two categories of people, namely A' level certificate holders and Diploma holders in relevant programmes.

### **3.2. Nature of the Programme**

This is a day and evening programme that is both government and private. There will also be the evening program that shall be only privately sponsored.

### 3.3. Duration

The duration for the Bachelor of Information Technology (BIT) degree programme is three (3) academic years comprising 6 semesters and two recess terms.

### 3.4. Tuition Fees

Tuition fees for privately sponsored students shall be UGX 3,024,000 Uganda Shillings per year for Ugandans and UGX 4,536,000 Uganda Shillings per year for non-Ugandans.

## 4. Regulations

### 4.1. Admission Requirements

#### a. Direct Entry

A candidate must satisfy the general minimum entry requirements of Makerere University. In addition, the following regulations shall hold:

Candidates seeking admission through this avenue must have obtained: -

- i. The Uganda Certificate of Education (UCE) or its equivalent, with credits in English and Mathematics.
- ii. At least two principal passes at the same sitting in Uganda Advanced Certificate of Education (UACE) in any two subjects (Mathematics, Physics, Economics, Chemistry and Biology and Entrepreneurship)
- iii. For purposes of computing weighted points, the advanced level subjects shall be grouped and weighted as follows:

Group	Weight	Subjects
Essential	3	Any two best done subjects among: Mathematics, Physics, Economics, Chemistry, Biology, Geography and Entrepreneurship.
Relevant	2	Any other best done subject of all A' level subjects.
Desirable	1	General Paper, Sub-Mathematics.
Others	0.5	All others.

#### b. Diploma Holders

- i. At least any second Class (lower division) diploma from a recognized institution.
- ii. Candidates who hold a Diploma in Computer Science and Information Technology from Makerere University with at least second class (lower division) shall be admitted to second year of Bachelor of Information Technology. Candidates who hold a pass class of the same diploma shall be admitted to first year of Bachelor of Information Technology.

### 4.2. Progression

Progression shall be regarded as normal, probationary or discontinuation as per the standard Makerere University Senate guidelines.

#### 4.2.1. Normal Progress

This occurs when a student passes each course taken with a minimum Grade Point of 2.0.

#### 4.2.2. Probationary

This is a warning stage and occurs if either the cumulative grade point average (CGPA) is less than 2.0 and/ or the student has failed a core course. Probation is waved when these conditions cease to hold.

#### 4.2.3. Discontinuation

When a student accumulates three consecutive probations based on the CGPA or the same core course(s), he/she shall be discontinued.

#### 4.2.4. Retaking a Course

A Student may re-take any course when it is offered again in order to pass if the student had failed the course. A Student may take a substitute elective, where the Student does not wish to re-take a failed elective.

#### 4.3. Weighting System

The weighting unit is the Credit Unit (CU). The Credit Unit is a contact hour per week per semester. A contact hour is equal to (i) one lecture hour, (ii) two practical hours or (iii) two tutorial hours

#### 4.4. Minimum Graduation Load

The minimum graduation load is 116 credit units. 104 are from core course units and at least 12 are from elective course units. A student must have at least 3 credit units from elective courses in every semester where electives are offered.

#### 4.5. Course Assessments

- a) Each Course will be assessed on the basis of 100 total marks with proportions as follows:  
Coursework – 40 and  
Examination – 60
- b) A minimum of two course assignments/tests shall be required per course.
- c) Course work shall consist of individual tests, group assignments (case studies, projects, field studies) and presentations in each semester.

#### 4.6. Grading of Courses

- a) Each Course will be graded out of a maximum of 100 marks and assigned an appropriate letter grade and a grade point as follows:

MARKS	LETTER GRADE	POINT
90-100	A+	5
80 – 89	A	5
75 – 79	B+	4.5
70 – 74	B	4
65 – 69	C+	3.5
60 - 64	C	3
55 - 59	D+	2.5
50 – 54	D	2
45 – 49	E	1.5
40 - 44	E-	1
Below 40	F	0

- b) The following additional letters will be used, where appropriate: -

W	-	Withdrawal from Course;
I	-	Incomplete;



AU	-	Audited Course Only;
P	-	Pass;
F	-	Failure.

#### 4.7. Minimum Pass Mark

A minimum pass grade for each course shall be 2.0 grade points.

#### 4.8. Calculation of Cumulative Grade Point Average (CGPA)

The CGPA shall be calculated as follows:

$$CGPA = \frac{\sum_{i=1}^n GP_i \times CU_i}{\sum_{i=1}^n CU_i}$$

Where  $GP_i$  is the Grade Point score of a particular course  $i$ ;  $CU_i$  is the number of Credit Units of course  $i$ ; and  $n$  is the number of courses so far done.

#### 4.9. Knowledge Areas Covered in the Program

##### 4.9.1 The categories

The curriculum is based on 10 broad knowledge areas that make up practical and resourceful Information Technology specialists.

These are:-

1. Information Technology Fundamentals (ITF)
2. Human Computer Interaction
3. Information Assurance and Security (IAS)
4. Information Management (IM)
5. Networking (NET)
6. Programming fundamentals (PF)
7. Platform Technologies (PT)
8. System integration and Architecture (SIA)
9. Social and Professional Issues (SP)
10. Internet Applications (IA)

##### 4.9.2 Content Distribution by Knowledge Area

Below is a summary of the distribution of the different course units in the different knowledge areas:

###### 1. Information Technology Fundamentals (ITF)

- a. BIT 1106: Introduction to Information Technology
- b. BIT 2201: Marketing in the Information Technology sector
- c. BIT 1208: Information Technology for Financial Services

###### 2. Human Computer Interaction

- a. BIS 2107: Human computer interaction Systems
- b. CSC 3119: User Interface Design

###### 3. Information Assurance and Security (IAS)

- a. BIT 3209: Digital Forensics and incident response

- b. BIT 1208: Security policies and procedures
- c. BIT 2208: Systems Administration

**4. Information Management (IM)**

- a. BIS 1100: Foundations of IS
- b. BIS 1204: Data and Information Management I
- c. BIS 2106: Data and Information Management II
- d. BIS 1206: Systems Analysis and Design
- e. BIS 3205: Data warehousing and Business Intelligence
- f. CSC 1304: Practical skills
- g. BIT 3212: Digital Libraries
- h. BIS 3105: Intelligent systems
- i. BIT 2207: Research Methodology
- j. BIT 3111: Information Technology Project I
- k. BIT 3213: Information Technology Project II

**5. Networking (NET)**

- a. BSE 3106: Mobile Networks and Computing
- b. BSE 2106: Computer Networks
- c. BIT 1105: Communications Technology and the Internet
- d. BIT 2302: Field Attachment
- e. CSC 1303: CCNA

**6. Programming fundamentals (PF)**

- a. BIT 3211: Integrative Programming and Technologies
- b. CSC 1107: Structured Programming
- c. CSC 1214: Object Oriented Programming

**7. Platform Technologies (PT)**

- a. CSC 2200: Operating Systems

**8. System integration and Architecture (SIA)**

- a. BIT 3210: System Integration and deployment
- b. BIT 3108: IT Project Management

**9. Social and Professional Issues (SP)**

- a. BIT 2209: IT Law and Ethics
- b. BAM 2102: Business Entrepreneurship for IT
- c. BIS 1104: Communication skills for IT
- d. CSC 1100: Computer Literacy

**10. Internet Applications (IA)**

- a. BIT2112: Electronic Commerce
- b. BIT2105: Electronic Media Systems and Multimedia
- c. BIT 2111: Web Systems and Technologies I
- d. BIT 3109: Web Systems and Technologies II

## 5. The Curriculum

As a base for the curriculum review, we have taken a “Computing Curricula Information Technology Volume” by Association of Computer Machinery<sup>1</sup>. We take into consideration though that these curricula are intended for students that are supposed to be computer-literate when joining the Information Technology department of the university.

### 5.1. Course Outline

The degree programme will extend over a period of three years. An academic year shall consist of two semesters of 17 weeks (15 weeks for classes and 2 weeks for examinations). The first and second years will in addition have a recess term of 10 weeks. Students without the Cisco Certified Networking Associate (CCNA) certification will take CCNA as an audited course during the first year recess term. A full-time student shall not carry less than 15 credit units and not more than 25 credit units per semester. All the students must make extensive use of the computing facilities outside the scheduled lecture, tutorial and practical hours. The details of the course structure are shown below, where LH, TH, PH, CH and CU stand for Lecture Hours, Tutorial Hours, Practical Hours, Contact Hours and Credit Units respectively.

#### 5.1.1. Year 1 Semester I (5 courses)

Code	Name	LH	PH	TH	CH	CU	Type	Remark	Mother Unit
<b>Cores:- (5 core courses)</b>									
BIS 1104	Communication Skills for IT	45	30	-	60	4	Core	Modified	IS
CSC 1100	Computer Literacy	30	60	-	60	4	Core	Old	CS
CSC 1107	Structured Programming	30	30	-	45	3	Core	Modified	CS
BIT 1105	Communications Technology and the Internet	45	30	-	60	4	Core	Modified	IT
BIT 1106	Introduction to Information Technology	45	30	-	60	4	Core	Modified	IT
<b>Total Cu</b>						<b>19</b>			

#### 5.1.2. Year 1 Semester II (5 courses)

Code	Name	LH	PH	TH	CH	CU		Remark	Mother Unit
<b>Cores:- (5 core courses)</b>									
BIT 1208	Information Technology for Financial Services	45	30	-	60	4	Core	New	IT
BIS 1206	Systems Analysis and Design	45	-	30	60	4	Core	Modified	IS
BIS 1204	Data and Information Management I	30	60	-	60	4	Core	New	IS
CSC 1214	Object Oriented Programming	30	60	-	60	4	Core	New	CS
BIT 1208	Security Policies and Procedures	45	-	30	60	4	Core	New	IT
<b>Total</b>						<b>20</b>			

### 5.1.3. Year I Recess Term

Code	Name	LH	PH	TH	CH	CU		Remark	Mother Unit
<b>Recess Term</b>									
CSC 1304	Practical Skills Development	15	90	-	60	4	Core	Modified	CS
CSC 1303	Cisco Certified Network Associate (Audited)	150	100	-	200	5	Audited	Old	CS
<b>Total</b>						<b>4</b>			

### 5.1.4. Year 2 Semester I (5 courses)

Code	Name	LH	PH	TH	CH	CU		Remark	Mother Unit
<b>Cores:- (4 core courses)</b>									
BSE 2106	Computer Networks	45	30	-	60	4	Core	New	BSE
BIS 2106	Data and Information Management II	30	60	-	60	4	Core	Modified	IS
BIT 2111	Web Systems and Technologies I	45	30	-	60	4	Core	Modified	IT
BAM 2102	Entrepreneurship Principles	30	-	30-	45	3	Core	Modified	COBAMS
<b>Electives:- (1 elective course)</b>									
BIT 2112	Electronic Commerce	45	30	-	60	4	Core	Modified	IT
BIS 1100	Foundations of Information Systems	45	-	-	45	3	Elective	Old	IS
BIT 2105	Electronic Media Systems and Multimedia	45	-	-	45	3	elective	Old	IT
<b>Total CU</b>						<b>18</b>			

### 5.1.5. Year 2 Semester 2

Code	Name	LH	PH	TH	CH	CU	Type	Remark	Mother Unit
<b>Cores:- (4 core courses)</b>									
BIT 2208	Systems Administration	45	30	-	60	4	Core	Modified	IT
CSC 2200	Operating Systems	45	-	30	60	4	Core	Old	CS
BIT 2207	Research Methodology	30	-	30	45	3	Core	Modified	IT
BIT 2209	IT Law and Ethics	30	-	30	45	3	Core	Modified	IT
<b>Electives:- (1 elective course)</b>									
BIT 2210	Digital Forensics and Incident Response	45	-	30	60	4	Elective	New	IT
BIT 2201	Marketing in the IT Sector	45	-	-	45	3	Elective	Old	IT
<b>Total</b>						<b>17</b>			

\* Modified due to increase in CU (3 to 4)

### 5.1.6. Year II Recess Term: 4CU

Code	Name	LH	PH	TH	CH	CU	Type	Remark	Mother Unit
<b>Recess Term</b>									
BIT 2302	Field Attachment	-	120	-	60	4	Core	Modified*	IT
<b>Total</b>						<b>4</b>			

### 5.1.7. Year 3 Semester 1

Code	Name	LH	PH	TH	CH	CU	Type	Remark	Mother Unit
<b>Cores:- (4 core courses)</b>									
BIT 3108	IT Project Management	45	30	-	60	4	Core	New	IT
BIT 3109	Web Systems and Technologies II	45	30	-	60	4	Core	Modified	IT
BIT 3111	Information Technology Project I	45	-	60	75	5	Core	New	IT
<b>Electives:- (1 elective course)</b>									
CSC 3119	User Interface Design	45	30	-	60	4	Elective	Modified	CS
BIS 3105	Intelligent systems	45	30	-	60	4	Elective	New	IS
BIS 2107	Human Computer Interaction	30	30	-	45	3	Elective	Modified	IS
BSE 3106	Mobile Networks and Computing	45	30	-	60	4	Elective	Old	NW
<b>Total CU</b>						<b>17</b>			

### 5.1.8. Year 3 Semester 2

Code	Name	LH	PH	TH	CH	CU		Remark	Mother Unit
<b>Cores:- (4 core courses)</b>									
BIT 3211	Integrative Programming and Technologies	30	30	30	60	4	Core	Modified	IT
BIT 3210	System Integration and Deployment	45	-	30	60	4	Core	New	IT
BIT 3213	Information Technology Project II	-	-	150	75	5	Core	New	IT
<b>Electives:- (1 elective course)</b>									
BIT 3212	Digital Libraries	30	30	-	45	3	Elective	New	IT
BIS 3205	Data Warehousing and Business Intelligence	45	30	-	60	4	Elective	Modified	IS
<b>Total</b>						<b>17</b>			

NOTE

## 6. Detailed Curriculum

### 5.1 Semester I

#### 5.1.1 BIS 1104 Communication Skills for IT (4 CU)

**Pre-requisite Courses:** None

- a) **Course Description:** This course provides students with skills of effective communication. These will mainly include verbal and written skills. The course aims at enabling the students communicate appropriately and effectively with society.
- b) **Aims:** The aims of the course unit are majorly to:
- Improve the communication competencies of the students
  - Improve problem solving strategies of students
  - Improve the art of critical thinking within the student
  - Improve the student's ability to collect and synthesize information
  - Provide students with knowledge to utilize the library and other educational resources effectively.
- c) **Learning Outcomes:** On completion of the course, the students shall be able to:
- communication competently on various aspects of IT
  - Demonstrate problem solving strategies on a range of IT issues
  - Demonstrate the art of critical thinking on IT subjects
  - independently collect and synthesize information on IT issues
  - Utilize the library and other educational resources effectively.
- d) **Teaching and Learning Pattern:** Teaching and Learning will be in form of classroom lectures and demonstration sessions where students can exhibit and practice learned skills.
- e) **Indicative Content:**
- **Writing Skills:** Thinking critically/ selectively before the writing process; selecting the relevant details; organizing the relevant details logically; Writing the reports essays, letters and taking notes in appropriate register; Avoiding ambiguities, fallacies, irrationalities; Providing supportive evidence; Editing documents, proof reading; Writing and expanding information; Quoting and citing references; Writing a curriculum vitae.
  - **Reading Skills:** The use of skimming; scanning inference and prediction in reading; Intensive and critical reading; Acquisition of specific reading skills; Interpretation of non linear texts; Locating information and comprehension.
  - **Speaking and Listening Skills to Enhance Effective Public Relations:** The art of persuasion in effective speaking; Conducting interviews; Conducting meetings; Participating in group discussions and tutorials; Non verbal communication clues; Presentation seminars, seeking clarification etc.; Expression of politeness; Public speaking; Proper listening skills.
- f) **Assessment Method:** Assessment will be in form of:
- |     |   |       |
|-----|---|-------|
| i.  | Coursework (Tests (20%) and individual assignment | (20%) |
| ii. | Final examination                                 | (60%) |

g) **Reading List**

- i. 101 ways to improve your communication skills instantly, by Bennie Bough, 4th Edition, 2005
- ii. The hard Truth About soft skills: Work Place Lessons Smart People wish they had learned sooner, by Peggy Klavs, 2008
- iii. Internet Future Strategies: How Pervasive Computing Services Will Change the World by Amor, D., Prentice Hall Inc., Upper Saddle River, 2002
- iv. Mastering the Internet and HTML by Zeid, I., Prentice Hall Inc., Upper Saddle River, 2000
- v. Communication Technology Update and Fundamentals, by Grant, A.E., Meadows, J.H., Focal Press, 2008
- vi. The New Communications Technologies, Fifth Edition: Applications, Policy, and Impact by Mirabito, M., Morgenstern, B., Focal Press, 2004.
- vii. (vii) Communication Technology and Social Change: Theory and Implications (Lea's Communication Series by Mirabito, M., Morgenstern, B., Lawrence Erlbaum, 2006

5.1.2 **CSC 1100 Computer Literacy (4 CU)**

**Pre-requisite Courses:** None

- a) **Course Description:** In this course, students are to learn about the basic organization, concepts and terminologies in a computerized environment. They are also to get an in depth understanding of common computer applications. The use of related applications in different operating systems will be explored.
- b) **Aims:** The aims of the course unit are to:
- Equip students with basic knowledge about computer organization;
  - Equip students with skills of using common office applications;
  - Expose students to different operating systems;
  - Equip students with skills of how to use the Internet; and
  - Equip students with knowledge about common text editors in different operating systems.
- c) **Learning outcomes:** On completion of this course unit, the students will be able to:
- Describe the different parts of a computer;
  - Describe the historical evolution of computers;
  - Competently use the common office applications in at least two operating systems and;
  - Competently use common text editor in at least two operating systems.
- d) **Teaching and learning pattern:** Teaching will be in terms of lectures and practical sessions in the computer laboratories.
- e) **Indicative content:**
- General computer organization
  - Historical perspectives of computing
  - Common Microsoft office packages
  - Office packages in other operating systems
  - Text editors
  - Common Linux commands
  - Using the web

f) **Assessment method:** The assessment will be in form of:

- |     |                         |                           |       |
|-----|-------------------------|---------------------------|-------|
| i.  | Coursework (Tests (20%) | and individual assignment | (20%) |
| ii. | Final written exam      |                           | (60%) |

g) **Reading List**

- i. Computer Literacy by John Preston, Robert Ferrett and Shelly Gaskin, 2007
- ii. Practical Computer Literacy by Jelne Janrich and Dan Oja, 2001
- iii. James Senn., (2004) Information Technology; Principles Practices and Opportunities Third Edition
- iv. Brian K Williams and Stacey C Sawyer (2007) Using Information Technology; A practical introduction to computers& Communications
- v. Introduction to Information Technology by Turban, E., Rainer, K.R., Porter R.E., Wiley and Sons Inc., 2007
- vii. Fluency with Information Technology: Skills, Concepts, and Capabilities (3rd Edition) by Snyder, L., Addison-Wesley, 2007
- viii. Using Information Technology by Williams, B. and Sawyer, S Career, Education, 2009

## 5.2.2 CSC 1107 Structured Programming (3 CU)

**Pre-requisite Courses:** CSC 1100 Computer Literacy

- a) **Course Description:** The course is to create a strong base in the principles and practice of functional programming. A high level programming language like C is to be used. The students are to cover both theoretical principles and hands on practical skills. The main concepts to cover include program structure, data structures, syntactical and semantic correctness, planning and segmentation in programming as well as working with data files.
- b) **Aims:** The aims of the course are to provide the student with:
- Comprehensive knowledge about structured oriented programming
  - Knowledge in planning and organization of programming projects
  - Knowledge and techniques of evaluating syntactic and semantic correctness of a computer program and;
  - Strong practical basis in programming.
- c) **Learning Outcomes.** Students who successfully complete this course of study will be able to:
- Understand the basic terminology used in computer programming
  - Write, compile and debug programs in C language
  - Use different data types in a computer program
  - Design programs involving decision structures, loops and functions
  - Explain the difference between call by value and call by reference
  - Use different data structures and create/update basic data files
- d) **Teaching and Learning pattern:** The course will be taught with a big practical component. Students will be expected to have two supervised practical sessions per week. They will so be given several programming assignments some of which will be marked and contribute to the coursework scores.
- e) **Indicative content:**
- Program structure



- Variables and Operators
- Conditional statements
- Looping statements
- Arrays and strings , Functions
- Advanced data types , Pointers
- Dynamic memory allocation and dynamic structures
- Working with files
- Graphical User Interfaces (GUI)

- f) **Assessment method:** Assessment will be in form of
- |      |  |       |
|------|--|-------|
| i.   | at least one (practical) assignment and one test | 30%,  |
| ii.  | A practical exam (4 hours open book) -           | (30%) |
| iii. | A final written examination                      | (40%) |

g) **Reading List:**

- i. C Programming Language by Brian W. Kernighan, Dennis M. Ritchie, 2<sup>ND</sup> Edition, 1989
- ii. C: A Reference Manual (5th Edition) by Samuel P. Harbison, 2004
- iii. Structured programming. Ole-Johan Dahl, Edsger Wybe Dijkstra, Charles Antony Richard Hoare - 1972
- iv. Structured programming, theory and practice. Richard C. Linger, Harlan D. Mills, Bernard I. Witt - 1979
- v. Structured programming: tutorial - Part 3. Victor R. Basili, Terry Baker, IEEE Computer Society - 1975
- vi. A guide to PL/1 and structured programming

#### 5.1.4 BIT 1105 Communications Technology & Internet (4 CU)

**Pre-requisite Courses:** None

- a) **Course Description:** This course is intended to be at the introductory level in a curriculum and to provide foundation skills for subsequent network-related courses, for example, Internet Programming. It provides an overview of Communications Technology and Internet. The goal is to help students understand the role and meaning of Communications Technology and Internet in the contemporary world.
- b) **Aims:** The course aims to:
- Give students main guidelines for the future study of networks-related courses
  - Develop their knowledge and understanding of ;
    - Core networking concepts and technologies;
    - Internet and intranet tools;
    - Basics of networking protocols;
    - Basics of network security;
    - Core Internet infrastructure;
    - Personal, business, social, legal and ethical implications of Internet governance.
- c) **Learning Outcomes:** On completion of this course unit, the students will be able to:

Seize main guidelines for the future study of networks-related courses Know and understand:-

- Core networking concepts and technologies;
- Internet and intranet tools;
- Basics of networking protocols;
- Basics of network security;
- Core Internet infrastructure;
- Personal, business, social, legal and ethical implications of Internet governance

d) **Teaching and Learning pattern:** Since this course is supposed to have only lecture hours, it will form mostly the theoretical knowledge. To provide students with practical skills, they will be given individual and group assignments to be done as a form of extracurricular activity.

e) **Indicative content:**

- Networking Concepts
- Internet and Intranet Tools
- Protocols
- Security
- Internet Infrastructure and Governance – Personal, Business, Social, Legal and Ethical Implications

f) **Assessment method:** The assessment will be in form of

- |     |   |       |
|-----|---|-------|
| i.  | Coursework (Tests, and individual assignment) | (40%) |
| ii. | Final examination                             | (60%) |

g) **Reading List:**

- i. Communication Technology Update and Fundamentals, by Grant, A.E., Meadows, J.H., Focal Press, 2008
- ii. The New Communications Technologies, Fifth Edition: Applications, Policy, and Impact by Mirabito, M., Morgenstern, B., Focal Press, 2004
- iii. Communication Technology and Social Change: Theory and Implications (Lea's Communication Series by Mirabito, M., Morgenstern, B., Lawrence Erlbaum, 2006
- iv. James Senn., (2004) Information Technology; Principles Practices and Opportunities Third Edition
- v. Brian K Williams and Stacey C Sawyer (2007) Using Information Technology; A practical introduction to computers& Communications
- vi. Introduction to Information Technology by Turban, E., Rainer, K.R., Porter R.E., Wiley

#### 5.1.5 BIT 1106 Introduction to Information Technology (4 CU)

**Pre-requisite Courses:** None

a) **Course Description:** This course is intended to be at the introductory level in the curriculum to provide students with an overview of the discipline of Information Technology (IT), relating it with other computing disciplines and beginning to instill an IT mindset.

b) **Aim:** The course aims to enable students understand the diverse contexts in which Information Technology is used and the challenges inherent in the diffusion of innovative Information Technology.

c) **Learning Outcomes:** On completion of this course unit, the students will be able to:

- Understand the academic discipline of Information Technology and contrast it with other computing related academic disciplines, such as, Information Systems, Computer Science, Software Engineering, Computer Engineering etc.
- Demonstrate capability to examine the local and global impact of computing and Information Technology on individuals, organizations, and society.
- Develop knowledge and understanding of Information Technology & Organizational Issues:
  - How to introduce I.T applications in business processes & functional areas;
  - Dissemination of Information Technology innovation and its change management;
  - Business process redesign;
  - Cost benefits analysis and Project Management.
- Understand professional development, ethical, legal, security and social issues and responsibilities of I.T personnel.

d) **Teaching and learning pattern:**

- Lectures
- Class discussions and presentations
- Group work

e) **Indicative content:**

- i. Information Technology Concepts
- ii. Data & Information
- iii. Information Technology & Organizations
- iv. Developing Information Technology applications
- v. The challenges of the digital age
- vi. Security , Reliability, Privacy, Legal and Ethical aspect, Digital Piracy
- vii. Information Technology Professional Development

f) **Assessment method:** The assessment will be in form of:

- |   |       |
|---|-------|
| i. Coursework (Tests and individual assignment) | (40%) |
| ii. Final written exam                          | (60%) |

g) **Reading List:**

- i. James Senn., (2004) Information Technology; Principles Practices and Opportunities Third Edition
- ii. Brian K Williams and Stacey C Sawyer (2007) Using Information Technology; A practical introduction to computers & Communications
- iii. Information Technology: Inside and Outside by Cyganski, D., Orr, J. A., Prentice Hall, 2001
- iv. The Executive's Guide to Information Technology by Baschab, J., Piot J., Garr, N.G., 21 Wiley and Sons Inc., 2007
- v. Fluency with Information Technology: Skills, Concepts, and Capabilities (3rd Edition) by Snyder, L., Addison-Wesley, 2007
- vi. Using Information Technology by Williams, B. and Sawyer, S Career, Education, 2009

## 5.2: Semester II

### 5.2.1 BIT 1208 Information Technology for Financial Services (4 CU)

**Pre-requisite Courses** (BIT 1106 Introduction to Information Technology)

**a) Course Description:**

With the increasing use of and reliance on technology in the financial services industry, IT personnel need to know not only the basic computing concepts but also understand the correlation that now exists between financial services and technology. This course is designed to equip participants to have an understanding of the above.

**b) Aims:** The aims of the course are:

- Give an understanding of applications of Information Technology in Financial services
- Relate and use E-Financial Services within the different industries
- To equip students with the skills to develop financial systems
- Equip students with knowledge and skills about the IT Infrastructure and security issues fir the Financial sector

**c) Learning Outcomes:**

After the successful completion of this course, participants will have a good understanding of the following concepts:

- Significance of IT in Financial Services
- IT infrastructure used in Finance
- Core and supplementary financial applications and packages
- Core financial services systems
- Communications systems
- IT Security and Risk Mitigation
- Basic understanding of how various electronic banking services work, such as:
- E-Financial Services
- Thorough understanding and basic functional knowledge of
  - The impact of outsourcing
  - Business Continuity Planning
  - Disaster Recovery and Management

**d) Indicative Content**

- Basic Computing Concepts/Terminology
- Information Technology in the Financial Sector
- Systems used in Financial Industry
- Behavioral assessment and Application scoring systems used for credit related decisions
- Introduction to the Internet & it's implications to financial services
- Emerging Technology trends in Financial Sector
- Open Source software (alternatives to Microsoft and other propriety products)
- IT policy in financial institutions
- Developing an organization-wide IT policy
- IT Vendor Services
- IT Security and Risk Mitigation
- Mitigation controls
- Security processes and management

**e)Teaching and learning pattern:**

- Lectures
- Class discussions and presentations
- Group work

**f) Assessment method:** The assessment will be in form of:

- |      |  |       |
|------|--|-------|
| iii. | Coursework (Tests and individual assignment) | (40%) |
| iv.  | Final written exam                           | 60%   |

**g) Reading List:**

- i. Jessica Keyes (2000). Financial Services Information Systems (Best Practices)
- ii. Jessica Keyes (1999) Handbook of Technology in Financial Services
- iii. Information Technology & Financial Services: The New Partnership. Anthony Gandy, Chris Chapman 1997
- iv. Managing Information Assurance in Financial Services. H. Raghav Rao, Manish Gupta, Shambhu Upadhyaya - 2007

### 5.2.3 BIS 1204 Data and Information Management I (4 CU)

**Pre-requisite Courses:** CSC 1100 Computer Literacy

**Pre-requisites:** Foundations of Information Systems

- a) **Course Description:** This course provides the students with an introduction to the core concepts in data and information management. It is centered around the core skills of identifying organizational information requirements, modeling them using conceptual data modeling techniques, converting the conceptual data models into relational data models and verifying its structural characteristics with normalization techniques, and implementing and utilizing a relational database using an industrial-strength database management system.
- b) **Course aims and Objectives:**  
The aims of this course are to:
  - Provide the students with systematic approaches to the design and implementation of database applications
  - Give hands on experience and knowledge in developing database (driven) applications
- c) **Learning outcomes:**  
At the end of this course, students should be able to:
  - Understand the role of database management systems in managing organizational data and information.
  - Understand the historical development of database management systems and logical data models.
  - Understand the basics of how data is physically stored and accessed and basic file organization techniques.
  - Apply information requirements specification processes in the broader systems analysis & design context.
  - Use a conceptual data modeling technique to capture the information requirements for an enterprise domain.
  - Link to each other the results of data/information modeling and process modeling.
  - Design high-quality relational databases and Design a relational database so that it is at least in 3NF.
  - Implement a relational database design using an industrial-strength database management system
  - Use the data definition, data manipulation, and data control language components of SQL in the context of one widely used implementation of the language.
  - Understand the basic mechanisms for accessing relational databases from various types of application development environments.

**d) Teaching and learning patterns:**

This course will be delivered through lectures, tutorials and laboratory Practicals. Students will be offered a range of experiences that include:

- Large group lectures
- working with team members in small groups (small group tutorials)
- Take home assignments
- Oral presentations
- Self-assessment and peer assessment
- Electronic discussion forum.

**e) Indicative content:**

This course will in the preliminary cover operations like requirements gathering and database planning. The course will also introduce students to developing application programs that talk to a database. These applications may be online or offline.

The course will also include the following topics:

- Database approach
- Types of database management systems
- Basic file processing concepts and physical data storage concepts including file organizations techniques
- Database Development Life Cycle
- Conceptual data modeling
- Logical data modeling
- Physical data modeling
- Database Application development

**f) Assessment:** Shall be by:

- i. Course work (Tests, Take home assignments, practical exercises): 40%
- ii. Final written exam 60%

**g) The Reading list:**

- i. Thomas Connolly and Carolyn Begg. 2003. *Database Solutions: A Step by Step Guide to Building Databases* (2nd Edition). Publisher: Pearson Addison Wesley. ISBN 0321173503.
- ii. Thomas Connolly and Carolyn Begg. 2002. *Database Systems: A Practical Approach to Design, Implementation, and Management* (3rd Edition). Publisher: Pearson Addison Wesley.
- iii. Silberschatz A., Korth H. F. and Sudarshan. 2002. *Database Systems Concepts* (4th Edition). Publisher: McGraw-Hill.
- iv. Greg R. 2001. *Principles of Database Systems with Internet and Java Application*. Publisher: Addison Wesley.
- v. Information-Driven Business: How to Manage Data and Information Robert Hillard - 2010
- vi. Principles of Data Management: Facilitating Information Sharing, Keith Gordon - 2007
- vii. Mastering information management. Thomas H. Davenport, Donald A. Marchand - 2000

### 5.3.1 CSC 1214 Object Oriented Programming (4 CU)

**Pre-requisite Courses:** CSC 1107 Structured Programming

- a) **Course Description:** The course is to give an in depth understanding of Object Oriented programming. It is to cater for Object Oriented Programming practices like inheritance, interfaces, exception handling, action handling, security, software reuse and robustness.
- b) **Aims:** The aim of the course is to:
- Move the students' programming skills from basic to advanced;
  - Avail students with skills to handle nonfunctional program aspects like robustness and security and;
  - Train students to develop complete computer applications.
- c) **Learning Outcomes:** Upon completion of the course, students shall be able to :
- Explain the principles of the object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism
  - Use an object oriented programming language, and associated class libraries, to develop object oriented programs
  - Design, develop, test, and debug programs using object oriented principles in conjuncture with an integrated development environment
  - Construct appropriate diagrams and textual descriptions to communicate the static structure and dynamic behavior of an object oriented solution
  - Describe and explain the factors that contribute to a good object oriented solution, reflecting on your own experiences and drawing upon accepted good practices.
- d) **Teaching and learning pattern:** This will include lectures, practical sessions and lab assignments
- e) **Indicative content:**
- The object oriented paradigm , Classes and objects
  - Inheritance and visibility modifiers
  - Interfaces and abstract classes
  - Graphical user interface and action handlers
  - Exception handling
  - Working with files
  - Working with databases
  - Sessions and user management
- f) **Assessment method:** The assessment will be done by
- |  |     |
|--|-----|
| i. <b>Coursework</b> (tests and take home assignments) | 30% |
| ii. Practical examination                              | 30% |
| iii. Written examination                               | 40% |
- g) **Reading List:**
- i. Java Software Solution: Foundations of Program Design (4th Edition) by John Lewis and William Loftus, 2008.
  - ii. A Programmer's Guide to Java™ Certification: A comprehensive Primer by Khalid A. Mughal and Rolf W. Rasmussen, 3<sup>rd</sup> Edition, 2008.
  - iii. Object-Oriented Programming: Using C++ for Engineering and Technology. Goran Svenk - 2003
  - iv. Object-oriented programming: an evolutionary approach. Brad J. Cox, Andrew J. Novobilski - 1991
  - v. Object Oriented Programming with C++. David Parsons - 2000

### 5.2.5 BIT 1208 Security Policies and Procedures (4 CU)

**Pre-requisite Courses:** BIT 1105 Communications Technology and the Internet

**a) Course Description:** This course will offer the students an overview of security policies in organizations. The course will specifically tackle creation of policies, maintenance of policies, threats to policies and how they can be handled with the general aim of ensuring information security and information assurance.

**(b) Aims:** This course aims at:

- Introducing students to the concepts of security policies and how they can be used to secure information and assets of any organization.
- Introducing procedures that can lead to proper creation and maintenance of policies which enable information assurance.

**(c) Learning Outcomes:** On completion of this course unit, the students will be able to:

- Describe the role of policy and procedure in the Information Assurance and Security (IAS) Model.
- Explain why policy and procedure are listed as countermeasures to organization threats.
- Explain how poorly defined and executed policies can be a vulnerability which can easily lead to attacks.
- Explain how an organization might develop a policy to defend against any possible vulnerability.
- Explain why any policy might need to be modified due to changing circumstances.
- Explain why security policies must consider all aspects of an organization in order to be effective.
- Create a set of policies that implement a specified organizational objective in a given industrial sector for example health, finance, small business, etc.
- Justify why a given policy is necessary to meet a specific organizational objective.
- Update a set of policies to reflect a change in organizational objectives.

**d) Teaching and learning patterns:** Course delivery will be in form of lectures and tutorials.

**(e) Indicative content:**

- Policies, standards and practices
- Policy Objectives, Role of Policy and Scope of a Real Policy
- Types of Security Policies and their Components
- Examples of Critical Security Policies
- Creation of security policies
- Security Policy Vulnerabilities and Attacks and Maintenance
- Avoidance of security policy breaches
- Response to security policy breaches
- Domain Integration (Physical, network, internet, etc.)
- Information Assurance and Security Model
- Threat Analysis Model

**(f) Assessment method:** Assessment will be in terms of

- i. Coursework ( tests and Assignment) (40%)



- ii. Final examination (60%)

**(g) Reading List:**

1. Computer Security Lab Manual (Information Assurance & Security) by Vincent Nestler, Arthur Conklin, Gregory White and Matthew Hirsch, Career Education 2005
2. Security in Computing, 4th Edition by Charles P. Pfleeger and Shari Lawrence Pfleeger, Prentice Hall 2006.

**5.4.2 BIS 1206 Systems Analysis and Design (4 CU)**

**Pre-requisite Courses:** BIS 2106 Data and Information Management II

- a) Course Description:** This course introduces established and evolving methodologies for the analysis and design of an information system. Great emphasis is placed on system characteristics, managing projects, prototyping, CASE/OOM tools, systems development life cycle phases, the role of the systems analyst, systems selection, definition of systems requirements, feasibility analysis, system design, and system architecture are topics included. Upon completion, students should be able to analyze a problem and design an appropriate solution using a combination of tools and techniques.
- b) Aims:** This course is to give students the core skills set needed to learn or understand, analyze and design information Systems. At the completion of this unit students will have knowledge and understanding of:
- How information Systems is developed and specifically, how business needs can be analyzed.
  - The SDLC and the role of the Systems Analyst in Systems development.
  - Concepts of data modeling process modeling and to some extent, object modeling.
  - The strength of the analysis and design process as a generic approach, while being exposed to the traditional structured, RAD and other approaches.
  - Students will come away from this course with a strong appreciation of the business requirements that drives any information systems as well as the ability to:
  - Develop and practice the skills and competencies necessary to undertake requirements analysis for a business application.
  - Apply problem solving techniques at different levels of abstraction and understand the effect this may have on a system specification
  - Explain the interdependence and relationships between all stake-holders in the systems development process.
- c) Learning Outcomes:** On completion of this course unit, the students will be able to:
- Define and describe the five phases of the system development life cycle;
  - State at least five expected benefits from systems projects;
  - Explain at least three ways in which information systems support business requirements;
  - Describe how systems analysts interact with users, management, and other information systems professionals;
  - Develop data flow diagrams and decision tables;
  - Perform a feasibility study;
  - Evaluate systems development alternatives;
  - Solve realistic systems analysis problems;
  - Determine methods for evaluating the effectiveness and efficiency of a system and;
  - Work as an effective team member on assigned projects.

d) **Teaching and learning pattern:** The course has a total of 45 lecture hours and 30 tutorial hours. Every week, 2 hours are dedicated to the lecture time while the other 2 hours are reserved for a weekly tutorial. The Learning is achieved by using real projects (done by students) and these provide the practical component of the course. Students identify problems in the industry and throughout the course time, as concepts of analysis and design are taught weekly, students apply these concepts to their projects. The projects are presented at the end of the semester and graded. This mark is what comprises the 20% of the course work.

e) **Indicative content:**

- SAD Fundamentals
  - Introduction to IS & types of IS
  - Need for SAD & role of Analyst
  - SDLC & use of CASE tools
  - Determining feasibility & management of SAD activities
- Information Requirements Analysis
- The Analysis Process
- The Design Process
- System Implementation
- Introduction to Object-oriented Systems Analysis & Design using UML

f) **Assessment method:** Assessment for the unit consists of

- |  |      |
|--|------|
| a. Coursework (tests and 1 Group assignment) | 40%  |
| b. Final written examination                 | 60%. |

g) **Reading List:**

1. Kendall & Kendall (2005) *Systems Analysis and Design, 6<sup>th</sup> Edition*, Pearson Prentice Hall
2. Hoffer, J. A, George J. F and Valacich, J. S(1999) *Modern Systems Analysis and Design, 2<sup>ND</sup> Edition*, Addison-Wesley

### 5.3: Semester III

#### 5.3.2 BIS 2106 Data and Information Management II (4 CU)

**Pre-requisite Courses:** BIS 1204 Data and Information Management I

a) **Course Description:**

This course is to provide students with a strong foundation in systematic approaches to design and implementing of database applications. Preliminarily, operations like requirements gathering and database planning will be covered. The course will also introduce students to developing of application programs that talk to the database. These applications may be online or offline.

b) **Aims:** The aims of the course are to:

- Provide a background for the evolution of database (management) systems
- Provide the students with the steps one has to go through when developing good database applications
- Give hand on experience and knowledge in developing database (driven) applications

c) **Teaching and learning pattern:** Teaching will be by lectures, take home reading assignments/class presentations and laboratory

practical sessions.

d) **Indicative content:**

- Background to databases
- Evolution of database systems
- Database organization and architecture
- Over view of database application development
- The database development life cycle
- Database design and modeling (Conceptual design , Logical design , Physical Design)
- Querying databases , SQL/PL SQL
- Scripting

e) **Teaching and learning patterns:** Course delivery will be in form of lectures and tutorials.

f) **Assessment methods:** Assessment will be in terms of

- i. Coursework (tests and take home assignments) (40%)
- ii. Final examination (60%)

g) **Reading List:**

- i. Thomas Connolly and Carolyn Begg. 2003. *Database Solutions: A Step by Step Guide to Building Databases* (2nd Edition). Publisher: Pearson Addison Wesley. ISBN 0321173503.
- ii. Thomas Connolly and Carolyn Begg. 2002. *Database Systems: A Practical Approach to Design, Implementation, and Management* (3rd Edition). Publisher: Pearson Addison Wesley.
- iii. Silberschatz A., Korth H. F. and Sudarshan. 2002. *Database Systems Concepts* (4th Edition). Publisher: McGraw-Hill.
- iv. Greg R. 2001. *Principles of Database Systems with Internet and Java Application*. Publisher: Addison Wesley.
- v. Information-Driven Business: How to Manage Data and Information Robert Hillard - 2010
- vi. Principles of Data Management: Facilitating Information Sharing, Keith Gordon - 2007
- vii. Mastering information management. Thomas H. Davenport, Donald A. Marchand - 2000

#### 5.2.4 BSE 2106 Computer Networks (4 CU)

**Pre-requisite Courses:** BIT 1105 Communications Technology and the Internet

a) **Course Description:**

This course will cover Introduction to Networks: definition, advantages, types, configurations; The OSI/ISO reference model; Transmission media: magnetic media, twisted pair, coaxial, fiber-optics; Data encoding: straight, Manchester, differential Manchester, satellite; Digital versus Analog transmission; Modems, modulation and their standards, codes and pulse code modulation; Integrated Services Digital Networks (ISDN); Network Access Protocols; Passive versus dynamic allocation; LAN standards:802.3 (Ethernet), 802.4 (token bus), 802.5 (token ring); Computer Network security, Active and Passive Attacks; Network layer and Network layer protocols; Transport layer and Transport layer protocols. Furthermore, the course considers problems on each layer of a multilayered communication model, and describes some typical solutions to such problems.

b) **Aims:** the aims of the course are

- To provide a solid basis on the theoretical and practical understand of data communication networks
- To introduce students to standards and guidelines in computer and data communication networks
- To impact knowledge and skill relevant for the design, implementation and maintenance of modern computer communication networks
- To introduce students to emerging technologies in data communication

c) **Learning outcomes:** On completion of this course unit, the students will be able to:

- Master the terminology and concepts of the OSI reference model and the TCP/IP reference model;
- Master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks;
- Demonstrate knowledge of wireless networking concepts;
- Appreciate contemporary issues in networking technologies and;
- Demonstrate knowledge of network tools.

d) **Teaching and learning pattern:**

The course will be delivered inform of lectures, tutorials, lab experimentation, and group assignments

e) **Indicative content:**

- Network services and applications: DNS, HTTP, SMTP, peer-to-peer systems
- Network transport architectures, TCP, UDP, TCP congestion control
- Routing and forwarding, intra-domain, inter-domain routing algorithms and Mobile IP
- Link layers and local area networks, Ethernet, Wi-Fi, and mobility
- Multimedia communications and quality of service
- Network measurement, inference, and management
- Network security (ACL, IPsec, etc.)
- Network programming
- Network experimentation and performance analysis
- Protocol verification

f) **Assessment method:** Assessment will be in terms of

- |     |  |       |
|-----|--|-------|
| i.  | <b>Coursework</b> (tests and Assignment) | (40%) |
| ii. | Final examination                        | (60%) |

g) **Reading List:**

- i. James F. Kurose and Keith W. Ross. Computer Networking - A Top down Approach Featuring the Internet, 3rd edition, Addison-Wesley, ISBN 0- 321-22735-2.
- ii. Computer Networks: A Systems Approach. L. Peterson and B. Davie. Morgan Kauffmann Publishers, 2003, 3<sup>rd</sup> Edition.
- iii. Computer networks. Andrew S. Tanenbaum - 2003
- iv. Computer Networks: A Systems Approach, Larry L. Peterson, Bruce S. Davie - 2011
- v. Data Communications and Computer Networks: A Business User's Approach, Curt M. White - 2012

- vi. Computer Networking Illuminated. Diane Barrett, Todd King - 2005

### 5.3.3 BIT 2111 Web Systems and Technologies I (4 CU)

**Pre-requisite Courses:** CSC 1107 Structured Programming, BSE 2106 Computer Networks

**a) Course Description:**

This course introduces students to web application development fundamentals. It provides a good understanding of the basic Internet technologies such as DNS, email services, LDAP and the HTTP protocol; Web application standards and standard bodies; web development approaches and architectures; HTML editors; website authoring tools such as FrontPage and/or Dream weaver. The course also emphasizes hands on experience using mark-up languages such as HTML and XML, client side languages such as CSS and JavaScript

**b) Aims:** This course aims to:

- Provide an understanding of the basics of the Internet, how it originated, how it works.
- Provide an understanding of web development approaches and architectures
- Provide a basic understanding of Internet related technologies and introductory skills in Web applications mainly focusing on client side languages.
- Provide an understanding of how to develop and maintain Web applications.

**c) Learning Outcomes:** On completion of this course unit, the students will be able to:

- Demonstrate understanding of the basic Internet technology concepts and standards.
- Demonstrate understanding of the web development approaches and architectures.
- Have essential skills for website development and management.
- Develop a prototype of an interactive static website.

**d) Teaching and learning pattern:**

In this course a combination of lectures and practical sessions will be used.

**e) Indicative content:**

- Basic Internet technologies such as DNS, email services, LDAP and the HTTP protocol
- Web application standards and standard bodies,
- HTML editors
- Website authoring tools such as FrontPage and/or Dream weaver
- Web development approaches and architectures
- Web mark-up languages such as XML, HTML
- Client side languages such as CSS and JavaScript

**f) Assessment method:**

The students shall be evaluated through the

- |     |  |       |
|-----|--|-------|
| i.  | Coursework (tests and individual assignments, practical group project) | (40%) |
| ii. | Final examination  | (60%) |

**g) Reading List:**

1. Internet & World Wide Web: How to Program by Paul J. Deite and Harvey M. Deitel, ISBN 10:0131752421, Prentice Hall; 4 edition September, 2007.
2. Instant HTML Programmer's Reference, Alex Homer, Chris Ullman & Steve Wright, Wrox, 1998, 1-861001-56-8.
3. Web application architecture - principals, protocols and practices 2003 John Wiley & Sons Ltd
4. Internet & World Wide Web – How to Program, H.M.Deitel, P.J.Deitel & T.R.Nieto, Prentice Hall,2000, 0-13- 016143-8
5. XML – How to Program, H.M.Deitel, P.J.Deitel, T.R.Nieto, T.M.Lin & P.Sadhu, Prentice Hall, 2000,0-13-028417-3

#### 5.3.4 BAM 2102: Entrepreneurship Principles (3 CU)

**Pre-requisite Courses:** None

**a) Course Description:**

The course introduces the students to the basic concepts in entrepreneurship, identification of business opportunities, business evaluation and analysis. It provides students with the skills needed to effectively identify, organize, develop, and manage own business ventures. This course is based on creativity and professional development foundations that should orient a student to take adventure, a personal journey, and a seize opportunity for business start-up. The course gives students an opportunity to make creative adjustments to meet personal needs and increase self-drive to achieving success.

**b) Aims:**

A student that undertakes this course should be able to:

- Understand the origins of entrepreneurship and an entrepreneur
- Identify, evaluate, and select business opportunities
- Perform a self-evaluation to match their own characteristics with that of an entrepreneur
- Carry out feasibility and viability of an investment opportunity
- Analyze and exploit the Entrepreneurial Environment provided by the political, socioeconomic and technological conditions.

**c) Learning Outcomes:**

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

- Perform self evaluation to match business opportunities
- Analyse the entrepreneurial environment
- Analyse start-up survival, sustainability of an investment opportunity ,
- identify their own personal entrepreneurial potential, ability, and competences
- identify, and exploit business opportunities and resources

**d) Teaching and Learning pattern:**

The teaching and learning approaches will combine use of case studies, Keynote lectures, student-led seminar presentations, site visits, and mini research

**e) Indicative content:**

- Entrepreneurship-Scope: Introduction, Entrepreneurship Defined, Importance of Entrepreneurship, Barriers to Entrepreneurship
- Entrepreneurship theories: Economic theories; Sociological theories ; Psychological theories ; Entrepreneurial Process;
- The Entrepreneur: Entrepreneur defined; Types of entrepreneurs; Emergence of entrepreneurs; Entrepreneurial traits
- Creativity and Innovation: Creativity and innovation defined; creativity and innovation processes; barriers to creativity and innovation; Factors that enhance creativity and innovation

- Feasibility study and analysis: Feasibility and Viability analysis; Idea generation; Process of carrying out a feasibility study; Feasibility Analysis Aspects; Components of a Feasibility report (Market feasibility, Technical feasibility, Financial feasibility, Operational feasibility)
- Business planning: Types of business plans; Uses of business plans; Users of business plans; Business Plan development process (Strategic focus review, Environmental Audit/Analysis, Developing Goals and Objectives, Developing appropriate strategies, Developing implementation plan, Developing a monitoring and control plan)
- Components of a business plan: Cover page, Table of Contents, Introduction, Company background; Shareholders/ Ownership; Legal status of the business; Vision, Mission, Core Values; Environmental Analysis; Target Market; PEST Analysis; SWOT Analysis; Supplier Analysis; Competitor Analysis.
- Business Strategies: Marketing; Financial, Production, Procurement, IT, Human Resources; Implementation Plan:- Activity Timeframes, Budgets; Monitoring and Control Plan

f) **Assessment method:**

Assessment will be in terms of

- |     |  |        |
|-----|--|--------|
| i.  | Coursework (tests and practical exercises) | (40 %) |
| ii. | Final examination                          | (60%)  |

g) **Reading List:**

1. Bruce R. Barringer & R. Duane Ireland (2006). Entrepreneurship: Successfully Launching New ventures. Published by Pearson-Prentice Hall. 1/e Edition. ISBN 0-13-061855-1
2. Thoma W. Zimmerer and Norman M. Scarborough (2005) Essentials of Entrepreneurship and Small Business Management. 4<sup>th</sup> Ed. ISBN 0-13-191856-7
3. Kumar, S. (2003) Entrepreneurship Development. New Age International publication
4. Thomas, W., & Scarborough, N.M. (2004) Effective small business management: An entrepreneurial approach, Prentice Hall International, New Delhi, India
5. Wickham, P.A (2004) Strategic Entrepreneurship. 3<sup>rd</sup> Ed, London Pitman Publishing

### 5.3.5 BIT 2112 Electronic Commerce (4 CU)

**Pre-requisite Courses:** BIT 1105 Communications Technology and the Internet

- a) **Course Description:** The topics covered in this course include: computerized trading systems, electronic funds transfer, automatic product identification and bar code technology, electronic data interchange; the infrastructure of electronic commerce; electronic payment systems; Electronic commerce retailing and corporate finance; Intranets and supply chain management; remote banking, procurement and purchasing, online marketing and advertisement, home shopping, and auctions. Ecommerce security issues, transaction integrity and electronic payment systems are considered; and legal aspects of ecommerce. The course includes a major group project, which draws on a wide range of skills of team members to set up an integrated electronic business. Issues such as business-to business transactions are also covered.
- b) **Aims:** The course aims to provide students with the skills required to design, implement and evaluate robust ecommerce applications. The theory and application of electronic commerce solutions on the internet to improve business profit are presented. The techniques, tools and infrastructure required for on-line transactions are presented.
- c) **Learning Outcomes:** On completion of this course unit, the students will be able to:

- Explain the issues related to various electronic commerce models and Internet/Web business opportunities and practices
- Appreciate and explain the fundamental technologies for implementing electronic Commerce systems.
- Explain the latest developments in electronic Commerce and their implications for organizations.
- Implement database-driven electronic Commerce Web sites.
- Appreciate the potential impacts of different electronic Commerce strategies.
- Become aware of the security and transaction properties of electronic Commerce systems and their solutions.
- Become aware of some of the regulatory and legal issues of electronic Commerce
- Learn various techniques ensuring Web transactions security

d) **Teaching and learning pattern:** The teaching and learning approaches will combine classroom lectures, discussions and group activities, quizzes and take home assignments. A group project shall form part of the coursework. The material presented in class will overlap that of the text but will contain additions and variations

e) **Indicative content:**

- Computerized trading systems
- Electronic funds transfer
- Automatic product identification and bar code technology
- Electronic data interchange
- Infrastructure of electronic commerce
- Electronic payment systems
- Electronic commerce retailing and corporate finance
- Intranets and supply chain management
- Remote banking, procurement and purchasing
- Online marketing and advertisement, home shopping, and auctions.
- Ecommerce security issues, transaction integrity and electronic payment systems
- Legal aspects of ecommerce
- Business-to-business transactions

f) **Assessment method:** The students shall be evaluated through

- |     |   |       |
|-----|---|-------|
| i.  | coursework (Individual Assignment, Tests, a group project, class quizzes) | 40%   |
| ii. | Final examination   | (60%) |

g) **Reading List:**

1. Rayport, J.F. and Jaworski, G.J. (2002) Introduction to e-Commerce, McGraw-Hill, ISBN 0072510242.
2. Rayport, J.F. and Jaworski, G.J. (2002) Cases in e-Commerce, McGraw-Hill, ISBN 0072500956.
3. Turban, E. et al. (2004) Electronic Commerce 2004: a Managerial Perspective Upper Saddle River, NJ; Pearson Prentice Hall, ISBN 0130094935.
4. Schneider, G.P. (2004) Electronic Commerce: The Second Wave, Boston MA Thompson Course Technology, ISBN 0619213310

### 5.1.3 BIS 1100 Foundations of Information Systems (3 CU)

**Pre-requisite Courses:** None

a) **Course Description:** The course covers the integration of Information and Communication Technologies into organizations and



their working practices, from design and implementation to strategic effects. Drawing on Information Systems (IS) and Management literature, the course offers a chance for students to examine case studies of IS successes and failures and to explore 'real-world' IS management issues.

- b) **Aims:** The course aims to provide students with knowledge for understanding the integration of business and technology resources to facilitate effective and efficient realization of an organization's mission and objectives.
- c) **Learning Outcomes:** Upon successful completion of this course, the student should be able to:
- Appreciate the role of information technology and information systems function in modern organizations.
  - Understand the factors influencing information systems engineering.
  - Gain an understanding of how to manage and grow information systems in organizations.
- d) **Teaching and Learning pattern:** The teaching and learning approaches will combine classroom lectures with theories and discussion of case studies in groups. Take home assignments / coursework will be administered.
- e) **Indicative content:**
- An information systems model: An Information System uses the resources of people, hardware, software, data, and networks to perform input, processing, output, storage and control activities that convert data resources into information products;
  - Role of Information Systems in an organization;
  - The shift from data processing Systems via information Systems to knowledge-Based Systems;
  - How information and knowledge add value to an organization;
  - Information Systems Trends;
  - The Information Technology component of Information Systems;
  - Information Systems Engineering.
  - Strategic planning: Organizational strategies and objectives;
  - Human resource development: budgeting, costing, charging, hire versus buy decisions;
  - Hardware and software procurement: request for proposal, evaluation, selection, contracting and maintenance; Security in computing: continuity of processes, controls and planning for standby;
  - Computer audit;
  - Project management: approaches, tools, site planning and installation.
- f) **Assessment method:** Assessment will be in terms of:
- |     |   |       |
|-----|---|-------|
| i.  | Coursework ((Tests and individual assignment) | (40%) |
| ii. | Final examination                             | (60%) |
- g) **Reading List**
- i. Business Information Systems: Analysis, Design and Practice by Graham Curtis, 1995.
  - ii. Business Information Systems: Technology, Development and Management for the E-Business by Paul Bocij, Dave Chaffey, Andrew Greasley, Simon Hickie
  - iii. Connolly T., Begg C. (2002). Database Systems: A Practical Approach to Design,
  - iv. Implementation and Management. USA: Pearson Education Limited.
  - v. Turban E., McLean,E. and Wetherbe, J (1998) Information Technology for management: making connections for strategic advantage. John Wiley & Sons, Inc.

### 5.3.6 BIT 2105 Electronic Media Systems and Multimedia (3 CU)

**Pre-requisite Courses:** BIT 1105 Communications Technology and the Internet

a) **Course Description:**

This course unit is designed to provide students with technical skills and a strong foundation in graphics design, animation, video production and management, studio management, sound effect management among others. It gives students opportunity to interact with many different areas of multimedia. It gives a detailed review of multimedia concepts and how they are integrated into final multimedia production.

b) **Aims:** The course aims at:-

- To introduce students to industry standard software authoring and hardware tools used in creating multimedia projects
- To investigate the video preparation, production, editing process.
- To introduce students to multimedia theories
- To investigate the multimedia story telling process
- To discuss concepts of digital photography and digital camera management
- To facilitate students in their wake to build multimedia projects as required in the given assignments.

c) **Learning outcomes:** On completion of this course unit, the students will be:

- Employ industry standard software authoring and hardware tools used in creating multimedia projects
- Investigate the video preparation, production, editing process (Digitize and prepare raw footage for editing).
- Create a virtual selection that demonstrates technical proficiency and solid design skills.
- Demonstrate understanding of professional theories and practices employed in the multimedia industry.
- Develop a variety of multimedia projects that include sound, animation, text, video, interactivity, 2D and 3D Art.

d) **Teaching and learning patterns:**

Both lectures and lab tutorials will be used in course delivery. This being a practical course, the lecturer should give lab tutorials more time for students to work on projects given out with an instructor who will work as a guide to students.

e) **Indicative content:**

- Introduction to multimedia theories:
- Multimedia authoring and Programming (open source and closed source): Multimedia Development Tools, classification of presentation tools available for multimedia development, Features of Authoring Software, weakness and strength of authoring versus Programming.
- Comprehensive discussion of Multimedia story telling
- Detailed discussion of digital photography: Definition and History, Types of Photography
- Sound Management in Multimedia:
- Digital Audio in Multimedia MIDI:
- Detailed discussion of the animation process:
- Comprehensive discussion of video and text: Explain standards for Broadcasting,
- Detailed discussion of music and speech:
- Comprehensive review of digital studio planning, layout and setup and Management: Photo studios, Television studios, hardware and software requirements and human ware required.

f) **Assessment method:** Assessment will be in terms of

- |  |        |
|--|--------|
| a. Coursework (tests, practical exercises, individual project) | 40%    |
| b. Final examination   | (60%). |

g) **Reading List:**

1. Multimedia Applications by Ralf Steinmetz and Klara Nahrstedt, Springer 2004
2. Multimedia Systems by Ralf Steinmetz and Klara Nahrstedt, Springer 2004
3. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew, Prentice Hall 2003
4. Information Management: Support Systems and Multimedia Technology (2003).
5. Data compression: The Complete Reference, 4<sup>th</sup> by David Solomon. Springer-Verlag London, 2007.
6. Internet (Web) resources

## 5.4 Semester IV

### 5.4.1 BIT 2208 Systems Administration (4 CU)

**Pre-requisite Courses:** BSE 2106 Computer Networks and CSC 1107 Structured Programming

a) **Course Description:**

This course addresses the requirements of setting up computer systems, maintaining them and ensuring that the users of these systems have access to them, in spite of the activities of users who tend to cause the systems to fail.

b) **Aims:**

The course aims to provide students with knowledge and skills in:

- Using Windows and Linux operating systems.
- Performing basic administration under Windows and Linux.
- Designing a network which is logical and efficient.
- Deploying large numbers of machines which can be easily upgraded later.
- Planning and implementing adequate system security.
- Troubleshooting and fixing system errors.

c) **Learning outcomes:**

On completion of this course unit, the students will be able to:

- Demonstrate understanding of computer networking, computing models, and basic network services.
- Recognize and describe logical and physical network topologies in terms of the media and network hardware.
- Compare current network technologies in terms of speed, access method, operation, topology, and media.
- Describe basic principles of Unix/Linux multi-user System Administration
- Plan, Install, Maintain and Run a Unix/Linux System as used in a TCP/IP networked environment
- Manage system resources, services and applications
- Write shell scripts to assist management functions
- Perform upgrades, backup, recovery and virus protection operations
- Test and configure services such as DNS, email, and cross platform file sharing

d) **Teaching and learning pattern:** The teaching style will be FACILITATOR with students being broken up into discussion groups after each major topic

e) **Indicative content:**

- Introduction to system administration: Discuss an overview of the system administration world; understand key concepts of system administration.
- Operating system concepts: Understand basic concepts that are the foundation of Operating System design, understand the Exodus of Operating Systems
- System Booting and Halting:
- System navigation and understanding (windows and Unix): Paths, architecture, directory structure
- Operating System Installations and Configurations (server and client)
- System Software installation and Management
- Systems Security: Concepts of Security administration key to a systems administrator
- Shell Scripting: Detailed view of shell scripts, Automation of system admin tasks like backup.
- Networking terminologies: VLAN, VSAT, hacking tools, protocol analyzers, network monitoring.

f) **Assessment method:** Assessment will be in terms of

- |   |        |
|---|--------|
| a. Coursework (tests and practical exercises) | (40 %) |
| b. Final examination                          | (60%)  |

g) **Reading List:**

- i. Mark Burgess (2004) Principles of Network and System Administration. . Published by Wiley and Sons 2<sup>ND</sup> Edition. ISBN 0-470-86807-4
- ii. Essential *System Administration*: Tools and Techniques for Linux .Eleen Frisch - 2002 –
- iii. Tom Adelstein, Bill Lubanovic - 2007 - Preview - More editions
- iv. Principles of Network and *System Administration*. Mark Burgess - 2007 –
- v. *Linux System Administration*. M. Carling, Stephen Degler, James Dennis - 2000
- vi. *Exchange System Administration*. Janice Rice Howd - 1999
- vii. *System administration: preparing for Network+ certification*. Jerry K. Ainsworth, Kristine A. Kriegel - 2004

### 5.4.3 CSC 2200 Operating Systems (4 CU)

**Pre-requisite Courses:** BSE 2106 Computer Networks and CSC 1107 Structured Programming

a) **Course Description:**

This course introduces students to software that controls hardware and makes the hardware usable. Its interaction with other computer devices and how it controls other computer processes is explored.

b) **Aims:** The course aims to:

- Provide students with a detailed understanding of how operating systems work
- Provide students with skills to write basic programs to utilize underlying operating system infrastructures.

c) **Learning outcomes:**

The dominant categories of operating systems are Windows and UNIX (Linux, Mac OS, Solaris, etc.). On completion of this course unit, the students will be able to:

- Have a proper understanding of the differences between these two operating systems
- Understand different design principles for operating systems and various software tools that make operating systems usable.

d) **Teaching and learning patterns:** The teaching pattern is by lectures, lab sessions and group projects

e) **Indicative content:**

- Operating Systems Structures , Processes and threads
- Thread creation, manipulation and synchronization and Deadlock
- Implementing Synchronization operations
- CPU scheduling and Memory management
- File systems and file system implementation
- Monitors , Segments and Disk Scheduling
- Networking , UDP and TCP

f) **Assessment method:** The assessment will constitute

- a. **Coursework** (Practical assignments, written course work, tests) (40%)
- b. Written Final Exam (60%)

g) **Reading List:**

- i. Operating Systems: Internals and Design Principles – William Stallings, 4<sup>th</sup> Edition, 2007.
- ii. Operating Systems: Internals and Design Principles. William Stallings - 2008
- iii. Operating systems. Harvey M. Deitel, Paul J. Deitel, David R. Choffnes - 2004
- iv. Operating Systems. Sibsankar Haldar, Alex A. Aravind - 2010
- v. Networked: The New Social Operating System. Harrison Rainie, Lee Rainie, Barry Wellman - 2012 -
- vi. Operating Systems: A Concept-based Approach, 2E. D. M. Dhamdhare - 2006 - Preview - More editions
- vii. Operating System: Concepts And Techniques. M. Naghibzadeh - 2005
- viii. Operating System Security. Trent Jaeger - 2008
- ix. Operating Systems. I.A. Dhotre - 2009 - Preview

**5.4.4 BIT 2207 Research Methodology (4 CU)**

**Pre-requisites:** Systems Analysis and Design

- a) **Course Description:** This course unit enables students to learn and apply principles of conducting scientific research, or undertaking a systematic research study.
- b) **Aim:** To enable the student to relate data gathering techniques and principles taught in Systems Analysis and Design (and software engineering or other course units in his/her programme) to his/her final year research project.
- c) **Learning outcomes:** A Student who has undertaken this course unit will be able to learn skills that will enable him/her to successfully undertake a research project. He/she will be able to:
  - Identify a relevant or significant research problem.
  - Identify the aims of a research project that can solve a given problem.
  - Select appropriate research methods to be used in solving a given project.
  - Select appropriate data collection techniques that can be used to gather data required to solve a given project.

- Select appropriate data analysis techniques and use them to process collected data, interpret data analysis results.

**d) Teaching and learning pattern**

- Lectures
- Group work and discussions aiming at applying research concepts and principles in e.g. identifying problems, defining objectives, defining research questions, formulating hypothesis, conducting literature reviews, selecting research methods etc.

**e) Indicative content**

- The course unit is divided into mainly five (5) parts.
- Part I covers introduction concepts of research. E.g. what is research, understanding the research process and fundamental concepts of research, how to formulate a research problem, research objectives, research questions, how to define scope, how to conduct literature review in a given study etc.
- Part II covers the various research methods. Student learns the various quantitative and qualitative research methods. Student also learns the data gathering techniques.
- Part III covers the evaluation phase of a research project, testing and validation of developed tool or research results. E.g. How to evaluate, testing, and validate research results; what are the evaluation criteria? What are the validation methods? What is one testing in the testing phase?
- Part IV covers the practical application of concepts learned from parts I to III. The lecturer suggests one or several class projects that require practical application of concepts learned from parts I to III.
- Part V covers report writing. E.g. how to prepare a research report, how to report research results/findings, how to present feedback or findings from evaluating the developed tool or research results etc.

**f) Assessment method: The course will be assessed by**

- Course work (individual assignments and tests) (40%)
- final examination (60%)

**g) Reading list**

- Synthesizing Research: A Guide for Literature Reviews by Cooper, H. Thousand oaks', California: Sage Publications 1998
- (ii) Research Methods for Students by Sounders, M, Lewis, P & Thornhill, A, 3rd edition, UK, Financial times, Prentice hall 2003

**5.4.5 BIT 2209 IT Law and Ethics (4 CU)**

**Pre-requisite Courses:** BIT 1106 Introduction to IT

**a) Course Description:**

This course focuses on introducing students to salient legal aspects in the field of Information Technology. It aims at creating an understanding of the relevance of law to achievement of a successful career in the Information Technology, understanding the law and its impact on Information Technology as well as providing skills needed to respond to daily work challenges without negatively affecting the IT career demands.

- b)** The course primarily focuses on creating an understanding of professionalism and its demands in the field of IT, appreciating professional behavior of the IT specialist in the interaction with IT clients as well as appreciating the ethical conduct of professionals in the IT field of practice. The students will be led to appreciate the practical differences between morality,

ethics and legality, with the ultimate aim of equipping students with skills and attitudes that will enable them provide professional service to their clients and the public.

**c) Aims:**

- The course aims at providing students with:
- A foundation in ethical, moral and legal issues affecting the role IT professionals play in society.
- The basic background to develop their professional role in the workplace, beyond simply performing technical tasks assigned to them.
- The general framework of the practical ethical and legal arena in which students will be practicing their IT skills in a Ugandan context.

**d) Teaching and learning pattern:**

Students will be availed with the above mentioned skills through lectures. However emphasis shall be given to discussions. Research shall be encouraged and at times students shall be required to make presentations after assignments that need to test their good judgment under conflicting moral and legal circumstances. Current IT-related legislation and case law will be taught by direct lectures, supported by directed reading. Assignments with strong formative aspects (requiring self-directed research on a topic) will support each of the sections of the course.

**e) Indicative content:**

- The course will cover the following areas;
- Understanding morality, nature of ethics and law
- Professionalism and ethical conduct
- Introduction to law and its relevance to the IT theory and practice.
- Legal regulatory framework on computer use and information.
- Computer use and crime.
- Privacy, human rights, data protection and computer use.
- Understanding contract, employment and other salient legal issues with specific emphasis on restraint of trade clauses and agreements.
- Intellectual property and the national and international legal instruments on invention, innovation and computer development.
- Risk and mitigation of risk by computer specialists through insurance and disclaimers.
- Product liability, negligence and provision of competent, professional and efficient service.
- National and international legal frameworks; specific legislation and case law involving IT issues.
- IP law; Data Protection; Computer misuse; Software Licensing, Transitional data flow; copyright protection; Information as a source of economic power; rights to access computer systems; computer crime; data privacy; establishing national priorities in the technical and social aspects of computing
- Legal and ethical issues in E-commerce and electronic trading

**f) Assessment method:** Assessment will be in terms of

- |     |  |     |
|-----|--|-----|
| i.  | Coursework (tests and practical exercises , individual Assignment) | 40% |
| ii. | final written examination  | 60% |

**g) Reading List:**

1. Computer Ethics: Integrating Across the Curriculum by Marion Ben-Jacob, Mercy College, ISBN-13: 9780763778095, ISBN-10: 0763778095, CD-ROM, 2010

2. Pandora's Box: Social and Professional Issues of the Information Age by Andrew A. Adams and Rachel McCrindle (Paperback - 14 Dec 2007)
3. David Bainbridge, Introduction to Computer Law [Pearson Longman, London 2004]
4. Kizza, J. M. Ethical and Social Issues in the Informational Age. 2<sup>ND</sup> edition. Springer-Verlag, New York, Inc. 2003
5. Quirk, P., Forder, J. Electronic Commerce and the Law. 2<sup>ND</sup> edition. John Wiley & Sons Australia 2003 0-470-80238-3

#### 5.4.6 BIT 2201 Marketing in the IT Sector (3 CU)

**Pre-requisite Courses:** BIT 1106 Introduction to IT

a) **Course Description:**

A marketing orientation drives strategic decision-making in most companies today. The business press is constantly discussing the efforts of companies to get close to their customers or to meet their needs better than the competition. Indeed, it is impossible to understand the current and potential financial success of companies today without a thorough understanding of their target markets, customer relationships, product development skills, and competitive advantages and disadvantages. Marketing is all about creating and capturing value. By providing superior value to customers, companies enhance their own value. The marketing concept is so pervasive in companies that a marketing orientation extends well beyond the marketing department. Marketing has become everyone's job. This course will enable students to apply marketing tools and concepts, whether you work in the marketing department or not.

b) **Aims:** A student that undertakes this course should:

- Be able to understand the role of marketing in companies.
- Be able to integrate the customer into every aspect of business planning. The core competence of marketing in any organization is its understanding of the customer.
- Be able to appreciate how companies develop relationships with customers that provide lifetime value to both the company and its customers.
- Be able to apply analytical tools appropriate for marketing analysis.
- Be able to develop specific recommendations and actions plans for companies facing difficult marketing decisions.

c) **Learning Outcomes:**

On completion of this course unit, the students will be able to have:

- Knowledge and Understanding of: Strategy, the customers and consumers
- Marketing Concepts: Segmentation, Targeting, Positioning, Differentiation, Value Proposition;
- how companies select from a variety of approaches to position their products;
- Learn the ways to extend brand names to new products
- View customers as assets (like technology and brands) that are used to generate revenues and profits;
- Understand the structure and significance of relationship marketing;
- Recognize the power of the Internet, with particular emphasis to marketing and security issues.
  - *Intellectual Skills* - Demonstrate a systematic understanding of relevant marketing knowledge and how it benefits organizations, their external context and how it can be used for competitive advantage.
  - *Practical Skills* -Apply relevant marketing knowledge to a range of complex situations taking account of its relationship and interaction with other areas of the business.
  - *Transferable Skills* -Be creative in application of marketing knowledge, demonstrating a practical understanding of how established marketing techniques like marketing research and enquiry are used to develop and interpret knowledge in business and management.

d) **Teaching and learning patterns:** The teaching style will be facilitator-led with students being broken up into discussion groups



after each major topic.

e) **Indicative content:** Marketing in the IT sector is a field of study that investigates the addition of values for the benefit of the customer and of course the business. This knowledge, in turn, is applied with the purpose of improving organizations' effectiveness.

- Introduction to Marketing Strategy , and Analyzing Buyer Behavior
- Segmentation, Targeting, and Positioning
- Analyzing Competition , Strategy over the Product Life Cycle
- Developing New Products , Advertising & Communication
- Pricing and Sales Promotion
- Channels of Distribution and Branding
- Customer Relationship Management
- The Internet as the Holy Grail of Marketing

f) **Assessment method:** Assessment will be in terms of

- |      |   |        |
|------|---|--------|
| (i)  | <b>Coursework</b> (tests and practical exercises) | (40 %) |
| (ii) | Final examination                                 | (60%)  |

g) **Reading List:**

1. Internet Marketing for Information Technology Companies: Proven Online Techniques That Increase Sales and
2. Marketing by Kerin, R., Hartley, S., Rudelius W., McGraw-Hill/Irwin 2008
3. Marketing by Pride, W.M., Ferrell O.C., South-Western College Pub, 2007
4. Preface to Marketing Management by Peter, J.P., Donnelly, J., McGraw-Hill/Irwin, 2007
5. Principles of Marketing by Kotler, P., Armstrong, G., Prentice Hall, 2007

## 5.5: Semester V

### 5.5.1 BIT 3108 Information Technology Project Management (4 CU)

**Pre-requisite Courses:** BIS 1100 Foundations of Information Systems

a) **Course Description:**

The purpose of this course is to enable the student learn the fundamentals and best practices of project management methods as applied to IT initiatives, and practice and master the skills one needs to deliver IT projects on time, within budget, and to specification. Examine all aspects of IT projects, including hardware, software, vendor relationships, communicating with different audiences, and working with local and remote teams. Develop skills to determine project scope, set and manage stakeholder expectations, identify and manage IT risks, and meet quality standards.

b) **Aims:**

The course aims at providing students with:

- Basic concepts of a project, program, and portfolio management.
- Knowledge about the various approaches for selecting projects.
- Demonstrates knowledge of project management terms and techniques such as
- Skills on project management by working on a team project as project manager or active team member.
- Uses Microsoft Project 2007 or 2010 and other software to help plan and manage a project

- Appreciation of the importance of good project management by sharing examples of good and bad project management and using knowledge and skills developed in this class in other settings.

c) **Learning Outcomes**

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

- Show Understanding of the genesis of project, program, and portfolio management and their importance to enterprise success and be able to describe the various approaches for selecting projects.
- Explain the main tasks involved in inputs and outputs of initiating, planning, executing, monitoring and controlling and closing projects
- Demonstrates knowledge of project management terms and techniques used
- Applies project management concepts by working on a team project as project manager or active team member.
- Appreciates the importance of good project management by sharing examples of good and bad project management and using knowledge and skills developed in this class in other settings.

d) **Teaching and learning pattern:**

Students will be availed with the above mentioned skills through lectures, group discussions ad case studies

e) **Indicative content:**

The course will cover the following areas;

- Introduction to Project Management and Overview of Process Groups
- Overview of Project Management Knowledge Areas
- Initiating Process Group , Planning Process Group and Executing Process Group
- Monitoring & Control Process Group and Closing Process Group
- Project Integration Management & Project Scope Management
- Project Time Management and Project Cost Management
- Project Quality Management & Project Human Resource Management
- Project Communications Management and Project Risk Management
- Project Procurement Management
- Tools and techniques of project management and Projects within the organization

f) **Assessment method:** Assessment will be in terms of

- |   |       |
|---|-------|
| a. Coursework (group work, tests and practical exercises) | (40%) |
| b. Final examination                                      | (60%) |

g) **Reading List:**

1. *Managing Information Technology Projects, Sixth Edition* by Kathy Schwalbe
2. Mak Digital Library Services at (<http://dspce3.mak.ac.ug>, <http://muklib.mak.ac.ug>, <http://196.43.133.123:8080>).

### 5.5.2 BIT 3109 Web Systems and Technologies II (4 CU)

**Pre-requisite Courses:** BIT 2111 Web Systems and Technologies I

a) **Course Description:**

This course equips students with skills for developing database driven web applications using various development frameworks such as WAMP and WISA. The course ensures that students acquire in-depth understanding of the processes involved in the development of a web application. The course also emphasizes hands on practical experience on developing data models and developing code using server side technologies such as PHP and ASP to interact with these models

**b) Pre-requisite:**

This course assumes that students have covered the web systems and technologies I course and are familiar with client side technologies and web architectures. It also assumes that students have skills in database management systems and e-commerce

**c) Aims:** The aims of the course are;

- To equip students with the skills to analyze requirements for their web based applications
- To equip students with the skills to design and develop data models that would be used in their web applications using SQL server databases
- To equip students with the skills to write server side code that would be used to interact with the SQL Server databases and provide output to the client side
- To enable students develop secure and scalable web applications

**d) Learning Outcomes:** On completion of this course unit, the students will be able to:

- Demonstrate understanding of the process of developing secure and scalable web applications
- Demonstrate understanding of server side technologies for different development frameworks
- Demonstrate understanding of using server side technologies to interact with SQL server databases
- Develop a prototype of a secure and scalable web application

**e) Teaching and Learning pattern:**

The preferred mode of teaching is laboratory based where most of the learning occurs during the completion of problem sets. Projects will be prototype business systems which include dynamic database access.

**f) Indicative content:**

- Recap of Client-side programming such as XHTML forms and JavaScript input validation
- The development process of a web application
- Data driven web application frameworks
- Developing data models for the web applications using SQL
- Server-side technologies such as PHP, ASP
- Interaction of server side technologies with SQL Database
- Creating secure web applications
- Web services and servers

**g) Assessment method:**

The students shall be evaluated through the

- |     |   |     |
|-----|---|-----|
| i.  | coursework ( Individual Assignment, Tests, a practical group project) | 40% |
| ii. | final examination   | 60% |

**h) Reading List:**

1. Build Your Own Database-Driven Website Using PHP & MySQL by Kevin Yank ISBN:0957921810• 2003
2. ASP.NET Unleashed: unleashed By Stephen Walther, Sams Publishing, 2003 ISBN 067232542X,9780672325427
3. Build Your Own ASP.NET Website Using C# &VB.NET, by Zak Ruvalcaba, 1st Edition; ISBN 0-9579218-6-1, 2005.
4. Internet Programming with VBScript and JavaScript (Web warrior series), by Kate Kalata, Course Technology, 1st edition, December, 2000. ISBN-10: 0619015233
5. Website: W 3 Schools: [www.W3C.com](http://www.W3C.com)

### 5.5.3 BIT 3111: Information Technology Project I (5 CU)

**Pre-requisite Courses:** Research Methodology

**a) Course Description:**

BIT Project I is part of the BIT students' final year projects. It provides students with the skills to write research proposals that would be turned into a working system during their second semester. It enables students to apply skills they have learned from other courses during their time of study especially research methodology and system development related courses.

**b) Course Aims**

To give the students experience in writing information technology research proposals that would provide IT solutions to real world problems affecting the industry at large.

**c) Learning outcomes**

- By the end of the course, the student should be able to:
- Identify a relevant or significant IT related research problem.
- Identify the aims of a research project that can solve a given problem.
- Review relevant literature that would inform the process of solving a given problem
- Identify an appropriate research method to be used in solving a given problem.
- Identify appropriate data collection techniques that can be used to gather data required to solve a given problem.
- Develop a budget that would be used to realize the project
- Write an IT project research proposal that would be turned into a working system in the second semester of their study.

**d) Teaching and learning pattern**

Teaching will be conducted through project works, working with the industry, case studies and independent studies.

**e) Assessment method**

- Project supervisors will assess students on a bi-weekly basis and reports from students showing progress will constitute 40% of the total course mark.
- Exams will be in form of students presentations of their research proposal to their supervisor and this would constitute 60% of the final mark

**f) Reading list**

- i. Synthesizing Research: A Guide for Literature Reviews by Cooper, H. Thousand oaks', California: Sage Publications 1998
- ii. (ii) Research Methods for Students by Sounders, M, Lewis, P & Thornhill, A, 3rd edition, UK, Financial times, Prentice hall 2003

### 5.5.4 BIS 2107 Human Computer Interaction (3 CU)

**Pre-requisite Courses:** BIS 1206 Systems Analysis and Design, CSC 1214 Object Oriented Programming

**a) Course Description:**

This course covers: Introduction to the interdisciplinary area of Human Computer Interaction (HCI); the underlying principles of psychology, computer science and ergonomics that influence theory and practice of HCI design and usage; specific topics will include: models of human information processing, organizational structures and socio-technical approaches to information system design;

design principles for dialogue management; issues of systems user-ability; hypertext; natural language processing; virtual reality and multimedia applications

**b) Aims:**

The course aims to provide students with knowledge and skills in human factors with respect to interactive software, characteristics of design processes, principles and guidelines of interface design, virtual environments with respect to interfaces, corporate and business aspects of human computer interaction, interface aspects of response times and presentation, interaction devices.

**c) Learning Outcomes:**

- On completion of this course unit, the students will be able to demonstrate understanding of:
- Basic human factors with respect to interactive software.
- Various characteristics of design processes.
- Principles and guidelines of interface design.
- Virtual environments with respect to interfaces.
- Corporate and business aspects of human computer interaction.
- Interface aspects of response times and presentation.
- Devices that facilitate interaction.

**d) Teaching and Learning pattern:**

The teaching and learning approaches will combine classroom lectures, discussions and group activities, quizzes and take home assignments. A group project shall form part of the coursework. The material presented in class will overlap that of the text but will contain additions and variations.

**e) Indicative content:**

- Conceptual systems models . Interface design and evaluation
- Systems engineering and systems design factors and Assessments
- Software tools and Virtual environments
- Menus and dialogues and Command and natural languages
- Interface devices and Response times
- Complexity and Information attributes
- Human factors and attributes, Tasks
- Cognitive modeling , Function mapping
- Hypermedia
- Societal considerations and ethics , Internet/web considerations

**f) Assessment method:** Assessment will be in terms of

- |     |  |       |
|-----|--|-------|
| i.  | Coursework (tests and practical exercises) | (40%) |
| ii. | Final examination                          | (60%) |

**g) Reading List:**

1. Human Computer Interaction 2<sup>ND</sup> Edition Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, Prentice Hall, 1997.
2. The Human – Computer Interaction Handbook by Andrew Sears and Julie A. Jacko, 2008
3. Interaction design: beyond human computer Interaction, by Helen Sharp, Yvonne Rodgers and Jenny Preece. John Wiley & Sons; 2nd Edition (12 Jan 2007).
4. Mak Digital Library Services at (<http://dspce3.mak.ac.ug>, <http://muklib.mak.ac.ug>, <http://196.43.133.123:8080>).

### 5.5.5 CSC 3119 User Interface Design (4 CU)

**Pre-requisite Courses:** BIS 1206 Systems Analysis and Design, CSC 1214 Object Oriented Programming

a) **Course Description:**

The course introduces the principles of user interface development, focusing on design, implementation and evaluation.

b) **Aims:**

The course aims at providing the skills listed below to students:

- Developing efficient, flexible and interactive User Interfaces (UI)
- Provide ability to identifying system users, the tasks they want to carry out and the environment in which they will be working;
- Creating conceptual designs;
- Designing various kinds of UI, in particular graphical user interfaces (GUIs) and websites; evaluating UIs;
- Appreciation of realities of developing usable UIs in an organization

c) **Learning outcomes:**

On completion of this course, the students will be able to:

- Developing efficient, flexible and interactive User Interfaces(UI)
- Have the ability to identify system users, the tasks they want to carry out and the environment in which they will be working;
- Create conceptual designs;
- Design various kinds of UI, in particular graphical user interfaces (GUIs) and websites;
- Evaluate UIs;
- Appreciate realities of developing usable UIs in an organization.

d) **Teaching and learning outcome:**

The teaching pattern is by lectures, lab sessions and projects.

e) **Indicative content:**

- Usability and User-Centered Design
- UI Software Architecture , Human Capabilities
- Output Models , Conceptual Models and Metaphors, Input Models
- Design Principles , Paper Prototyping , Constraints and Layouts
- Graphic Design and Computer Prototyping
- Heuristic Evaluation
- User Testing , Experiment Design
- Experiment Analysis

f) **Assessment method:** Assessment will be in form of

- |     |  |       |
|-----|--|-------|
| i.  | Coursework (individual assignments and tests ) | (40%) |
| ii. | Final written exam                             | (60%) |

g) **Reading List:**

1. Norman, D. A. The Design of Everyday Things, New York, NY: Doubleday, 1990. ISBN: 0385267746.
2. Nielsen, J. Usability Engineering. Burlington, MA: Academic Press, 1994. ISBN: 0125184069.

3. Mullet, K., and D. Sano. Designing Visual Interfaces: Communication oriented techniques. Upper Saddle River, NJ: Prentice Hall, 1994. ISBN: 0133033899.
4. Mak Digital Library Services at (<http://dspce3.mak.ac.ug>, <http://muklib.mak.ac.ug>, <http://196.43.133.123:8080>).

### 5.5.6 BIS 3105 Intelligent Systems (4 CU)

**Pre-requisite Courses:** CSC 1214 Object Oriented Programming

**Course Description:** This course introduces the fundamental concepts and applications of intelligent systems. It introduces various concepts of popular intelligent systems techniques and how they can be applied to provide solutions to specific problems with a focus on information systems. The course also introduces the criteria for measuring the successful application of intelligent systems techniques

**Aim:** The aims of the course are to:

- Introduce to students fundamental intelligent systems concepts that establish the foundation of applying intelligent systems to Information Systems related problems
- Introduce to students popular intelligent systems techniques that are suitable for solving various types of Information systems related problems
- Make students apply intelligent systems to information systems related problems
- Explore limitations and / or challenges associated with intelligent systems and how to overcome them in the context of information systems applications.

**Learning outcomes:**

By the end of this course, a student should be able to:

- Explain key concepts associated with intelligent systems and how their application to information systems related problems
- Describe several intelligent systems approaches (e.g. expert systems, neural networks, and genetic algorithms, etc.) and their application to information systems related problems
- Develop various applications of intelligent systems
- Evaluate the application of intelligent systems in solving information systems related problems.

**Teaching and learning patterns:**

- Lectures
- Project-like assignments to be done in groups
- Class discussions about the project-like assignments

**Indicative content:**

- Introduction
- Review of probability and statistical concepts
- Structure of Intelligent systems
- Problem solving strategies:
  - Uninformed problem solving
  - Informed problem solving
- Intelligent systems development Methodologies and Case studies
  - Knowledge Engineering /Intelligent Systems development phases
  - Expert systems, Artificial neural networks
  - Evolutionary computation

- Case-based reasoning, Intelligent software agents
- Data mining, Natural language processing
- Hybrid intelligent systems

**Assessment:**

- |     |  |     |
|-----|--|-----|
| i.  | Course work (Tests, take home assignments, practical exercises): | 40% |
| ii. | Final written exam:  | 60% |

**References:**

- i. Michael Negnevitsky. 2011. *Artificial Intelligence: A guide to Intelligent Systems*, 3<sup>rd</sup> Edition. Publisher: Addison Wesley. ISBN: 140822574
- ii. Stuart Russell and Peter Norvig. 2009. *Artificial Intelligence: A Modern Approach*, 3<sup>rd</sup> Edition. Publisher: Prentice Hall. ISBN-10: 0-13-60425907, ISBN-13: 978-0-13-604259-4

**5.5.7 BSE 3106 Mobile Networks and Computing (4 CU)**

**Pre-requisite Courses:** BSE 2106 Computer Networks, CSC1303 CCNA

**a) Course Description:**

This course examines principles, design, implementation, and performance of mobile computing and wireless networking. The aim is to lay a foundation in the student's understanding and skills in mobile computing and wireless networking standards, technologies, application and services. Ideally the course is an integration of Wireless Networking and Mobile Computing. Subjects of study under Mobile Networking will include; Wireless Network technologies (including GSM/GPRS/3G & Wireless LANs), Convergence networks, NextGen, Mobile IP, wireless ATM, Wireless Ad Hoc Networks and Bluetooth. While subjects of discussion under Mobile Computing will include; Mobile Computing Architectures (including SMS/SIM, WAP, I-mode and J2ME/J2EE), mobile OS (e.g., Android) and Mobile Application Development including location– based services.

**b) Aims:** The aims of the course include:

- To introduce students to the theory and practice of Mobile networking and computing.
- To facilitate the development of technical skills in mobile application development platforms particularly J2ME and J2EE.
- To enhance students skills in mobile application development using Java and other technologies
- To introduce students to the fundamental concepts in wireless technology and mobile computing including standards, technologies, devices and services
- To use and experiment with new technology and cutting-edge projects
- To understand how networking research is done
- Investigate novel ideas in the area via semester-long skill development projects.

**c) Learning outcomes:** On completion of this course, the students will:

- Have gained an understanding of the theory and practical aspects of mobile computing and wireless networking.
- Discuss the considerations in wireless mobile networking architectures
- To design and implement simple wireless and mobile networks using Bluetooth, Wi-Fi among others
- Work with the J2ME and J2EE platforms with minimal difficulty
- Develop simple mobile applications deployable on Java enabled mobile devices
- Discuss the current research directions in mobile and wireless networking
- Demonstrate mastery of development and deployment of secure mobile services.



**d) Teaching and learning patterns:**

The course will be delivered in form of lectures, tutorials, lab experimentation, and group assignments

**e) Indicative content: Pre-requisite:**

Knowledge in the following (Computer Networking, Programming Principles, and Java)

- Introduction to mobile computing and wireless networking principles
- The Bluetooth and Zigbee short range wireless technologies
- The Wi-Fi Technologies
- Introduction to GSM/GPRS/3G/3GPP
- The Mobile IP technology
- Wireless ATM technology
- Introduction to Mobile application development
- Introduction to J2ME and J2EE platforms
- Understanding mobile computing architectures (I-mode, SMS and WAP)
- Introduction to GSM gateways e.g. Kannel

**f) Assessment method:**

- Coursework (tests, practical assignment ) 40%
- Final written exam 60%

**g) Reading List:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, 2000.
2. Mark Beaulieu, "Wireless Internet Applications & Architectures: Building Professional Wireless Applications Worldwide", Addison-Wesley, 2002.
3. Qusay H. Mahmoud, "Learning – Wireless Java", O'Reilly, 2002.
4. John W. Muchow, "Core J2ME, technology & MIDP", Prentice-Hall, 2002.
5. Steve Mann, "Programming Applications with Wireless Application Protocol", John Wiley & Sons, Inc., 2000

**5.6 :Semester VI**

**5.6.1 BIT 3209 Digital Forensics and Incident Response (4 CU)**

**Pre-requisite Courses:** BIT 1207 Security Policies and procedures, BSE 2106 Computer Networks

a) **Course Description:** This course provides an overview of digital forensics and incident response by placing students in a series of hands-on assessments based on industrial case studies related to digital forensics and incident response. Students will work in groups to respond to and investigate corporate and government intrusions. Students will learn event correlation and reconstruction techniques as well as cutting-edge data collection and analysis approaches. Students will be required to apply and synthesize these competencies and utilize their own problem solving skills to bring these cases to court. Students must follow sound digital forensic methodology to protect and prepare digital evidence and expert testimony to support any legal trials. Additionally, students will learn and implement executive best practices for managing crisis situations effectively including vulnerability assessment, threat vectors, incident response strategies, components of a secure system, security testing, basic forensic skills, forensic acquisition, analysis and reporting of digital evidence using commercial and open source tools, terminology, and methods and systems auditing.

**b) Aims:**

The course aims to enable students to Develop their knowledge and understanding of

- Identifying and employing tools for tracking intruders, gathering, preserving and analyzing evidence of their activities.
- Emphasizing both the fundamental digital forensics techniques and the hands-on experience of utilizing the tools needed to uncover illegal activities of digital users.
- Learning the procedures used to gather and preserve this evidence to ensure admissibility in court.

**c) Learning Outcomes:**

On completion of this course unit, the students will be able to:

- Understand the fundamental techniques and procedure of digital forensics, including inherent flaws and limitations.
- Understand social, legal, and ethical considerations that are encountered when working in this field.
- Demonstrate their ability to identify and utilize appropriate IDS tools to detect network and system intruders.
- Describe the basic procedure of incident response.
- Utilize available forensic tools to discover, collect, preserve, analyze and document digital evidence.
- Obtain the basic skills to uncover hidden evidence such as deleted and hidden files, cryptographic, steganography, and illegal software and crack encrypted files.

**d) Teaching and learning pattern:**

Teaching and Learning will be in form of group work on case study scenarios, classroom lectures, and demonstration and students lab practical projects.

**e) Indicative content:**

- Digital forensic methodology
- Implementing executive best practices for managing crisis situations effectively including vulnerability assessment, threat vectors, incident response strategies
- Components of a secure system
- Security testing,
- Forensic skills and acquisition, analysis and reporting of digital evidence using commercial and open source tools,
- Terminologies, and methods for systems auditing.
- Legal Considerations
- Evidence Collection and Preservation
- Preparing Incident Response Tools
- Hackers' Methods of Maintaining Presence/Persistence Methods
- System Compromise Indicators/Detecting and Confirming Intrusions
- Malware Analysis
- Building an Incident Response Tool Suite
- System Registry Analysis

**f) Assessment method:** The assessment will be in form of

- |     |                                |       |
|-----|--------------------------------|-------|
| i.  | Coursework (group work, tests) | 40%   |
| ii. | final written exam             | (60%) |

**g) Reading List**

- i. Prorise, C; Mandia, K and Pepe, M. (2003). Incident Response and Computer Forensics, Second Edition, ISBN-13: 978-0072226966
- ii. Warren G. Kruse II, W. G and Jay G. Heiser, J. G. (2001). Computer Forensics: Incident Response Essentials, ISBN-13: 978-0201707199

- iii. Keith J. Jones, K.J.; Bejtlich, R. and Curtis W. R. (2005). Real Digital Forensics: Computer Security and Incident Response, ISBN-13: 978-0321240699

### 5.6.2 BIT 3211 Integrative Programming and Technologies (4 CU)

**Pre-requisite Courses:** BIS 1206 Systems Analysis and Design, CSC 1214 Object Oriented Programming

- (a) **Course Description:** The course covers integration of different computer technologies to empower business processes. It covers object oriented programming technologies, event driven programming technologies and scripting languages. There will be much emphasis on creative problem solving using IT and its skillful implementation. The course looks at systems integration with focus on communication mechanisms and data standardization. Students will learn how to represent data structures and how to transport data using XML and related technologies and protocols. Standardization of XML documents for the purpose of data exchange is stressed.
- (b) **Aims:** The main focus of the CIT program is the understanding of the different types of technologies available in the IT market today, and the innovative and creative integration of these technologies to form customized solutions to empower businesses and organizations.
- (c) **Learning Outcomes:** On completion of this course unit, the students will be able to:
- Program in an object oriented language and a scripting language
  - Develop standalone and internet applications using technologies such as xml and in popular frameworks such as ASP.NET
  - Create the necessary connections and scripts in order that one or more servers can share data from one or more data sources.
  - Use middleware where necessary to integrate data sources which are dissimilar in structure and platform.
  - Construct and understand an XML document and Parse an XML document.
  - Use XML schemas and DTDs to construct data structure, constraints and type enforcement.
  - Use XSL for transformations and formatting.
  - Exchange data among data sources where data structure and/or model is not the same, using XML, and understand how to use vendor support for XML.
- (d) **Teaching and learning pattern:** The teaching and learning approaches will combine classroom lectures, discussions and group activities, quizzes and take home assignments. A group project shall form part of the coursework. The material presented in class will overlap that of the text but will contain additions and variations.
- (e) **Indicative content:**
- Intersystem Communications and integration
  - Data Mapping and Exchange
  - Markup languages such as XML and HTML and, DBMS such as MySQL and Oracle
  - Object oriented programming technologies such as C# and Java
  - Scripting languages (JAVASCRIPT AND PHP)
  - Software Security Practices
- (f) **Assessment method:** The students shall be evaluated through the
- |     |   |       |
|-----|---|-------|
| i.  | Coursework (Individual Assignment, Tests, a group project, class quizzes) | 40%   |
| ii. | Final examination   | (60%) |

**(g) Reading List:**

- i. XML Programming with VB and ASP ISBN: 1884777872 Mark Wilson, Tracey Wilson
- ii. Java Developers Guide to E-Commerce with XML and JSP (ISBN: 0782128270) Bill Brogden et al.
- iii. Build Your Own ASP.NET Website Using C# & VB.NET, by Zak Ruvalcaba, 1st Edition; ISBN 0-9579218-6-1, 2005.
- iv. Internet & World Wide Web: How to Program by Paul J. Deite and Harvey M. Deitel, ISBN 10: 0131752421, Prentice Hall; 4 edition September, 2007.
- v. ASP.NET Unleashed: unleashed By Stephen Walther, Sams Publishing, 2003 ISBN 067232542X, 9780672325427
- vi. Internet Programming with VBScript and JavaScript (Web warrior series), by Kate Kalata, Course Technology, 1st edition, December, 2000. ISBN-10: 0619015233

**5.6.3 BIT 3210 System Integration and Deployment (4 CU)**

**Pre-requisite Courses:** BIS2106 Data and Information Management II

**a) Course Description:**

This course is designed to provide students with an understanding of Systems Integration (SI) processes, approaches, drivers, tools and techniques required for successful SI, critical success factors, and best practices. The course focuses on how a proposed system will be integrated with other existing or planned systems. It addresses the System Integration problem using architectures as the basis and then addresses the evaluation of the architectures in terms of the capabilities they provide. Case studies and examples from the Information Technology (IT), energy, and financial services industry will be used to illustrate the concepts discussed. The students will learn the theory and practice of business process integration, legacy integration, new systems integration, business-to-business integration, integration of commercial-off-the-shelf (COTS) products, interface control and management, testing, integrated program management, integrated Business Continuity Planning (BCP). Specific focus will be given to issues of interface integration and interoperability of systems.

**b) Aims:**

- To provide students with an understanding of the technical and business process issues involved in systems integration.
- The course presents students with the concepts applicable to the process of linking together different computing systems and software applications physically or functionally, so they can act as a coordinated whole.
- The course also provides practical skills required for modeling and planning deployments of IT Systems.

**c) Learning outcomes:**

On completion of this course, the students will be able to:

- Identify integration issues upfront in the process of System Integration and should be able to identify the best practices that ensure successful System Integration.
- Have an understanding of the technical and business process issues involved in systems integration.
- Describe Enterprise integration in terms of components and interfaces.
- Describe middleware platforms applicable to system integration and deployment.
- Describe the major considerations for enterprise integration platform selection.
- Explain frameworks that facilitate enterprise information integration.
- Install and test an enterprise integration middleware platform.
- Identify and describe architecturally significant components in a deployment model.

- Map software architecture created in a design to a physical system architecture that executes it.
- Explain why a pilot deployment is used prior to a system rollout.
- Identify and explain the tasks involved in a system rollout to all user sites

**d) Teaching and learning pattern:**

Teaching this course will combine both lectures and tutorials. A number of case studies will also be used to illustrate some concepts as mentioned in the indicative content.

**e) Indicative content:**

- 
- Challenges of Systems Integration – Human, Organizational, Societal Cultural, Economic, and Technological aspects;
- Processes, approaches, drivers, tools and techniques required for successful SI, critical success factors, and best practices in Systems Integration;
- The Role of Architectures in Systems Integration;
- Systems Interoperability;
- Measures of Performance and Effectiveness;
- The theory and practice of business process integration, legacy integration, new systems integration, business-to-business integration, integration of commercial-off-the-shelf (COTS) products, integrated program management, integrated Business Continuity Planning (BCP).
- Infrastructure, middleware and platforms for Enterprise systems integration and deployment
- Techniques – data warehouses, extending frameworks, wrappers, glue, facades
- Testing/evaluation/benchmarking
- System release: pilot and acceptance testing and defect repair
- System support strategies and user support plans
- Enterprise deployment models and architectures

**f) Assessment method:** Assessment will be in form of

- |     |  |      |
|-----|--|------|
| i.  | Coursework (tests and practical assignments) | 40%  |
| ii. | final written examination                    | 60%. |

**g) Reading List:**

- Sage A.P. and Rouse, W.B. Handbook of Systems Engineering and management, John Wiley & Sons, 1999.
- Integrated It Project Management: A Model-Centric Approach - Kenneth R. Bainey - 2004
- Handbook of Human Systems Integration - Volume 1. Harold R. Boohar - 2003 - Preview

**5.6.4 BIT 3213 Information Technology Project II (5 CU)**

**Pre-requisite Courses:** BIT 3111 BIT Project 1

**Course Description:**

To apply the Research Methodology concepts, give the student experience in developing independent skills and implementing non-trivial information technology research projects. Each student will pursue a lengthy project in any area of information technology. The project will be specified, designed and implemented, with one of the Professors / lecturers as advisor / supervisor.

Reading List

- i. Synthesizing Research: A Guide for Literature Reviews by Cooper, H. Thousand oaks', California: Sage Publications 1998
- ii. (ii) Research Methods for Students by Sounders, M, Lewis, P & Thornhill, A, 3rd edition, UK, Financial times, Prentice hall 2003

## **BIT 3212: Digital Libraries (3 CU)**

**Pre-requisite Courses:** BIS2106 Data and Information Management II

### **a) Course Description**

Digital libraries are a specific type of information system that attempts to organize data and provide relevant services (such as search engines and directories) to users seeking information. This course will look at the various policy and technical issues involved in building digital libraries, as well as relevant standards and practices that are broadly applicable to networked system design in general and specifically Web application design.

**b) Aims:** The students will acquire the basic technical capacity to build and operate a digital library on their own.

- They will have gained familiarity with XML, Information Retrieval
- They will have learned how to collect and transform digital data to extract metadata
- They will be able to index the metadata
- They will able to design user interfaces for the data in the index
- The practical work will encourage the students to think about the issues that surround digital libraries. These can be metadata problems, information retrieval, copyright issues, etc.

### **c) Learning outcomes**

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

- Identify and discuss the components of a digital library
- Discuss the various approaches to Digital Libraries
- Demonstrate knowledge of the issues and challenges facing Digital Libraries
- Demonstrate knowledge of core digital library activities and issues
- Detail the major digital library projects and use the vocabulary of the field appropriately
- Actively take part in the development of a team-based digital library project
- Demonstrate a deep understanding and hands-on competence in XML retrieval, image retrieval or information visualization

### **d) Teaching and learning pattern**

Tuition will be conducted through lectures, written assignments, seminars, demonstrations, practices, project works and independent studies.

### **e) Indicative content**

- Definitions and examples of DLs, DL models, data and services
- Overview of XML technologies, Data definition, schema, metadata, DC, Data transformation, XSLT
- Repositories and archives, identifiers, RAP, SODA, FEDORA
- Search engines and algorithms, DL as Web application, Greenstone, EPrints
- DL as Web service, search protocols, SOAP

- Data transfer and repository access protocols, RAP
- Open Archives Initiative and OAI-PMH
- ODL, OpenDLib, and other component models
- Orchestration and composition, WS-Coordination, 5SL
- Distributed and hierarchical systems
- The library perspective, MARC, Z39.50, IP Rights, DRM
- Interfaces and usability, portals, mobile devices, community support
- Preservation, LOCKSS, Open access, BOAI, OAI, economics and business models

**f) Assessment method**

- Coursework ( Group assignments, tests ) 40%
- The final exam 60%

**g) Reading List**

- Digital Libraries by *William Y. Arms*. Available online at <http://www.cs.cornell.edu/wya/DigLib/>
- Mak Digital Library Services at (<http://dspce3.mak.ac.ug>, <http://muklib.mak.ac.ug>, <http://196.43.133.123:8080>).

**5.6.5 BIS 3205 Data Warehousing and Business Intelligence (4 CU)**

**Pre-requisite Courses:** BIS2106 Data and Information Management II

**a) Course Description:**

This course introduces the student on how companies can build data warehouses and utilize business intelligence for decision-making hence saving money and increasing profit. Several, initiatives ranging from supply chain integration to compliance with organizational/government-mandated reporting requirements depend on well-designed data warehouse architecture. Therefore the course introduces you to the main components of a data warehouse for business intelligence applications. This will include how a data warehouse fits into the overall strategy of a complex enterprise, how to develop data models, data mats useful for business intelligence, and how to combine data from disparate sources into a single database that comprises the core of your data warehouse. The course will also explore how to define and specify useful management reports from warehouse data.

**b) Aims:** The aims of the course are

- Give students the understanding on the role and operation of data warehouses
- To equip students with skills of developing data warehouses
- To equip students with skills of maintaining existing data warehouses
- To equip students with skills of manipulating data warehouses to generate information for business decision making

**c) Learning outcomes:**

On completion of this course, the students will be able to:

- Explain how data warehouse combined with good business intelligence can increase a company's bottom line.
- Describe the components of a data warehouse.
- Describe different forms of business intelligence that can be gleaned from a data warehouse and how that intelligence can be applied toward business decision-making.
- Develop dimensional models from which key data for critical decision-making can be extracted.

- Sketch out the process for extracting data from disparate databases and data sources, and then transforming the data for effective integration into a data warehouse.
  - Load extracted and transformed data into the data warehouse.
- d) **Teaching and learning pattern:** Teaching will be in form of class lectures, tutorials and lab demonstrations as well as class presentations.
- e) **Indicative content:**
- Data warehouse concepts: partitioning, granularity, record of source, and metadata
  - Building viable decision support environments.
  - Architect development,
  - Data migration and integration,
  - Use of operational data stores, and transactional systems.
- f) **Assessment method:** Assessment will be in form of
- |   |       |
|---|-------|
| i. Coursework (tests and practical assignments) | (40%) |
| ii. Final written examination                   | (60%) |
- g) **Reading List:**
- i. Data warehousing fundamentals by Paulraj Ponniah, 2001, ISBN: 978-0-471-41254.
  - ii. Progressive Methods in *Data Warehousing and Business Intelligence*: David Taniar - 2009
  - iii. Open Source *Data Warehousing and Business Intelligence*. Lakshman Bulusu - 2012
  - iv. *Agile Data Warehousing: Delivering World-Class Business* .Ralph Hughes - 2008
  - v. Pentaho Solutions: *Business Intelligence and Data Warehousing* with Roland Bouman, Jos van Dongen - 2010
  - vi. *Agile Data Warehousing Project Management: Business Intelligence* .Ralph Hughes - 2012
  - vii. *IBM Data Warehousing: with IBM Business Intelligence Tools*, Michael L. Gonzales - 2003

## 7. Resources and Infrastructure

The School of Computing and Informatics Technology and specifically the Department of Information Technology have sufficient resources and infrastructure to suitably run the program as further described below.

### 7.1. Source of Funds

Fees payable by the students will enable the University to sustain the programme.

### 7.2. Staff

The Department of Information Technology (see list of staff members in Appendix A) in conjunction with other departments in the School of Computing and Informatics Technology have an adequate number of staff who can competently teach the courses.

### 7.3. Lecture Space

The School of Computing and Informatics Technology in the College of Computing and Information Sciences is housed on 2,500 and 12,000 square meter of COCIS buildings known as Block A and B, respectively. The COCIS Block A mainly accommodates offices and



a few laboratories, while Block B has lecture rooms together with the rest of the general and specialized laboratories. The two buildings sufficiently cater for all the lecture and lab space requirements for all the teaching in the School. Specifically SCIT has 6 lecture theatres each of 400 square meters (600seat capacity); 6 small lecture theatres of total area 1200 square metres and 1800 square metres of circulation space where students are able to access other services such as wireless internet services.

#### **7.4. Computer Laboratories and Software**

The COCIS buildings i.e. Block A and B respectively, have general laboratories (for student practice), teaching laboratories and specialized laboratories, that are shared among the four departments. At present, these laboratories have in total approximately 2000 computers. In summary, SCIT has **got** 6 computer laboratories each of 800 square meters (1000 seat capacity) and 6 small laboratories of total area 1200 square meters. More lab details can be found on the School website: <http://cit.ac.ug/cit/facilities/labs.php>.

At the same time, the School has an approximation of 5000 students; which makes the student to computer ratio 1:2.5. This is adequate for the practical components of the curriculum.

In addition to the physical computers, different software is installed for usage by students depending on their focus. Most of the software is available as free distributions for academic purposes. The School and department therefore have (and can access) enough software that can run the practical aspects of the program.

#### **7.5. Library Services**

Makerere University Library supports the College Computing and Information Science Library which is located on the First level (Block B Building). The College Library is stocked with up-to-date information resources. The information resources in the College Library have been acquired through purchases made by Makerere University Library and the School. In addition to this facility, the University Library provides access to print books, print journals, electronic journal databases, a well-stocked reference section and connections to many remote databases like the Uganda Scholarly Digital Library at <http://dspce3.mak.ac.ug>. The print collection is beefed up by the broad variety of electronic resources provided by the University Library and accessible online at <http://muklib.mak.ac.ug>. Through the Document Delivery Service which is provided by the University Library, users who fail to get access to full-text articles from the available databases can make requests for the articles and delivered to them at no cost. Library users can also access the Online Public Access Catalogue (OPAC) to get bibliographic information about the collections found in the College Library at <http://196.43.133.123:8080>.

### **8. Quality Assurances**

Several activities will be carried out as quality assurance measures so as to:

- a. Measure the general extent to which the required skills have been achieved
- b. Ascertain the Implementation of the methodological changes proposed
- c. Create a feed back bench marks for possible future revisions in the curriculum

#### **8.1. Feedback from students enrolled**

In the current set up, each class has 1 student representative. These representatives are in constant contact with the Head of Department in case there are any quality related matters in a particular class. This set up is to be maintained.

In addition, at the end of each semester, samples of students from respective classes/years are given questionnaires to respond to several quality related matters like staff punctuality, delivery mode, course content and the general perceived usefulness of the course unit.

The school of Computing and Informatics Technology has a computerized system that is used to capture and analyze the data

collected from the students. With the computerized system:

- i. Every student is required to assess every lecturer teaching him/her
- ii. No time will be required in the analysis of the results. Staff and School management will be able to get the feedback instantly
- iii. Data is easily archived and therefore the trend of staff performance in the respective areas is easy to visualize

### **8.2. Class meetings**

The School management makes at least 2 meetings with every class every semester. In this meeting, general quality issues are addressed. Students are also given a chance to raise any questions that are answered and/or addressed by the department management. This set up will also continue.

### **8.3. Use of ICT in availing lecture materials**

Currently, Makerere University has the MUELE e-learning tool on its Intranet. Students in the Department of Information Technology have adequate access to computers. This creates conducive environments for e-learning blended teaching. All courses in the revised curriculum will be taught in a blended way. All course materials are put on MUELE. Staff will, as much as possible, make use of e-learning facilities like discussion forum and drop boxes for assignments. This will increase student activity/participation and reduce staff effort (e.g. staff will not need to dictate notes). This will result to increase in the material covered and taken in by the students.

### **8.4. Peer review**

Course leaders and other members of staff will enroll to all classes taught in the department. They will therefore be able to view contents of courses taught by their peers. Course leaders will advise fellow staff on the content, depth and presentation of materials. Consequently, for every course, students will access the best material provided on the online platform which is also viewed by all staff in the department. But the course instructor shall be excluded from this view. .

### **8.5. External examiners' reports**

Like it is everywhere in Makerere University, students' exams are reviewed by senior external examiners. This is to bring a 'foreign view' of the quality of the examination. External examiners write reports on their view of the curriculum and examinations. Recommendations for the students about their exams can be implemented immediately or in a longer term. The department will make the maximum possible use of external examiners' reports as a means of assuring quality in the program.

### **8.6. Tracer studies**

The School of Computing and Informatics Technology is devising ways of keeping in contact with its alumni together with their employers. This is with a view of making a tracer study of its graduates. The Department of Information Technology will use outputs of the tracer studies to gauge the quality of the program and whenever necessary improve it.

## Appendix A

	<b>Name of Staff</b>	<b>Qualification</b>	<b>Rank</b>	<b>Area of Specialization</b>
1	Dr Jude Lubega	PhD	Senior lecturer	Information Technology
2	Dr Gilbert Maiga	PhD	Lecturer	Information Systems
3	Dr Paul Ssemaluulu	PhD	Assistant Lecturer	Information Technology
4	Ms Phiona Turinayo	PhD student (Year IV)	Assistant Lecturer	Information Systems
5	Ernest Mwebaze	PhD student (Year IV)	Assistant Lecturer	Computer science
6	Ms Aminah Zawedde	PhD student (Year IV)	Assistant Lecturer	Information Systems
7	Raymond Mugwanya	PhD student (Year IV)	Assistant Lecturer	Information Systems
8	Daudi Jingo	PhD student (Year IV)	Assistant Lecturer	Medical informatics
9	Esther Namirembe	MSc IT	Assistant Lecturer	Information systems
10	Henry Serugunda	MSc IT	Assistant Lecturer	Information Systems
11	Halim Chongomweru	MSC IS	Assistant Lecturer	Information Technology
12	Hawa Nyende	MSc IT	Assistant Lecturer	Information Technology
13	Alice Mugisha	MSc IT	Assistant Lecturer	Information Technology
14	Margaret Nagwovuma	MSc IT	Assistant Lecturer	Information Systems
15	Innocent Ndibatya	MSc Student	Teaching Assistant	Information Systems
16	Asimwe Rebecca	MSc Student	Teaching Assistant	Information Systems
17	Flavia Namagembe	MSc Student	Teaching Assistant	Information Systems