Makerere University

Faculty of Computing and Information Technology

Department of Information Systems

Master of Science in Information Systems (M.Sc. IS) Degree Programme

Day / Evening Programme

August 2009

Contents

1 Introduction

The MSc. in Information Systems Degree programme offers a course of study leading to the Master of Science in Information Systems (MSc. IS) by focusing on areas such as data management, strategic management for business information systems, systems modeling and technology issues. The course takes on two main tracks: information systems management and information systems technology which provide students with an option of specializing in management or technological issues. The programme is designed to give students a thorough knowledge of the field and to provide an enduring foundation for future professional growth. The programme blends theory and practice into a learning experience that develops skills applicable to complex real-world problems.

The objectives of the MSc. in Information Systems Degree Programme are:

(i) To build human resource capacity in information systems discipline in both the public and private sectors, especially in universities;
(ii) To generate a pool of highly qualified candidates for the PhD in information systems programme;
(iii) To address the increasing demand for information systems training at master's degree level;
(iv) to develop professionals with theoretical and practical skills in the ICT sector.

The Master of Science in Information Systems Degree Programme is offered to give an opportunity to prospective students to undertake training in information systems at master's degree level in Uganda. This programme provides an avenue to those already engaged in the ICT-sector without master's degree qualifications in ICT to join the M.Sc. in Information Systems Degree Programme. By adopting this curriculum, faculty, students, and employers can be assured that MSc. IS graduates are competent in a set of professional knowledge and skills, know about a particular field in detail from the career track, and are instilled with a strong set of values essential for success in the Information Systems field. In short, it is a programme that reflects current and future industry needs.

2 The Programme

2.1 Target Group

For the foreseeable future, it is anticipated that Information System (IS) programmes will continue to attract students with a wide range of backgrounds. In traditional graduate programmes, it is assumed that students enrolled have a common background obtained through an undergraduate degree in that field. The MSc. IS programme may also attract experienced individuals including IS professionals and people seeking career changes. The architecture of the MSc. IS programme accommodates this wide diversity of backgrounds and learning environments. Specifically, the MSc. IS programme is appropriate for:

- Graduates with bachelor degrees in Information Systems, Computer Science, Information Technology, Software Engineering, Computer

Engineering, Business with an IS concentration, and any other degree with evidence of having taken acceptable courses in information systems.

- Experienced Information System professionals seeking to upgrade skills and to understand management issues.
- Experienced management professionals seeking skills in managing technology.
- Professionals from many engineering fields seeking a change in careers.
- Post graduate diploma holders in IS who wish to upgrade to Masters Level.

2.2 Admission Requirements

To qualify for admission, a candidate must fulfill the general Makerere University entry requirements for master's degrees, and in addition the candidate must be a holder of either;

(i) A Postgraduate Diploma in Information Systems or Computer Science or software engineering or Information Technology or computer engineering from a recognized University/ Institution; or

(ii) A Bachelor's degree in Information Systems or Computer Science or software engineering or Information Technology of computer engineering from a recognized University/ Institution; or

(iii) Any other degree with evidence of having taken acceptable courses in information systems.

Upgrading PGD IS to M.Sc. IS degree

When a student graduates with a Postgraduate Diploma in Information Systems (Lower Second Class, Upper Second Class or First Class), he can apply and join the second year of the Master of Science in Information Systems. In such a scenario, the applicant is expected to either take on Plan A or Plan B. With Plan A, the applicant is expected to undertake research for one year which is equivalent to semesters III and IV course load that is covered on the MSc. IS programme. With Plan B, the applicant is expected to undertake semester III courses and a project in semester IV as stipulated in the M.Sc. IS programme.

The upgrading of the PGD IS to the MSc. IS described above must be supported by the relevant academic documents attained from the PGD IS of Makerere University. This must be done for purposes of analyzing the relevant academic courses that must have been attempted as per the current MSc. IS curriculum. Any courses that were not attempted by the applicant as per the first year's course load of the current MSc. IS curriculum must be undertaken.

On the other hand, when a student graduates with a Postgraduate Diploma in Information Systems (Pass), he/she can apply for the Master of Science in Information Systems but for two academic years i.e. has to start from first year.

2.3 Nature of the Programme

The MSc. IS will be run as a day/evening programme with privately sponsored students. The duration of the day/evening programme is two years consisting of four semesters. The programme shall offer two plans: (i) Plan A, and (ii) Plan B.

2.3.1 Plan A

Students under Plan A are required to take two semesters of course work and two semesters of an Information Systems dissertation. To qualify for Plan A a student shall have developed a research proposal, latest by the second week of semester three.

2.3.2 Plan B

Students under Plan B are required to take three semesters of coursework and one semester of an Information Systems project. To qualify for Plan B a student shall have developed a research proposal, latest by the second week of semester four.

2.4 Tuition Fees

Tuition fees payable by the students will enable the University sustain the program. Ugandan students will pay tuition fees totaling to Three Million and Eight Hundred twenty five thousands shillings (3,825,000/=) per year. Foreign students will pay tuition fees of 3,350 US Dollars per year.

3 Regulations

3.1 Course Module Assessments

The general assessment of course modules will be based on of 100 total marks with proportions as follows:-

a. Continuous coursework – 40 marks;
b. Examination – 60 marks.

However, some courses have varying assessment distributions that are described in the detailed course descriptions. A minimum of two course assignments/tests shall be required per course.

3.2 Grading of Courses

(i) 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	GRADE POINT	INTERPRETATION
90 - 100	A+	5.0	Exceptional
80 - 89	A	5.0	Excellent
75 - 79	B+	4.5	Very good
70 - 74	B	4.0	Good
65 - 69	C+	3.5	Fairly good
60 - 64	C	3.0	Pass
55 - 59	D+	2.5	Marginal Fail
50 - 54	D	2.0	Clear Fail
45 - 49	E	1.5	Bad Fail
40 - 44	E-	1.0	Qualified Fail
Below 40	F	0.0	Qualified Fail

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

W - Withdraw from Course;
I - Incomplete;
AU - Audited Course Only;
P - Pass;
F - Failure.

3.3 Pass Mark

A minimum pass grade for each course shall be 3.0 grade points.

3.4 Retaking a Course or Courses

(i) A student shall retake a course(s) when next offered in order to obtain at least the pass mark (60%) if he/she had failed during the first attempt in the course(s). A Student may take a substitute elective, where the Student does not wish to retake a failed elective.

(ii) A student who has failed to obtain at least the pass mark (60%) during the second assessment in the same course(s) he/she has retaken shall receive a warning.

(iii) Where students miss to sit examinations for justified reasons; they should not be recorded as those who retake when they sit the examinations when next offered.

(iv) A student shall not be allowed to accumulate more than five (5) retake courses at a time. Students are required to register for retake course(s) first before registering for new courses offered in that semester and the retake courses should fit into the approved normal load so as to avoid time table clashes.

(v) Students who have a course(s) to retake and these course(s) fall beyond the set normal semester load for their academic programmes shall pay tuition fees for any course(s) to be retaken. Besides, such students also pay the re-examination fees per course retaken as well as the registration fees.

3.5 Weighting System

The weighting unit is based on a Credit Unit (CU). A Credit Unit is one contact hour per week per semester or a series of fifteen (15) contact hours per semester. A contact hour is equal to (i) one lecture hour, or (ii) two practical hours.

3.6 Calculation of Cumulative Grade Point Average (CGPA)

The CGPA shall be calculated as follows: -

$$CGPA = \frac{\Sigma^{n}_{i=1}(GP_i * CU_i)}{\Sigma^{n}_{i=1} CU_i}$$

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.

3.7 Progression

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

(i) Normal Progress: This occurs when a student passes each course taken with a minimum Grade Point of 3.0.

(ii) Probationary: This is a warning stage and occurs if either the cumulative grade point average (CGPA) is less than 3.0 and/or the student has failed a core course. Probation is waved when these conditions cease to hold.

(iii) Discontinuation: When a student accumulates three consecutive probations based on the CGPA or the same core course(s), he/she shall be discontinued. A student who has failed to obtain at least the pass mark (60%) /grade point of 3.0 during the third assessment in the same course(s) he/she had retaken shall be discontinued from his/her studies at the University. A student who has overstayed in an academic programme by more than two (2) years shall be discontinued from his /her studies at the university.

3.8 Master's Dissertation

Students are required to demonstrate their ability to independently formulate a detailed dissertation proposal, as well as develop and demonstrate their dissertation thoroughly.

(i) A candidate shall submit a dissertation proposal to the Faculty of Computing and IT, Higher Degrees and Graduate Research Committee during the second semester of the first academic year.
(ii) A candidate shall be allowed to formally start on the dissertation after the second semester.
(iii) A candidate shall be assigned a supervisor who is a specialist in the candidate's field of study to undertake supervision of the research work.
(iv) The candidate shall execute the dissertation during second year (the third and fourth semesters).
(v) The candidate shall submit a dissertation report by the end of the fourth semester.

3.8.1 Passing of a Dissertation

To pass the Dissertation, the candidate shall satisfy the Internal Examiner, External Examiner, and Viva Voce Committee independently.

3.8.2 Revised Dissertation

A candidate, who fails to satisfy the examiners, shall re-submit a Revised Dissertation in accordance with the standing University guidelines for the dissertation examinations.

3.9 Master's Project

Students are required to demonstrate their ability to independently formulate a detailed project proposal, as well as develop and demonstrate their project thoroughly.

(i) A candidate shall submit a project proposal to the Faculty of Computing and IT, Higher Degrees and Graduate Research Committee during the third semester.
(ii) A candidate shall be allowed to formally start on the project after the third semester.
(iii) A candidate shall be assigned a supervisor who is a specialist in the candidate's field of study to undertake supervision of the project.
(iv) The candidate shall execute the project during the fourth semester.
(v) The candidate shall submit the project report by the end of the fourth semester.

To pass the project, the candidate shall satisfy the examiners in a written report and viva voce independently.

3.10 Minimum Graduation Load

To qualify for the award of the degree of Master of Science in Information Systems under Plan A (Plan B), a full-time candidate is required to obtain a minimum of 29 credit units (41 credit units) for courses passed including all the compulsory courses; and the Master's Dissertation – 10 credit units (Master's Project Report – 5 credit units) within a period stipulated by the School of Graduate Studies, usually not exceeding five (5) years from the date of registration.

3.11 Knowledge Areas Covered in the Curriculum

The curriculum is based on 7 broad knowledge areas that make up practical and resourceful information systems. The seven knowledge areas are:

(i) Data Management
(ii) Research and Development
(iii) Policy, Strategy and Management
(iv) Security Issues
(v) Information Systems in Business
(vi) Web Computing Technologies
(vii) Systems Modeling

See Subsection 4.2 for a distribution of MSc. IS programme courses in the knowledge areas.

4 Proposed Curriculum

4.1 Course Outline

The degree includes a standard set of core courses in IS which are offered in the first semester. This provides a foundation for MSc. IS graduates which provides them with competence across the entire IS field. The course is then divided into two options IS Management (Subsection 4.1.2) and IS Technology (Subsection 4.1.3) which allow students (within the competency of the Faculty) to concentrate in a specific area for which there is demand and to achieve breadth across a topic area.

4.1.1 Detailed Curriculum for Master of Science in Information Systems

Code	Name	LH	PH	CH	CU
Semester I					
MIS 7100	Systems Analysis and Design	30	30	45	3
MIS 7102	Modeling and Simulation	30	30	45	3
MIS 7110	Database Systems	30	30	45	3
MIS 7111	Information Systems for Managers	45	-	45	3
MIT 7116	Research Methodology	45	-	45	3
Semester II					
MIS 7206	Data warehousing	30	30	45	3
MIS 7209	Project and Organisation Change Management	45	-	45	3
MIS 7210	Management for IS Professionals	45	-	45	3
MIS 7212	Data Communication and Networking	45	-	45	3
MIT 7215	IT Strategic Planning and Management	45	-	45	3
MIT 7216	E-Service Delivery	45	-	45	3
MIT 7217	Web Design and Usability	30	30	45	3
MIT 7218	Legal and Ethical Aspects of Computing	45	-	45	3
MCS 7226	Seminar Series	-	60	30	2
Semester III					
MIS 8108	Business Intelligence and Data mining	30	30	45	3
MIS 8110	Geographic Information Systems and Remote Sensing	30	30	45	3
MIS 8115	Information Systems Security	45	-	45	3
MIS 8116	Enterprise Integration and Collaborative Communication	45	-	45	3
MIT 8116	Multimedia and Emerging Technologies	30	30	45	3
MIS 8117	Business Process Modeling and Analysis	30	30	45	3
MIT 8117	XML and Web Services	30	30	45	3
MIS 8118	Master's Dissertation in Information Systems	-	-	-	10
Semester IV					
MIS 8204	Master's Project in Information Systems	-	-	-	5

4.1.2 MSc. Information Systems -Information Systems Management Option [ISM]

Plan A [ISM]

Code	Name	LH	PH	CH	CU
Semester I (5 Courses)					
Cores:- (5 core courses)					
MIS 7100	Systems Analysis and Design	30	30	45	3
MIS 7102	Modeling and Simulation	30	30	45	3
MIS 7110	Database Systems	30	30	45	3
MIS 7111	Information Systems for Managers	45	-	45	3
MIT 7116	Research Methodology	45	-	45	3
Total Credit Units					15
Semester II (5 Courses)					
Cores:- (4 core courses)					
MIS 7209	Project and Organisation Change Management	30	30	45	3
MIS 7210	Management for IS Professionals	45	-	45	3
MIT 7217	Web Design and Usability	30	30	45	3
MCS 7226	Seminar Series	-	60	30	2
Electives:- (1 elective course)					
MIT 7215	IT Strategic Planning and Management	45	-	45	3
MIT 7216	E-Service Delivery	45	-	45	3
MIT 7218	Legal and Ethical Aspects of Computing	45	-	45	3
Total Credit Units					14
Semesters III & IV (A Master's Dissertation)					
MIS 8118	Master's Dissertation in Information Systems	-	-	-	10
Total Credit Units					10

Plan B [ISM]

Code	Name	LH	PH	CH	CU
Semester I (5 Courses)					
Cores:- (5 core courses)					
MIS 7100	Systems Analysis and Design	30	30	45	3
MIS 7102	Modeling and Simulation	30	30	45	3
MIS 7110	Database Systems	30	30	45	3
MIS 7111	Information Systems for Managers	45	-	45	3
MIT 7116	Research Methodology	45	-	45	3
Total Credit Units					15
Semester II (5 Courses)					
Cores:- (4 core courses)					
MIS 7209	Project and Organisation Change Management	30	30	45	3
MIS 7210	Management for IS Professionals	45	-	45	3
MIT 7217	Web Design and Usability	30	30	45	3
MCS 7226	Seminar Series	-	60	30	2
Electives:- (1 elective course)					
MIT 7215	IT Strategic Planning and Management	45	-	45	3
MIT 7216	E-Service Delivery	45	-	45	3
MIT 7218	Legal and Ethical Aspects of Computing	45	-	45	3
Total Credit Units					14
Semester III (4 Courses)					
Cores:- (3 core courses)					
MIS 8115	Information Systems Security	45	-	45	3
MIS 8116	Enterprise Integration and Collaborative Communication	45	-	45	3
MIS 8117	Business Process Modeling and Analysis	30	30	45	3
Electives:- (1 elective course)					
MIS 8110	Geographic Information Systems and Remote Sensing	30	30	45	3
MIT 8117	XML and Web Services	30	30	45	3
Total Credit Units					12
Semester IV (A Master's Project)					
MIS 8204	Master's Project in Information Systems	-	-	-	5
Total Credit Units					5

4.1.3 MSc. Information Systems - Information Systems Technology Option [IST]

Plan A [IST]

Code	Name	LH	PH	CH	CU
Semester I (5 Courses)					
Cores:- (5 core courses)					
MIS 7100	Systems Analysis and Design	30	30	45	3
MIS 7102	Modeling and Simulation	30	30	45	3
MIS 7110	Database Systems	30	30	45	3
MIS 7111	Information Systems for Managers	45	-	45	3
MIT 7116	Research Methodology	45	-	45	3
Total Credit Units					15
Semester II (5 Courses)					
Cores:- (4 core courses)					
MIS 7206	Data warehousing	30	30	45	3
MIS 7209	Project and Organisation Change Management	30	30	45	3
MIS 7212	Data Communication and Networking	45	-	45	3
MCS 7226	Seminar Series	-	60	30	2
Electives:- (1 elective course)					
MIT 7215	IT Strategic Planning and Management	45	-	45	3
MIT 7216	E-Service Delivery	45	-	45	3
MIT 7218	Legal and Ethical Aspects of Computing	45	-	45	3
Total Credit Units					14
Semesters III & IV (A Master's Dissertation)					
MIS 8118	Master's Dissertation in Information Systems	-	-	-	10
Total Credit Units					10

Plan B [IST]

Code	Name	LH	PH	CH	CU
Semester I (5 Courses)					
Cores:- (5 core courses)					
MIS 7100	Systems Analysis and Design	30	30	45	3
MIS 7102	Modeling and Simulation	30	30	45	3
MIS 7110	Database Systems	30	30	45	3
MIS 7111	Information Systems for Managers	45	-	45	3
MIT 7116	Research Methodology	45	-	45	3
Total Credit Units					15
Semester II (5 Courses)					
Cores:- (4 core courses)					
MIS 7206	Data warehousing	30	30	45	3
MIS 7209	Project and Organisation Change Management	30	30	45	3
MIS 7212	Data Communication and Networking	45	-	45	3
MCS 7226	Seminar Series	-	60	30	2
Electives:- (1 elective course)					
MIT 7215	IT Strategic Planning and Management	45	-	45	3
MIT 7216	E-Service Delivery	45	-	45	3
MIT 7218	Legal and Ethical Aspects of Computing	45	-	45	3
Total Credit Units					14
Semester III (4 Courses)					
Cores:- (3 core courses)					
MIS 8108	Business Intelligence and Data mining	30	30	45	3
MIS 8110	Geographic Information Systems and Remote Sensing	30	30	45	3
MIT 8116	Multimedia and Emerging Technologies	30	30	45	3
Electives:- (1 elective course)					
MIS 8115	Information Systems Security	45	-	45	3
MIT 8117	XML and Web Services	30	30	45	3
Total Credit Units					12
Semester IV (A Master's Project)					
MIS 8204	Master's Project in Information Systems	-	-	-	5
Total Credit Units					5

4.2 Course Distribution by Knowledge Area

The list below summarizes the distribution of the different MSc. IS curriculum course units in seven knowledge areas:

(i) Data Management
- MIS 7110: Database Systems
- MIS 7206: Data Warehousing
- MIS 8115: Business Intelligence and Data mining

(ii) Research and Development
- MIS 7100: Systems Analysis and Design
- MIT 7116: Research Methodology
- MCS 7226: Seminar Series
- MIS 8118: Master's Dissertation in Information Systems
- MIS 8204: Master's Project in Information Systems

(iii) Policy, Strategy and Management
- MIS 7209: Project and Organisation Change Management
- MIS 7210: Management for IS Professionals
- MIT 7215: IT Strategic Planning and Management
- MIS 8116: Enterprise Integration and Collaborative Communication

(iv) Security Issues
- MIS 8115: Information Systems Security
- MIT 7218: Legal and Ethical Aspects of Computing

(v) Information Systems in Business
- MIS 7111: Information Systems for Managers
- MIS 8110: Geographic Information Systems and Remote Sensing

(vi) Web Computing Technologies
- MIS 7212: Data Communication and Networking
- MIT 7216: E-Service Delivery
- MIS 7217: Web Design and Usability
- MIT 8117: XML and Web Services
- MIT 8116: Multimedia and Emerging Technologies

(vii) Systems Modeling
- MIS 7102 Modeling and Simulation
- MIS 8117 Business Process Modeling and Analysis

5 Detailed Curriculum

5.1 Courses for Semester I

5.1.1 MIS 7100: Systems Analysis and Design (3CU)

a) Description: Use management information systems techniques to solve managerial and organizational problems of limited complexity. Includes solving formal analytic problems and implementing solutions using MIS development techniques.

b) Aims and objectives: The Course focuses on the following aspects of Information System Development:

- Study, Analysis and Design of a System
- Documenting and evaluating the System.
- Data Modeling.
- Developing Information Management System for an Organisation.
- Implementing and Testing.

c) Course learning outcomes: On completing this course, students should be able to:

(i) Understand the organizational, functional, non-functional and data requirements, carry out system study and analyze information.
(ii) Document and evaluate a System.
(iii) Develop an Information Management System for an Organisation.
(iv) Implement and Test the system

d) Teaching and learning patterns:

- Lectures, tutorial/practical sessions as well as demonstrations.
- Individual and group-based tutorial.
- Wide range of computer-based learning and other tools will be used to support the student's learning process.
- Use of real life case studies

e) Indicative content:

- Introduction: System Definition and Concepts: General Theory systems, Manual and automated systems, Real-life Business Sub-systems. System Environments and Boundaries. Real-time and distributed systems. Basic principles of successful systems. Approach to system development: Structured System Analysis and Design, Prototype, Joint Application Development.
- Systems Analyst: Role and Need of Systems Analyst. Qualifications and responsibilities. System Analysis as a Profession
- System Development Cycle: Introduction to Systems Development Life Cycle (SDLC). Various phases of SDLC: Study, Design, Development, Implementation, Maintenance. System documentation consideration:

Principles of Systems Documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization

- System Planning: Data and fact gathering techniques: Interviews, Group Communication - Questionnaires, Presentation and Site Visits. Assessing Project Feasibility: Technical, Operational, Economic, Cost Benefits Analysis, Schedule, Legal and contractual, Political. Modern Methods for determining system requirements: Joint Application, Development Program, Prototyping, Business Process Re-engineering. System Selection Plan and Proposal.
- Modular and Structured Design: Module specifications, Top-down and bottom-up design. Module coupling and cohesion. Structure Charts.
- System Design and Modeling: Process Modeling, Logical and physical design, Conceptual Data Modeling: Entity-Relationship Analysis, Entity-Relationship Modeling, ERDs and DFDs, Concepts of Normalization. Process Description: Structured English, Decision Tree, Decision Tables. Documentation: Data Dictionary, Recording Data Descriptions
- Input and Output: Classification of forms, Input / Output forms design. User-interface design, Graphical interfaces. Standards and guidelines for GUI design. Designing Physical Files and Databases: Designing Fields, Designing Physical Records, Designing Physical Files, Designing Databases. Introduction to CASE Tools, Features, Advantages and Limitations of CASE Tools, Awareness about some commercial CASE Tools
- System Implementation and Maintenance: Planning considerations. Conversion methods, procedures and controls. System acceptance criteria. System Evaluation and Performance. Testing and Validation. Preparing User Manual. Maintenance Activities and Issues
- Computer System Audit and Security: Audit of Computer System Usage. Types of Threats to Computer System and Control Measures: Threat and Risk Analysis, Disaster Recovery and Contingency Planning, Viruses.
- OO Analysis/Design: Introduction to UML. OO Development Life Cycle and Modeling. Static and dynamic modeling. Comparison of OO and Module-oriented Approach. Modeling using UML

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Course Reference List:

(i) Modern Systems Analysis and Design, Second Edition, 2000, Joey George and Joseph Valacich Pearson Education. J. Hoffer

(ii) Systems Analysis and Design, First Edition, 2002, John Wiley & Sons, Inc. A. Dennis and B.H. Wixom

(iii) Systems Analysis and Design Methods, First Edition, 2000, Tata McGraw-Hill. J. Whitten, L. Bentley and K. Dittman

(iv) Management Information Systems, Seventh Edition, 2002, Pearson Education. K.C. Laudon and J.P. Laudon

5.1.2 MIS 7102: Modeling and Simulation (3CU)

a) Description: This course will introduce systems thinking, modeling, and computer simulation as a tool for the analysis, planning and management of industrial production processes and for corporate policy analysis and strategic planning. The student will obtain the knowledge and skills to conduct small simulation projects, consisting of input data analysis, model building, verification and validation, and finally interpretation of output data. Development of computer models to solve complex business problems in MIS, operations. Introduction to computer modeling techniques, discrete-event simulation and System Dynamics Modeling. Model development and testing.

b) Aims and objectives: This course provides an introduction to system modeling using both computer simulation and mathematical techniques. A wide range of case studies are examined, both in the lectures and tutorial exercises, although the emphasis is on the analysis of computer and communication systems using a combination discrete-event simulation and continuous modeling paradigms using System Dynamics Methodology.

c) Course learning outcomes: On completing this course, students should be able to:
   (i) Demonstrate an understanding of system modeling through the competent use of Computer Simulation methods and Mathematical Modeling techniques.
   (ii) Determine the type of systems whose behaviour can be investigated using Discrete Event Simulation and Modeling.
   (iii) Determine the type of systems whose behaviour can be investigated using System Dynamics-simulation modeling technique;
   (iv) Develop an understanding of the elements involved in the basic construction of a causal loop diagram;
   (v) Appreciate how a verbal description of a system can be translated into a causal loop diagram and used to examine the system's behaviour;
   (vi) Translate a causal loop diagram, representing a given system, into a quantitative SD model (differential equations);
   (vii) Develop an understanding of the stages involved in the model development process.

d) Teaching and learning patterns:
   - lectures, tutorial/practical sessions as well as demonstrations.
   - Individual and group-based tutorial.
   - Wide range of computer-based learning and other tools will be used to support the student's learning process.
   - Use of real life case studies and individual literature review of current developments in the simulation and modelling

e) Indicative content:

- Introduction to Simulation & Modeling – with the help of relevant examples introduce concepts, uses, applications, advantages, disadvantages of simulation and modeling. Look at a detailed example of hand simulation.
- Introduction to System Dynamics – Provide an introduction to system dynamics, the stages of the modelling process and develop its philosophical linkage to science and.
- Systems thinking and Causal Loop Diagramming – This section will provide an introduction to systems thinking, the use of causal loop diagrams in modeling, feedback structures and various exercises in the development of causal loop diagrams.
- Discrete Event Simulation – a practical approach to Discrete Event Simulation in the labs using CSIM software (which uses C++). Comparison with the hand simulation.
- Introduction to System archetypes, their importance and various groups present the different archetypes providing clear explanations and relevant application to different public policies.
- Stock and Flows – Introduction to differential equations (Euler and 1st Order Runge Kutta equations). A practical approach to drawing Stock and Flow Diagrams . Introduction to STELLA modeling technique. Conversion of Causal Loop Diagrams to Stock and Flow Diagrams.
- Graphical Integration – Graphical integration exercises-constant rates, linearly increasing and decreasing flows, parabolic, Step functions, Ramp functions.
- Feedback Structures / Functions – focus on improvement of behaviour feedback dynamics. A review of different curves and other functions used in modeling such as exponentials, oscillations, S-shaped, goal seeking graphs
- Model Development – A review of the phases of model development – Conceptualisation, formulation, testing and implementation.
- Model Testing & Validation – A review of the model testing and validation

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Course reference list:

(i) Coyle, R. G (2001) System Dynamics Modelling : A Practical Approach; Chapman & Hall, London
(ii) Pid, M., (1992) Computer Simulation in Management Science, 3Ed John Wiley, Chichester
(iii) Richardson, G.P & Pugh, A L (1981); Introduction to System Dynamics Modelling with DYNAMO; MIT Press
(iv) Senge Peter (2003). The Fifth Discipline.
(v) Steward Robinson (2004). Simulation. The Practice of Model Development and Use. John Wiley and Sons Ltd.

(vi) Sterman, J.D. (2000). Business Dynamics : Systems Thinking and Modeling for a Complex World. Irwin McGraw Hill.

5.1.3 MIS 7110: Database Systems (3CU)

a) Description: The concepts, principles, issues and techniques for managing corporate data resources of various types. Techniques for managing the design and development of large database systems including logical data models, concurrent processing, data retrieval, data distribution, and database administration.

b) Aims and objectives: This course provides an understanding of the issues in managing database systems as an essential organizational resource. Students learn enterprise data architecture components, data storage configurations, and information retrieval methods. The course proceeds from the relational model to the multidimensional model, object-relational techniques, and web accessed data.

c) Learning outcomes: Upon completion of the course the students should be able to :

(i) Demonstrate an understanding of the issues in managing database systems as an essential organizational resource. Students learn enterprise data architecture components, data storage configurations, and information retrieval methods.
(ii) Design, build and implement a database, exercise the database built under various conditions, query the database using SQL and use SQL to demonstrate implementation problems.
(iii) Evaluate file storage and transfer methods, Sort and merge files.
(iv) Demonstrate an advancement from the relational model to the multidimensional model, object-relational techniques, and web accessed data.

d) Teaching and learning patterns: Suggested pedagogical approaches to delivering the course:

- Lectures
- Case discussions to demonstrate management issues
- Team projects
- In-class student presentations

e) Indicative content:

- The variety and complexity of current data management systems and evolving data management technology
- Enterprise data architecture components and data requirements
- The entity relationship model and Normalization
- Comparison of normalized and denormalized models
- Relational integrity and concurrency control
- Limitations inherent in the relational model and possible solutions including object-oriented databases, object-relational databases, and multidimensional databases.

- Large text files, multi-media and embedded information needed for a complete information set
- Retrieving information using SQL and other methods
- Overview of database security, maintenance, recovery and tuning

f) Assessment method: Assessment will be in terms of tests, coursework & database system project (40%); and, a final examination (60%)

g) Reading list:

(i) Connolly, T., Begg, C. E., Holowczak, R. (2007). Business Database Systems. (2007). Publisher: Addison Wesley.

(ii) Beynon-Davies, P. (2003). Database Systems. Publisher: Palgrave Macmillan; 3rd Revised edition.

5.1.4 MIS 7111: Information Systems for Manager (3CU)

a) Description: There are several trends occurring in the world today, among many is the movement to computer based information systems. Managers need to be informed about the trends in information systems and hence participate fully in its development and management. This course studies the range of information systems needed to provide support for management in decision-making, planning and control. The starting point, therefore, is the set of potential managerial problems and opportunities, and the associated information requirements. Organisational diagnostics are considered for problem/opportunity identification. Solution approaches are developed and used as the basis for describing the structure, characteristics and management of generic categories of systems such as Decision Support Systems (DSS), Executive Information Systems (EIS) and Expert Systems (ES).

b) Aims and objectives: This course provides an enables students to identify information systems needs and participate in its development in order to create a business competitive advantage. It facilitates students to become aware of the benefits and limitations of different kinds of computer-based IS commonly used in business, such as database management systems, decision support and executive information systems, and expert systems. Students are able to gain a sophisticated awareness of the rich variety of managerial issues raised by information systems and information literacy by attending to the managerial ramifications of selected additional topics, such as the utilization of information systems for competitive advantage; technologies (hardware, software, network technologies); outsourcing; and the process of systems development (building an IS).

c) Learning outcomes: At the end of the course the students should be able to:

(i) Define different types of information systems and their role in today's competitive business environment.

(ii) Address what an information system is. What managers need to know about information systems.

(iii) How information systems transform organizations and management. How the Internet and Internet technology has transformed business.
(iv) The major management challenges in building and using information systems.
(v) Participate in structured information systems developments as a knowledgeable person from planning, feasibility study, information requirement analysis, design, implement, maintain, and evaluate. Identify other information systems development, their advantages and Disadvantages, when they are appropriate and when they should not be used.

d) Teaching and learning patterns: Suggested pedagogical approaches to delivering the course:
- Lectures
- Case discussions to demonstrate management issues
- Team projects
- In-class student presentations

e) Indicative content:
- Introduction to Information Systems: Definitions, Types, Basic features, Examples of modem Information systems. Transaction Information systems, Management reporting systems, Decision support systems. Reports: detailed, historical, Summary and exception reports, Challenges in building Information system
- Information Systems for Strategic Advantage: Discuss how organizations can use information systems for automation, organizational learning, and strategic support. Describe information systems' critical strategic importance to the success of modern organizations. Define the term strategic advantage and discuss how organizations are using information systems to gain such an advantage. How should a manager think about competitive strategies? How can competitive strategies be applied to the use of information systems by an organization?
- Information Systems in the Enterprise: Describe what enterprise systems are how they have evolved. Explain how organizations support business activities by using information technologies. Understand and utilize the keys to successfully implementing enterprise systems. Identify some of the strategies employed to lower costs or improve service. Discuss how organizations justify the need for information systems. Define the types of roles, functions, and careers available in information systems.
- Hardware & Software : Describe how to select and organize computer system components to support information system objectives and business organization needs. Discuss how applications software can support personal, workgroup, and enterprise business objectives.
- Telecommunications: Identify types of communications media and discuss the basic characteristics of each. Identify several types of

telecommunications hardware devices and discuss the role that each plays. Identify the benefits associated with a telecommunications network.

- Data and Knowledge Management Explain how organizations are getting the most from their investment in database technologies. Describe what is meant by knowledge management and knowledge assets as well as benefits and challenges of deploying a knowledge management system
- Decision support systems, Decision making concept, Decision support system versus management information systems, Decision support model
- Executive support systems
- Expert systems
- Group support systems

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Reading List:

(i) Decision Support Systems and Intelligent Systems, Efraim Turban and Jay E. Aronson, Sixth Edition

(ii) Management Information Systems, A Managerial End User Perspective (1999), James A. O' Brien, 4th Edition, Irwin/McGraw Hill

(iii) Management Information Systems, Managing Information technology in Business Enterprise (2004), James A. O' Brien, 6th Edition, TATA -McGraw Hill

(iv) Management Information systems: Managing the Digital firm by K.C. Laudon and J.P. Laudon, Prentice Hall.

(v) Management Information systems: Organisation and Technology by K.C. Laudon and J.P. Laudon, Prentice Hall.

5.1.5 MIT 7116 Research Methodology

a) Course Description: In this course, guidance will be given to students on how to identify a research problem. Instructions will be provided which will enable students to perform effective literature reviews. Students should be warned against plagiarism. Students will be presented with various research paradigms and models of methodology and assist with designing an appropriate method for their research. Students will be trained in the analysis and presentation of results, exposition of processes and methods used and conclusions drawn. Guidelines outlining the preparation and writing of a research dissertation and or a project will be provided at the conclusion of the course.

b) Aims: The aims of the course are:

- To provide students with a firm foundation/underpinnings of research from which they can undertake a research problem.
- To provide students with a number of separate, but related practical skills associated with the research process

c) Learning outcomes: At the end of this course unit, the students will be able to identity the aims of the research, selection of appropriate methodological approach, selection of implementation methods, data collection and analysis techniques and its interpretation, and how all this fits within the literature. In other words, the students will produce a research proposal as a blue print for the whole research dissertation and or project.

d) Teaching and Learning Pattern: Lectures will be given through out the semester. Group work and discussions to perform literature reviews will be done to enable understanding and application of concepts. This will involve identification and reading material which includes journal papers to be distributed to students a week in advance. The lecturer addresses questions to the students to encourage them to think about and understand the material. The students will identify researchable problems from which they will apply the concepts taught in class with an aim of producing research/project proposals by the end of the semester. The students will be required to build on their proposals on a weekly basis in line with the new concepts that will be taught. The students will make presentations of their draft proposal for critique and feedback from both the students and the lecturer.

e) Indicative Content: The course will cover the following topics:
- Definition of Research Methodology
- Research Paradigms in Computing and Information Systems
- Research Planning and Management
- Types of Research Methods
- Scientific writing including abstracts; identifying research problems, research objectives and questions; Interpretation of technical literature (literature reviews); Selection of overall methodological approach; Selection of suitable data collection and analysis techniques; Interpretation and conclusion of the research; and Presentation of research findings
- Research Ethics/ Plagiarism

f) Assessment Method: Assessment will categorized as foolows:
- Progressive assessment 40%
    - Group work (literature reviews) 20%
    - Presentation (skills) 10%
    - Theory and application (concepts) 10%

- Final written Exam 60%
    - Individual work (scientific writing and research paper) 40%
    - Theory and application (concepts) 20%

g) Reference books
   (i) Practical Research: Planning and Design (March 2004): Paul D. Leedy, Jeanne E. Ormrod, Jeanne Ellis Ormrod, Paperback, Prentice Hall
   (ii) Graduate research: A guide for Students in the sciences (May 1998): Robert V. Smith, Paperback, University of Washington
   (iii) Research Methods: A process of Inquiry ((May 2006)): Anthony M. Graziano, Michael L. Raulin, Hardcover, Prentice Hall
   (iv) Introduction to qualitative research methods: A guidebook and resource (1998): Taylor, Steven J.; Bogdan, Robert, Hoboken, (3rd Ed.) NJ, US: John Wiley & Sons Inc.

5.2 Courses for Semester II

5.2.1 MIS 7206: Data warehousing (3CU)

a) Description: This course includes the various factors involved in developing data warehouses and data marts: planning, design, implementation, and evaluation; review of vendor data warehouse products; cases involving contemporary implementations in business, government and industry; techniques for maximizing effectiveness through OLAP and data mining. The course in data warehousing (DW) presents the necessary fundamentals of DW (methodology, tools, techniques, systems and terminology) to students by putting these concepts into context and comparing expert views in these areas through seminars, discussions, and hands-on-work in computer labs. The prerequisite for the course is a graduate course in Database Systems before taking this course and having the skills of ER modeling, normalization, SQL and some other basic DBMS skills.

b) Aims and objectives: The main purpose of the course is to develop and gain an understanding of the principles, concepts, functions and uses of data warehouses, data modeling and data mining in business. A DW project is usually business driven and will work to improve the direction of the company by aligning the data warehouse technology with business strategy. The following areas of interest are addressed in the course:
   - DW methodology
   - DW architectures
   - The DW development processes: Logical and physical DW
   - DW data modeling
   - ETL, Data access, Data quality

c) Learning outcomes: At the completion of this unit students will have a theoretical and conceptual understanding of:
   (i) the knowledge of theories and principles of data warehousing and OLAP;
   (ii) the potential benefits of data warehousing;
   (iii) the techniques and tools used to design a data warehouse;

(iv) the theories and principles of data warehousing with regard to the practice of decision support;
(v) and be able to design multi-dimensional data structures;
(vi) and appreciation of how to interact effectively with managers, consultants, and vendors in the development of a data warehouse.

Upon completion of this subject, students should be able to accomplish the following:
(i) Demonstrate the concept of enterprise modeling as a conceptual framework in building data warehouses.
(ii) Develop the data model using the enterprise-modeling framework, the model of the requirements for analytical functions is developed in conjunction with the development of the data model.
(iii) Create and populate databases and develop of ETL routines, user interface, analytic applications, reports, system and application interfaces.
(iv) Extract data from the OLTP database to the DW (they created) by addressing ETL issues.

d) Teaching and learning patterns: The course is delivered in the form of lectures, group discussions, teamwork and seminars where participants are required to actively participate both in presentation & discussions and investigate agreed upon topics.

e) Indicative content:

- Requirements Analysis: The concept of analytical requirements and their differences from operational requirements are introduced. Key concepts in analytics that deal with forecasting, projection and formation of strategies are explored. Data gathering techniques such as user interviews, joint application design (JAD) are explored and practiced by doing project work in small groups.
- Conceptual Design: For the topic of conceptual design, modeling techniques specific to DW are discussed. They include the Entity-Relationship (ER) modeling and dimensional modeling including the Star Schema and Snowflake Schema, which utilize fact tables and dimension tables. Strategies in modeling with regard to the data warehouse ER model, the data warehouse dimensional model and the independent data marts Data sourcing strategies and the logical mapping of the data schema of sourcing systems to the conceptual model can be developed during the conceptual design phase.
- Physical Design: Various levels of the physical design for the data warehouse are explored. They consist of three levels: the data level, the application level and the technical infrastructure level. Topics for the data warehouse database design include the general database design principles and specific data warehouse considerations such as de-normalization. The data level design also includes the design of data extraction, transformation and loading (ETL). At the technical infrastructure level general concepts of technical architecture for data warehousing include requirements in

hardware, software and networking are discussed. The design phase also includes development of user interfaces (UI) and considerations of scalability in terms of both the growth in the number of users and the increase of use by each user.

- Development and Testing: For the topic of development, concepts and techniques in the creation of databases and applications in a development environment are introduced. They include the creation and population of databases and the development of ETL routines, user interface, analytic applications, reports, system and application interfaces. Topics of unit testing, system testing and performance testing are studied. Special topics in development sourcing strategies can be included.
- Implementation and Deployment: Different deployment strategies are discussed. They include the big-bang approach and various phased approaches. In the big-bang approach the data warehouse is deployed to the entire organization with all functionalities all at once. In the phased approach, the data warehouse can be deployed by phases based on various criteria such as geography, organizational units or data warehouse functions.
- Data Modeling: For the data modeling part of the course the starting point is to understand the basics of ER modeling and also its limitation for creating an enterprise wide data model for decision-making purposes. The STAR or dimensional modeling is used for creating data warehouses (DW). Idea behind a data warehouse is to centralize company wide information to create and deliver the necessary analytical environment, for example data mining and business intelligence; to meet the business needs. The use of an accepted methodology provides big advantages in the conversion of the ER model to the STAR model in DW creation.
- ETL: Decision-making data are extracted from OLTP source and further organized as per fact/s or burning question/s for decision-making purposes. Data are cleansed, aggregated, transformed and loaded in the DW.

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%).

g) Course reference list:

(i) Kimball , R., Reeves, L., Ross, M., & Thornthwaite, W. (1998 - or later editions) The Data Warehouse Lifecycle Toolkit. John Wiley & Sons

(ii) Kimball, R. & Ross, M. (2002). The Data Warehouse Toolkit : The Complete Guide to Dimensional Modelling (2nd Ed). John Wiley & Sons. ISBN: 047120024-7

(iii) Todman, C. (2001). Designing a Data Warehouse Supporting Customer Relationship Management. Upper Saddle River, NJ: Prentice Hall PTR.

5.2.2 MIS 7209: Project and Organisation Change Management (3CU)

a) Description: Managing projects within an organizational context, including the processes related to initiating, planning, executing, controlling, reporting, and closing a project. Project integration, scope, time, cost, quality control, and risk management. Software size and cost estimation. Assigning work to programmer and other teams. Monitoring progress. Version control. Managing the organizational change process. Identifying project champions, working with user teams, training, and documentation. The change management role of the IS specialist. The use of sourcing and external procurement; contracts and managing partner relationships.

b) Aims and objectives: Students develop detailed project plans, schedules, and budgets; estimate project resources; allocate/coordinate resources; and interface with management. They are expected to learn tools and techniques of project planning and management, including the use of project management software. The course develops skills in the human and organizational implications of change including understanding the organizational change process; identifying stakeholders; assessing potential impacts of projects; and overcoming resistance, politics, and other human issues.

c) Learning outcomes: Upon completion of the course the students should be able to :
   (i) Develop detailed project plans, schedules, and budgets
   (ii) Estimate project resources; allocate/coordinate resources; and interface with management.
   (iii) Use tools and techniques of project planning and management, including the use of project management software.
   (iv) Have skills in the human and organizational implications of change including understanding the organizational change process; identifying stakeholders;
   (v) Assess potential impacts of projects; and overcome resistance, politics, and other human issues.

d) Teaching and learning patterns: Teaching will be in terms of lectures, case studies and group work.

e) Indicative content:
   (i) Managing software / technology projects:
      - Project lifecycle, Project stakeholders, Project management skills (leading, communicating, negotiating, influencing, and presenting)
      - Project planning (definition, scope, schedule, costs, quality, resources, and risks)
      - Estimating software size and cost.
      - Software work module design, assignment, and control.
      - Role of repository, project library, and version control.
      - Contingency planning
      - Project reporting and controls (definition, scope, schedule, costs, quality, resources, and risks),

- Testing and testing plans; alpha and beta.

(ii) Managing organization change:

- The role of IS specialists as change agents, Envision change and the change process, Diagnose and conceptualize change
- Deal with the challenges of implementation and understand and cope with resistance
- Deal with issues of motivation, interpersonal relations, group/team dynamics, and leadership in the change process; implications of cross-organization and international teams.
- Manage organizational politics
- The limitations of projects as organizational change initiatives
- Organizational influences on project success (culture, organizational structure, rewards, and measures)
- Software project management resources and professional development such as SMI and PMI.
- Additional activities required to ensure the success of IT projects (training, job redesign, communication, etc.)
- Manage sourcing partners as well as define contract and relationships
- Hands-on experience using project management software (e.g., Microsoft Project).

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Reading list:

(i) Project management for information systems, Edited by James Cadle and Donald Yeates, Prentice Hall, 2001.

(ii) Breakthrough technology project management, Bennet P. Lientz, Academic Press, 2001.

(iii) The project manager's desk reference: a comprehensive guide to project planning, scheduling, evaluation, and systems, James P. Lewis, McGraw-Hill, 2000.

(iv) Project management for business and technology : principles and practice, John M. Nicholas, Prentice Hall, 2001.

5.2.3 MIS 7210: Management for IS Professionals (3CU)

a) Description: The course introduces students to the management process and develops a critical awareness of current management issues relevant to IS professionals. The unit examines managerial decision-making techniques and provides an understanding of planning, finance, marketing and human resource decision-making techniques and supporting information systems. It builds on this understanding of managerial processes and functions to show how organizations can be analysed, interpreted and modeled as systems.

b) Aim of the course: The aim of the course is to develop the student's prior exposure to the practical issues and theoretic concepts of management, through advanced theoretical study and complex case studies, so as to enable students to evaluate current research and advanced scholarship. And in particular:

- To critically evaluate current research issues in the management domain that are of interest to information system professionals.
- To analyse the relationships between financial, marketing, operations and human resource management, the incorporation of their outputs in the overall corporate strategic planning process and their role in the delivery of the strategic plan.
- To analyse the requirement for financial, marketing, operations and human information systems.
- To analyse organizations in a systematic manner and show how policy issues may be evaluated using an organizational model.

c) Course learning outcomes:

(i) Knowledge and understanding. On successful completion of the course, the student is expected to:

- Demonstrate clear understanding of the nature of the management issues of interest to Information System Professionals (Assessment 1)
- Demonstrate an understanding of the techniques for analyzing organizations in a systematic manner. (Assessment 1 &2)
- Competently discuss current research trends and issues in management issues relevant to information system professionals. (Assessment 2)
- Apply to a complex problem situation an appropriate selection from the methods utilized by corporate bodies when making planning, financial, marketing, operations and human resource management decisions and to make sound judgments leading to well-argued conclusions. (Assessment 2)
- Apply originality and creativity to the analysis and evaluation of alternative strategic plans. (Assessment 2)

(ii) Intellectual skills – able to:

- Formulate/express management problems
- Analyse and evaluate academic management literature

(iii) Practical skills - write reports:

- Analyse, design, implement and evaluate management systems
- Construct influence diagrams and other systems-based models of organizations.

(iv) Transferable skills – able to:

- Communicate
- Manage oneself and one's time
- Work independently

- Evaluate one's work objectively

d) Teaching and learning patterns: The course is delivered in the form of lectures, group discussions, teamwork and seminars where participants are required to actively participate both in presentation and discussions and investigate agreed upon topics.

e) Indicative content:
   - Introduction to Case Study
   - Business Planning & Performance metrics
   - Marketing and marketing IS
   - Accounting
   - Resource Management and budgets
   - IT cost structures and FIS
   - Corporate strategy
   - Operations and Development in Management thinking
   - Human Resource Management and HRIS
   - Entrepreneurship & Leadership
   - System thinking

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Course reference list:

   (i) Kennedy M. (Ed), 2005, Management for Information systems professionals, Pearson.
   (ii) Hannagan T. (2005), Management concepts and practices, Prentice Hall
   (iii) Maani K. E. and Cavan R.Y. (2000), Systems thinking and modeling, Prentice Hall
   (iv) Sherwood D. (2002), Seeing the Forest for the Trees – A manager's guide to applying systems thinking, Nicholas Brealey Publishing.
   (v) Warren K. (2002), Competitive Strategy Dynamics, Wiley
   (vi) Bell, G.A, Cooper, M, A, Kennedy, M, and Warwick, J. (2001) The Holon Planning Framework: From Enquiry to Metrication, Proceedings of the Nineteenth International System Dynamics Conference, Atlanta, Georgia
   (vii) Kennedy, M. and Clare, C (2003), A comparison of the application of performance indicators, system dynamics models and the Holon Framework to quality assessment in higher education, Proceedings of the twenty first International system dynamics Conference, New York, USA
   (viii) Various articles on the topics from http://elin.mak.ac.ug

5.2.4 MIS 7212: Data Communication and Networking (3CU)

a) Description: Telecommunications fundamentals including data, voice, image, and video. The concepts, models, architectures, protocols, standards, and security for the design,

implementation, and management of digital networks. Server architectures, server farms, cluster computing, and grid computing. Storage area networks and network attached storage, Data center design and implementation. Development of an integrated technical architecture (hardware, software, networks, and data) to serve organizational needs in a rapidly changing competitive and technological environment. Network, data and application architectures. Enterprise application integration, XML. Web Services.

b) Aims and Objectives: This course develops a managerial level of technical knowledge and terminology for data, voice, image, and video communications and computer networks to effectively communicate with technical, operational and management people in telecommunications. Students are expected to understand and apply data communications concepts to situations encountered in industry; learn general concepts and techniques of data communications; understand the technology of the Internet; understand the most important server and storage architectures and the main mechanisms for providing high-capacity processing and storage capacity; and understand the regulatory environment.

c) Learning outcomes: The course develops capabilities that enable the students to make intelligent choices about computer architectures and platforms with appropriate emphasis on both organizational integration and flexibility. By the end of this course the students should be able to:
   (i) Understand the capabilities as well as the strengths and weaknesses of various computational, data, networking, and software architectures.
   (ii) Provide an understanding of managerial issues and technologies related to interoperability: issues and technologies.
   (iii) Provide an appreciation of the choice between open standards and proprietary solutions.
   (iv) Understand the product strategies of major hardware, software, and telecommunications vendors.
   (v) Understand how national and global standards organizations influence architectural standards, regulations, and future developments.
   (vi) Design, implement and manage security and disaster recovery plans and business continuity from an overall organizational perspective.
   (vii) Examine issues related to the acquisitions and ongoing management of products, services, and contracts.

d) Teaching and learning patterns: Teaching will be in terms of lectures, case studies and laboratory demonstrations/practicals.

e) Indicative content:

Philosophy underlying the selection of topics: Because the student should be able to design and supervise the building of organizational telecommunication networks, this course focuses on technical as well as managerial aspects. The course may be organized into three major activities:

(i) State of the Practice: describe the components, software, and practices of currently installed computer networks.
(ii) State of the Market: given a set of new requirements for global and/or enterprise-wide computer networking capability (including e-commerce) identify, examine, evaluate, and chose a set of available components and software that an organization can buy and/or build to satisfy the requirements. Estimate initial and recurring costs.
(iii) State of the Art: project the development of aspects of computer communications into the foreseeable future (two to five years) and provide feasibility, capability, and market projections.

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%).

g) Reading list:
(i) Behrouz Forouzan, Data Communications and Networking (McGraw-Hill Forouzan Networking) McGraw-Hill Science/Engineering/Math; 4 edition (February 9, 2006). ISBN-10: 0073250325, ISBN-13: 978-0073250328
(ii) James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach (4th Edition) (Hardcover) Addison Wesley; 4 edition (April 2, 2007). ISBN-10: 0321497708, ISBN-13: 978-0321497703

5.2.5 MIT 7215: IT Strategic Planning and Management (3CU)

a) Course description: This course addresses the ways in which managers use modern business information systems and networks to enhance the management process and promote business outcomes. Building on core concepts of the role and function of information systems in the organization, the course focuses on the key areas of management decision making related to investment in and strategic management of information technology resources. The impact of digital networks and communications technology on modern business activities and strategies is a core theme of the course.

b) Aims of the course: A student that undertakes this course should:
- Be able to understand concepts relating to the role and function of networked business information systems, and the typical applications found in the modern organization;
- Be able to understand typical activities and decisions involved in the acquisition and/ or development and management of networked business information systems and their impact on organizations;
- Be able to understand information systems and eBusiness strategy ;
- Be able to understand the development and use of networked business information systems in the context of promoting overall business objectives, and the place of information technology management within the organization;

- Be able to understand how networked business information system activities are led and managed in the context of the intersecting interests of business executives, IT executives, partner organizations, and IT users.

c) Learning outcomes: Upon successful completion of the course the student will reliably demonstrate the ability to:
   (i) explain the role of, and comment on a range of modern business applications;
   (ii) survey the range of activities involved in, and decisions related to, the acquisition and/or development of a business information system;
   (iii) comment critically on information systems and eBusiness strategy;
   (iv) appreciate the effective use of communications and information technology;
   (v) present a rationale for decision-making around the strategic use of networked business information systems using appropriate supporting data

d) Teaching and learning patterns: The course is delivered in the form of lectures, group discussions, teamwork and seminars where participants are required to actively participate both in presentation and discussions and investigate agreed upon topics.

e) Indicative content:
   - Understanding information, its management, and the history of IT
   - The role and importance of BIS and IT management in the enterprise.
   - Where does BIS management fit in the organization and what kind of leaders are needed?
   - IT processes in the organization
   - Planning-related IT processes
   - Managing the essential technologies in the digital economy
   - Methods of acquiring information systems
   - Systems development life cycle
   - Initiating systems development
   - Systems analysis and design
   - Information technology project management
   - Outsourcing and vendor management
   - Managing information security
   - Systems for supporting decision-making, collaboration and knowledge work
   - IT planning, strategy and strategic alignment
   - Assessing the value of IT
   - The future of IT in the enterprise: commodity or business driver?
   - E-Business: technologies and business models
   - E-business strategy
   - Defining strategic direction in E-Business
   - Managing emerging technologies

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Course reference lists:
   (i) McNurlin, Barbara C., Ralph Sprague and Tung Bui. 2008. Information Systems Management in Practice. 8th Edition. Prentice Hall. ISBN: 0132437155
   (ii) Afuah, Alan and Tucci Christopher L. (2003). Internet Business Models and Strategies: Text and Cases. 2nd ed. McGraw Hill, New York. (Chapter 11, pp. 203 – 223)
   (iii) Bocij, Paul et al. (2005) Business Information Systems: Technology, Development and Management for the e-business. 3rd Edition. Financial Times / Prentice Hall.

5.2.6 MIT 7216: E-Service Delivery (3CU)

a) Course description: The course begins by looking at the definitions of e-governance and e-government. The course then introduces policy and management issues specific to e-governance. The course seeks to introduce students to topics salient to effective governmental adoption and implementation of initiatives mediated by the Internet, including e-procurement, e-licensing, online citizen access to governmental databases, and e-democracy initiatives, both in terms of prerequisites to successful implementation and in terms of organizational and social impacts of these initiatives. Core questions addressed in the course include what government functions are best implemented through e-government methods, how e-government initiatives may be evaluated to assess effectiveness, what exemplary practices might improve e-government effectiveness, what the sociopolitical implications of e-governance are, and how the training of public administrators must change given new roles emerging due to the rise of e-governance.

b) Aims and objectives: The course aims to provide basic knowledge on the delivery of Electronic Services and its importance to society. In particular, it examines the basics of e-governance; e-governance laws and policies; and different kinds of e-services delivered by governments. In addition, models of best practices in e-service delivery will be taught. Specific objectives of the course are to:
   - provide knowledge and understanding of existing and emerging Electronic Services;
   - provide knowledge and understanding of possible innovations in public administration through Electronic Services delivery;
   - develop skills of the effective use of Electronic Services as citizens;
   - to help graduate students to choose topics for their future Masters projects and dissertations.

c) Learning outcomes: knowledge and understanding of:
   (i) Electronic Services and its importance to society;
   (ii) basics of E-governance and its laws and policies;
   (iii) models of best practices in e-service delivery;
   (iv) possible innovations in public administration through E-services delivery.

d) Teaching and learning patterns: 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:

E-governance; E-government. Policy and management issues specific to E-governance. Effective governmental adoption. E-government initiatives: E-procurement; E-licensing; Online citizen access to governmental databases; E-democracy initiatives. Successful implementation of E-government initiatives. Organizational, social and political impacts of E-government initiatives. E-government functions. E-government methods. E-government effectiveness evaluation and improvement. Training of public administrators on E-governance.

f) Assessment method:

- Course Work: 40% (Test I: 10%, Test II: 10%, Assignment: 20%)
- Exams: 60%

g) Reference books:

(i) Lamersdorf, W., Tschammer, V. & Amarger, S. (2004). Building the E-Service Society: E-Commerce, E-Business and E-Government. Kluwer Academic Publishers.

(ii) Malkia, M., Savolainen, R., Anttiroiko, A.-V. (2003). E-Transformation in Governance: New Directions in Government and Politics. Idea Group Publishing.

(iii) Pavlichev, A., Garson, G.D. (2003). Digital Government: Principles and Best Practices. Idea Group Publishing.

(iv) Gronlund, A. (2002). Electronic Government: Design, Applications and Management. Idea Group Publishing.

(v) Curtain, G.G., Sommer M.H., Vis-Sommer, V. (2004). The World of E-Government. Haworth Press, 2004

(vi) Huang, W., Siau, K., Wei, K.K. (2005). Electronic Government Strategies and Implementation. Idea Group Publishing.

(vii) Dunleavy, P., Margetts, et al. (2006). Digital Era Governance: IT Corporations, the State, and e-Government. Oxford University Press.

(viii) Curtain, G. G. et al. (2004). The World of E-Government. Haworth Press.

5.2.7 MIT 7217: Web Design and Usability (3CU)

a) Course description: This course provides students with non-IT educational background with necessary knowledge of core principles and technologies of Web design. Topics covered in this course include fundamental principles of Web design such as information architecture, page layout, color principles, style consistency, use of multimedia. Overview of Web technologies is dealt with markup languages (HTML, XHTML, XML), Style Sheet Languages (CSS, XSL), client-side scripting (JavaScript, VB Script), service-side scripting (PHP, ASP) and multimedia technologies (Flash). Other topics focus on

practical issues of building effective Web sites in terms of enhancing their usability. Students will be given individual and group assignments to form practical skills.

b) Aims: This course aims to provide students with non-IT educational background with necessary knowledge of core principles and technologies of Web design. Those students who already studied Web technologies being at the bachelor's level this course helps to systemize their knowledge before taking further courses like XML and Web Services.

c) Learning outcomes:
   (i) Knowledge and understanding of
      - fundamental principles of Web design
      - main Web technologies
   (ii) Practical skills of
      - using principles of Web design
      - Web technologies
      - building effective (usable) Web sites

d) Teaching and learning patterns: Since this course is supposed to have both lecture and practical hours, it will form the theoretical knowledge as far as practical skills. To provide students with practical skills, they will be given individual and group assignments to be done within practical and extracurricular hours.

e) Indicative content: Fundamental principles of Web design: Information architecture; Page layout. Color principles; Style consistency; Use of multimedia. Overview of Web technologies: Markup languages (HTML, XHTML, XML); Style Sheet Languages (CSS, XSL); Client-side scripting (JavaScript, VB Script); service-side scripting (PHP, ASP); Multimedia technologies (Flash). Building effective Web sites in terms of enhancing their usability.

f) Assessment method:
   - Course Work: 40% (Test I: 15%, Test II: 15%, Assignment: 10%)
   - Exams: 60%

g) Reference books:

   (i) Fowler, S., Stanwik V. (2003). Web Application Design Handbook: Best Practices for Web-Based Software. Elsevier Inc, Morgan Kaufmann Publishers, San Francisco. ISBN: 1-55860-752-8
   (ii) Brink, T., Gergle, D. & Wood, S. (2003) Usability for the Web: Designing Web Sites that Work. Morgan Kaufmann Publishers, San Francisco.
   (iii) Spool, J. M., Scanlon, T. et al. (2003) Web Site Usability: A Designer's Guide. Morgan Kaufmann Publishers, San Francisco.
   (iv) Johnson, J. (2003). Web Bloopers: 60 Common Web Design Mistakes, and How to Avoid Them. Morgan Kaufmann Publishers, San Francisco.

(v) Yuen, P.K., Lan, V. (2003). Practical Web Technologies. Pearson Education Ltd. ISBN 0201 750767
(vi) Welling, L., Thomsen, L. (2005). PHP and MySQL Web Development (Third Edition). Sams Publishing. ISBN 0-672-32672

5.2.8 MIT 7218 Legal and Ethical Aspects of Computing

a) Course Description: The course focuses on issues that involve computer impact on society and related concerns. The students will be taught issues on: 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; current and anticipated uses of computer prediction. The course will also examine and evaluate the meaning of ethics and professional conduct including the protection of personal ethical concerns. The students will also be exposed to the status of the regulation and emerging markets.

b) Aims: This course aims at providing students with:

- A good grounding in social, legal, ethical and management issues affecting their probable role as researchers and or working computer scientists, practitioners or engineers in Computing and Information Technology-related disciplines.

- The basic background to develop their professional role in the workplace, beyond simply performing technical tasks assigned to them.

c) Learning outcomes: Upon successful completion of this course, the students will:

- Apply the ethical concepts relevant to resolving moral issues in business, industry, and other relevant areas of concern;
- Articulate and defend with good reasons his/her own ethical point of view pertaining to specific problem areas in business, industry, and related areas;
- Analyze business plans, working procedures and policies in terms of current legislative and case law;
- Evaluate proposed and actual changes in the law for their effect on their working and personal environments in terms of rights, liabilities and responsibilities;
  Present compelling arguments about the social impact of new technological developments; and
- In addition, students should be able to maintain and develop their awareness of the social, legal and ethical framework in which they find themselves, through knowledge of the underlying mechanisms of change in these areas.

d) Teaching and Learning Pattern: The course will primarily be taught by external seminar speakers (i.e. professionals in the field of IT and Law related disciplines) and directed reading (from internet resources and text books as seen in the reading list). Also interactive lectures i.e. presenting a topic to the class and giving a starting point from which the students can give their own ideas will be used in learning this course. Strong

encouragement will be given for students to continue these discussions outside lectures both in person and using online discussion tools such as MUELE (Makerere University Elearning). 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 topics:
   - Nature of ethics, ethical development, responsibilities and basic ethical directions
   - Ethical principles, values, and their foundations
   - Specific computing and information technology related business, industry, and engineering ethical issues
   - Social impact of technological change:
     Internet communications; medical technologies; bio-engineering; education; entertainment; industry, commerce and working practices; globalization; public misunderstanding of science; environmental impact of high technology
   - National and international legal frameworks; specific legislation and case law involving IT issues
   - Domain Names; 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

f) Assessment Method: Assessment will be made up of coursework (40%) and a final written exam (60%). Coursework will entail four parts:
   - A portfolio or similar on social issues (10%);
   - An essay on a legal question (10%);
   - Individual questions from the external speakers requiring short answers (10%);
   - In-depth concise online discussions on legal and social issues (10%)

g) Reference books
   (i) Computer Ethics: Integrating Across the Curriculum by Marion Ben-Jacob, Mercy College, ISBN-13: 9780763778095, ISBN-10: 0763778095, Cd-rom, 2010
   (ii) Pandora's Box: Social and Professional Issues of the Information Age by Andrew A. Adams and Rachel McCrindle (Paperback - 14 Dec 2007)
   (iii) Engineering Ethics by Charles B. Fleddermann, 1st edition Prentice Hall, 1999. ISBN 13: 9780137842247
   (iv) Engineering, Business and Professional Ethics by Moodley, Krisen, Elsevier Science \& Technology 2007, ISBN-13: 9780750667418

5.2.9 MCS 7226: Seminar Series (2 CU)

a) Description: The course helps students to strengthen their ability to do guided research, make a report on technical issues and present these issues in a scientific set up. While lecturers will give the students guidelines on the topics to research on, they will not formally teach them in class. However, what is expected out of the students will be explicitly given to them and examined.

b) Aims and objectives: The aims of the course are:
- To develop the students' ability to search for and internalize scientific academic material.
- To develop the student's skills in technical writing.
- To develop the student's presentation skills.

c) Learning outcomes: Successful completion of the module will demonstrate that students are able to:
(i) Have defined their research questions
(ii) Developed appropriate conceptual and methodological approaches to their research
(iii) Have developed a full proposal for their own research-based dissertation
(iv) Learned how to offer and received constructive comments on their work in progress

d) Teaching and learning patterns: Students will be given broad areas of study together with research questions to address by the beginning of the second semester. Each student will be given a senior staff from whom they can get advice and guidance whenever necessary. The student will then be required to address one research problem and make a write up on it. The student will then be required to present his work to the staff and his/her peers. As part of the course, the student will also be obliged to attend all (weekly) research talks in the faculty (for the entire second semester).

e) Indicative content:

The content is both in terms of skill and technical content:
- Technical content: This depends on the problem addressed. The student is expected to show understanding and comprehension of the subject matter.
- Skill content: a student is expected to show ability to comprehend scientific literature, correctly make a technical report and competently prepare and make an academic presentation.

f) Assessment method:
- Attendance of Workshops (40%);
- Presentation of Concept Paper (20%)
- Presentation of 15 page Proposal (40%)

g) Course reference lists:
(i) J. W. Cresswell, Research Design: Qualitative and Quantitative Approaches, Sage, 1994.

(ii) Makerere University, Faculty of Computing and IT, Research Guide [available on the website www.cit.ac.ug]

5.3 Courses for Semester III

5.3.1 MIS 8108 Business Intelligence and Data Mining (3CU)

a) Description: This course introduces basic data mining technologies and their use for business intelligence. Students will learn how to analyze the business needs for knowledge discovery in order to create competitive advantages and how to apply data mining technologies appropriately in order to realize their real business value. Students will gain hands-on experience through assignments and a real world project or a term paper. The course will cover the following topics:
   - The need for business intelligence
   - Data mining concepts, methods, and process
   - Data mining technologies
   - Data mining applications
   - Data mining case studies

b) Aims and objectives: Business intelligence (BI) is a broad category of applications and technologies for gathering, storing, analyzing, and providing access to data to help enterprise users make better business decisions. BI applications include the activities of decision support systems, query and reporting, online analytical processing (OLAP), statistical analysis, forecasting, and data mining. Students will learn the concepts, techniques, and applications of data mining for business intelligence through lectures, class discussions, hands-on assignments, and term paper presentations. Data mining and business intelligence is a very important topic for students in the IS area. It will help students to advance in their future career.

c) Course learning outcomes : Upon completion of this course, students will be able to complete the following key tasks:
   (i) Understand the basic concept of business intelligence
   (ii) Understand the basic concept and the process of data mining
   (iii) Learn basic data mining technologies
   (iv) Learn how to use business intelligence to solve business problems

d) Teaching and learning patterns: Teaching will be in terms of lectures, case studies and group work. This course is often taught as a case-based course near the end of the student's MSc. IS programme. By that time, the student has developed a broad perspective on IS and knows about it at a detailed level.

e) Indicative content:
   - Introduction to business intelligence
   - Business driven data mining objectives and process

- OLAP with Data warehousing
- Business Analytics and data visualization
- Data mining algorithms and applications
- Classification/Clustering algorithms
- Association/Sequence discovery algorithms
- Prediction algorithms
- Neural Networks
- Business performance management

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Course reference list:
   (i) Efraim Turban, Ramesh Sharda, Jay E. Aronson, David King, Business Intelligence: A Managerial Approach, Pearson Prentice Hall, 2008.
   (ii) Galit Shmueli, Nitin Patel, and Peter Bruce, Data Mining for Business Intelligence: Concepts, Technologies, and Applications in Micorsoft Office Excel with XLminer, John Wiley & Sons, Inc. 2006, (ISBN 0-470-08485-5)

5.3.2 MIS 8110: Geographical Information Systems and Remote Sensing (3CU)

a) Description: To introduce students to the concepts of geographical information systems and their applications; functionality and applications of a GIS. GIS is not only, 2D, but also 3D, or 4D (3D + 77 time); Characteristics of spatial data; Models of spatial information; Spatial relationships and algorithms; Spatial analysis (such as route planning, map overlay, buffer zoning, etc.); Database models for spatial data; Errors in spatial data; Sources of raster spatial data and introduction to remote sensing; Sources of vector spatial data; Ethical issues and spatial data; Cartographic communication - the display of spatial data; Coordinate systems and map projections. REMOTE sensing, Geo-DBMS (spatial ADT's, spatial indexing, etc), Mobile GIS" (location based services, combination with positioning, e.g. GPS, Galileo, etc). Laboratory assignments to include: urban /& rural planning, water, management, utilities pipelines and cables, etc.

   Geographical information systems (GIS) are powerful tools for handling geographically referenced data. This course introduces students to the fundamental principals, concepts and techniques of geographic information systems (GIS) and remote sensing (RS). Students will also be introduced to theoretical, practical and application oriented aspects of GIS and RS. Students finishing the course will be able to learn how to independently design and carry out sequential data processing chains in the application fields of geo-information science.

b) Aim: To learn how to generate information about the Earth from remote sensing and data stored in Geographic Information Systems.

c) Learning outcomes: By the end of the course, the student should be able to:

- Identify basic concepts and operations of a GIS
- Identify basic concepts and operations of Remote Sensing
- Apply and further develop basic practical skills in GIS and Remote Sensing
- Describe the nature of geographic phenomena and their representation in the context of geo-informatics;
- Outline the principal data models for spatial and non-spatial data used in GIS databases;
- Outline the main components of a GIS and their functions;
- Explain the relationship between spatial data and coordinate systems;
- Outline the main spatial data analysis functions;
- Explain the role of RS in GIS in their field of application;
- Describe the physical background of remote sensing and compare the main platforms and sensor systems using examples for Applied earth Science;
- Explain the main digital image processing procedures in their field of application;
- Describe the common methods of image analysis in their field of application;
- Outline the principal rules for cartographic visualisation;
- Describe aspects of data quality and how various stages of spatial data handling affect it.
- Outline state-of-the-art RS/GIS technology and techniques in their field of application

Carry out basic RS/GIS operations:

- Carry out basic data preparation, geo-referencing and data entry into a GIS;
- Perform basic manipulation, analysis and visualisation operations using a GIS;
- Perform basic image processing techniques in their field of application;
- Carry out a visual interpretation of an AP stereo pair and a satellite image; in their field of application
- Apply basic data quality assessment procedures.
- Communicate RS/GIS products to audiences with variable levels of expertise;
- Evaluate the influence of different scales and types of imagery on the resulting products

Apply appropriate RS/GIS methods for problem solving to:

- Understand the capabilities, uses and limitations of GIS and RS in their field of application;
- Design and carry out sequential data processing steps for solving a typical application problem;

- Evaluate the results of data processing;
- Be aware of organisational issues of GIS development and implementation.
- Identify and evaluate data archives relevant to their field of application;
- Resolve new tasks independently though consultation of library and online resources

d) Teaching and learning patterns:
- Lectures, tutorial/practical sessions as well as demonstrations.
- Individual and group-based tutorial.
- Wide range of computer-based learning and other tools will be used to support the student's learning process.
- Use of real life case studies and individual literature review of current developments in the GIS

e) Indicative content:
- Functionality and applications of a GIS (2D, 3D, or 4D (3D + time),
- Characteristics of spatial data. Models of spatial information.
- Spatial relationships and algorithms.
- Spatial analysis (such as route planning, map overlay, buffer zoning,etc.).
- Database models for spatial data.
- Errors in spatial data.
- Sources of raster spatial data and introduction to remote sensing.
- Sources of vector spatial data.
- Ethical issues and spatial data.
- Cartographic communication - the display of spatial data.
- Coordinate systems and map projections.
- REMOTE sensing,
- Geo-DBMS
- Mobile GIS" (location based services, combination with positioning , e.g. GPS, Galileo, ...).
- Laboratory assignments to include: urban & rural planning, water, management, utilities pipelines and cables, etc.

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Reading list:
(i) R.A. de By (ed.), 2004: Principles of Geographic Information Systems - An introductory textbook, 3rd ed., ITC, 226 p. ISBN 90-6164-226-4
(ii) N. Kerle, L.L.F. Janssen, G.C. Huurneman (eds.), 2004: Principles of Remote Sensing - An introductory textbook, 3rd ed., ITC, 250 p. ISBN 90-6164-227-2
(iii) T.M. Lillesand, R.W. Kiefer, J.W. Chipman, 2003: Remote Sensing and image interpretation, 5th ed., Wiley, 784 p. ISBN: 0471152277.

Other reference Materials

- The Geographer's Craft, University of Colorado: http://www.colorado.edu/geography/gcraft/contents.html
- NASA online RS tutorial: http://rst.gsfc.nasa.gov/
- Ohio University online RS tutorial: http://dynamo.phy.ohiou.edu/tutorial/tutorial_files/frame.htm
- Geospatial Resource portal: http://www.gisdevelopment.net/tutorials/tuman008.htm

5.3.3 MIS 8115: Information Systems Security (3CU)

a) Description: This unit is designed to provide students with an understanding and appreciation of a range of information system security components, principles and policies, strategies. Information security philosophies are discussed along with methods, models, techniques and controls, including risk analysis, qualitative and quantitative matrices, and access controls: such as passwords, smart cards, and security auditing. Information security is especially considered in the area of Internet security management and policy; and from the standpoint of ethical and legal issues, as well as computer crime. Information security current issues and future trends will also be discussed.

b) Course Learning outcomes: At the completion of this unit the students will:

(i) have knowledge of:
- Current security philosophies, security methodologies, security
- analysis and design methods and techniques, security, management, and professional ethics

(ii) have an understanding of:
- The ethical, legal and criminal issues relating to the security of
- information systems

(iii) have the skills to apply security analysis and design methods and techniques in the analysis of threats, risks, and breaches to an information system, and in the design of suitable security control measures

(iv) have developed attitudes which enable them to demonstrate ethically sound viewpoints with respect to the protection of information resources in regard to maintaining a secure IS framework; in relation to confidentiality, integrity, and availability, in the professional development of information systems

c) Indicative content:

- Brief overview of the unit and unit outline Introduction to IS Security in organisations
- IS Security – framework, Breaches, threats, vulnerabilities
- IS Security – access controls
- Risk management
- Risk analysis
- E-commerce , Internet Security

- Security policies and procedures
- Business continuity plans (BCP) and disaster recovery
- Privacy and the law
- Current issues and future
- Trends in IS Security

d) Reading list:

(i) Ciampa, M. (2005). Security+ Guide to Network Security Fundamentals, (2nd Edn). Boston, Massachusetts: Thomson Technology.
(ii) Erbschloe, M. (2003). Guide to Disaster Recovery. Boston, Massachusetts: Thomson Technology.
(iii) Maiwald, E. (2004). Fundamentals of Network Security. New York: McGraw-Hill.
(iv) Palmer, M. (2004). Guide to Operating Systems Security. Boston, Massachusetts: Thomson Technology.
(v) Panko, R. R. (2004). Corporate Computer and Network Security. New Jersey: Pearson Education International.
(vi) Quirk, P. & Forder, J. (2003). Electronic Commerce and the Law (2nd Edn). Singapore: John Wiley & Sons Australia, Ltd.
(vii) Whiteman, M. E. & Mattord, H. J. (2005). Principles of Information Security (2nd Edn). Boston, Massachusetts: Thomson Technology.

e) Recommended resources:

(i) Hassler, V. (2001). Security Fundamentals for E-Commerce. London: Arteck
(ii) House.
(iii) Reynolds, G. W. (1998). Information Systems for Managers. Minneapolis: West. Publishing Company
(iv) Schneider, G.P. & Perry, J. T. (2001). Electronic Commerce (2nd Edn). UK:
(v) Thomson Learning Inc
(vi) Tiptom, H. F., & Krause, M. (2000). Information security management (Handbook 4th edn). New York: Auerbach Publications.
(vii) Wood C. C. (1990). "Principles of Secure Information Systems Design".
(viii) Computers and Security, Vol 9, No 1.

5.3.4 MIS 8116: Enterprise Integration and Collaborative Communication (3 CU)

a) Description: This course focuses on the design and management of an overall organizational system consisting of three interacting subsystems:
(i) the enterprise itself - its structure, core processes, and relationships with external entities such as customers, suppliers, and outsourcers;
(ii) the IS function and its role in marshalling information technologies and information assets to support the strategy of the organization, and
(iii) the information technology architecture consisting of the organization's networks, hardware, data, and applications.

b) Aims and objectives: Provide the skills and knowledge needed to assume a leadership role in helping organizations utilize computer and communication systems to achieve their objectives. Students use the technical, managerial, and social skills developed in the rest of the curriculum to understand and develop reasoned responses to the major forces shaping the role of IT in organizations competing in a global economy.

c) Learning outcomes: Upon completion of the course the students should be able to :
   (i) Integrate and synthesize these three aspects of the enterprise, how IT must be aligned with the strategy of the organization, and how to make appropriate choices about architecture in relationship to overall organization goals.
   (ii) Develop reasoned responses to the major forces shaping the role of IT in organizations competing in a global economy.

d) Teaching and learning patterns: Teaching will be in terms of lectures, case studies and group work.

e) Indicative content:
   (i) The Enterprise System – this section of the course focuses on organizational and managerial issues at the level of the enterprise as a whole:
      - An integrated view of the firm and its relations with suppliers and customers
      - Organizational strategy: customer, product, operational and compliance objectives and their implications for IT management and architecture
      - Core business processes
      - Role of ERP, supply chain and customer relationship management systems
      - The economic value of information technology
      - Strategic alignment of IT
   (ii) The IS Function – this section of the course focuses on managing the IS function to further the policy and strategies of the enterprise:
      - IT's key business processes
      - IT organizational structure and governance alternatives
      - Human resource needs and management methods
      - Methods to measure and demonstrate the value of IT
      - Methods and organization to ensure regulatory compliance
      - Managing sourcing
   (iii) The Technologies – this section of the course is concerned with how to develop an integrated enterprise architecture consonant with organizational policies and strategies:
      - Evaluating and selecting among architectural and platform choices, priorities, and policies
      - Assessing the impact of emerging technologies
      - Evaluating the role of standards
      - Evaluating the effect of vendor strategies
   (iv) Overview – the final section of the course provides an overview of the information systems role in the enterprise:

- The role of the CIO
- The future role of information technology in the organization and society.

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%)

g) Reading list:
   (i) Joseph Brady, Ellen Monk and Bret Wagner, Concepts in Enterprise Resource Planning. Course Technology; 1 edition (March 30, 2001) ISBN-10: 0619015934, ISBN-13: 978-0619015930
   (ii) David Olson and David Olson. Managerial Issues of Enterprise Resource Planning Systems. McGraw-Hill/Irwin; 1 edition. ISBN-10: 0072861126. ISBN-13: 978-0072861129
   (iii) Beth Gold-Bernstein; William Ruh, Enterprise Integration: The Essential Guide to Integration Solutions, Addison-Wesley Professional, ISBN-10: 0-321-22390-X, ISBN-13: 978-0-321-22390-6

5.3.5 MIT 8116: Multimedia and Emerging Technologies (3 CU)

a) Course description: First, definition of terms and concepts is given. Then, multimedia capture, authoring, production, compression tools and techniques are considered. Graphic and streaming media formats are discussed including their characteristics and interoperability. Students learn how to deploy and serve media contents within Web applications. Other issues include enhancing Web accessibility through using multimodal user interface. A virtual reality as an example of an emerging technology is given. To provide students with practical skills, they will be given individual and group assignments to be done as a form of extracurricular activity.

b) Aims: This course aims on providing students with:
   - knowledge and understanding of: (i) core concepts, technologies and formats of multimedia; and (ii) concept of Virtual Reality
   - skills of: (i) multimedia capture, authoring, production and compression; and (ii) skills of deploying and serving media contents within Web applications

c) Learning outcomes:
   (i) knowledge and understanding of core concepts, technologies and formats of multimedia
   (ii) skills of multimedia capture, authoring, production and compression
   (iii) skills of deploying and serving media contents within Web applications
   (iv) knowledge about how Web accessibility can be enhanced through using multimedia
   (v) knowledge of the concept of Virtual Reality as an emerging technology

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: Definition of terms and concepts. Multimedia capture; authoring; production; compression tools; and techniques; Graphic and streaming media formats; their characteristics and interoperability. Using media contents within Web applications; Web accessibility; and multimodal user interface. Other issues include enhancing Web accessibility through using multimodal user interface. A virtual reality as an example of an emerging technology is given.

f) Assessment method: The students shall be evaluated through the coursework (40%: Test I: 10%, Test II: 10%, Assignment: 20%) consisting of Individual Assignment, Tests, a group project, and a final examination (60%)

g) Reference books:
   (i) Chapman, N., Chapman, J. (2000). Digital Multimedia. John Wiley & Sons Ltd. ISBN 0-471-98386
   (ii) Lee, W.W., Owens, D.L. (2000) Multimedia-Based Instructional Design. Jossey-Bass/ Pfeiffer. ISBN 0-7879-5159-5
   (iii) Li, Z.-N., Drew, M.S. (2004). Fundamentals of Multimedia. Pearson Higher Education.
   (iv) Garrand, T. (2006). Writing for Multimedia and the Web: A Practical Guide to Content Development for Interactive Media (Third Edition). Elsevier Inc., Oxford, UK.
   (v) Coorough, C., Shuman, J.E. (2006). Multimedia for the Web Revealed: Creating Digital Excitement. Course Technology.\

5.3.6 MIS 8117: Business Process Modeling & Analysis (3CU)

a) Description: With increased globalization, companies are facing stiffer competition and successful companies cannot afford to harbor inefficiencies if they are to be competitive. Furthermore, customers are becoming more demanding. Business processes must be designed to ensure that they are effective and meet customer requirements. A well-designed process will improve efficiency and deliver greater productivity. This unit will survey the analytical tools that can be used to model, analyse, understand and design business processes. Students will also gain hands-on experience in using simulation software as a tool for analyzing business processes.

b) Aims and objectives:
   - To develop students' awareness of the theoretical aspects of process modeling and business systems development
   - To develop an understanding of business organization operations and their relationships and functional structure and the advantage of considering the process oriented view of organizations;

- Gain a thorough knowledge of business process, management systems, their structure and how processes fit in to the overall organisation objectives;
- Acquire knowledge of the analytical tools that can be used to model, analyse, understand, and design business processes;
- Acquire skills to use simulation software as a tool for analyzing business processes.

c) Learning outcomes: On completion of the course, students are expected to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas:
   - Knowledge and understanding: Information Systems modeling in business, Business Process Management Systems, Systems Implementation and development, Enabling IT tools and technologies
   - Intellectual skills: Formulate and express problems in the IS/IT and the business domain, Analyse and evaluate academic literature within IS/IT and computing, Develop an independent and strategic viewpoint within the IS/IT and computing domain.
   - Practical skills: Plan and implement IS/IT projects, Write reports, Analyse, design, implement and evaluate IT systems, Use a variety of IT and computing tools and techniques to solve systems problems.
   - Transferable skills: Communicate, Work independently, Evaluate one's work objectively, Develop and demonstrate the capacity to learn in unfamiliar situations.

d) Teaching and learning patterns: The course will be taught through:
   - Lectures, tutorial/practical sessions as well as demonstrations.
   - Individual and group-based tutorial.
   - Wide range of computer-based learning and other tools will be used to support the student's learning process.
   - Use of real life case studies and individual literature review of current developments in the business process modelling filed.
   - Seminars and debates in which staff and students are pro-active and interactive are used.
   - Coursework will be a practical-based case study. Students will be presented with a complex real life organizational system within which they must apply business process modelling concepts and strategic analysis for the preparation of process-based system. Students will be expected to review, select and design appropriate application and to support their process-view systems intervention. Students will also be expected to comment on their work and it's applicability to strategic business process modelling in different organisational and/or industrial settings. Coursework will be based on continuous and progressive assessment for all learning outcomes.

e) Indicative content:
- Introduction to Business Processes.
- Evolution of Enterprise Systems architectures
- Introduction to Business Process Modelling
- Approaches to Business Process Modelling and Analysis
- Business process management Systems
- Business Modelling with Unified Modelling Language
- Business Process Methodology

f) Assessment method: The assessment will be in form of tests and assignments (40%) and final written exam (60%).

g) Reading list:
(i) Business Process management by Mathias and Weske 2007
(ii) Business Process Analysis by Geoffrey Darnton with Moksha Darnton
(iii) Workflow Patterns - Wil M.P. van der Aalst, AHM ter Hosftede
(iv) Business Process Management Demystified: A Tutorial on Models, Systems and Standards for Workflow Management Wil M.P. van der Aalsts
(v) Eriksson, H and Penker, M (2000) Business Modelling with UML: Business Patterns at Work OMG Press.
(vi) Leffingwell, D and Wirig, D (2000) Managing Software Requirements: A Unified Approach, Object Technology Series Addison- Wesley
(vii) Darnton, G and Darnton, M. (1997) Business Process Analysis. Thomson Business Press.
(viii) Harrington. J. H, Esseling. EK.C and van Nimwengen, H (1997) Business Process Improvement: WorkbookMcGraw-Hill

5.3.7 MIT 8117: XML and Web Services (3 CU)

a) Course Description: Necessary pre-requisites for this course are Web Design and Usability containing an overview of Web technologies and security-related courses. This course includes the following topics: XML, XML Schema, XSLT, XPATH, the Web Services Protocols (SOAP, WSDL and UDDI), Web Services Security Protocols (WS-Security, XML Key Management, XML Signature, Security, Assertion Markup Language), Web Services Orchestration & Execution (Web Services Choreography Interface, Business Process Execution Language for Web Services, WS –coordination, WS – Transaction), Web Services Interoperability, XML Editors & Mappers, relationship between XML & J2EE, MS.NET and XML Databases.

b) Aims: the aims of the course are to:
- develop in-depth knowledge and understanding of XML, XSL, XSLT, XPath, XML Schema, Web Service Protocols, Web Service Security Protocols, Web Services Orchestration & Execution, Web Services Interoperability, relationship between XML & J2EE, MS.NET and XML Databases;

- develop skills of:
  - creating documents using XML, XSL, XSLT and XPath;
  - creating XML schemas and validating XML documents against them;
  - describing Web Services using WSDL and UDDI;
  - using XML Editors and Mappers.

c) Learning outcomes: On completion of this course unit, the students will be able to:
   (i) develop in-depth knowledge and understanding of XML, XSL, XSLT, XPath, XML Schema, Web Service Protocols, Web Service Security Protocols, Web Services Orchestration & Execution, Web Services Interoperability, relationship between XML & J2EE, MS.NET and XML Databases;
   (ii) develop skills of:
      - creating documents using XML, XSL, XSLT and XPath;
      - creating XML schemas and validating XML documents against them;
      - describing Web Services using WSDL and UDDI;
      - using XML Editors and Mappers.

d) Teaching and learning pattern: Since this course is supposed to have both lecture and practical hours, it will form the theoretical knowledge as far as practical skills. To provide students with practical skills, they will be given sample documents (XML, XSL, XML Schema, SOAP etc) for the analysis as far as individual and group assignments to be done within practical and extracurricular hours.

e) Indicative content: Necessary pre-requisites for this course is Web Design and Usability containing an overview of Web technologies and security-related courses. This course includes the following topics: XML, XML Schema, XSLT, XPATH, the Web Services Protocols (SOAP, WSDL and UDDI), Web Services Security Protocols (WS-Security, XML Key Management, XML Signature, Security, Assertion Markup Language), Web Services Orchestration & Execution (Web Services Choreography Interface, Business Process Execution Language for Web Services, WS –coordination, WS – Transaction), Web Services Interoperability, XML Editors & Mappers, relationship between XML & J2EE, MS.NET and XML Databases.

f) Assessment method: Assessment will be in terms of tests and Assignment (40%: Test I: 15%, Test II: 15%, Assignment: 10%) and final examination (60%)

g) Reference books:

   (i) Deitel, H.M., Deitel, R.M., Nieto T.R. (2003). Internet & World Wide Web How to Program: Featuring XML and XHTML (Second Edition). Prentice Hall, New Jersey. ISBN 0-13-030897
   (ii) Yuen, P.K., Lan, V. (2003). Practical Web Technologies. Pearson Education Ltd. ISBN 0201 750767
   (iii) Extensible Markup Language (XML). Retrieved from http://www.w3.org/XML/ 9.04.09

(iv) The Extensible Style sheet Language Family (XSL). Retrieved from http://www.w3.org/Style/XSL/ 9.04.09
(v) XML Schema. Retrieved from http://www.w3.org/XML/Schema 9.04.09
(vi) Web Services. Retrieved from http://www.w3.org/2002/ws/ 9.04.09
(vii) Web Services Description Working Group. Retrieved from http://www.w3.org/2002/ws/desc/ 9.04.09

6 Resources and Infrastructure

The Department of Information Systems and the Faculty of Computing and Information Technology have enough resources and infrastructure to sufficiently run the revised programme. Refer to Appendix B for a detailed representation of the various resource and infrastructure in the Faculty of Computing and Information Technology.

6.1 Staff

The Faculty of Computing and Information Technology has a big pool of staff who can competently teach the courses. The list of staff members in the Department of Information Systems and other departments is in Appendix A

6.2 Lecture Space

Initially, the Faculty of Computing and Information Technology housed in a 2,500 square meter building (Block A). In January 2009, a new 12,000 square meter building (Block B) was officially opened. The new building has lecture rooms together with general and specialized laboratories. The two buildings sufficiently cater for all the lecture and lab space requirements for all the teaching in the faculty.

6.3 Computer Laboratories

The old and new faculty buildings have general laboratories (strictly for students practice), teaching laboratories and specialized laboratories (multimedia lab, GIS lab) for graduate programmes. These laboratories are shared among the departments of the faculty and are scheduled by the ICT services unit. Currently, the faculty has approximately 2000 computers and 5000 students. This leads to a student to computer ratio of 1: 2.5 which is adequate for the practical components of the curriculum.

6.4 Software

On top of the physical computers, students need software for the different practicals. Different computers are installed with different software depending on their focus. Most of the software is available as free distributions for academic purposes. The faculty and department therefore have (and can access) enough software that can run the practical aspects of the programme.

7 Quality Assurance

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

(i) Measure the general extent to which the required skills have been achieved.
(ii) Ascertain the Implementation of the methodological changes proposed.
(iii) Create a feed back bench mark for possible future revisions in the curriculum.

The activities in the proceeding subsections will be carried out in the process of monitoring and assuring quality in the proposed programme.

7.1 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 of teaching and learning related matters in a particular class. This set up is to be maintained.

At the end of the semester, samples of students 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 Faculty of Computing and Information Technology is the process of creating a computerized system that will capture and analyze the data. With the computerized system:

(i) Every student will be required to assess every lecturer teaching him/her, the sample space will therefore be increased.
(ii) No time will be required in the analysis of the results. Staff and faculty management will be able to get the feedback instantly.
(iii) Data will be easily archived and therefore the trend of staff performance in specific areas will be easy to visualize.

7.2 Class Meetings

The faculty 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

7.3 Use of E-Learning in Availing Lecture Materials

Currently, Makerere University has the blackboard e-learning tool on its Intranet. Students in the Department of Information Systems have adequate access to computers. This creates a conducive environment for e-learning blended teaching. All courses in the new curriculum will be taught in a blended way. All course materials will be put on blackboard. 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 in turn will, in turn, increase the material covered and taken in by the students.

7.4 Peer Review

All members of staff will enroll (as students) to all classes taught in the department. They will therefore be able to view contents of courses taught by their peers. Staff will be free to advise fellow staff on the content, depth and presentation of materials. Consequently, for every course, students will access the best possible material in the view of all staff in the department not the course instructor

7.5 External Examiners' Reports

Like it is everywhere in Makerere University, student results are reviewed every semester by a senior external academician. This is to bring a 'foreign view' of the quality of the programme. External examiners write reports on their view of the curriculum/examinations. Some recommendations can be implemented immediately while others have to be implemented in a longer term. The department will make the maximum possible use of external examiners' reports as a means of assuring quality in the revised programme.

7.6 Tracer Studies

The Faculty of Computing and Information 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 Systems will use outputs of the tracer studies to gauge the quality of the programme and whenever necessary, improve it.

Appendix A: Academic Staff - Course Load Distribution

(I): Information Systems Full Time Staff

S/N	Name	Rank	Qualification	Specialization	Current Teaching Load		Proposed Teaching Load		Total Load (CU)	
					Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2
1	Patrick Ogao	Associate Professor	B.Sc., M. Sc., PhD IS	GIS, Computer graphics, visualization			MIS 7111: Information Systems for Managers (3CU) MIS 8110: Geographic Information Systems and Remote Sensing (3CU)	MIS 8116: Enterprise Integration and Collaborative Communication (3CU) & MIT 8106: Web Database Applications (3CU)	6	6
2	Martin Bagaya	Lecturer	B.Sc. Eng. (Elec.), M.Sc. (ISM) , PhD IS	Web Services, Database Design and Administration, Offshore outsourcing, Security	MIS 8101 Client Server and Distributed Computing (3CU)	MIS 7203: E-Commerce on the Internet (3CU)	MIS 7110: Database Systems (3CU) MIS 8115: Information Systems Security (3CU)	MIS 7210: Management for IS Professionals (3CU) MIS 7206: Data Warehousing (3CU)	6	6
3	Agnes R Semwanga	Lecturer	B. Sc. ED (Maths, chemistry, M.Sc.(CS), PhD IS	Education (specifically maths), Management Information Systems, Computer Modelling and		MIS 8105: Decision Support Systems (3CU)	MIS 7102: Modeling and Simulation (3CU) & MIS 8117: Business		3	3

				simulation, Decision support systems			Process Modeling and Analysis (3CU)			

(II): Full Time Staff from other Departments

S/N	Name	Rank	Qualification	Specialization	Current Teaching Load		Proposed Teaching Load		Total Load (CU)	
					Sem. 1	Sem. 2	Sem. 1	Sem. 2	Sem. 1	Sem. 2
1	Irina Ya. Zlotnikova	Visiting Professor	PhD	eLearning, Theory and Methodology of Computer Science Education, Software Engineering for Educational Purposes, Development of Educational Web Resources		MIT 7211: E-Governance (3CU) & MIT 7213: XML and Web Services (3CU)	MIT 8104: Online Information Services (3CU) & MIT 8100 Network Security (3CU)	MIT 7211: E-Governance (3CU) & MIT 7213: XML and Web Services (3CU)	6	6
2	Josephine Nabukenya	Lecturer	PhD Ag. Head of Department	Collaboration Engineering, Analysis and design of information and systems flows; and Facilitating organizational change by adoption and diffusion of ICT		MIT 8102: Database Security (3CU)	MIT 7116 Research Methodology (3CU)	MIT 7218: Legal and Ethical Aspects of Computing (3CU)	3	6
3	Joseph K. Ssewanyana	Senior Lecturer	PhD	Business process modeling, and ICT for development			MIS 7113: System Analysis & Design(3CU)	MIS 7209: Project and Change Management (3CU) & MIT	3	6

								7215: IT Strategic Planning and Management (3CU)		
4	Jude T Lubega	Lecturer	PhD Ag. Deputy Dean (GSR)	Tracking and Assessment in e-learning, Content Authoring, Multimedia, Multi-Agent Systems, Data Warehousing, Knowledge Representation.			MIS 8108: Business Intelligence and Data mining (3CU)	MIT 7214: Audit & Security Assurance Principles(3CU)	3	3
5	Jose Quinum	Lecturer	PhD	Computer Science, Software Engineering, Security				MCS 7226: Seminar Series (2CU)		3

(III): Visiting Staff

	Name	Highest Degree	Rank	Specialization	University	Proposed Teaching Load Sem 1	Proposed Teaching Load Sem 2	Visiting Period
1	Greg Gibbon	PhD	Senior Lecturer	Mathematical Logic	University of New Castle		MIT 7216: E-Service Delivery (3CU)	August 2009-May 2010
2	Janet Aisbett	PhD	Professor	Information Systems	University of New Castle		MIT 7217: Web Design and Usability (3CU)	August 2009-May 2010
3	HN Muyingi	PhD	Professor	Information Systems	University of Fort Harare		MIS 7212: Data Communication and Networking (3CU)	August – Dec 2009

(IV): Part-time Staff from Other Institutions outside Uganda under the project 'Strengthening ICT Training and Research Capacity in the Four Public Universities in Uganda'

	Name	Highest Degree	Rank	Specialization	Comments
1	Koos Duppen	PhD	Professor	CS	University of Groningen
2	Wim H Hesselink	PhD	Professor	CS	University of Groningen
3	Jan Bosch	PhD	Professor	CS	University of Groningen
4	Gert Vetger	PhD	Professor	CS	University of Groningen
5	Doitse Swierstra	PhD	Professor	CS	Utrecht University
6	Hendrik Alex Proper	PhD	Professor	CS	Radboud University Nijmegen
7	Theodorus Petrus van der weide	PhD	Professor	IS	Radboud University Nijmegen
8	Peter Lucas	PhD	Ass. Professor	CS	Radboud University Nijmegen
9	Renardel de Lavalelte, Gerald Rudol	PhD	Professor	Math / CS	University of Groningen
10	Karl Leo Lambert Marie Dittrich	PhD	Assistant Professor	Management	University of Groningen
11	Richard Wait	PhD	Professor	IT	Uppsala (Sweden)
12	Hendrik Jan Van Linde	PhD	ICT Consultant	Mathematics/ CS	University of Groningen
13	John Nerbonne	PhD	Professor	IS	University of Groningen
14	Jan Folkert	PhD	Ass. Professor	Educational ICT	University of Groningen
15	Jos Tolboom	PhD	Programme Manager	Math/ CS	University of Groningen
16	Robert Janz	PhD	Director	IT	University of Groningen
17	Marc Petit	PhD	Senior Consultant	Math/ CS	University of Groningen
18	Rein Smedinge	PhD	Faculty IT Staff	CS	University of Groningen
19	Marinus (Rien) A.C Dam	PhD	Management	Earth Sciences	University of Groningen
20	Harm Bakker	Msc.	Senior Lecturer	CS	University of Groningen
21	Ria Klasine Jacobi	MSc	Senior Educational Consultant	ICT & Education	University of Groningen