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FACULTY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

MODULES DESCRIPTIONS

ACADEMIC YEAR, 2014-2015

PROGRAMME STRUCTURE

Level	Semester	Code	Module title	Credits	Components	Core Module
I	**1**	FUMA1513	Fundamentals of Mathematics	15		Core
		CFCP1513	Computer fundamental and Computer programming	15	#1.Introduction to Computer Science #2.Programming Fundamentals using C	Core
		SSCL1512	Study skills and Computer Literacy	10		Not
		ENG 1521	English	5		Not
		SCD1522	Social Church Doctrine	10		Not
		AGEO 1512	Algebra and Geometry	15		Not
	2	PRST 2522	Probability and Statistics	10		Not
		GPHY 1523	General Physics	15		Not
		DMIS 1512	Database Management and Information Systems	15		Core
		CPPP	C++ programming	10		core
AWARD			**CERTIFICATE OF HIGHER EDUCATION**			

Level	Semester	Code	Module title	Credits		
II	**1**	ENG 1521	English	5		Not
		ENT2521	Entrepreneurship	10		Not
		CMH 2512	Computer Maintenance and Hardware	15		Core
		OSCA 2512	Operating system and Computer Architecture	15		Core
		WASA 2522	Web application and site Administration	15		Core
	2	ADEL 2523	Analog and Digital electronics	20		Core
		DSAA 2513	Data structure and Algorithms analysis	20		Core
		OOPR 1522	Object Oriented Programming using Java.	20		Core
AWARD			**DIPLOMA IN HIGHER**			

			EDUCATION			
Level	**Semester**	**Code**	**Module title**	**Credits**		
III	**1**	ENG 1521	English	5		Not
		SEPM 3513	Software engineering and Project management.	20		Core
		NETW 3513	Networking	15		Core
		SSPE 3513	Server site programming and e-commerce	20		Core
AWARD			**ADVANCED DIPLOMA IN HIGHER EDUCATION**			
Level	**Semester**	**Code**	**Module title**	**Credits**		
IV	**2**	HCIN 4522	Human computer interaction	15		Core
		RMTW 4521	Research methodology	10		Not
		GMUL 4523	Graphics and multimedia	20		Core
		SADM 4522	System administration and Wireless Network administration	15		Core
AWARD			**ORDINARY DEGREE**			

Level	**Semester**	**Code**	**Module title**	**Credits**		
V	**1**	AIGP 5513	Artificial intelligence and game programming	20		Core
		CISE 5513	Cryptography and information security	20		Core
		PDSY 5513	Parallel and Distributed Systems	20		Core
	2	RPRO 5523	Research project	20		Core
		INAT 5523	Internship	20		Core
		ESYS 5523	Embedded Systems and Mobile Computing	20		Core
AWARD			**BACHELOR DEGREE WITH HONOURS**			

1. **Module Code: FMAT1513**
2. **Title: Fundamentals of Mathematics**
3. **Level: 1 Semester: 1 Credits: 15 First year of presentation: 2010-2011**
4. **Administering Faculties: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite module, excluded combinations**

6. Allocation of study and teaching hours

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting, marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of aims

The module aims at:

- Ensuring that the student has a thorough () comprehension of mathematical statements and methods of proofs and can apply the methods to develop logical thinking.
- Introducing the concept of limit and its application to continuity, differentiation and integration of functions of one variable and several variables;
- Improving thorough comprehension of techniques to solve first and second order differential equations.

7.2 Learning outcomes

Having successfully completed the module, students should be able to:

1. Comprehend the logical structure of mathematics
2. Develop their problem-solving skills related to differential and integral calculus
3. Apply the concepts to aid in curve sketching, solving applied problems of optimization in science.
4. Solve first and high order differential equations

8. INDICATIVE CONTENT

Mathematical Logic: Propositions, local connectives, truth tables, tautologies, contradictions. Algebra of propositions, inferences, formal arguments, quantifiers; Mathematical statements, general and particular statements, converse and contra positive of a statement. Methods of proof, direct proof, proof by contradiction, contra positive and mathematical induction.
Functions of one variable: Definition, domain, range, and graph of a function; operations on functions, composition of functions, polynomial and rational functions. Injective, subjective and bijective functions. Inverse functions; monotonous and bounded functions.

Sequences of numbers: Concept of a sequence, convergence, sum, product and quotient rules of limits, monotonous convergence theorem.

Limits: Epsilon-delta definition of limits; basic theorems on limits, elementary functions and their limits; one-side limits, asymptotic limits.
Continuity: Definition and basic theorems of continuous functions; continuity of function of one variable, intermediate value theorem, extreme value theorem; continuity of inverse functions.

Differentiation: Derivative; tangent lines; differentiation rules; maxima and minima of a function; Rolle's Theorem, Mean Value Theorem, Cauchy's Mean Value, L'Hospital's rules for indeterminate forms; higher derivatives; Taylor's Theorem with remainder. Second derivative test for extrema, concavity and points of inflection, curve sketching.

Key mathematical functions: Trigonometric functions, logarithmic, exponential and hyperbolic functions, power functions and their graphs.

Integration: Anti-derivate; integration techniques; area under a curve; Riemann sums and the definition of the integral; integrability theorems without proofs, mean value theorem, fundamental theorem of calculus;
Improper Integrals: Improper integrals of first and second kind; introduction of integral transforms, including Laplace transforms, gamma functions and beta functions;

Infinite Series: Convergence and convergence tests; alternating series, conditional and absolute convergence; power series and convergence; differentiation and integration of power series; Taylor series, Mac Laurin series.

Functions of several variables: Real function of several variables, limits and continuity of functions, partial derivatives and rules for partial derivatives, directional derivatives and the gradient, normal and the tangent plane, extrema , Lagrange multipliers.
Multiple Integrals: Double Integrals, double integrals in polar coordinates, Triple integrals, triple integrals in cylindrical and spherical coordinates, applications.
Ordinary differential equations:

First order differential equations (**odes**): General theory of first order differential equations. Solution methods of first order equation: Linear first order equations, separable equations, homogeneous differential equations, Bernoulli equation, Clairant and Lagrange equations. Exact

differential equations and integrating factors. Initial value problems, existence and uniqueness theorem and applications in science.

Higher order differential equations: General theory second order differential equations. Linear equations with constant coefficients; homogeneous and non homogeneous linear equations,, method of undetermined coefficients and method of variation of parameters. Cauchy-Euler equations, Initial value and boundary value problems.

9. LEARNING AND TEACHING STRATEGY

- Basic knowledge and understanding are developed in formal classroom lectures.
- Group works in tutorial sessions for solving structured exercises and problems in class or outside class are recommended.
- Open days for giving more explanations to students who faced difficulties in this module are organized.

10. ASSESSMENT STRATEGY

- Learning outcomes are evaluated using continuous assessment tests (CAT)
- Students' ability to use appropriate referencing and to work in groups are evaluated through assignments
- A written exam will be organized at the end of each semester.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Tests and Assignments	60%	1,2,3,4
Final Exam	40 %	1,2,3,4

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT

Each test or assignment is marked with immediate feedback
Specimen solutions of exercises and problems are available for students self-assessment needs
Consultation hours for students in order to interact on methods, problems and ways forward on the module are organized.

13. INDICATIVE RESOURCES

- Robert Wrede, *Advanced Calculus*, Schaume's Outline Series, Mc Graw Hills, 2010.
- Seymour Lipschutz**,** Discrete Mathematics, Schaume's Outline Series, Mc Graw Hills, 2007
- Richard Brochon, Schaume's Outline Series, Mc Graw Hills, 2003.
- David C. Lay, Linear Algebra and its Applications, Addison Wesley, Sun Francisco New York, 2003.
- David A. Santos, Linear Algebra Notes, GNU Free Documentation License, 2007.
- Jason Starr, Calculus Lecture notes, MIT Open Course Ware, 2005.

- Ya. S BOUGROV, S.M Nikolsky 1972; *Higher mathematics*. Edition Mir. Moscow,1972
- William F. Trench, Introduction to Real Analysis, Trinity University. San Antonio, TX, USA, 2009.
- Sigurd B. Angenent, http://www.math.wisc.edu/~angenent/Free-Lecture-Notes GNU Free Documentation License, 2009, accessed on 10, September 2013

14. Teaching team:

-Mr . IYAKAREMYE Jean Pierre: **MSc in Statistical modeling and actuarial Sciences**

1. **Module code: CFCP1513**
2. **Module Title: Computer Fundamentals and Computer Programming**
3. **Level: 1 Semester: 1 Credits: 20 First year of presentation: 2010**
4. **Administering Faculty:Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   ICT skills, Linear algebra
6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 Description of aims

Module consists of two courses "Introduction to Computer Science" and "Programming Fundamentals"

#1. Offers a broad overview of computer science designed to provide students with an appreciation for and an understanding of the many different aspects of computer science.

#2. Introduces the fundamental concepts of procedural programming.

7.2 Learning Outcomes

1. A critical understanding of the theory: algorithmic analysis, idea about the instruction execution of the system, programming languages, and objects oriented concepts, operating systems.
2. An ability to apply the theory of computer science and programming.
3. Problem solving ability, including appropriate mathematical competence.
4. Skills in the use of computer.
5. Ability to design and implement algorithms.

6. Achieving skills to understand hardware realization of algorithms, data representation, handle operating system functionalities.
7. Get an idea of basic machine organization.
8. Knowledge of programming and programming skills, knowledge of computer graphics and networks.
9. Able to analyze the complex problem and design suitable programs to solve the problems.

8. INDICATIVE CONTENTS

#1. "Introduction to Computer Science"

Topics include: basic concepts in hardware, operating systems, networks, graphics, and an overview of the social context of computing

• History of computing and computers; evolution of ideas and machines; social impact of computers and the Internet; professionalism, and software piracy.

Introduction to programming languages, algorithmic problem solving

• Algorithms: Definition, design, and implementation; introduction to classical algorithms

• Machine level representation of data: Bits, bytes, and words; numeric data representation and number bases; representation of character data

• Hardware realizations of algorithms: Data representation; the von Neumann model of computation; the fetch/decode/execute cycle; basic machine organization

• Software development methodology: Fundamental design concepts and principles; structured design; testing and debugging strategies; test-case design; programming environments; testing and debugging tools

• Operating systems and virtual machines: Historical evolution of operating systems; responsibilities of an operating system; basic components of an operating system

• Networking and computer graphics: Brief introduction to some of the basic concepts in networking.

#2. "Programming Fundamentals using C"

• Program design

Fundamental programming constructs: Syntax and semantics of a higher-level language; variables, types, expressions, and assignment; simple I/O; conditional and iterative control structures; functions and parameter passing; structured decomposition

• Fundamental data structures: Primitive types; arrays; records; strings and string processing

• Advanced concepts in C- Pointers, Files and Structures.

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

The major component of summative assessment is the written examination at the end of the module. Formative assessment is by means of regular tutorial exercises. Feedback to students on their,

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and solve problems in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.

- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Compnonent	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1,2,3,4,5,6,7,8,9
Final Exam	40 %	1,2,3,4,5,6,7,8,9

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT

Each test or assignment is marked with immediate feedback
Specimen solutions of exercises and problems are available for students self-assessment needs
Consultation hours for students in order to interact on methods, problems and ways forward on the module are organized.

13. INDICATIVE RESOURCES

- Peter Norton, Introduction to Computers, , 6th Edition, 2005
- Reed Balanced, Introduction to Computer Science, A, 2/E, Prentice Hall, 2008
- Yaswant Kanethekar, Let us C, , 10th Edition, BPB, 2009

- Clovis L. Tondo and Scotte E. Gimpel,[1989] *The C Answer book ,Second edition,* Prentice Hall.
- Ritchie, M. Dennis, *The C programming language*, New Jersey,2000

14. TEACHING TEAM

Mr. Theogene BIZIMUNGU, **MSc in Software Engineering**.

1. Module Code: SSCL 1512

2. Module Title: Study Skills

3. Level: 1 Semester: 1 Credits: 15 First year of presentation: 2010

4. Administering Faculty: Faculty of Science and Technology

5. Pre-requisite or co-requisite modules, excluded combinations

Secondary School

6. Allocation of study and teaching hours

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting,marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of Aims

The purpose of this module is to equip students with the necessary skills for further study: computer access, library induction, skills of essay- and examination-writing and oral presentation, an understanding of the logic of argument, skills of note-taking, summarising and information retrieval, the knowledge and attitude to cope with self-directed study and an understanding of what is expected of the student and what may be expected of the university.

7.2 Learning Outcomes

Having successfully completed the module, students should be able to:

1. Use sources selectively to extract relevant information.
2. evaluate the reliability of sources as information
3. organize information to answer a question or an examination
4. plan and write an essay
5. work effectively in groups and individually
6. show familiarity with the use the computer (Microsoft Windows, Word and Excel)
7. make effective oral presentation by using Microsoft PowerPoint
8. make effective use of the University Library

8. INDICATIVE CONTENT

Four clusters of work have been identified:

Academic General Knowledge

- **Techniques and cognitive skills:** reading for a purpose, note-taking, summarizing, describing, comparing and contrasting, comparing and contrasting, analyzing the logic of arguments, constructing a logical argument, relating facts to theories and paradigms (at a rather low level), assessing practical application. Sources of information: books, journals (hard copy and on line), data bases etc, student-generated data (formal and informal), grey literature, other sources as appropriate to discipline. Assessing the validity of data.

- **Presentation and communication:** presentations, essays (short, long, examination), others as appropriate to discipline (e.g. research proposals and reports, evaluations of poems and books, diagnosis and proposed treatment). Preparing and drafting coursework assignments; preparing for and taking examinations.

- **Computer Literacy**: introduction(information, binary system), Computer structure (software and hardware), Operating system window(creating a file, move a file, copy a file, delete a file, rename a file, creating a folder, remove a folder, rename a folder, delete a folder , configuration of peripheral devices) ; Run an application with OS window, Microsoft Word; Microsoft Excel Microsoft PowerPoint. Introduction to Internet (Web browser, protocols; creation of e-mail address, research of information).

9. LEARNING AND TEACHING STRATEGY

A substantial lecture (or two shorter ones) each week will deliver common factual material and interpretative frameworks to relatively large classes.

Smaller group sessions (max. 20 people) are for discussion, practice with feedback and group presentation.

Most weeks also have a two-hour computer session scheduled for the progressive use of the computer, Moodle, email and the web; structured exercises will be set for student practice outside class hours.

Student practice will take place predominantly in the other modules – they will practice note-taking, summarizing, finding and evaluating sources and constructing arguments by doing so in the substantive subject areas they study.

10. ASSESSMENT STRATEGY

Small pieces of work and structured computing exercises will be set for students to do outside class, with answers and comments supplied in seminars, but these will be formative and will not count towards the grade.

The module is ‘punctuated’ by two substantial pieces of assessment – an essay and a group presentation.

The final assessment will be a two-hour examination including multiple-choice questions and an essay under examination conditions.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	2, 3, 4, 5, 8
Final Exam	40%	1,4,5,6,7,8

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT

Feedback and support will be part of the seminars and, of course, some degree of individual support will be given during computer sessions. Further support can be offered during lecturers' office hours and by Academic Advisers (as the content of the module is not specialist).

13. INDICATIVE RESOURCES

A list of useful library books and web references/sites will be compiled. Disciplines will add their own recommended sources for skills and basic practice.

14. TEACHING TEAM

Mr UWAYEZU Jean de Dieu, **MSc in ICT/Telecommunication Engineering**

1. **Module Code: LAGE 1512**
2. **Module Title: LINEAR ALGEBRA AND GEOMETRY**
3. **Level: 1** **Semester:** 1 **Credits:** 15 **First year of presentation: 2010**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite module, excluded combinations**

A-level Mathematics or equivalent

6. Allocation of study and teaching hours

Activities	Learning hours	Teaching hours
Face to face lectures	**54**	**54**
Students support hours	**36**	**36**
Preparation hours	**-**	**90**
Setting and marking assignment and exams + invigilation		**45**
Self-directed readings	**15**	**-**
Preparation and writing assignments	**22.5**	**-**
Revision and writing exams	**22.5**	**-**
Total hours	**150**	**225**

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Brief description of aims

The module aims at:

1. Identifying algebraic structures and operating in these structures
2. Solving systems of linear equations in a vector space, in the ring of polynomials with one indeterminate and in the field of fractions
3. Solving geometric problems involving points, straight lines, planes, coordinate systems, curves in an affine Euclidean space.

7.2 Learning outcomes

On successful completion of the module students should be able to:

1. Comprehend concepts and fundamental notions of groups, rings, fields and their manipulation; vector spaces, linear transformations and matrices over an arbitrary field;

2. Operate on vectors in orthonormal bases, vector functions of real variables and applications to parametric curves

3. Develop their problem-solving in relation to vector algebra and calculus

4. Apply concepts and methods of vector algebra and calculus to solve problems in other scientific areas

5. Work in small groups and submit work in the allocated time

8. INDICATIVE CONTENT

LINEAR ALGEBRA: Introduction to groups, subgroups, isomorphism of groups, residue classes modulo-n, introduction to rings and fields.
Vector spaces, subspaces, linear independence, basis and dimensions of vector spaces; linear transformations; matrices of linear transformations; determinants and linear operators, systems of linear equations; eigenvalues and eigenvectors; diagonalisation of a matrix.
Theory of polynomials with an indeterminate: operations on polynomials with complex coefficients, division and indivisibility of polynomials, relationship between coefficients and root of a polynomial; rational functions and decomposition of a polynomial in simple elements: real and complex factored forms.

ANALYTICAL GEOMETRY: Operations on vectors in IR^2 and in IR^3 in orthonormal bases: addition, scalar product, vector product, mixed products; lines and planes in IR^3, distance from a point to a plane ; vector function of one real variable with values in IR^2 and in IR^3, limit, continuity, differentiation and integration, application to parametric curves in IR^2 and in $IR^{3.}$

9. LEARNING AND TEACHING STRATEGY

- Basic knowledge and understanding are developed in formal classroom lectures.
- Group works in tutorial sessions for solving structured exercises and problems in class or at home are planned
- Open days for giving more explanations to students who faced difficulties in this module are organized.

10. ASSESSMENT STRATEGY

Learning outcomes are evaluated using Continuous Assessment Tests (CAT)
Students' ability to use appropriate referencing and to work in groups is evaluated through assignments.
A final written exam will be organized.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Tests and Assignments	60 %	1,2,3,4,5
Final Exam	40 %	1,2,3,4

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT

Each test or assignment is marked with immediate feedback
Specimen solutions of exercises are available for students self-assessment needs
Consultation hours for students in order to interact on methods, problems and ways forward on the module are planned.

13. INDICATIVE RESOURCES

- Glencoe/Mac Graw-Hill Algebra 2, Columbus, 2008.
- Thomas, G.B. and R.L. Finney, Calculus and Analytic Geometry. 6th ed. Addison-Wesley 1994.
- Kreyszig,E. (1988). Advanced Engineering Mathematics, 6th edition. New York.
- Hoffman, K. and R. Kunze (1971). Linear Algebra. 2nd ed., Prentice-Hall
- Nering, E.D. (1970). Linear Algebra and Matrix Theory. 2nd ed. New York: Wiley
- Samuelson, H.(1974). An Introduction to Linear Algebra. John Wiley and Sons.
- Hamilton,A.G (1992). Linear Algebra. Cambridge University Press.
- Gilbert,J.and Gilbert,L.(1993). Linear Algebra and Matrix Theory. Academic Press

14. TEACHING TEAM

Mr MUDAHERANWA Gerard, **MSc in Mathematics**

1. **Module code: PRST 1522**
2. **Module Title: Probability and statistics**
3. **Level: 1 Semester: 2 Credits: 15 First year of presentation: 2012**
4. **Administering Faculty: FST**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   Calculus I, Linear algebra I
6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting,marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of Aim

To exhaustively cover probability theory and statistics

7.2 Learning outcomes

Having successfully completed the module students will be able to:

1. Draw frequency histogram

2. Calculate the mean, median, mode of discrete data

3. Construct cumulative frequency curves and use them to estimate the median, quartiles and percentiles of a distribution

4. Calculate various measures of dispersion- the range and interquartile range; the variance and the standard deviation of a sample

5 . Use the product principle to count the number of possible outcomes of an experiment

6. Use permutations and combinations to enumerate possible outcomes

7. Apply the binomial theorem in a variety of contexts

8. Understand the terms: sample space, sample point, simple event, event, complementary events, independent events, mutually exclusive events and conditional probability

9. Use Bayes' theorem and the binomial probability distribution

10. Apply any of the above ideas to establish the probability of a variety of events

11. Draw up a probability table for a number of discrete distributions

12. Find the mean of a discrete distribution

13. Find the variance and standard deviation of a discrete distribution whose probability table is known

14. Find the mean and standard deviation of a given binomial probability distribution

15. Use the Poisson distribution in a variety of situations

16. Convert a given normal probability distribution to standard normal and use tables or GDC (Graphic Display Calculator) to calculate probabilities of a normal distribution

8. INDICATIVE CONTENTS

1. Types of data, frequency distributions and graphical representations
2. Measure of parameters of central tendency and parameters of variations
3. Theory of probabilities
4. Random variables
5. Random variable systems
6. Conditional distribution
7. Limits theorems

9. LEARNING AND TEACHING STRATEGY

The course will be delivered by class lectures, class exercises and computer lab applications.

10. ASSESSMENT STRATEGY

Two kinds of assessments in each component will be organized: one CAT+ self directed work which will count 50% and a final examination which will count 50%.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	**1-16**
Final exam	40%	1-16

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).
- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- Maurray R. SPIEGEL, Schaum's outline series of theory and problems of probability and statistics, 23rd Printings, 1998.
- Maurray R. SPIEGEL, Schaum's outline series, Theory and problems Statistics 4th edition, McGraw-Hill, 2008
- Seymour LIPSCHUTZ, Schaum's outline series of theory and problems of probability, McGraw-Hill, 2008
- E. KREYSZIG, Advanced Engineering Mathematics, 9th Edition, John Wiley and Sons

14. TEACHING TEAM

Mr Nsengiyumva Cyprien, **MSc in Technical Physics and Techno mathematics**

1. Module Code: GPHY 1523
2. Module Title: General Physics
3. Level: 1 **Semester: 2 Credits: 20 First year of presentation: 2010**
4. Administering Faculty: Faculty of Science and Technology
5. Pre-requisite or co-requisite modules, excluded combinations
Algebra and geometry, Mathematical analysis, and complex numbers.

6. Allocation of study and teaching hours

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting, marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENT
7.1 Description of aims

This module has three parts:
The first part of the module consists on Kinematics, Dynamics of a particle, Vibrations and waves. The second part comprises Electrostatics, Electrokinetics, Magnetism and Electromagnetism, AC circuits. The third part deals with Geometric Optics.

7.2 Learning Outcomes

At the end of the module, students should be able to :
1. Review the basic concepts on Kinematics
2. Outline the place of Newtonian mechanics in the development of science and to explain the experimental basis for Newton's Laws of Motion;
3. Display a basic knowledge of how particles move under forces, and understand how one describes this in mathematical terms.
4. Solve **F** = **dp**/dt for a variety of simple cases and be familiar with the concepts of potential and kinetic energy, and of the conservation of linear momentum and of energy;
5. Understand more about the concepts of charge, field and flux.
6. Be able to compute the electrostatic and magnetic fields for simple distributions of monopoles or dipoles.
7. Understand and outline the interaction between electrostatic or magnetic fields.

8. Understand the phenomena of capacitance and inductance.
9. Know the laws of electromagnetic induction and be able to apply them to calculate self- and mutual inductance.
10. Understand the behavior of electricity generators and electric motors, and be able to find the energy in simple magnetic fields.
11. Understand the phenomenon of resistance and be able to calculate the current and potential distributions in simple DC or AC networks
12. Explain the fundamental laws of Geometrical Optics and apply them.
13. Understand working principle of optical instruments, describe and use them adequately in experimental sets.
14. Verify experimentally the Newton's laws of motion and Electricity in Laboratory Practical exercises
15. Verify experimentally the laws of General Optics and use properly Optical instruments in Laboratory Practical exercises

8. INDICATIVE CONTENT

Kinematics of a particle: Frames of reference; position, displacement, velocity and acceleration vectors; Motions along a straight line; curvilinear motions.
- Dynamics of a particle : Newton's Laws of Motion ; Linear momentum vector and conservation ; Angular momentum vector and conservation ; Applying Newton's Laws - equilibrium, dynamics of particles, friction and dynamics of circular motion ; Elasticity, Hooke's law, elastic modulus, elastic springs ; Work, Kinetic and Potential energy ; Total mechanical energy and conservation.
- Vibrations and waves: Simple harmonic motion (Energy, Dynamics of that motion) ; Mechanical waves (Types, propagation, celerity, harmonic waves, wave equation, Interference).
- Electrostatics : Electric forces and electric fields (Properties of electric charges, Insulators and conductors, Coulomb's law, Electric field, Conductors in electrostatic equilibrium, Electric flux, Gauss' law and applications ; Electric energy and capacitance (Electric potential, Potential energy due to point charges, Capacitance, the parallel-plate capacitor, Combinations of capacitors, Energy stored in a charged capacitor, Dielectrics).
- Electrokinetics : Direct current and resistors (Electric current and drift velocity, Ohm's law, Resistivity and resistance, Electrical energy and power) ; Direct current circuits (Electromotive force, Combinations of resistors, Kirchhoff's laws, RC circuits, Electrical measuring instruments).

- Magnetism and Electromagnetism : Magnetism (Magnets, Magnetic field, Motion of a charged particle in a magnetic field, Magnetic force on a current-carrying circuit, Torque on a current loop, Magnetic field of an electric circuit and interactions , Ampere's law, Magnetism in matter) ; Induced voltages and inductance (Induced **emf**, Electromagnetic flux, Faraday's laws of induction, Lenz's law, Motional **emf**, Electric generators and motors, Self-inductance, RL circuits, Energy stored in a magnetic field) ; Alternating current circuits (Alternating current, Transformers).
- Geometric Optics: Rectilinear propagation of light (Principle, Laws of Geometrical Optics) ; Reflection on a plane/spherical surface ; Refraction of light(Plane and spherical dioptric) ; Thin

lenses and lens combinations; Optical instruments (eye, magnifying lens and compound microscope, Refracting telescope and camera).

9. LEARNING AND TEACHING STRATEGY

- During contact hours, the lecturer presents the module's content chapter by chapter.
- During self study hours, students will work in groups at library on indicated topics.
- Students can ask questions on prepared topics for more information
- Each chapter is ended by structured problems; some of them will be done in class and others will be done at home by students as assignment.
- Each lecturer must have one open day for the students and help them in particular problems.

10. ASSESSMENT STRATEGY

Assessment is organized in 3 ways: one assignment after each chapter, assessment on practical works in laboratory, and a final exam.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1,2,3,4,5,6,9,12,13
Final Exam	40%	1,2,3,4,5,6,7,8,9,10,11,12,13,14, 15

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

Each test or assignment is marked with immediate feedback

Specimen solutions of exercises are available for students self-assessment needs

Consultation hours for students in order to interact on methods, problems and ways forward on the module are organized.

13. INDICATIVE RESOURCES

- H D Young and R A Freedman, University Physics 11th Edition, Pearson, 2000
- D. Halliday, R. Resnick and J. Walker, Fundamentals of Physics 7th Edition, John Wiley & Sons , Canada, 2004.
- D. Halliday, R. Resnick and J. Walker, Fundamentals of Physics 6th Edition, John Wiley & Sons, USA, 2003.

14. TEACHING TEAM

Mr Mageza Celestin, MSc

1. **Module Code: BOEN 1522 Faculty: FST**
2. **Module Title: Social Church Doctrine and Entrepreneurship**
3. **Level: 1 Semester: 2 Credits: 15 First year of presentation: 2010**
4. **Administering Faculty: FST**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   No Computer Science knowledge is required
6. **Allocation of study and teaching hours**

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting, marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description aims

Module consists of two units “Business organization” and “Entrepreneurship”.
This module is designed to go with the core Business Strategy, by examining the key problems and dilemmas that may emerge for all stakeholders in contemporary organizations from the attempt to manage and implement strategic change. The idea is to be in a position to think through, take risks and be able to run and manage a micro enterprise on their own.

7.2 Learning outcomes

On successful completion of this module students will be able to:

1. Critically evaluate competing perspectives on the nature of management as both a function and process within organizations.
2. Critically analyze the concept of managerial power and authority, in the context of the work of individual managers, and organizations within their social and cultural contexts.
3. Critically analyze models of managerial decision-making.
4. Critically evaluate the das a moral and ethical process, and evaluate the contribution of various theoretical perspevelopment of organizations in their historical, social and cultural contexts, and the choices that this creates for the management of organizations.
5. Critically evaluate the process of organizational change and development.
6. Analyze management ectives to a critical understanding of management in action.

7. To prepare students to become competent in the areas of management viz. finance , accounting , marketing and production and building the capacity to think "entrepreneurially:
8. To develop an entrepreneurial idea for a micro enterprise
9. To create , run and manage an enterprise
10. To develop effective "team work" abilities
11. To develop effective leadership skills

8. INDICATIVE CONTENT

Management concepts
Research in organizations
Power and politics in organizations.
Decision-making in organizations; participative management, and the impact of organizational design and structure on the decision making process. Rational and non-rational models of decision-making in action.
Organizational culture and globalization. The management of culture and the culture of management. Management styles and globalization. Ethical aspects of globalization and management.
Business and ethics and corporate social responsibility. Competing models and approaches. Managing ethically. Policies and procedures and cultural climates.
Managing change. Contrasting models on planning change and dealing with unplanned change. The concept of the "learning organization". New ways of working and new ways of organizing and managing.

9. LEARNING AND TEACHING STRATEGY

The module is delivered by a range of techniques, including lectures, case analysis
and role-play. A variety of teaching methods are adopted for the delivery of the course. The reliance shall be primarily on hands on management of small enterprise, self learning, critical reasoning, innovative & creative approaches to problem solving, logically presenting solutions and gain and reflect on the learning in the class.

10. ASSESSMENT STRATEGY

- A mid-term test (written test) should be given after a certain teaching period and work reports should be considered; the whole work has to be counted at 35%.
- Practical work reports are assessed in peer but some common errors are commented in class and are counted at 25%.
- The final exam should be given at the end of the semester and should be counted at 40%.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	4,5,6,7,8 ,9,11
Final exam	40%	1,2,3,6,7,8,9,10,11

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

Consultation hours to see the students in the office.
Two meeting with the students during the semester to discuss their problems (if any).
Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- Colin Hales, 2000; managing Through Organization: The Management Process, Forms of Organization and the Work of Managers;
- P. H Hersey, Kenneth H Blanchard, Dewey E Johnson; 2007; Management of Organizational Behavior (9th Edition); Prentice Hall.
- Steve Mariotti; 2008; Entrepreneurship: Starting and Operating a Small Business with CDROM; Pearson Prentice Hall.
- Robert A. Baron; 2007; Behavior in Organizations (9th Edition). Prentice Hall.
- Steve GOTTRY; 2005; Collins Business; Common Sense Business: Starting, Operating, and Growing Your Small Business--In Any Economy.

14. TEACHING TEAM

Mrs.MUKASEKURU Alice ,Msc

1. **Module code: NALP 2512**
2. **Module Title: NUMERICAL ANALYSIS AND LINEAR PROGRAMMING**
3. **Level: 2 Semester: 1 Credits: 15 First year of presentation: 2011**
4. **Administering Faculty: FST**
5. **Pre-requisite or co-requisite module, excluded combinations**
   Fundamentals of Mathematics, C++ Programming

6. Allocation of study and teaching hours

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting,marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of Aims

The module aim is to:

- Present and discuss on the basis methods for the numerical resolution of problems, and notably the numerical resolution of equations.
- Construct numerical methods from principles of basis,
- Introduce the analysis of the errors and to the assessment of the efficiency of the methods in terms of computation volume;
- Facilitate the students the good understanding of writing of algorithm for different numerical methods
- Do practical using C, C++ , Python to generate oneself programs or a symbolic computer analysis package (MATLAB, MAPLE, …) to program the numerical methods and use of built in functions.

7.2 Learning outcomes

On completion of this module, students should have a reasonable understanding of:

1. Basic concepts of the types of one variable equations (algebraic and transcendent);
2. Iterative numerical methods of resolution approached the linear equation systems and differential equations;
3. How to apply the mechanisms of integration, interpolation and extrapolation
4. Apply C++ language into the resolution of different equations

8. INDICATIVE CONTENT

#1. Numerical analysis

- Algorithm and the organization chart for the resolution approached of the algebraic and transcendent equations: Root separation, the method of bipartition of Newton, the proportional part method and the successive approximation.
- Polynomial interpolation and extrapolation: Polynomial of Lagrange, Hermite and Newton. Numerical resolution of non-linear equation of one variable: Method of the bisection, regulation of Falsi, the secant and Newton – Raphson. Approximation of the derivatives: Finite difference methods(forward, regressive and central)
- Numerical integration: Trapezoidal rule, Simpson's rules, Gaussian quadrature and Romberg algorithm. System of linear equations: Naïve Gaussian elimination, iterative methods (Jacobi iterative method, Gauss-Seidel iterative method).
- Numerical methods for differential equations: Euler's method, Runge-Kutta methods, higher order Taylor series methods, Finite Differences, Adams-Bashforth methods and Adams-Moulton methods.

#2. Linear PROGRAMMING

- Structure general of the computer and the algorithm: Internal and external memory of computer, structure of algorithm, different steps of the resolution of a problem, declaration of the simple variables and functions, syntax presentation of the loop and tests.
- Initiation to the programming software: use of commands and the instructions, types of variables, the spaces of work, declaration the vectors and of the matrixes, mode of program, representation of the curves and graphic.
- Using the programming software, to program and to execute the algorithms for the different numeric methods.

9. LEARNING AND TEACHING STRATEGY

- Basic knowledge and understanding are developed in formal classroom lectures.
- Group work in tutorial sessions for solving structured exercises and problems in class or at home are recommended.
- Open day for giving more explanations to students who faced difficulties in this module is organized.

10. ASSESSMENT STRATEGY

Learning outcomes are evaluated using continuous assessment tests Students' ability to use appropriate referencing and to work in groups are evaluated through assignments
A final written exam will be organized.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Tests and Assignments	60%	1,2,4
Final Exam	40 %	1,2,3,4

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT

Each test or assignment is marked with immediate feedback
Specimen solutions of exercises are available for students self-assessment needs
Consultation hours for students in order to interact on methods, problems and ways forward on the module are organized.

13. INDICATIVE RESOURCES

1. Richard, L.Burden, James Douglas Faires. **Numerical Analysis, 2nd ed.** PLUS_KENT Publishing Company, 1989.
2. Kreyszig, E.; **Advanced Engineering Mathematics,6th ed**. New York: John Wiley and Sons, 1988.
3. Hildebrand, F.B. **Introduction to Numerical Analysis, 2nd ed.**New York: McGraw-Hill, 1974.
4. Isaacson, E. and H.B. Keller. **Analysis of Numerical Methods.** New York: Wiley, 1966.
5. Hubbard, J. R. (John R.), date
   Schaum's outline of theory and problems of fundamentals of computing with C++ / John R. Hubbard. (Schaum's outline series), 1998

14. TEACHING TEAM

Mr Jean Pierre Iyakaremye, MSc

1. **Module Code: DSAA2513**
2. **Module Title: Data Structures and Algorithms analysis**
3. **Level: 1 Semester: II Credits: 20 First year of presentation: 2011**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**

   Fundamentals of Computer Science and Programming
6. **Allocation of study and teaching hours**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of Aims

Module consists of two courses "Analysis of algorithms" and "Data Structures and Programming"
#1. Introduces fundamental concepts of data structures and the algorithms that proceed from them.
#2. Introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency.

7.2 learning outcomes

Having successfully completed the module, students should be able to:

1. Explain the mathematical concepts used in describing the complexity of an algorithm.
2. Select and apply algorithms appropriate to a particular situation.
3. Employ one from a range of strategies leading to the design of algorithms to serve particular purposes.
4. Explain the trade-offs that exist between a range of algorithms that possess the same functionality.

8. INDICATIVE CONTENT

#1. "Data Structures and Programming"

• Review of elementary programming concepts
• Fundamental data structures: Stacks; queues; linked lists; hash tables; trees; graphs
• Object-oriented programming: Object-oriented design; encapsulation and information hiding; classes; separation of behavior and implementation; class hierarchies; inheritance; polymorphism
• Fundamental computing algorithms: O(N log N) sorting algorithms; hash tables, including collision-avoidance strategies; binary search trees; representations of graphs; depth- and breadth-first traversals
• Recursion: The concept of recursion; recursive mathematical functions; simple recursive procedures; divide-and-conquer strategies; recursive backtracking; implementation of recursion

#2. "Analysis of Algorithm"

Topics include asymptotic complexity bounds, techniques of analysis, algorithmic strategies, and an introduction to automata theory and its application to language translation.
• Review of proof techniques
• Basic algorithmic analysis: Asymptotic analysis of upper and average complexity bounds; best, average, and worst case behaviors; big-O, notation; standard complexity classes; empirical measurements of performance; time and space tradeoffs in algorithms; using recurrence relations to analyze recursive algorithms
• Fundamental algorithmic strategies: Brute-force; greedy; divide-and-conquer; backtracking; branch-and-bound; heuristics; pattern matching and string/text algorithms; numerical approximation
• Fundamental data structures: Implementation strategies for graphs and trees; performance issues for data structures
• Graph and tree algorithms: Depth- and breadth-first traversals; shortest-path algorithms (Dijkstra's and Floyd's algorithms); transitive closure (Floyd's algorithm); minimum spanning tree (Prim's and Kruskal's algorithms); topological sort
• Automata theory: Finite-state machines; Turing machines; context-free grammars; uncomputable functions; the halting problem; implications of uncomputability
• Introduction to language translation: Comparison of interpreters and compilers; language translation phases; machine-dependent and machine-independent aspects of translation; language translation as a software engineering activity .

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 100 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Formative assessment is by means of regular tutorial exercises. Feedback to students on their solutions and their progress towards learning outcomes is provided during lectures and tutorial classes. The major component of summative assessment is the written examination at the end of the module. This gives students the opportunity to demonstrate their overall achievement of learning outcomes. It also allows them to give evidence of the higher levels of knowledge and understanding required for above average marks.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
CATs	60%	1, 2, 3,4
Final exam	40%	1,2,3,4

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).
- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

Core Text (include number in library or URL) (inc ISBN)

Jeffrey Childs C++: Classes and Data Structures / Prentice Hall , 2008,
Larry R. Nyhoff ADTs, Data Structures, and Problem Solving with C++, 2/E, Prentice Hall, 2005,
Richard Johnsonbaugh, Marcus Schaefer Algorithms, Prentice Hall, 2004, 768 pp,

14. TEACHING TEAM

Mr MAJYAMBERE Silas, **MSc in Computer Science**

1. **Module code:OSCA2512**
2. **Module Title: Operating System and Computer Architecture**
3. **Level: 2 Semester: 1 Credits: 15 First year of presentation: 2012**
4. **Administering Faculty:Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   Fundamentals of Computer Science

6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting, marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 Description of Aims

The module consists of three components: Introduction to operating system, Unix and shell programming and Computer Architecture.

#1. Introduces the fundamentals of operating systems together with the basics of networking and communications.

#2. The aim of this unit is to make the student familiar with the Unix operating system and the shell programming in Unix. It also gives an idea about how one can send communicate with others using Unix and change the setup of Unix operating system.
#3. This course introduces the basic concepts of computer architectures. It starts with the structure of subsystems and covers the organization of the overall system. The unit outlines the fundamental way in which a computer works: starting with simple logic and progressing to a simple model of a microprocessor. This is followed by an appreciation of low-level programming leading to a clear understanding of the key points of machine performance.

7.2 Learning Outcomes

Having successfully completed the module, students should be able to

1. Summarize the principles underlying the design and construction of a typical operating system, giving particular recognition to the wider applicability of the ideas and the influences from such developments as high-level languages, networking, multimedia, and security concerns.
2. Use the facilities of the operating system to achieve a range of simple tasks, including enhancing the functionality by integrating new software components.
3. Identify the security issues associated with distributed web applications and be able to suggest mechanisms leading to a resolution of these problems.
4. Explain the concepts of UNIX shell commands.
5. Write UNIX shell scripts for small applications.
6. Explain the assembly codes used to instruct the processor.
7. Write and debug simple programs using assembly code.
8. Explain the principles underlying the design and development of computer systems for a variety of purposes.
9. Trace the influences of important computing developments (such as compiler technology, networking, the web, multimedia, safety, security) on the architecture of computer systems.
10. Outline the architectural features of a modern computer system.
11. Explain the state of working of internal and external memory organizations.

8. INDICATIVE CONTENTS

#1: Introduction to Operating Systems

• Overview of operating systems: Role and purpose of the operating system; history of operating system development; functionality of a typical operating system

• Operating system principles: Structuring methods; abstractions, processes, and resources; concepts of application program interfaces; device organization; interrupts; concepts of user/system state and protection

Introduction to event-driven programming

• Using APIs: API programming; class browsers and related tools; programming by example; debugging in the API environment

• Introduction to concurrency: Synchronization principles; the “mutual exclusion” problem and some solutions; deadlock avoidance

• Introduction to concurrency: States and state diagrams; structures; dispatching and context switching; the role of interrupts; concurrent execution; the "mutual exclusion" problem and some solutions; deadlock; models and mechanisms; producer-consumer problems and synchronization
• Scheduling and dispatch: Pre-emptive and nonpreemptive scheduling; schedulers and policies; processes and threads; deadlines and real-time issues
• Memory management: Review of physical memory and memory management hardware; overlays, swapping, and partitions; paging and segmentation; placement and replacement policies; working sets and thrashing; caching
• Introduction to distributed algorithms: Consensus and election; fault tolerance
• Introduction to net-centric computing: Background and history of networking and the Internet; network architectures; the range of specializations within net-centric computing
• Introduction to networking and communications: Network architectures; issues associated with distributed computing; simple network protocols; APIs for network operations.

#2: UNIX and Shell Programming

- Operating system introduction: overview of operating systems, functionalities and characteristics of OS, OS system structure, brief history of Unix, features.
- Unix Command: internal command and external commands
- Files: options and filenames, general-purpose utilities, files and directories.
- Shell Programming: The common shells, login shell, what the shell does, wildcards, standard input and output, shell variables, command substitution, running commands in the background, job control, the korn, bash and c shells, the vi editor, the emacs editor, text basic file attributes, filters and utilities, text formatting utilities, lex and yacc, shell programming.

#3 Computer Architecture

• Digital logic: Fundamental building blocks (logic gates, flip-flops, counters, registers, PLA); logic expressions, minimization, sum of product forms; register transfer notation; physical considerations (gate delays, fan-in, fan-out) • Data representation: Bits, bytes, and words; numeric data representation and number bases; fixed- and floating-point systems; signed and twos-complement representations; representation of nonnumeric data (character codes, graphical data); representation of records and arrays
• Assembly level organization: Basic organization of the von Neumann machine; control unit; instruction fetch, decode, and execution; instruction sets and types (data manipulation, control, I/O); assembly/machine language programming; instruction formats; addressing modes; subroutine call and return mechanisms; I/O and interrupts

• Memory systems: Storage systems and their technology; coding, data compression, and data integrity; memory hierarchy; main memory organization and operations; latency, cycle time, bandwidth, and interleaving; cache memories (address mapping, block size, replacement and store policy); virtual memory (page table, TLB); fault handling and reliability
• Interfacing and communication: I/O fundamentals: handshaking, buffering, programmed I/O, interrupt-driven I/O; interrupt structures: vectored and prioritized, interrupt acknowledgment; external storage, physical organization, and drives; buses: bus protocols, arbitration, direct-memory access (DMA); introduction to networks; multimedia support; raid architectures
• Functional organization: Implementation of simple datapaths; control unit: hardwired realization vs. microprogrammed realization; instruction pipelining; introduction to instruction-level parallelism (ILP)
• Multiprocessor and alternative architectures: shared memory systems; Cache coherence; memory models and memory consistency
• Performance enhancements: RISC architecture; branch prediction; prefetching; scalability
• Contemporary architectures: Hand-held devices; embedded systems; trends in processor architecture

9.LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

*Practical: E*xamples of projects that used different software engineering techniques, seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 50 hours private study including preparation of worked solutions for tutorial classes.

10.ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.

- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
CATs	60%	1,3,4
Final exam	40%	1,2,3,4,5,6,7,8,9,10, 11

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).
- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- Andrew Tanenbaum, Modern Operating Systems, 2nd Edition, Prentice Hall
- AT & T. UNIX System User's/Programmer's manual.
- M.J. Bach. Design of the UNIX operating system. Prentice Hall of India.
- R. Thomas. Advanced Programmer's Guide to UNIX System V. McGraw Hill, 1989.
- V. C. Hamacher, Z. G. Vranesic and S. G. Zaky, Computer Organization, 2nd Edition, McGraw Hill, 1988.
- J. P. Hayes, Computer Architecture and Organization, Second Edition, McGraw Hill, 1988.
- A. S. Tanenbaum, Structured Computer Organization, Third Edition, Prentice Hall of India, 1983.
- Rafiquzzaman and Chandra, A modern Computer Architecture, Galgotia.
- William Stallings, Operating Systems: Internals and Design Principles, Fifth Edition, Prentice Hall
- Avi Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, Seventh Edition, John Wiley & Sons, Inc.
- B.W. Kernighan and R. Pike. The UNIX Programming Environment. Prentice-Hall, 1984.
- William Stallings, Computer Organization and Architecture, Fifth Edition, Prentice Hall
- M. Morris Mano, Computer System Architecture, 1992, Prentice Hall

14. Teaching Team

Mr. UWIMANA Jean Pierre, MSc in Information Technology

1. **Module code: OOPR2513**
2. **Module Title: Object Oriented Programming**
3. **Level: 2 Semester: 1 Credits: 20 First year of presentation:2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   C, C++ programming

6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting, marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 Description of Aims

This module consists of two components: “Introduction to Java” and “Advanced Java”.

#1. Introduction to Java

The student will learn how to write simple Java programs with primitive data types, control statements, methods, and arrays.

#2. Advanced Java

The Unit provides the students a comprehensive course in Java programming. The students must be aware of various Object Oriented Programming Concepts before studying this unit.

7.2 Learning outcomes

At the completion of the module students will be able to:

1. distinguish the terms API, IDE, and JDK
2. variables and operators
3. write a simple Java program
4. Obtain input using the JOptionPane input dialog boxes.
5. Obtain input from the console using the Scanner class.
6. Control structures
7. To implement program control with break and continue
8. To create methods, invoke methods, and pass arguments to a method

9. To use method overloading and understand ambiguous overloading.
10. (Optional) To group classes into packages
11. Arrays
12. To understand objects and classes, and use classes to model objects
13. To use UML graphical notations to describe classes and objects
14. To learn how to declare a class and how to create an object of a class
15. To understand the role of constructors when creating objects
16. To distinguish between object reference variables and primitive data type variables
17. To use classes in the Java library
18. To declare private data fields with appropriate get and set methods for data field encapsulation to make classes easy to maintain
19. To create immutable objects from immutable classes
20. To develop methods with object arguments
21. To determine the scope of variables in the context of a class
22. To use the keyword this to refer to the calling
23. To store and process objects in arrays
24. (Optional GUI) To create windows using JFrame

8. INDICATIVE CONTENTS

#1. Introduction to Java

Introduction to Computers, distinctions between computer programs, operating system, applications, programming languages, java, API,JDK, IDE, Simple Java program, creating, compiling and executing a java program, Dispalaying a text in dialog box,data type, variables, numeric data operations, numeric data conversions, Getting input from input dialog, programming errors and debugging.

#2. **Advanced Java**

Java Programming Design, Reusing Classes, Introduction to Objects, Programming a Graphical User Interface, Building a Simple User Interface, Laying out a User Interface, Exception Handling and Threading in Java, Event Handling. Swing programming, JAVA beans, JAVA networking, Advanced programming, JDBC, Web programming, remote method invocation, Servelet Programming, JAVA server pages, Java security.

9.LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

The major component of summative assessment is the written examination at the end of the module. Formative assessment is by means of regular tutorial exercises. Feedback to students on their,

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Tests and Assignments	60 %	1,2,3,4,5,6,8,9,14,16,18
Final Exam	40 %	1,2,3,4,5,6,8,9,12,13,14,16,17,18 19,20, 21, 22,23, 24

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT

Each test or assignment is marked with immediate feedback

Specimen solutions of exercises are available for students self-assessment needs

Consultation hours for students in order to interact on methods, problems and ways forward on the module are planned.

13. INDICATIVE RESOURCES

- Ravi Sethi, Programming Languages- Concepts & Constructs, , 2nd Edition, Addision Wesley. 1996
- Java 2, the Complete Reference, 2004
- Java 2, Advanced Programming, Deital and Deital, 2006

14. TEACHING TEAM

Mr. NSENGIYUMVA Jean Marie Vianney, **MSc in Information Systems**

1. **Module code: ADEL 2523**
2. **Module Title: Analog and Digital electronics**
3. **Level: 2 Semester: 2 Credits: 20 First year of presentation: 2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   General physics, Linear Algebra

6. **Allocation of study and teaching hours:**

Activities	**Learning hours**	**Teaching hours**
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting, marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. **BRIEF DESCRIPTION OF AIMS AND CONTENTS**

7.1 Description of Aims

To obtain a knowledge and understanding of operation principle and application of semiconductor devices. In addition, they will be able to distinguish different electronic equipment (amplifier, signal generator oscilloscope, voltmeter Ohmmeter and Ammeter), design and analyze simple analogue and digital electronic circuits containing passive and active components as well as integrated circuit components.

7.2 Learning Outcomes

1. A critical understanding of the theory.
2. An ability to apply the theory
3. Problem solving ability, including appropriate mathematical competence.
4. Skills in the use of laboratory instruments.
5. Understanding of scientific method and its ethos.
6. Ability to communicate in the language of the subject.

- Appreciation of the ethical aspects of science and technology.

8. INDICATIVE CONTENT

Different types of semiconductors; PN-junction ; PN diode, Rectifier, Zener diode , LED diode, photodiode , BJT (Bipolar Junction Transistor), Schottky diode
Transistor biasing concept; Transistor V-I characteristics; Different connections (CE,CB,CC) and their characteristics, Small signal model of a transistor(h-parameter analysis of the transistor);Amplifier circuit using h parameters (current gain, voltage gain input impedance and output);Transistor as an amplifier - single stage, multi -stage (cascaded) amplifier; FET(Field effect transistor); the junction field effect transistor (JFET) - The JFET V-I characteristics - The FET small signal model ; MOSFET; Biasing the FET ; Analog signal, Sampling and quantization ; Digital signal ; Number codes used in digital electronics(Binary number ,octal, decimal and hexadecimal number); binary do decimal conversion and vice versa; binary to hexadecimal conversion and vice versa; logic gates, Multivibrator, Boolean algebra and logic simplification. De Morgan's Theorems ; Keeping circuits simple(Karnaugh Maps), Demultiplexers and decoders,Arithmetic/Logic Units(ALUs).

9.LEARNING AND TEACHING STRATEGY

Lectures: for the transmission of content and the explanation of concepts and theory.

Practicals: for the development of laboratory and experimental skills and basic report writing.

Tutorials: for the development of self-reliance and proficiency in problem solving, including mathematical competence.

Self-study: for the developing the ability to study effectively from texts, for encouraging learners to reflect on the subject matter and for cultivating disciplined and orderly work-habits.

10.ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Understanding of scientific method and its ethos.
- Numeracy as shown by problem solving skills.

- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1,2,3,4,5,6
Final Exam	40	1,2,3,4,5,6,7

12. **STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE**

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).
- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- H.D. Young & R.A. Freedman, 'University Physics' (10th Edition) Addison-Wesley, 2000
- V.K.MENTA, RONIT MENTA; Principals of Electronics, New Delhi, INDIA, 2000.
- Paul Scherz; Practical Electronics for Inventors; McGraw-Hill Companies, USA, 2000.
- Thomas L.Floy; Digital Electronics; Pearson Prentice Hall; New Jersey, 2009**.**

14. TEACHING TEAM

Mr UWAYEZU Jean de Dieu, **MSc in ICT/Telecommunication Engineering**

1. **Module code: WASA2522**
2. **Module Title: Web Application and Site Administration**
3. **Level: 2 Semester: 2 Credits: 15 First year of presentation: 2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   Fundamentals of Computer Science and Programming, Database Management Information System

6. **Allocation of study and teaching hours:**

Activities	**Learning hours**	**Teaching hours**
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of Aims

Module consists of two components “Internet” and “Web Design and Development Tools”.

#1. This unit deals with concepts of internet, e-mails, web pages, internet protocols, equipment used for internet connectivity, providing domain names, etc.
#2. This unit deals with all the internet technologies. Student must be familiar with some of the latest concepts of internet, in-depth knowledge is not required but layery information will be enough. In response to a stated business problem, students will be able to create a complete Web-based solution. This course also covers using Dreamweaver to create Web pages.

7.2 Learning outcomes

Students who complete this course should be able to perform the following tasks:

1. Describe internet and its features
2. Configure web servers in Linux
3. Understand mobile internet technologies
4. Create and manage web contents and interfaces
5. Illustrate HTML codes for creating web applications

6. Create and format web sites using Dreamweaver

8. INDICATIVE CONTENT

#1. Internet

Internet characteristics, Definitions and Concepts

Internetworks

Materials/equipment of connectivity (vsat, dial up, ISDN, Tx, Wlan, fiber optic etc…)

Internet Protocols (TCP/IP,)

IP Addressing and NAT

Networks Multi-media Web

Upload/Download

Servers: Hide/proxy, Web, ftp, DNS, email, dhcp etc…

Internet Security and Firewalls

Wimax configuration

Web servers & services configuration under Linux

The ISPs

Mobile Internet (Wifi, Wimax, Bluetooth, Wlan, Access point, Base Stations, bridge etc...)

Web

- Web Content Management
- Sites Web, mails, sms, chart, research,
- Multimedia Content (streaming, http, downloading)
- Web Interface and its ergonomics
- Domain name and Domain name Registration and Activation (local and general NIC with AfriNIC)

Web 2

- Internet, the web and the regulations
- Internet, the web and the ethics

#2. Web Design and Development Tools

General HTML resources link list, Moving into custom page design skills, HTML manual coding (HTML Frames, HTML style sheets), Graphics design and tools for HTML (Layout tips and optimization, Image sources available for free download and use, Optimizing image downloads (download speed vs. viewing quality), Image mapping (linking web pages and explanations to details within page images), Making animated GIF images, graphics design and tools, dynamic html, multimedia: audio, video, speech synthesis and recognition, client-side scripting, vbscript, javascript.
Creating a web site with dreamweaver, create and edit web pages with dreamweaver create web pages that include links, tables, graphics, and frames, use dreamweaver templates to create and modify web pages, insert and use dreamweaver elements in web pages, properties box, tag chooser, code a simple page in html, code view, design view, compare the code, text: colors, fonts, size, positioning, images: inserting, sizing, v-space, h-space, tables: creating, modifying, manipulating, rollovers, cascading style sheets, site structure.

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 100 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Formative assessment is by means of regular tutorial exercises. Feedback to students on their solutions and their progress towards learning outcomes is provided during lectures and tutorial classes. The major component of summative assessment is the written examination at the end of the module. This gives students the opportunity to demonstrate their overall achievement of learning outcomes. It also allows them to give evidence of the higher levels of knowledge and understanding required for above average marks.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-6
Final exam	40%	1-6

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

Core Text (include number in library or URL) (inc ISBN)

- Wille, Kohler, and Archer (1999). *Sams Teach Yourself Web Development with ASP*. Sams Publishing Co.
- Musciano and Kennedy (2000) *HTML and XHTML: The Definitive Guide*. O'Reilly and Associates.
- Susan Fowler and Victor Stanwick, Web application Design handbook. Best practices for web-based Software, 2004.

14. TEACHING TEAM

Mr NSENGIYUMVA Jeam Marie Vianney,MSc in Information Systems.

1. **Module code: IMDS2522 Faculty: FST**
2. **Module Title: Database Management and Information Systems**
3. **Level: 2 Semester: 2 Credits: 15 First year of presentation:2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   Computer Fundamentals, Linear Algebra.

6. **Allocation of study and teaching hours:**

Activities	**Learning hours**	**Teaching hours**
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting,marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 Description of aims

This module consists of two units #1.Database management system and #2. Information Management.

#1. The primary aim of the subject is to provide the students a deeper understanding of the relational database model by exposing the students to a variety of important issues of data base management, e.g., database design, physical storage, query optimization, database recovery, concurrency control, security and data integrity.

#2. This course will provide the students with an understanding of the principles of information systems technology and its impact on the strategic goals and direction of the organization. They will learn how MIS concepts are applied in business and how information systems can provide solutions to the entire organization.

7.2 Learning Outcomes

Having successfully completed the module, students should be able to:

1. Identify various types of database models.
2. Describe the relational database model.
3. Identify entities, relationships and attributes.
4. Perform normalization up to the third normal form.
5. Use structured query language to access database record.

6. Understand the principles of information systems technology and its impact on the strategic goals and direction of the organization.
7. Ability to implement a management application.

8. INDICATIVE CONTENTS

#1. Database management system

- Introduction to DBMS
- Introduction to DBMS, Architecture of DBMS, Components of DBMS, Traditional data Models (Network, Hierarchical and Relational), Database Users, Database Languages, Schemas and Instances, Data Independence
- Data Modeling
- Entity sets attributes and keys, Relationships (ER), Database modeling using entity, Weak and Strong entity types, Enhanced entity-relationship (EER), Entity Relationship Diagram Design of an E-R Database schema Object modeling, Specialization and generalization
- Relational database model
- Basic Definitions, Properties of Relational Model, Keys, Constraints, Integrity rules, Relat ional Algebra, Relational Calculus.
- Relational Database Design
- Functional Dependencies, Normalization, Normal forms (1st, 2nd, 3rd, BCNF), Lossless decomposition, Join dependencies.
- Query Language
- SQL Components (DDL, DML, DCL), SQL Constructs (Select…from…where…. group by…. having…. Order by…), Nested tables, Views
- Concurrency control, Database recovery.
- Distributed database systems.
- Database transactions and management.
- Data security and integrity.

#2 Information Systems

- Introduction to MIS
- Ethical and Social Issues
- Information Technology Infrastructure
- Information Systems

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 50 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.
- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-7
Final exam	40%	1-7

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).
- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- Elmasri & Navathe Fundamental of Database Systems, Pearson Education, 2006
- Leon & Leon, Data Base Management System, Vikas Publications, 2003
- Korth & Sudarshan, Database System Concepts, 5 edit.TMH, 2005
- Laudon and Laudon, Management Information Systems, 12edit, Prentice Hall, 2012.

14. TEACHING TEAM

Mr NSENGIYUMVA Jean Marie Vianney, **MSc in Information Systems**

1. **Module code: SEPM3513**
2. **Module Title: Software Engineering and Project Management**
3. **Level: 3 Semester: 1 Credits: 20 First year of presentation:2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**

Introduction to computer science, Database Design & Management

6. **Allocation of study and teaching hours:**

Activities	**Learning hours**	**Teaching hours**
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting, marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 Description of Aims

Module consists of three units #1. Software Engineering Concepts, #2. Software Project Management

#1. This unit will provide the foundation of systems analysis and design by covering requirements analysis for both commercial and technical applications. It will also introduce the data and functional modeling techniques, which students can be expected to use.

#2. In this unit one has to learn the software processes life cycle models prototype, evolutionary and spiral models. Here one has to go through software planning, Process management, Effort Estimation and scheduling, risk management, organizational behaviour, and configuration management.

7.2 Learning Outcomes

Having successfully completed the module, students should be able to

1. Apply guidelines for the design of application software and user interfaces.
2. Apply the principles of program design (involving the design and development of a range of objects) to the construction of a significant piece of software, justifying the design decisions made at each stage and addressing the relevant quality issues.

3. Identify the basic techniques that result in efficient and effective ways of building large software systems and be able to use those techniques in practice.
4. Apply the principles associated with the design and development to a range of web applications.
5. Outline the theories that underpin the design and development of human-computer interfaces.
6. Assess in a systematic fashion the quality of the interfaces in a range of software systems.
7. Discuss the properties of good software design.
8. Compare and contrast object-oriented analysis and design with structured analysis and design.
9. Evaluate the quality of multiple software designs based on key design principles and concepts.
10. Select and apply appropriate design patterns in the construction of a software application.
11. Create and specify the software design for a medium-size software product using a software requirement specification, an accepted program design methodology (e.g., structured or object-oriented), and appropriate design notation.
12. Conduct a software design review using appropriate guidelines.
13. Evaluate a software design at the component level.
14. Evaluate a software design from the perspective of reuse.
15. Explain the value of application programming interfaces (APIs) in software development.
16. Use class browsers and related tools during the development of applications using APIs.
17. Design, implement, test, and debug programs that use large-scale API packages.

8. INDICATIVE CONTENTS

#1. Introduction to Software Engineering

- Introduction to Software Engineering
- Software processes
- Requirements engineering
- System analysis

- Architectural design
- Design and implementation (Use of CASE tools such as UML)
- Software testing
- Software evolution

#2. Software project management

- Project management
- Project planning
- Quality management
- Configuration management
- Process measurement
- Risk management
- Organizational behavior (Motivation theories)

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

*Practical: E*xamples of projects that used different software engineering techniques, seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.

- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-20
Final exam	40%	1-20

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

Prescribed textbook (P):

- Roger S. Pressman, Software Engineering: A Practitioner's Approach, Sixth Edition, McGraw-Hill, 2009
- Ian Sommerville, Software Engineering, 6th Edition, Addison Wesley. 2008

14. Teaching Team

Mr Bizimungu Theogene, **MSc In Software Engineering**

1. **Module Code: NETW3513**
2. **Module Title: Networking**
3. **Level: 3 Semester: 1 Credits: 20 First year of presentation: 2012**
4. **Administering Faculty: FST**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   Knowledge in Operating Systems, Computer Architecture and Electrical and Digital Circuits.

6 Allocation of study and teaching hours

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting, marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of aims

The aim of this module is to introduce the key of computer networks, design & administration of integrated communication networks using CISCO Devices and network management.

7.2 LEARNING OUTCOMES

Having successfully completed the module, students should be able to:

1. Discuss important network standards in their historical context.
2. Describe the responsibilities of the layers of the ISO reference model.
3. Discuss the differences between circuit switching and packet switching along with the advantages and disadvantages of each.
4. Explain how a network can detect and correct transmission errors.
5. Illustrate how a packet is routed over the Internet.
6. Install a simple network with two clients and a single server using standard host configuration software tools such as DHCP.

7. Discuss the fundamental ideas of network security
8. Summarize common authentication protocols.
9. Gain knowledge in Network management basics, Network standards, Internet management, SNMP, Designing and Administrating networks
10. Understand the basic principles that underpin network management associated with integrated communications networks.

8. INDICATIVE CONTENT

#1. Computer Networks

- Network standards and standardization bodies The ISO 7-layer reference model in general and its instantiation in TCP/IP, Types of Networks, Circuit switching and packet switching
- Streams, datagrams and Physical layer networking concepts (theoretical basis, transmission media, standards) Data link layer concepts (framing, error control, flow control, protocols) Internetworking and routing (routing algorithms, internetworking, congestion control) Transport layer services (connection establishment, performance issues)
- Subnetworking

#2. Network Design (Cisco)

- Overview of Network Administration
- Review of computer network technology
- Distributed System Concepts
- Network management: standards, models, languages
- Static routes
- Network Routing Protocols (RIP, EIGRP,OSPF)
- Network management tools, systems, applications
- Web based network management
- Router configuration
- Design project: Design of a network, and its supervision for a medium-sized company.

#3. Network Management

- SNMP (Simple Network Management Protocol) versions 1, 2, and 3
- Network Communication Devices.
- Network Monitoring (CACTI, MRTG, WIRESHARK)
- Network Management Tools (Installation of DNS, DHCP, WEB SERVER, FILE SERVERS…)
- VLAN Management

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups using Cisco packet tracer 6.0

Self-study: Students are also expected to undertake private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.
- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-10
Final exam	40%	1-10

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).
- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

Core Text (include number in library or URL) (inc ISBN)

J.Irvine & D.Harle, Data Communications & Networks: An Engineering Approach, 2001
J. Kurose & K. Ross, Computer Networking, 6edit, Addison Wesley, 2012
M. Subramanian "Network Management: Principles & Practice", Addison Wesley
Cisco materials (CCNA), 2010
Subramanian, Mani: *Network Management: An introduction to principles and practice.* Addison-Wesley, 2000.

14. Teaching team

Mr Jean Marie Vianney NSENGIYUMVA, MSc

1. **Module Code: SSPE3513**
2. **Module Title: Server-side Programming and E-commerce**
3. **Level: 3 Semester:1 Credits: 20 First year of presentation:2012-2013**
4. **Administering School: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**

   The module requires the knowledge in computer architecture, programming fundamentals such as in Visual basic, C, C++ and Java.

6. **Allocation of study and teaching hours**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. **BRIEF DESCRIPTION OF AIMS AND CONTENT**
   7.1 Description of aims

Module consists of two units:
#1. Overview of server-side programming languages;

#2. Electronic commerce “e-commerce”;

1. The first unit of overview of server-side programming languages offers a broad overview of server-side programming. The unit is divided into three parts which are the following: **web page client scripting**, **web page server-side scripting** and an **introduction to database**.

2. The second unit introduces the fundamental concepts of e-commerce and its general framework.

7.2 LEARNING OUTCOMES

After the completion of this course, a student will be equipped with the following:

1. A critical understanding of the theory: client/server architecture, concept of programming, programming languages and their scope and diversity
2. An ability to apply the theory in the production of server applications such as database applications
3. Problem solving ability, including appropriate programming competence.
4. Knowledge of client scripting and server-side scripting.
5. Able to analyze the complex problem and then; through client scripting and server-side scripting, the student is able design suitable application to solve the problems.
6. Also able to learn recent techniques and apply them in production of effective solutions.

8. INDICATIVE CONTENT

1. "Server side programming"

Web design techniques, Server side programming using PHP and MySQL, SMS applications and an overview of existing CMSs and framework for simplifying server-side applications.

Mainly the unit provides students with the knowledge and skills to develop and maintain dynamic Web pages. HTML, XHTML, XML, Cascading Style Sheets, and JavaScript are introduced as client-side techniques. Server-side programming techniques are examined especially Ajax and PHP and MySQL. The students create Web pages that collect and validate data.

2. "E-COMMERCE"

E-Commerce and its Technological Aspects, Internet Based E-Commerce: Issues, Problems and Prospects, Electronic Payment Systems, Protocols for Electronic Payment Systems, Security Implications, and Cornerstones of Security (Authenticity, Privacy, Integrity, and Non-repudiation).

9. LEARNING AND TEACHING STRATEGY

The teaching is done by theoretical and practices in laboratory lectures and exercises to do in the classroom and at home to ensure that the material has been understood and assimilated. Organize explanation sessions. Give a test when the course is sufficiently advanced and at the end of the course.

10. ASSESSMENT STRATEGY

-
- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-6
Final exam	40%	1-6

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).
- Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

1. Robin Nixon, Learning PHP, MySQL, and JavaScript: A Step-By-Step Guide to Creating Dynamic Websites, 2012.
2. Luke Welling, Laura Thomson**,** PHP and MySQL Web Development, 4th Edition, 2008
3. Larry Ullman**,** PHP 6 and MySQL 5 for Dynamic Web Sites, 2011
4. PHP Solutions: Dynamic Web Design Made Easy by David Powers
5. Beginning PHP and MySQL: From Novice to Professional (Expert's Voice in Web Development) by W. Jason Gilmore
6. PHP Cookbook: Solutions and Examples for PHP Programmers by Adam Trachtenberg, David Sklar
7. K.C. Laudon & e.G. Traver, E-commerce, Pearson Education, 2003
8. R. Kalakota & A.B.Whiilston-' Frontiers of Electronic Commerce, Pearson Education- 2006.
9. K.K.Bajaj & D.Nag- E-Commerce, Tata McGraw Hill, New Delhi , Second Edition

14. Teaching team

Mr UWAYEZU Jean de Dieu, MSc

Mr NSENGIYUMVA Jean Marie Vianney,MSc

1. Module Code: HCIN4522

2. Module Title: Human-Computer Interaction

3. Level: 4 Semester: 2 Credits: 15 First year of presentation: 2013

4. Administering Faculty: Faculty of Science and Technology

5. Pre-requisite or co-requisite modules, excluded combinations

Introduction to Computer Programming and Operating System.

6. Allocation of study and teaching hours

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting, marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 DESCRIPTION OF AIMS

Module consists of three units "Foundations of human-computer interaction", "Graphical user interface design" and "Ergonomics" combined into one course "Human-Computer Interaction".
This entire course presents a comprehensive introduction to the principles and techniques of human-computer interaction.

7.2 LEARNING OUTCOMES

Having successfully completed the module, students should be able to:

1. Identify several fundamental principles for effective GUI design.
2. Use a GUI toolkit to create a simple application that supports a graphical user interface.
3. Applying User Centred Design Techniques to build Standalone and Web Application User Interface in Java Swing and Servlet/JSP
4. Illustrate the effect of fundamental design principles on the structure of a graphical user interface.

5. Conduct a simple usability test for each instance and compare the results.

8. INDICATIVE CONTENT

Topics:

- Motivation: Why care about people?
- Contexts for HCI (tools, web hypermedia, communication)
- User-centred development and evaluation
- Human performance models: perception, movement, and cognition
- Human performance models: culture, communication, and organizations
- Accommodating human diversity
- Principles of good design and good designers; engineering tradeoffs
- Introduction to usability testing
- Principles of graphical user interfaces (GUIs)
- GUI toolkits

Course "Human-Computer Interaction**"**

- Foundations of human-computer interaction: Motivation; contexts for HCI; human centred development and evaluation; human performance models; human performance models; accommodating human diversity; principles of good design and good designers; engineering tradeoffs; introduction to usability testing
- Human-centred software evaluation: Setting goals for evaluation; evaluation without users; evaluation with users
- Human-centred software development: Approaches, characteristics, and overview of process; functionality and usability; specifying interaction and presentation; prototyping techniques and tools
- Graphical user-interface design: Choosing interaction styles and interaction techniques; HCI aspects of common widgets; HCI aspects of screen design; handling human failure; beyond simple screen design; multi-modal interaction; 3D interaction and virtual reality

- Graphical user-interface programming: Dialogue independence and levels of analysis; widget classes; event management and user interaction; geometry management; GUI builders and UI programming environments; cross-platform design
- HCI aspects of multimedia systems: Categorization and architectures of information; information retrieval and human performance; HCI design of multimedia information systems; speech recognition and natural language processing; information appliances and mobile computing
- HCI aspects of collaboration and communication: Groupware to support specialized tasks; asynchronous group communication; synchronous group communication; online communities; software characters and intelligent agents

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 100 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.
- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

CoSmponent	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-5
Final exam	40%	1-5

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

- Analyzing the results of Assessment to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

Core Text (include number in library or URL) (inc ISBN)

- J. Preece, Y. Rogers, H. Sharp, D. Benyon, S. Holland, T. Carey, Human-Computer Interaction: Concepts And Design, by, Addison Wesley,

- Alan J. Dix & co, Human-Computer Interaction, 2nd Edition, by, Prentice Hall, 2003
- Hans & Al, Intuitive Human-Computer Interaction-Toward User-Friendly Information, 2002

14. Teaching team

Mr Majyambere Silas, MSc

1. **Module Code: RMTW4521**

2. **Module Title: Research Methodology and Technical Writing**

3. **Level: 4 Semester: 2 Credits: 10 First year of presentation: 2013**

4. **Administering Faculty: Faculty of Science and Technology**

5. **Pre-requisite or co-requisite modules, excluded combinations**

   Study skills, Probability and Statistics, Software Engineering etc..

6. **Allocation of study and teaching hours**

Activities	Learning hours	Teaching hours
Face to face lectures	72	36
Student support hours	48	24
Preparation hours	-	60
Setting,marking assignments and exams + Invigilation	-	30
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	150

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 DESCRIPTION OF AIMS

Course will review the major considerations and tasks involved in conducting scientific research, particularly in the area of computer science. It introduces the essential aspects of designing, supporting, and conducting a research project. Those who successfully complete the course will be able to: produce a well-developed research proposal: select an appropriate methodology with which to conduct the research and defend the methodology of their selection; understand the various tasks required to carry out the research; find the resources needed to guide them through the research process and the documentation of its findings.

7.2 LEARNING OUTCOMES

Successful students will be able to

1. to explain the scientific method,
2. create a research plan,
3. design and conduct experimental studies in Computer Science,
4. Write in academic style, and give academic presentations.

8. INDICATIVE CONTENT

0. Introduction
1. Computer Science & Engineering research
2. Levels of Research
3. The literature review
4. Selecting a research area
5. Writing a scientific research paper

9. TEACHING STRATEGIES AND METHODOLOGY

The course will be delivered by class lectures, class discussions and seminars.

10. ASSESSMENT STRATEGY

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.
- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-4
Final exam	40%	1-4

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of Assessment to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- Weaver, P. (2004). *Success in your Project: a Guide to Student System Development Projects.*, Prentice-Hall

- Galliers, R. (1992). *Information Systems Research: Issues, Methods and Practical Guidelines,* Blackwell Scientific

- Cornford, R. and Smithson, S. (1996). *Project Research in Information Systems: A Students Guide,* Macmillan

- Dawson, C. (2000). *The Essence of Computing Projects, a Students' Guide*, Pearson

- Blaxter, L., Hughes, C. & Tight, M. (1998). *How to Research*, OU Press

Background Texts (include number in library or URL) (inc ISBN)

Gillham, B. (2000). *The Research Interview*, Continuuum

Gillham, B. (2000). *Developing a Questionnaire,* Continuum

Gillham, B. (2000). *Case Study Research Methods*, Continuum

Kumar, R. (1999). *Research Methodology A Step-by-Step Guide for Beginners*, Sage

14. Teaching team
Mr Nsengiyumva Cyprien, MSc

1. **Module code: GMUL4523**
2. **Module Title: Graphics and Multimedia**
3. **Level: 4 Semester: 2 Credits: 20 First year of presentation: 2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**

Fundamemtals of computer science and programming and linear algebra

6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 DESCRIPTION OF AIMS

Module consists of three courses "#1. Computer Graphics" "#2. Digital Imaging" "#3. Multimedia Applications"

#1. Offers an introduction to computer graphics, which has become an increasingly important area within computer science. Computer graphics, particularly in association with the multimedia aspects of the World-Wide Web, have opened up exciting new possibilities for the design of human-computer interfaces. The purpose of this course is to investigate the principles, techniques, and tools that have enabled these advances.

#2. This unit describes all the important aspects of the Photo Editing and Graphic Designing. It provides the basic concepts of the Photoshop Environment and how to use Photoshop.
This course includes also an introduction to creating visual and interactive web pages using animation. The student will use a vector based web animation program to draw, import and prepare graphics for web movies.

#3. This unit provides information about Raster and vector graphics systems, video display devices, physical and logical input devices, issues facing the developer of graphical systems, simple color model homogenous coordinates, viewing transformation and clipping.

7.2. LEARNING OUTCOMES

Students who complete this course should be able to perform the following tasks:

1. Offer a meaningful critique of graphical and multimedia interfaces that incorporates an understanding of the principles of HCI design.
2. Apply the principles that underpin the design of graphics and multimedia systems.
3. Describe the range of tools that can be used to support the development of graphical and multimedia systems.
4. Use existing graphics and multimedia packages to develop appropriate graphical applications.
5. Describe graphic media file format characteristics such as color depth, compression, etc.,
6. Describe how to create and edit images using photoshop.
7. Work with different tools of photoshop and can perform effectively with animation and sound files.
8. For each of several media or multimedia standards, describe in non-technical language what the standard calls for, and explain how aspects of human perception might be sensitive to the limitations of that standard.
9. Evaluate the potential of a computer system to host one of a range of possible multimedia applications, including an assessment of the requirements of multimedia systems on the underlying networking technology.
10. Describe the characteristics of a computer system (including identification of support tools and appropriate standards) that has to host the implementation of one of a range of possible multimedia applications.
11. Implement a multimedia application of modest size.

8. INDICATIVE CONTENT

#1. Computer Graphics

- Graphic systems: Raster and vector graphics systems; video display devices; physical and logical input devices; issues facing the developer of graphical systems

- Fundamental techniques in graphics: Hierarchy of graphics software; using a graphics API; simple color models; homogeneous coordinates; affine transformations; viewing transformation; clipping

- Graphical algorithms: Line generation algorithms; structure and use of fonts; parametric polynomial curves and surfaces; polygonal representation of 3D objects; parametric polynomial curves and surfaces; introduction to ray tracing; image synthesis, sampling techniques, and anti-aliasing; image enhancement

- Principles of human-computer interaction: Human-centered software development and evaluation

• Graphical user-interface design: Choosing interaction styles and interaction techniques; HCI aspects of interface design; dynamics of color; structuring a view for effective understanding

• Graphical user-interface programming: Graphical widgets; event management and user interaction; GUI builders and programming environments

• Computer animation: Key-frame animation; camera animation; scripting system; animation of articulated structures; motion capture; procedural animation; deformation

• Multimedia techniques: Sound, video, and graphics; design of multimedia systems; tools for multimedia development; virtual reality

#2. Digital Imaging

- Digitization process, The Photoshop Workplace Use of Menus, Palettes and Toolbox, Creating New Images, Using Selections and Channels-Selection Tools, Lasso Tools, Direction selection Tool, Convert Point Tool, Use the channels palette to save Selections, Using Layers, and Editing Images.

- Flash: Vector bitmap graphics stage and the timeline window, library window, creating a new movie, drawing and painting with pencil tools, brush, drawing straight lines, ovals and rectangles, creating custom line width and style using the paint bucket tool, working with objects and filling the objects, rotating and viewing the objects, flash movies, creating layers using instant overview, creating key frames, editing actions, creating forms, importing sound, interactive animations.

#3. Multimedia Applications

- Graphic systems, fundamental techniques in graphics, graphical algorithms, principles of human computer interaction, graphical interface, graphical user-interface design.
- Computer animation (key-frame animation, camera animation, scripting system, animation of articulated structures, motion capture; procedural animation, deformation).
- Multimedia techniques (sound, video, and graphics, design of multimedia systems, tools for multimedia development, virtual reality and tools, future trends, technology of games development), line generation algorithms, use of fonts, polynomial curves, polygonal representations, image synthesis, sampling techniques, image enhancement, design/programming, GUI builders and programming environment and transformation.

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 100 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Formative assessment is by means of regular tutorial exercises. Feedback to students on their solutions and their progress towards learning outcomes is provided during lectures and tutorial classes. The major component of summative assessment is the written examination at the end of the module. This gives students the opportunity to demonstrate their overall achievement of learning outcomes. It also allows them to give evidence of the higher levels of knowledge and understanding required for above average marks.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-11
Final exam	40%	1-11

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

Core Text (include number in library or URL) (inc ISBN)

-Macromedia Flash 8 a Tutorial guide by jay armstrong, jen dehaan 2005
-Photoshop® CS3 for Dummies® Published by Wiley Publishing, Inc. 2007 by Wiley Publishing, Inc.,

13.Teaching team

Mr UWIMANA Jean Pierre,MSc in Information Technology

1. **Module code: SAWN4522**
2. **Module Title: System Administration and Wireless Network Administration**
3. **Level: 4 Semester: 2 Credits: 15 First year of presentation: 2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**
   Networking, Operating system, Fundamental of Computer Science

6. ALLOCATION OF STUDY AND TEACHING HOURS:

Activities	Learning hours	Teaching hours
Face to face lectures	72	54
Student support hours	48	36
Preparation hours	-	90
Setting,marking assignments and exams + Invigilation	-	45
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	225

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 DESCRIPTION OF AIMS

This module consists of two units: #1. Wireless Network administration and #2. System administration.

7.2 LEARNING OUTCOMES

On successful completion of this module the learner will be able to

1. Describe the fundamentals of system administration.
2. Install and administer an operating system.
3. Explain the structure of a file system.
4. Manage users and groups.
5. Administer secondary storage management.
6. Differentiate wired and wireless networks.
7. An ability to apply the theory
8. Problem solving ability.
9. Skills in the use of lab.
10. Understanding of scientific method and its ethos.

8.INDICATIVE CONTENTS

#1. Wireless network administration

Overview of wireless standards, organizations and fundamentals, Introduction to networking, Radio frequency fundamentals, Multiplexing, IEEE 802.11 standards, WLAN topologies, 802.11 medium access, 802.11 MAC architecture, wireless security, Wireless lab.

#2. System administration

Describe the fundamentals of system administration, Install and administer an operating system, Explain the structure of a file system, Manage users and groups, Administer secondary storage management, install and manage FIREWALL, DHCP, DNS, FILE SERVER, WEB SERVER,...

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Understanding of scientific method and its ethos.
- Numeracy as shown by problem solving skills.

- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-11
Final exam	40%	1-11

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- Wale Soyinka, "Wireless Network Administration A Beginner's Guide" 2010.
- Jochen Schiller, Mobile communications, second edition, 2003.
- Link: http://www.pdfbooksplanet.org/engineering-and-technology.

14. TEACHING TEAM

Mr Bizimungu Theogene, MSc

1. **Module code:AIGP 5513**
2. **Module Title: Artificial Intelligence and Game programming**
3. **Level: 5 Semester: 1 Credits: 20 First year of presentation: 2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**

   Fundamental of Computer Science and Computer Programming, Operating System and Computer Architecture, Data Structure and Algorithm.

6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. **BRIEF DESCRIPTION OF AIMS AND CONTENTS**

7.1 DESCRIPTION OF AIMS

Module consists of two courses “Artificial Intelligence” and “Game Programming”

#1. This course provides the fundamental tools for the field of Artificial Intelligence and the application of these tools.

#2. Introduces the fundamental concepts of game programming.

7.2 LEARNING OUTCOMES

Students will be expected to:

1. Understand artificial intelligence concept
2. Understand problem solving techniques using intelligent computer systems
3. Apply knowledge presentation techniques and Artificial intelligence tools to create intelligent computer systems.

8.Indicative Contents

#1. “Artificial intelligence”

Techniques of artificial intelligence.; Historical perspective of AI: Problems: problem spaces and search; knowledge representation: knowledge based and experimental systems; intelligence agents; game playing; planning; robotics; natural language understanding and speech recognition; expert systems; machine learning; adaptive systems; vision. Artificial intelligence tools: Introduction to Prolog, LISP.

#2. "Introduction to game programming"
Applications of Artificial intelligence including game programming

9.Learning and Teaching Strategy

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10.Assessment strategy

Assessment criteria

The major component of summative assessment is the written examination at the end of the module. Formative assessment is by means of regular tutorial exercises. Feedback to students on their,

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and solve problems in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.

- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. Assessment Pattern

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-3
Final exam	40%	1-3

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.

- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. Indicative Resources

- Peter Norton, Introduction to Computers, Irwin Professional, 6th Edition, 2005
- David Reed, Balanced Introduction to Computer Science, A, 2/E, Prentice Hall, 2008.
- Yaswant Kanethekar, Let us C, , 4th Edition, 2008

14. Teaching team

Mr UWAYEZU Jean de Dieu, MSc

1. **Module Code: CISE5513**
2. **Module Title: Cryptography and Information Security**
3. **Level: 5 Semester: I Credits: 20 First year of presentation: 2012**
4. **Administering Faculty: FST**
5. **Pre-requisite or co-requisite modules, excluded combinations**

   Networking and data structure and algorithm
6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. BRIEF DESCRIPTION OF AIMS AND CONTENTS

7.1 DESCRIPTION OF AIMS

This course includes three sub modules that are, "#1. Cryptography" " #2. Information security"

#1. Cryptography

This course aims to concentrate on operational issues, policies and procedures, attacks and defense mechanisms, risk analyses, recovery, and information security.

#2. Information Security

This course will provide an introductory course on security and privacy issues related in dara-related applications. This course also provides students an understanding of design principles and implementation techniques for information security and privacy in databases. After taking the course, students are expected to to understand security vulnarabilities and privacy breaches in databases and the design of defence countermeasures and privacy mechanisms for the databases.

7.2 LEARNING OUTCOMES

At the end of the module students will be able to perform the following tasks:

1. Describe efficient basic number-theoretic algorithms, including greatest common divisor, multiplicative inverse mod n, and raising to powers mod n.
2. Describe at least one public-key cryptosystem, including a necessary complexity theoretic assumption for its security.
3. Create simple extensions of cryptographic protocols, using known protocols and cryptographic primitives.
4. Discuss the fundamental ideas of public-key cryptography.
5. Describe how public-key cryptography works.
6. Distinguish between the use of private- and public-key algorithms.
7. Summarize common authentication protocols.
8. Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
9. Summarize the capabilities and limitations of the means of cryptography that are conveniently available to the general public.

8. INDICATIVE CONTENTS

#1. Cryptography

- Historical overview of cryptography
- Private-key cryptography and the key-exchange problem
- Public-key cryptography
- Digital signatures
- Security protocols
- Applications (zero-knowledge proofs, authentication, and so on)
- Prime numbers

#2. Information Security

- Definition of information systems security, security threats, breaches, threat analysis and counter measures.
- Definition and classification of programmed threats alongside preventive measures.
- Security in operating systems, Database security, and Web security.
- Firewall design and implementations and related issues.
- Security in e-payments. Case studies.
- VPN, IPSEC

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

The major component of summative assessment is the written examination at the end of the module. Formative assessment is by means of regular tutorial exercises. Feedback to students on their,

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and solve problems in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.
- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-5
Final exam	40%	1-3

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- V. K. Pachghare, Cryptography And Information Security, 2008.
- William Stallings, Cryptography and Network Security, Fourth Edition.
- Bishop. M. Computer Security : Arts and Science, Addision –Wesley, 2003
- Pfleeger, C. P. Pfleeger, S. L., Security in Computing, Third Edition, Printice-Hall, 2002.

14. Teaching team

Majyambere Silas, MSc
Mr Bizimungu Theogene, MSc

1. **Module Code: ESMC5523**
2. **Module Title: Embedded Systems and mobile computing**
3. **Level: 5 Semester:2 Credits: 20 First year of presentation: 2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**

Previous modules of Networking, Computer architecture, system administration and wireless network administration

6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. **BRIEF DESCRIPTION OF AIMS AND CONTENTS**

7.1 DESCRIPTION OF AIMS

This course includes two components that are, "#1.Embedded Systems" "#2. Wireless and mobile computing"

#1. Embedded Systems

This unit introduces students to the concept of embedded systems and the problems associated with programming within this framework.

#2 Mobile computing and Wireless

This course is designed to provide knowledge about mobile networking and its managements. And also to make the students understand the mobile network traffic and to implement simple mobile applications.

7.2 LEARNING OUTCOMES

At the end of the module students will be able to perform the following tasks:

1. Explain the concepts of distributed operating systems, network operating systems, and other network communication systems.
2. Describe the application layer protocols, distributed processes, distributed synchronization, and distributed object based systems.
3. Describe the main characteristics of mobile IP and explain how differs from IP with regard to mobility management and location management as well as performance.
4. Illustrate (with home agents and foreign agents) how e-mail and other traffic is routed using mobile IP.
5. Implement a simple application that relies on mobile and wireless data communications.
6. Describe areas of current and emerging interest in wireless and mobile computing, and assess the current capabilities, limitations, and near-term potential of each.

8. INDICATIVE CONTENT

#1. "Embedded Systems"

- Basics Concepts of Embedded Systems
- Typical Hardware required for Embedded Systems
- Interrupts and Software Architecture
- Embedded Software Development Tools: Host and Target Machines
- Linker/Locators For Embedded System
- Debugging Techniques: Testing on the Host Machine
- Instruction Set Simulators, The Assert Macro, Using Laboratory Tools.

#2 Mobile computing

- The special problems of wireless and mobile computing
- Wireless local area networks and satellite-based networks
- Wireless local loops
- Mobile Internet protocol
- Mobile aware adaption
- Extending the client-server model to accommodate mobility
- Mobile data access: server data dissemination and client cache management
- Software package support for mobile and wireless computing
- The role of middleware and support tools
- Performance issues

- Emerging technologies

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.
- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1,3,5
Final exam	40%	1-6

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

http:/ / www. st. com/ stonline/ books/ pdf/ docs/ 4966. pdf
http:/ / www. vlsichipdesign. com
http:/ / embedded-system. net/ reference/ what-is-embedded-system/
http:/ / www. nabble. com/ MicroControllers-f2055. html
http:/ / www. embeddedstar. com/
http:/ / www. endtas. com/ robot
http:/ / embedded. com/

http:/ / embedded. com/ design/ multicore/ 201200638
http:/ / www. eg3. com/
http:/ / www. norcom-electronics. com/ electronics_tutorials. php

14. **TEACHING TEAM**

Mr Jean de Dieu Uwayezu, MSc

1. **Module Code: PDSY5513**
2. **Module Title: Parallel and Distributed System**
3. **Level: 5 Semester: 1 Credits:20 First year of presentation: 2012**
4. **Administering Faculty: Faculty of Science and Technology**
5. **Pre-requisite or co-requisite modules, excluded combinations**

   Previous modules of computer architecture & data communication network.
6. **Allocation of study and teaching hours:**

Activities	Learning hours	Teaching hours
Face to face lectures	72	72
Student support hours	48	48
Preparation hours	-	120
Setting,marking assignments and exams + Invigilation	-	60
Self-directed readings	20	-
Preparation and writing assignments	30	-
Revision and writing exams	30	-
	200	300

7. **BRIEF DESCRIPTION OF AIMS AND CONTENT**

7.1 DESCRIPTION OF AIMS

This course includes three sub modules that are, "#1. Parallel systems""#2. Distributed systems" and "#3. Parallel and distributed Algorithms"

#1. Parallel Systems

Understanding and operating with parallel systems topics involving concepts, architectures and programming models.

#2. Distributed Systems

Understanding and operating with distributed systems topics involving concepts, architectures and programming models.

#3. Parallel and Distributed Algorithms

This course provides under graduate students in computer science with experience of parallel and distributed computing. It gives an overview of parallel and distributed computers, and parallel

computation. The course addresses architectures, languages, environments, communications, and parallel programming. Emphasis on understanding parallel and distributed computers and portable parallel programming with MPI.

7.2 LEARNING OUTCOMES

At the end of the module students will be able to perform the following tasks:

1. Describe the various paradigms and architectures of parallel and distributed systems
2. Describe the different parallelization techniques
3. Describe how to manage load in a parallel system
4. Analyze a given application/problem and implement a parallelization strategy
5. Knowledge of advanced concepts, paradigms and models for building distributed systems
6. Write MPI programs and implement them on a cluster computer
7. Students will be able to develop models of evaluation of modern distributed systems.
8. Explain the distributed paradigm.
9. Explain one simple distributed algorithm.
10. Determine when to use consensus or election algorithms.
11. Distinguish between logical and physical clocks.
12. Describe the relative ordering of events in a distributed algorithm.
13. Describe implementation of linked lists on a PRAM.
14. Use parallel-prefix operation to perform simple computations efficiently in parallel.
15. Explain Brent's theorem and its relevance.

8. INDICATIVE CONTENT

#1. "Parallel systems" & #2." Distributed systems"

Concurrency and synchronization; architectural support; programming language constructs for parallel computing; parallel algorithms and complexity; messages vs. remote procedure calls vs. shared memory models; structural alternatives (e.g., master-slave, client-server, fully distributed, cooperating objects); coupling (tight vs. loose); naming and binding; verification, validation, and maintenance issues; fault tolerance and reliability; replication and availability; security; standards and protocols, temporal concerns (persistence, serializability); data coherence; load balancing and scheduling; appropriate applications.

#3. " Parallel and distributed algorithms"

Distributed Algorithms:

Consensus and election
Termination detection
Fault tolerance
Stabilization
Election Algorithms
Mutual Exclusion algorithms

Parallel Algorithms:

PRAM model
Exclusive versus concurrent reads and writes
Pointer jumping
BRENT's theorem and work efficiency

9. LEARNING AND TEACHING STRATEGY

Theory: Formal lectures will be presented to cover the material of the course, with tutorials.

Practical: Practical exercises, examples and seminar practices will be given to workout individually/groups.

Self-study: Students are also expected to undertake at least 70 hours private study including preparation of worked solutions for tutorial classes.

10. ASSESSMENT STRATEGY

Assessment criteria

- Knowledge and critical understanding of theory.
- Ability to solve relevant problems.
- Ability to write and deliver presentations in appropriate language.
- Ability to perform laboratory experiments, interpret results and write reports.
- Problem solving skills.

- All assessment methods try to force the learner to demonstrate his / her ability to think through unseen problems.

11. ASSESSMENT PATTERN

Component	Weighting (%)	Learning objectives covered
Assignments and Tests	60%	1-15
Final exam	40%	1-15

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

- Consultation hours to see the students in the office.
- Two meeting with the students during the semester to discuss their problems (if any).

Analyzing the results of the tests and seminars to reach possible problems and take measures to solve them.

13. INDICATIVE RESOURCES

- Sujoy Basu; Vanish Talwar; Bikash Agarwalla; Raj Kumar, Interactive Grid Architecture for Application Service Providers, Technical Report, [available] http://www.hpl.hp.com/techreports/2003/HPL-2003-84R1.pdf July 2003
- Philips, Chase; Von Welch; Wilkinson, Simon: GSI-Enabled Open SSH available on the internet from http://grid.ncsa.uiuc.edu/ssh/ January 2002
- The EU-CrossGrid Project, http://www.crossgrid.org
- Various Authors: CrossGrid Deliverable D3.5: Report on the Result of the WP3 2nd and 3rd Prototype, available: http://www.eu-crossgrid.org/Deliverables/M24pdf/CG3.0-D3.5, 2004
- Foster, Ian; Kesselmann, Carl: The Grid, Blueprint for a New Computing Infrastructure, Morgan Kaufmann Publishers, 1999

14. Teaching Team

Mr Jean Marie Vianney NSENGIYUMVA, MSc

1. **Module Code: INTS 5523**
2. **Module Title: Internship**
3. **Level: 5 Semester: 2 Credits: 20 First year of presentation: 2013-2014**
4. **Administering Faculty: ALL faculty**

5: **Pre-requisite or co-requisite modules, excluded combinations:** Research Methodology

6.Allocation of activities hours

Activities	**Student hours**	**Supervisor's hours**
Introduction to the institution	10	
Obsrvation of institution and activities	30	
Internship its own	100	
Progressive reports	20	
Internship report	40	
Supervision and report marking		20
	200	20

7. BRIEF DESCRIPTION OF AIMS AND CONTENT

7.1 Description of aims

Internship reinforces students' knowledge and equips them with the professional skills through action research.

Briefly it aims to:

(1) Empower students to have a deep understanding in relation to their future profession, and its challenges and related constructive solutions.

(2) Enable students to improve their professional skills through critical thinking, dialogue, discussions, group work and social attitudes.

8. Indicative Content

- Getting in touch with the realities of the work and it is a hands-on training in view of testing learned content and solving real problems.
- Report of a detailed summary of report of activities performed during internship.
- Apply theoretical knowledge to the realities on the ground
- Gaining experience for future service
- Career development

9. LEARNING OUTCOMES

The internship program aims to help students to:

- Apply acquired knowledge in the class situation to real life situations;
- Give the opportunity to work with qualified professionals;
- Foster self- confidence and learn to interact professionally with peers;
- Identify self strengths and weaknesses by referring to future career;
- Establish contacts and networks for future employment;
- Improve ways to address issues and solve problems through action research.
- Internship program engages student in service activities for the purpose of providing enough experiences that enhance their learning and appropriate professional skills;
- Internship program enhances students' creativity and critical thinking, promotes interest in their future career, creates a network and contact with all internship stakeholders and contributes to the accomplishment of the academic requirements;
- Internship program equips students with scientific skills and interest for the identification of their final research project.

10. ASSESSMENT STRATEGY

The internship will be assessed by both the Field Instructor and the field supervisor. The assessment report will be brought by the Field Supervisor to the Field Coordinator one week after the internship period.

COMPONENT	**WEIGHT / 100**
Field Instructor's Assessment	40
Field Supervisor's Assessment	30
Students' reports	30

Internship evaluation items

Designation	*MARKS*
Client oriented attitude	15%
Motivation/innovation	10%
Team spirit	10%
Decision making	10%
Communication	10%
Planning skills and Regularity	15%
Internship Report	30%
Total MARKS	

11.ASSESSMENT PATTERN

The module will be assessed in the following ways:

- Grades/marks will be assigned based on the achievement of goals and objectives of field education.
- Referring to the general academic regulation of CUR, the passing mark for internship is 50%.
- Student who will score below the passing mark will re-do the internship any time within the following academic year after fulfilling the financial requirements for retaken courses.

12. STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING THE MODULE

The student is mentored by field instructor and field supervisor along the various steps of the internship and prompt feedback is given to him/her as required for regular improvement. The intern is required to correct all mistakes as indicated by the supervisors and a report of improvement is sent to the field coordinator.

Module team :

- LUK CANNOODT, FPHHN
- ALPHONSE NSHIMIYIMANA, FED
- CHRISTOPHER MUYOBOKE, FSW
- JEAN PIERRE MUNYAMPUNDU, FST
- VEDASTE NYILIMANA, FCRS
- THEOGENE HAKIZIMANA, FCOM
- DANIEL UMEREWENEZA, FPHHN

1. **Module Code: FIPR 5523**
2. **Module Title: Final Project**
3. **Level: 5 Semester: 2 Credits: 20 First year of presentation: 2013-2014**
4. **Administering Faculty: ALL**
5. **Pre-requisite or co-requisite modules, excluded combinations** : Research Methodology
6. **Allocation of activities hours**

Activities	**Student' hours**	**Supervisor's hours**
Laboratory (if applicable)	20	5
Reading	40	
Writing the Reseach Proposal	10	
Designing the Final Project Tools	20	
Data Collection	40	
Data processing and entry	20	
Writing the Final Project	30	
Presentation of results	2	
Assessment	18	15
Total	200	20

7. **BRIEF DESCRIPTION OF FINAL PROJECT**

Final Project is an integral and compulsory part of the program of each faculty. All students will take a project module in final year of an honours degree. The undergraduate Final Project will consist of original research, investigation, compilation or experimentation, making some contribution for discovering a new knowledge in the relevant discipline.

8. **LEARNING OUTCOMES**

At the end of module, students are expected to:

1. Acquire sufficient capacity of correctly writing English ,
2. Conduct a sustained and significant (technical) individual led project.
3. Select and use tools/methodologies appropriate to the (project) tasks and domain.
4. Specify, design, test and implement solution(s) appropriate to the (project) task and domain
5. Formally present, in an oral manner, project progress and outcomes to technically literate, expert and no expert, audiences.
6. Demonstrate individual technical expertise and knowledge pertinent and relevant to that specific project domain.
7. Understand and demonstrate an ability to undertake practical work in a manner appropriate to professional practice, including issues such as safety, standards and ethics.

9. INDICATIVE CONTENT

- Structure of the Final Project
- Write the final project appropriately
- Present the results of the Project
- Skills and knowledge related to library and internet
- Technical report writing

Assessment is based upon the following:

- Final Report
- Presentation

10.ASSESSMENT STRATEGY

The projects will be assessed in two parts. The first consists of the Final project work documentation submitted by the students in regard with its content, style, formation, grammar, effective use of graphics and pictures, statistical results. The second part consists the oral presentation of the research work by the students.

The module will be assessed in the following ways:

written document	40 % of total marks
Oral presentation	60% of total marks

The Chairperson reads these marks to the panel at the time of awarding the final grade.

11.STRATEGY FOR FEEDBACK AND STUDENT SUPPORT DURING MODULE

Students will keep in touch with the lecturer or the supervisor of the final project work to get assistance. The student is mentored by supervisor(s) along the various steps of the research and prompt feedback is given to him and the department. After the oral presentation, the candidate is required to correct all mistakes as indicated by the panel and reader of the final version of the work.

12. INDICATIVE RESSOURCES

Research and Interne ship Policy of CUR

MODULE TEAM:

- LUK CANNOODT, FPHHN
- ALPHONSE NSHIMIYIMANA, FED
- CHRISTOPHER MUYOBOKE, FSW
- JEAN PIERRE MUNYAMPUNDU, FST
- VEDASTE NYILIMANA, FCRS

- THEOGENE HAKIZIMANA, FCOM
- DANIEL UMEREWENEZA, FPHHN

13. EXTERNAL REVIEWER

Mrs. UMUTESI Liliane

14. UNIT APPROVAL

Dean and Heads of all Departments contribution to the programme to confirm agreement

DEPARTMENT OF COMPUTER SCIENCE	**DEAN/HEAD OF DEPARTMENT**	SIGNATURE
1	Dr. Protais MUHAYIMANA Dean	
2	NSENGIYUMVA JMV Academic Secretary	
3	ALPHONSE NSHIMIYIMANA Director of Quality	