THE OPEN UNIVERSITY OF TANZANIA

FACULTY OF SCIENCE, TECHNOLOGY AND ENVIRONMENTAL STUDIES

MASTER OF SCIENCE IN COMPUTER SCIENCE (MSCS)

2019

1.0 Normal Learning Matrix & Course Matrix indicating (course credit, hrs, core and elective/options etc

Programme structure

The Master of Science in Computer Science is a mixed mode programme and consists of taught courses and a project. The programme consists of a total of 180 Units. The project is compulsory to all candidates and consists of 60 Units. Candidates must also complete and pass 6 core courses with a total of 120 Units.

There are two streams leading to MSc in Computer Science which are Information Systems and Cyber Security (the different streams will only be reflected on Transcripts, but the Certificate will read MSc in Computer Science). Both streams will share 5 core courses. However, specialized courses will be selected based on the stream. Furthermore, the candidate must produce a project that is in line with the chosen stream.

	CORE COURSES (120 CREDITS)	
CODE	**COURSE TITLE**	**CREDITS**
OCS 601	Scientific Research Methods	10
OIM 601	IT Entrepreneurship and Management	10
OCS 602	Data Warehouse and Data Mining	10
OCS 603	Core networks, Virtualization and Cloud Computing	20
OCS 604	Advanced Programming and Algorithms	10
OCS 609	Project	60

	SPECIALIZATION COURSES (60 CREDITS) INFORMATION SYSTEMS	
CODE	**COURSE TITLE**	**CREDITS**
OCS 605	Mobile and Web based Information Systems	20
OCS 606	Intelligent Expert Systems	20
OCS 607	Management information systems	20

	SPECIALIZATION COURSES (60 CREDITS) CYBER SECURITY	
CODE	**COURSE TITLE**	**CREDITS**

OCS 608	Ethical Hacking, Security Audit and Digital Forensics	20
OCS 609	Network Security and Cryptography	20
OIM 602	IT Security Planning and Management	20

Each Student of Master of Science in Computer Science shall be required to complete a minimum of 180 cumulative credits.

2.0 ASSESSMENT DETAILS

2.1 Programme assessment strategy

The programme evaluation strategy is based on the university charter where the directorate of quality assurance sets regular assessment mechanisms to all postgraduate programmes.

2.2 Examination general format, examination regulations and examination moderations

The assessment procedures and the assessment criteria will follow OUT examination regulations for postgraduate courses. The following regulations will apply for the assessment of the programme:

1. Assessment of coursework and examination.

- Each course carries 100% marks. The final examination counts for 70% of the total marks. Coursework carries 30% of the total marks and in addition, a course with practical shall be assessed as part of coursework.
- A candidate shall not pass the course unless he/she attains a minimum of 50% (B) in each module.

2. Before the candidate is allowed to start writing a dissertation he/she must have successfully completed the coursework part with a mean overall grade of "B" or above (i.e. GPA of at least 3.0) in all chosen /pursued core modules listed.

3. The mode of evaluation for the dissertation comprises 100% and shall be evaluated internally and by external examiners.

4. Each course will have an external examiner approved by Senate. Draft examination papers are usually sent to the appointed external examiners for moderation and where required, comments of the external examiner are incorporated in the examination paper before delivery to the data base of examinations.

COURSE DESCRIPTION

6.3 Course Code OCS 601

i) Course Title: Scientific Research Methods

ii) Course Aim

This course aims to enable Master's students to understand what research is and what is not. It will raise awareness of crucial aspect of the nature of Knowledge and the value of scientific method. The course will introduce the concept at the heart of every research project –the research problem- and to discuss what a researchable problem is. Additionally the course will evaluate literature, form a variety of sources, pertinent to the research objectives. Furthermore it will identify and justify the basic components of the research framework, relevant to the tackled research problem. Last the course will explain and justify how researchers will collect research data and put forward a credible research proposal

The course will provide students with a strong foundation in the conceptualisation and operationalisation of research, how to design a research project and 'hands-on' skills in the utilisation of different research methods. The course structure is based on a cumulative approach which introduces, step-by-step, the contents of the academic subject of research theory and practice. It will also involve each student in the practical work in order to develop the skills needed to produce a good quality of dissertation. There are ten modules in this course, which are designed to be taught consecutively. Each theme contains sections that discuss the relevant core idea of the subject studied. These sections are interpreted through interactions with exercises and or discussions forums for the students to consolidate and assess their understanding of the subjects presented

iii) Expected Course Outcomes

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

1. Understand some basic concepts of research and its methodologies
2. Identify appropriate research topics
3. Select and define appropriate research problem and parameters
4. Prepare a project proposal (to undertake a project)
5. Organize and conduct research (advanced project) in a more appropriate manner
6. Write a research report and thesis
7. Write a research proposal (grants)
8. Conduct and write a research report

iv) Course status: Core

v) Credit rating: 10 Credits

vi) Total hours spent: 100 hours

vii) Course Content

Module 1: Research Methodology:

- Lecture 1: A review of the Research Methodology Fundamentals
- Lecture 2: Planning of Research , Research Problem and Hypothesis

Module 2: The Review of Literature

- Lecture 3: How to Conduct the Review of Literature

Module 3: Research Methods

- Lecture 5: Research Design
- Lecture 6: data collection

Module 4: Research Findings and Discussion

- Lecture 7: Qualitative and Quantitative Data Analysis
- Lecture 8: Research Outputs

Module 5: Data Analysis Tools

- Lecture 9: Statistical and Data Science Analysis Tools

Module 6: Report Writing

- Lecture 10: Principles of Research Report writing

viii) Teaching and learning activities:

30 Contact hours (20 lecture hours plus 10 hours of practical) and 70 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Kothari, C. R & Garg, G. (2015). Research Methodology: Methods and Techniques, New Age International Publishers, ISBN: 978-81-224-3623-5
- Montogomery, D.C. (2017). Design and Analysis of Experiments, 9 Edition, John Wiley, ISBN: 978-1-119-11347-8
- Fellows, R. F., & Liu, A. M. (2015). Research Methods for Construction, 4th Edition. John Wiley & Sons
- Marczyk, G. R., DeMatteo, D., & Festinger, D. (2010). Essentials of Research Design and Methodology. Hoboken: Wiley.

6.4 Course Code OIM 601

i) Course Title: OIM 601 Information and Technology Entrepreneurship and Management
ii) Course Aim

This course aims to provide students with an understanding of the nature of enterprise and entrepreneurship. It introduces the role of the entrepreneur, innovation and technology in the entrepreneurial process, and describes and applies management functions. It also examines complexities of entrepreneurial dynamics and strategic planning process. The course focuses on providing the knowledge and skills in information and technology Entrepreneurship and Management. It presents and analyzes various topics such as Theories of Management and Roles Managers Play in IT Organization, Organizational design decisions and Leadership Styles, Innovations stimulation and business plan development, Entrepreneur Financial Management, Competitors analysis, marketing strategies and market mix components, Taxation, Legal Aspects and practice in Tanzania

iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

1. Demonstrate an understanding and application of major principles and concepts of management theory and practice in their work;

2. Identify and analyze various approaches to management and entrepreneurship;

3. Demonstrate an understanding of the basic elements of a business plan and be able to generate an entrepreneurial idea and develop it into an actual market-ready plan;

4. Comprehend various business strategies and operational components of a business and apply entrepreneurial knowledge in their place of work and by developing their own businesses and managing them with confidence;

iv) Course status: Core

v) Credit rating: 10 Credits

vi) Total hours spent: 100 hours

vii) Course Content

Module 1: Nature, Evolution and Meaning of Management, Organization and Leadership

- Lecture 1: Theories of Management and Roles Managers Play in Organization
- Lecture 2: Decision Making Process
- Lecture 3: Organizational design decisions and Leadership Styles
- Lecture 4: Employees motivation and Contemporary Issues in Leadership

Module 2: Entrepreneurship

- Lecture 5: Theories of Entrepreneurship
- Lecture 6: Entrepreneurship and new venture creation in context
- Lecture 7: Technology entrepreneurship and commercialisation

Module 3: Innovation.

- Lecture 8: Innovation stimulation and business plan development
- Lecture 9: Venture management and growth
- Lecture 10: Design thinking

Module 4: Entrepreneur Financial Management

- Lecture 11: Introduction to Finance, Financial forecasting and budgeting
- Lecture 12: Basic financial statement and financing options

Module 5: Marketing

- Lecture 13: Competitors analysis, marketing strategies and market mix components

Module 6: Taxation and Legal Aspects.

- Lecture 14: Taxation, Legal Aspects and practice in Tanzania

viii) Teaching and learning activities:

30 Contact hours (20 lecture hours plus 10 hours of practical) and 70 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Bygrave, W and Zackarakis, A (2013) Entrepreneurship, 3rd Edition, John Wiley and Co.
- Bessant, J & Tidd, J (2015). Innovation and Entrepreneurship, Wiley, ISBN 978-1-118-99309-5
- Dodgson M, Gann, D, M & Phillips, N (2014) The Oxford Handbook of Innovation, Oxford University Press, NY. ISBN 9780199694945
- Hisrich, R.D., Peters, M.P., and Shepherd, D. (2013) Entrepreneurship, McGraw-Hill Irwin, Boston.
- Kuratko, D. (2013) Entrepreneurship: Theory, Process, and Practice, 9th Edition, Wiley online library.

- Moore, Geoffrey, (2014) Crossing the Chasm, Marketing and Selling Disruptive Product to Mainstream Customer, Harper & Collins, ISBN 978-0-06-229298-8
- Belton, P. (2017). Competitive strategy: Creating and sustaining superior performance. London: Taylor and Francis.

6.5Course Code OCS 602

i) Course Title: Data Mining and Data Warehouse

ii) Course Aim

To train students to collect data from different sources, and discover knowledge. The course aims to teach students to group data into Data into Data warehouse for analysis and reporting. The course further teachers students on how to discover patterns that can be discovered from the data by learning from historical datasets using Machine Learning Algorithms. The course provides students with knowledge of general concepts and technologies of Data Manipulation using algorithms and data processing tools. Also the course trains students on how to recognize problems that can be solved by using Data warehouse and Data Mining Techniques.

iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

- Know and understand general concepts and technologies of Data Mining.
- Develop Data ware houses and run OLAP queries for various applications analysis
- Apply Machine Learning Algorithms in datasets for prediction and description of various problems
- Recognize problems that can be solved by Data Mining Techniques

iv) Course status: Core

v) Credit rating: 10 Credits

vi) Total hours spent: 100 hours

vii) Course Content

Module 1: Knowledge Discovery in Database

- Lecture 1 : Knowledge Discovery in Databases Flow and Data Types (Audio, Video, Blobs, Vectors, Lists) and Distributed Database
- Lecture 2: Data Cleaning - (Extraction, Translation and Loading – (ETL))

Module 2: Data warehouse

- Lecture 3 : Data warehouse schema (Star and Snowflakes) and Data Cubes and Data Mart
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Module 2: Data warehouse Operations

- Lecture 4 : Data Warehouse Operations/ (Roll up, Dice, Roll down) and (On-line Analytical Processing (OLAP) and On-line Transaction Processing (OLTP)

Module 4: Data mining

- Lecture 5 : Data Mining Tools, Platforms and Applications and Statistical Data Mining and Datasets (Linked Datasets, Open Datasets, Dataset Discovery/Sharing)

Module 5: Machine Learning Algorithms

- Lecture 6: Machine Learning Algorithms Types, Training, Validation, Comparison
- Lecture 7 : Association – Association Rules
- Lecture 8 : Clustering – K Means, Hierarchical Clustering
- Lecture 9 : Classification – Decision Trees, Random Forest , Boosting

Module 6: Data Mining Application

- Lecture 10 : Deep Learning – Neural Networks, SVM

viii) Teaching and learning activities:

30 Contact hours (20 lecture hours plus 10 hours of practical) and 70 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Kantardzic, M., (2011) Data Mining: Concepts Models, and Algorithms, Wiley-Blackwell, ISBN-13: 978-0470890455
- Tuffery, S., Data Mining and Statistics for Decision Making, Wiley, 2011
- Witten I. H., E. Frank, and M. A. Hall (2011), Data Mining: Practical Machine Learning Tools and Techniques, Third Edition, Morgan Kaufmann, 2011
- Elmasri, R., and S. B. Navathe (2011), Fundamentals of Database Systems, 6th Edition, Addison-Wesley, 2011.

- Sing, Harry S., Data Warehousing: Concept & Technologies

6.6 Course Code OCS 603

i) Course Title: Core Networks, Virtualization and Cloud Computing

ii) Course Aim

To provide students with the advanced knowledge and skills to efficiently use resources by applying cloud computing and virtualization techniques. The first part of the course will cover virtualization concepts, data center and cloud computing. The course will start with introduction to concepts and technologies and later on transition to specific topics such as cloud computing models, performance and scalability issues, virtual machines, etc. The second part will cover network virtualization and Software Defined Networks (SDN). In virtualization we will explore different platforms such as VMWare and KVM. In SDN we will cover its history and evolution, data plane, control plane, and programming aspects. Finally the course will wrap up with a project that puts together the application of all of the above concepts.

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iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

- Explain the concepts of virtualization as well as contrast and compare different virtualization technologies.
- Explain cloud computing concepts and service models
- Understand data center virtualization including partitioning servers and creating Virtual Machines (VM).
- Select the optimal virtual networking technology for private or public cloud
- Describe the key concepts in Software Defined Networks (SDN)
- Examine the SDN architecture and key functions
- Evaluate several SDN controller platforms such as Open Daylight
- Evaluate several Cloud Computing Platforms such as OpenStack and CloudStack
- Examine Northbound Interfaces such as REST and Southbound Interfaces such as OpenFlow and Netconf

iv) Course status: Core

v) Credit rating: 20 Credits

vi) Total hours spent: 200 hours

vii) Course Content

Module 1: Network Background

- Lecture 1: Basic concepts (Layers and protocols, BGP, MPLS, VPLS, VRF, VLAN, VxLAN, etc) and security

Module 2: Virtualization Concepts

- Lecture 2: Definitions and landscape
- Lecture 3: Virtualization areas, advantages and downside

Module 3: Network Virtualization

- Lecture 4: Network Virtualization Role and Products
- Lecture 5: Available virtualization platforms
- Lecture 6: Virtualization Protocols and technologies, IP V6

Module 4: Software Defined Networks

- Lecture 7: History and planes separation
- Lecture 8: Control Plane: Overview, Existing SDN Controllers including Floodlight and OpenDaylight projects.
- Lecture 9: Customization of Control Plane: Switching and Firewall
- Lecture 10: Data Plane: Software-based and Hadrware-based; Programmable Network Hardware.
- Lecture 11: Northbound Interfaces such as REST and Southbound Interfaces such as OpenFlow and Netconf
- Lecture 12: Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs.

Module 5: Cloud Computing Concepts

- Lecture 13: Introduction to Cloud Computing and models
- Lecture 14: Cloud Architectures: Public cloud, private cloud, hybrid clouds including Federated Clouds
- Lecture 15: Cloud OS, technology and performance issues
- Lecture 16: Cloud Security and Privacy
- Lecture 17: Capacity Planning and Disaster Recovery in Cloud Computing

Module 6: Data Center Virtualization

- Lecture 18: Data Centers for Cloud Computing
- Lecture 19: Storage Virtualization
- Lecture 20: Applications Virtualization

viii) Teaching and learning activities:

60 Contact hours (40 lecture hours plus 20 hours of practical) and 140 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Nayyar, A (2019). Handbook of Cloud Computing, India, ISBN: 978-93-88176-66-8.
- Morgan K. (2011).Distributed and Cloud Computing, 1st edition.
- Hwang, Kai, and Min Chen. Big-Data Analytics for Cloud, IoT and Cognitive Computing. John Wiley & Sons, 2017.
- B. R. Chandavarkar, G. Ram Mohan Reddy,"Survey Paper: Mobility Management in Heterogeneous Wireless Networks", Procedia Engineering, Elsevier, Vol. 30, 2012, pp. 113-123.
- Hämäläinen, S., Sanneck, H., & Sartori, C. (Eds.). (2012). LTE self-organising networks (SON): network management automation for operational efficiency. John Wiley & Sons.
- Stanoevska-Slabeva, K., Wozniak, T., & Ristol, S. (2009). Grid and cloud computing: a business perspective on technology and applications. Springer Publishing Company, Incorporated.
- Kusnetzky, D. (2011). Virtualization: A manager's guide. " O'Reilly Media, Inc.".
- Nelson, B., Phillips, A & Steuart, C. (2016). Guide to Computer Forensics and Investigations, 5th Edition, ISBN13: 978-1-305-80568-2.
- Thomas D. Nadeau (2013). SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies. Ken Gray Publisher: O'Reilly Media, ISBN: 978-1-4493-4230-2, ISBN 10: 1-4493-4230-2.
- Goransson, P., Chuck B., & Morgan K. (2014). Software Defined Networks: A Comprehensive Approach, Print Book ISBN: 9780124166752, eBook ISBN : 9780124166844

- Vivek T (2013). SDN and OpenFlow for Beginners, Sold by: Amazon Digital Services, Inc., ASIN.
- Fei Hu (2014). Network Innovation through OpenFlow and SDN: Principles and Design. CRC Press, ISBN-10: 1466572094.
- Open Networking Foundation (ONF) Documents, https://www.opennetworking.org, 2015.
- OpenFlow standards, http://www.openflow.org, 2015.

6.7 Course Code OCS 604

i) Course Title: Advanced Programming and Algorithms

ii) Course Aim

This course explores algorithmic techniques for solving various computational problems to students. The course teaches students to use programming to break down a large NP problem into recursive manageable computation problem. Complex data structures used in represent and store data in the computer memory will be discussed in the course. Students will learn design patterns that can guide the development of software /programs to solve NP problems. The course will also discuss Graph theory and its application in finding optimal solutions

iii) Expected Course Outcomes

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

9. To give you more practice with problem solving via computer programming.
10. To teach you some alternative programming paradigms.
11. Compare and contract different design patterns that can be used to solve computation problems
12. Use Graph algorithms to solve computational problems
13. Break down a long computation problem using greedy and dynamic programming

iv) Course status: Core

v) Credit rating: 10 Credits

vi) Total hours spent: 100 hours

vii) Course Content

Module 1: OO Programming:

- Lecture 1: OO Programming Concepts (Recap) (Abstraction, Encapsulation, Inheritence, Polymorphism, Classes, Objects, Conditions, Loops) , NP Problems

Module 2: Data Structures

- Lecture 2: Basic and Composite Data Structures i.e Arrays, List, Stack, ArrayList, HashMap, Sets etc

Module 3: Data Structures Operations and Algorithms

- Lecture 3: Searching – Binary Search, Search Tree, Decision Tree
- Lecture 4: Sorting - Quick Sort, Bubble, Merge Sort

Module 4: Greedy Algorithms

- Lecture 5: Greedy Programming

- Lecture 6 : Dynamic Programming – Recursive Programming

Module 5: Graph Theory Algorithm

- Lecture 7: Breadth First Search Algorithm
- Lecture 8: Depth First Search Algorithm

Module 6: Design Patterns

- Lecture 9: Overview of Design Patterns
- Lecture 10: Types of Design Pattern - Common Design Patterns- Factory Design, Singleton Design, Builder Pattern, Prototype Pattern

viii) Teaching and learning activities:

30 Contact hours (20 lecture hours plus 10 hours of practical) and 70 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- He, H. (2013). Coding interviews: questions, analysis & solutions. Apress.
- Bertsekas, D. P. (2018). *Abstract dynamic programming*. Athena Scientific.
- Stephens, R. (2019). *Essential Algorithms: A Practical Approach to Computer Algorithms Using Python and C*. Wiley.
- Raphael Finkel (1995) , *Advanced Programming Language Design,* Pearson; 1 edition
- Lee, K. D., & Hubbard, S. (2015). *Data structures and algorithms with Python*. Springer.
- Rahman, M. S. (2017). *Basic graph theory* (p. 3). Cham: Springer.

6.8 Course Code OCS 605

i) Course Title: Mobile and Web based Information Systems

ii) Course Aim

This course aims to introduce students to the basic principles of systems, state-of-the-art client and server side web technologies, methodologies of web application development, the programming and design patterns, especially in design and development of mobile and web based information systems. This course focuses on providing the knowledge and skills to design and develop Mobile and Web based Information Systems. It presents and analyzes various topics such as systems development life cycle, Object Oriented Design and UML Diagrams, Information System Development and Maintenance, Current major mobile operating systems and their architecture, Mobile Application Development life cycle, Sever Side Scripting and Technologies such as PHP, Perl, JQuery and Ajax, Web Development with Content management system, Mobile and Web based design frameworks and Securing Web and Mobile Apps

iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

- Apply system analysis and design processes
- Identify current major mobile operating systems and their architecture
- Prepare programming tools for a mobile application development
- Develop Mobile and Web based Applications
- Develop interactive Web site using PHP, Perl, JQuery and Ajax
- Apply UML Diagrams in Object Oriented Design
- Identify most popular mobile and Web Design Frameworks
- Design Web site with Bootstrap framework
- Develop website with Content management system
- Detect and secure different types of Web and Mobile apps Attacks

iv) Course status: Core

v) Credit rating: 20 Credits

vi) Total hours spent: 200 hours

vii) Course Content

Module 1: Information Systems Development Overview

- Lecture 1: Core concepts of IS
- Lecture 2: Information System in practice

Module 2: System Design and Life Cycle Models

- Lecture 3: System Development Processes
- Lecture 4: System Planning and SDLC Models
- Lecture 5: Object Oriented Design and UML Diagrams

Module 3: Mobile Application Development

- Lecture 6: Modern mobile operating systems and their architecture
- Lecture 7: Software distributions systems for mobile devices
- Lecture 8: Mobile Application Development life cycle
- Lecture 9: SDK and other programming tools for a mobile application development

Module 4: Dynamic Web development

- Lecture 10: Client-Server Architecture and Web Protocols
- Lecture 11: Server Side Scripting and Technologies
- Lecture 12: Developing an interactive Web site using PHP, Perl, JQuery and Ajax
- Lecture 13: Design of Web 2.0 and Enterprise 2.0 Applications

Module 5: Responsive Mobile and Web design frameworks

- Lecture 14: Most Popular mobile and Web Design Frameworks
- Lecture 15: Front End Web based Programming and Design
- Lecture 16: Identify the Entity Framework and its components
- Lecture 17: MVC Mobile Application VS Internet Application
- Lecture 18: Web Development with Content management system

Module 6: Securing Web and Mobile Apps

- Lecture 19: Main Types of Web and Mobile apps Attacks
- Lecture 20: Detection and securing of Web and Mobile based Attacks

viii) Teaching and learning activities:

60 Contact hours (40 lecture hours plus 20 hours of practical) and 140 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Murugesan, S., Deshpande, Y. (Eds.): Web Engineering: Managing Diversity andComplexity of Web Application Development. LNCS 2016,
- Web Engineering. (2017). Larsen & Keller Educ. ISBN-13: 978-1635492927
- Dick, J., Hull, E & Jackson, K. (2017). *Requirements engineering: fundamentals, principles, and techniques*. Springer Publishing Company, Incorporated. ISBN-978-3-319-61072-6
- Golob, R., & Šmalc, J. (2013). Security engineering risk assessment and security measures. Ljubljana: Self published.
- Anderson, R. J. (2010). *Security engineering: a guide to building dependable distributed systems*. John Wiley & Sons.
- Hubka, V., & Eder, W. E. (2012). *Theory of technical systems: a total concept theory for engineering design*. Springer Science & Business Media.
- Kossiakoff, A., Sweet, W. N., Seymour, S. J., & Biemer, S. M. (2011). *Systems engineering principles and practice* (Vol. 83). John Wiley & Sons.
- McWherter, J., & Gowell, S. (2012). Professional Mobile Application Development. Somerset: Wiley, ISBN: 978-1-118-22842-5

6.9 Course Code OCS 606

i) Course Title: Intelligent and Expert Systems

ii) Course Aim

The course is aimed to provide students with the knowledge and skills to design and implement intelligent expert systems which use artificial intelligence to solve human problems. It includes Artificial Intelligence, Semantic Web, Semantic Web Layers, Semantic Web Rule Language, Ontologies, Inference, Knowledge Bases, Fuzzy Logic, Logic Programming, Reasoning, Boolean, Rule-based systems, Forward and Backward Chaining, Security in the Expert Systems and Soft Computing

iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

- Know how to construct artificial intelligence systems to solve human problems.
- Have knowledge and understanding of the syntax and semantics of classical propositional and first-order logic.

iv) Course status: Core

v) Credit rating: 20 Credits

vi) Total hours spent: 200 hours

vii) Course Content

Module 1: Knowledge, Reasoning and Representation

- Lecture 1 : Introduction to Artificial Expert Systems and First Order Logic
- Lecture 2 : Knowledge Bases (Logic Reasoning)
- Lecture 3 : Inference (Inference Rules & Inference Engines)
- Lecture 4 : Backward and Forward Chaining

Module 2: Semantic Web

- Lecture 5 : Ontologies and Linked Data
- Lecture 6 : Semantic Web Layers
- Lecture 7 : Semantic Web Languages

Module 3: Internet of Things

- Lecture 8 : IPV6

- Lecture 9 : Sensors and Tagging
- Lecture 10 : Smart Computing

Module 4: Soft Computing

- Lecture 11 : An overview of soft computing
- Lecture 12: Fuzzy Logic
- Lecture 13 : Natural Language Programming

Module 5: Learning

- Lecture 14: Supervised and Unsupervised Learning
- Lecture 15 : Bagging and Boosting
- Lecture 16 : Regression and Classification with Linear Models
- Lecture 17 : Machine Learning Algorithms

Module 6: Introduction to Artificial Intelligence

- Lecture 18 : The Foundations of Artificial Intelligence
- Lecture 19 : Intelligent Agents
- Lecture 20 : Introduction to Robotics

viii) Teaching and learning activities:

60 Contact hours (40 lecture hours plus 20 hours of practical) and 140 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Azar, A. T., & Vaidyanathan, S. (2016). Advances in chaos theory and intelligent control (Vol. 337): Springer.
- Tzafestas, S. G. (2013). Knowledge-based system diagnosis, supervision, and control: Springer Science & Business Media.
- Copeland, J. (2015). Artificial intelligence: A philosophical introduction. John Wiley & Sons.
- Charniak, E., Riesbeck, C. K., McDermott, D. V., & Meehan, J. R. (2014). Artificial intelligence programming. Psychology Press.

- Jones, M. T. (2015). Artificial Intelligence: A Systems Approach: A Systems Approach. Jones & Bartlett Learning.
- Poole, D. L., & Mackworth, A. K. (2010). Artificial Intelligence: foundations of computational agents. Cambridge University Press.
- David, J. M., Krivine, J. P., & Simmons, R. (Eds.). (2012). Second generation expert systems. Springer Science & Business Media.
- Yager, R. R., & Zadeh, L. A. (Eds.). (2012). An introduction to fuzzy logic applications in intelligent systems (Vol. 165). Springer Science & Business Media.
- Hebeler, J., Fisher, M., Blace, R., & Perez-Lopez, A. (2011). Semantic web programming. John Wiley & Sons

6.10Course Code OCS 607

i) Course Title: Management Information Systems

ii) Course Aim

This course aims to provide students with the knowledge and skills to manage information systems. This course focuses on the reflection of the different means to manage securely information systems in the organizations to meet the increasing need for optimal deployment and utilization within and across the organizations. It presents and analyzes various topics such as the Real World of Information Systems, Trends in Information Systems, The Components of Information Systems, Enterprise Business Systems, Financial Management Systems, Supply Chain Management Systems, ERP, GIS, e-Commerce Applications, Improving Decision Making and Managing Knowledge, Securing Information Systems and Ethical and Social Issues in Information Systems.

iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

- Understand MIS and analyze its revolution, types, importance and acquisition
- Understand and analyze data and databases that manipulates and stores them
- Comprehend and apply integrated and secured IS to improve business processes
- Identify and apply MIS in decision-making and managing knowledge
- Understand and apply secured GIS and e-commerce applications

iv) Course status: Core

v) Credit rating: 20 Credits

vi) Total hours spent: 200 hours

vii) Course Content

Module 1: MIS Definition, Types, Importance and Acquisition

- Lecture 1: The management information systems definition, evolution eras and trends
- Lecture 2: The components, types, roles, importance, and influence of MIS
- Lecture 3: MIS procurement vs. development and open vs. proprietary systems

Module 2: The Communications Revolution – Centralized, Distributed & Cloud Based MIS

- Lecture 4: Centralized and distributed MIS (Client-Server).
- Lecture 5: Distributed infrastructures and telecommunications networks
- Lecture 6: The cloud computing & MIS

Module 3: Data, Databases, Big Data

- Lecture 7: Data: a key ingredient in an MIS (Data vs information, quality information)
- Lecture 8: Databases, database structure and database management systems (DBMS)
- Lecture 9: Data modelling and normalization of relational databases (SQL, DBMS choices)
- Lecture 10: Big data and its applications

Module 4: Integrated IS and Business Processes

- Lecture 11: Introduction to supply chain & integrated information systems as apex of MIS
- Lecture 12: Integrated business processes, business process modelling (BPM) and IS
- Lecture 13: ERP and major MIS structure: modules, common database and pros and cons
- Lecture 14: MIS & ERP in specific customization, adaption, implementation & post-implementation

Module 5: MISs in Decision-Making and Managing Knowledge

- Lecture 15: Decision making and Transactional systems vs. Decision Support Systems
- Lecture 16: Decision Support Systems benefits and challenges
- Lecture 17: DSS, non- structured data, Big Data and the future of MIS

Module 6: GIS and e-Commerce Applications and Securing Information systems

- Lecture 18: GIS foundation & applications e.g. location based systems & services and smart cities
- Lecture 19: e-Commerce foundation and Applications in the real world
- Lecture 20: Ethical, social and securing issues of information systems today

viii) Teaching and learning activities:

60 Contact hours (40 lecture hours plus 20 hours of practical) and 140 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Laudon, K. C., & Laudon, J. P. (2011). *Essentials of management information systems*. Upper Saddle River: Pearson.
- Information Systems Today, 5th Edition, Joseph Valacich and Christoph Schneider, Publisher: Prentice Hall (2010), ISBN-10: 0137066996, ISBN-13: 9780137066995
- Rainer, R. K., Prince, B., & Watson, H. J. (2014). *Management Information Systems*. Wiley Publishing.
- Magal, S. R., & Word, J. (2011). *Integrated business processes with ERP systems*. Wiley Publishing.
- Pearlson, K. E., Saunders, C. S., & Galletta, D. F. (2016). *Managing and Using Information Systems, Binder Ready Version: A Strategic Approach*. John Wiley & Sons.
- Management Information Systems: Managing the Digital Firm, 14th Edition, Kenneth C. Laudon, New York University, Jane P. Laudon, Azimuth Information Systems, 2016, Pearson. ISBN-13: 9780133898163
- Chaffey, D., & Wood, S. (2012). Business information management: Improving performance using information systems. Harlow: FT Prentice Hall.
- Hoffer, J. A., George, J. F., & Valacich, J. S. (2014). Modern systems analysis and design. Boston: Pearson.
- Jordan, J. M. (2012). *Information, technology, and innovation resources for growth in a connected world*. Hoboken, NJ: Wiley.

6.11 Course Code OIM 602

i) Course Title: IT Security Planning and Management

ii) Course Aim

The course is designed to introduce fundamental concepts of information systems security by providing the students with an understanding of the importance of information security and several techniques of planning and managing information systems security methods, frameworks and ethics.

Security is one of the fundamental aspects in IT investment. Technology adopters need effective methods to manage security for their systems and processes across lifetime of IT assets. This module is designed to introduce fundamental concepts of information systems security. It provides the students an understanding of the importance of information security and several techniques of planning and exploiting information systems security methods. The course provides details of key information security concepts including major issues in attacks, risks, threats, assets and protection strategies. The course also covers information security risk management, scoring systems, enterprise security architecture, network security infrastructure, security policies and procedures organization structure and management levels, information security planning and business continuity, cyber security economy, information security program development and management, computer emergency incident response plans and teams.

In this course, the relevant information security models and frameworks are also discussed. Major frameworks covered include COBIT, ISO 27000 Series, NIST SP 800 Series, SAMM, SANS 20 / CIS 20, HITRUST, Cisco Security Control Framework (SCF) Model and other relevant in-house developed security frameworks. Students are also alerted of the issuing bodies including ISACA, IEEE, etc.

As part of this course, the information security ethics, legal and emerging issues are also discussed with focus on local and international data protection related laws and acts. Students are also introduced to security emerging issues based on OWASP list, National Vulnerability Database (NVD) sources in both physical and virtual computing for the threat sources, attacks and Intrusion Detection and Prevention System (IDPS) tools.

iii) Expected Learning Outcomes

Upon completion of this course, a student will be able to:

- describe key elements of information security management
- discuss operational, tactical and strategic IT security issues
- identify risks, threats, vulnerabilities and assets profiles for information security management
- demonstrate security architecture landscape based on the conceptual design of the network security infrastructure
- explain major issues for ICT security related policies and procedures
- describe organization structure and management levels with respect to IT security roles
- discuss information systems security planning, and business continuity aspects
- analyze cyber security economy and design of security metrics
- identify the legal and ethical issues in information security
- identify, plan and analyze major information security incident management and response

- demonstrate CERTs operations and establish CERT working plans
- describe major security frameworks such as COBIT, ISO 27000 series, NIST SP 800 Series, SANS 20/ CIS 20 and analyze the relevancy of each
- explain the issuing bodies of different security frameworks and IT security professional associations
- describe the major security emerging issues in physical and virtual computing environments
- monitor security trends of monitoring bodies such as OWASP and NVD sources
- establish disaster recovery strategies and recover data after security breach

iv) Course status: Core

v) Credit rating: 20 Credits

vi) Total hours spent: 200 hours

vii) Course Content

Module 1: Elements of Security Management

- Lecture 1 - Key Information Security Concepts and Components
- Lecture 2 - Issues of Security Management
- Lecture 3 - Information Risk Management

Module 2: Enterprise Security Architecture

- Lecture 4 : Security Architecture Landscape
- Lecture 5 : The Network Security Infrastructure
- Lecture 6 : Security Policies and Procedures
- Lecture 7 : Organization Structure

Module 3: Information systems security planning and Business Continuity

- Lecture 8: The Importance of Security Planning
- Lecture 9 : The Cyber Security Economy
- Lecture 10 : Information Security Program Development & Management

Module 4: Information Security Incident Management & Response

- Lecture 11 : Disaster Recovery Plan
- Lecture 12 : Principals of Asset Protection
- Lecture 13: Implementing Asset Protection Programme
- Lecture 14 : Security Incident Management
- Lecture 15 : Computer Emergency Response Team

Module 5: Relevant Information Security Models and Frameworks

- Lecture 16 : IT security frameworks and standards
- Lecture 17 : Introduction to COBIT an SAMM frameworks
- Lecture 18 : NIST Cloud Computing Security and Other models

Module 6: Information Security Ethical, Legal issues and emerging issues

- Lecture 19 : Information Security Ethics and Legal Issues
- Lecture 20 : Information Security Emerging Issues

viii) Teaching and learning activities:

60 Contact hours (40 lecture hours plus 20 hours of practical) and 140 hours self-directed learning, assessment, assignments and seminars..

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Calder, A., & Watkins, S. (2008). *IT governance: A manager's guide to data security and ISO 27001/ISO 27002*: Kogan Page Ltd.
- Cassidy, A. (2016). *A practical guide to information systems strategic planning*: Auerbach Publications.
- Nadel, B. A. (2004). *Building security: Handbook for architectural planning and design*: McGraw-Hill.
- Peltier, T. R. (2016). *Information Security Policies, Procedures, and Standards: guidelines for effective information security management*: Auerbach Publications.
- Raggad, B. G. (2010). *Information security management: Concepts and practice*: CRC Press.
- Rhodes-Ousley, M. (2013). *Information security: the complete reference*: McGraw Hill Education.
- Schumacher, M., Fernandez-Buglioni, E., Hybertson, D., Buschmann, F., & Sommerlad, P. (2013). *Security Patterns: Integrating security and systems engineering*: John Wiley & Sons.
- Stallings, W., Brown, L., Bauer, M. D., & Bhattacharjee, A. K. (2012). *Computer security: principles and practice*: Pearson Education.
- Agrawal, M., Campoe, A., & Pierce, E. (2014). Information security and IT risk management. Hoboken, NJ: John Wiley & Sons, ISBN: 978-1-118-80309-7.

6.12Course Code OCS 608

i) Course Title: Ethical Hacking, Security Audit and Digital Forensics

ii) Course Aim

To provide students with the techniques to audit activities that happen in the IT systems and using computer technologies to verify malicious events (related to the use of IT) that happen in real life. This module provides an insight into information security principles, security policy models/protocols, industry standards for security compliance, and risk assessment. The students will acquire a critical understanding of how to use information security techniques to solve practical security problems. The students will also have the opportunity to gain skills for designing/implementing security infrastructure and writing security/incident response polices. Practical, extensive, hands-on project work is designed to ensure the readiness to apply the knowledge in the workplace the knowledge gained in the module. Addresses ethical, legal, and policy frameworks within which information assurance and secure development lifecycle professionals must practice. The course additionally investigates the core techniques currently used for the purpose of data retrieval, evidence preparation, crime scene management and intelligence extraction. Students will get an overview of international digital forensic investigation infrastructures and put legal procedures into context. By completing this course, the student will acquire a critical understanding of how to use cryptographic algorithms and protocols to solve practical security problems (such as confidentiality, integrity and authenticity).

iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

- Explain the relationship between traditional forensic science and digital forensics
- To provide students with a deep understanding of the mechanisms and techniques that can be used to prevent, or at least mitigate, cybercrime.
- To provide students with an insight into cryptographic algorithms and protocols.

iv) Course status: Core

v) Credit rating: 20 Credits

vi) Total hours spent: 200 hours

vii) Course Content

Module 1: Digital Forensics & Incidence Response.

- Lecture.1. Course Introduction
- Lecture.2. Security infrastructures, Policy Models and Protocols
- Lecture.3. Security/incident response policies
- Lecture.4. Penetration testing

Module 2: Security, Policy, Ethics, and the Legal Environment.

- Lecture.5. Professional and ethical issues arising from IT systems
- Lecture.6. Common legal and social challenges faced by IT professionals
- Lecture.7. Key management skills needed in IT

Module 3: Cyber Crime Prevention & Protection

- Lecture.8. Symmetric key encryption algorithms
- Lecture.9. Hash function algorithms
- Lecture.10. Public key cryptography algorithms
- Lecture.11. Key agreement protocols

Module 4: Digital Forensics.

- Lecture.12. Understanding the Digital Forensics management landscape
- Lecture.13. The potential of cybercrime (through ethical hacking)
- Lecture.14. Tools and techniques for cybercrime prevention
- Lecture.15. Cybercrime prevention in commercial and non-commercial settings

Module 5: Cyber Forensics.

- Lecture.16. Volatile Data Collection
- Lecture.17.Analysis Techniques
- Lecture.18. Application Analysis Techniqes
- Lecture.19. Cell Phone Analysis, etc.

Module 6: M Sc Project - Computer Security and Forensics

- Lecture.20. Professional Project Management
- Lecture.21 Research Challenges

viii) Teaching and learning activities:

60 Contact hours (40 lecture hours plus 20 hours of practical) and 140 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Iosif I. Androulidakis, *"Mobile phone security and forensics: A practical approach",* Springer publications, 2012.
- Andrew Hoog, *" Android Forensics: Investigation, Analysis and Mobile Security for Google Android"*, Elsevier publications, 2011.
- Marshall, A. M (2013). Digital forensics: Digital evidence in criminal investigations, Wiley-Blackwel, ISBN: 978-1-118-80247-2
- Kitsos, Paris; Zhang, Yan , "*RFID Security Techniques, Protocols and System-On-Chip Design* ", ISBN 978-0-387-76481-8, 2008.
- Johny Cache, Joshua Wright and Vincent Liu," *Hacking Wireless Exposed: Wireless Security Secrets & Solutions* ", second edition, McGraw Hill, ISBN: 978-0-07-166662-6, 2010.

6.13 Course Code OCS 609

i) Course Title: Network Security and Cryptography

ii) Course Aim

To provide students with the advanced knowledge and skills to understand threats and attacks in the network, then apply different defense mechanisms to secure personal and organizational data and systems in a networked environment. This course covers advanced areas of network security and cryptography. Specifically, it covers network (and protocols) threats, attacks, defense mechanisms, and services. It will also cover details of symmetric and asymmetric cryptography, authentication protocols and key management. In order to understand application of cryptography, the course will apply the techniques in real-time and non-realtime communication security.

iii) Expected Course Outcomes

At the end of this course, students will acquire knowledge, skills and competencies that will enable them to:

- Explain common core network vulnerabilities and attacks, defense mechanisms against network attacks, and cryptographic protection mechanisms.
- Identify network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks.
- Understand and apply concepts related to applied cryptography, including plaintext, ciphertext, symmetric cryptography, asymmetric cryptography, and digital signatures.
- Explain the theory behind the security of different cryptographic algorithms.
- Outline the requirements and mechanisms for identification and authentication in the network.
- Identify the possible threats to each mechanism and ways to protect against these threats.
- Explain the requirements of real-time communication security and issues related to the security of web services.
- Explain the requirements of non-realtime communication security (email security) and ways to provide privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, and anonymity.

iv) Course status: Core

v) Credit rating: 20 Credits

vi) Total hours spent: 200 hours

vii) Course Content

Module 1: Overview of Network Security and Cryptography

- Lecture 1: Examples and Basic concepts
- Lecture 2: Basic Cryptography

Module 2: Cryptography (Secret-key and Public-key) and Message Digest

- Lecture 3: Data Encryption Standard (DES)
- Lecture 4: Encrypting large messages (ECB, CBC, OFB, CFB, CTR)
- Lecture 5: Multiple Encryption DES (EDE)
- Lecture 6: Theories
- Lecture 7: RSA, Selection of public and private keys
- Lecture 8: Strong and weak collision resistance, The Birthday Paradox
- Lecture 9:MD5, SHA-1

Module 3: Authentication and Trusted Intermediaries

- Lecture 10: Security Handshake pitfalls, online vs. offline password guessing
- Lecture 11: Reflection attacks, Per-session keys and authentication tickets
- Lecture 12: Key distribution centers and certificate authorities, Public Key infrastructures
- Lecture 13: Certification authorities and key distribution centers, Kerberos

Module 4: Real-time and non-realtime Communication Security

- Lecture 14: Network protocols attacks, Implementation layers for security protocols and implications
- Lecture 15: IPsec: AH and ESP, IPsec: IKE, SSL/TLS T9.
- Lecture 16: Directory services and Distribution lists, establishing keys
- Lecture 17: Privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, anonymity, Pretty Good Privacy (PGP)

Module 5: Firewalls and Web Security

- Lecture 18: Packet filters, Application level gateways, Encrypted tunnels
- Lecture 19: Cookies, Web security problems, Mobile security, 2-step authentication

Module 6: Wireless Network Security

- Lecture 20: Wireless networking protocols and security issues, 801.11 protocols, attacks, and countermeasures.

viii) Teaching and learning activities:

60 Contact hours (40 lecture hours plus 20 hours of practical) and 140 hours self-directed learning, assessment, assignments and seminars.

ix) Assessment Methods

Main TT = 30%; final examination = 70% or as per OUT General Examination Regulations

x) Recommended Readings:

- Charlie Kaufman, Radia Perlman, and Mike Speciner, *Network Security: PRIVATE Communication in a PUBLIC World*, Prentice Hall, ISBN 0-13-046019-2
- Stallings, W., & Tahiliani, M. P. (2014). *Cryptography and network security: principles and practice* (Vol. 6). London: Pearson.
- Kahate, A. (2013). *Cryptography and network security*. Tata McGraw-Hill Education.
- Alpcan, T., & Başar, T. (2010). *Network security: A decision and game-theoretic approach*. Cambridge University Press.
- Taylor, R. W., Fritsch, E. J., & *Liederbach, J. (2014). Digital crime and digital terrorism*. Prentice Hall Press.
- Katz, J., & Lindell, Y. (2014). *Introduction to modern cryptography*. CRC press

6.14Course Code OCS 610

i) Course Title: Project; Credits

ii) Course Aim

To provide students with the skills to develop IT related projects and researches

Develop a solution to a real world problem

iii) Expected Learning Outcomes

At the end of the course students are expected to develop research/projects in the field of Computer Science.

iv) Course status: Core

v) Credit rating: 60 Credits

vi) Total hours spent: 600 hours

vii) Course Contents: Students are expected to develop research/project work from the 1st semester after acquiring skills in Research Methods. Students will develop innovative solutions to real world problems in context under close supervision of respective lecturers.

viii) Teaching and learning activities: N/A

ix) Assessment Methods

Project 100% or as per OUT General Examination Regulations

x) Recommended Readings:

- Plowright, D. (2011) Using Mixed Methods: Frameworks for an Integrated Methodology. London: Sage.
- B Joyner, R. L., Rouse, W. A., Glatthorn, A. A., & Glatthorn, A. A. (2013). *Writing the winning thesis or dissertation: A step-by-step guide*. Thousand Oaks, CA: Corwin Press.
- Gruba, P., & Zobel, J. (2017). *How to write your first thesis*. Cham: Springer.
- Nather, A. (2016). Planning your research and how to write it. New Jersey: World Scientific.

8. Academic staff available to run the proposed or reviewed programme with their qualifications

CODE	COURSES	LECTURER	STATUS	INSTITUTION
OCS 601	Scientific Research Methods	Dr Khamis Kalegele	Full Time	OUT
OIM 601	IT Entrepreneurship and Management	Prof George Oreku	Full Time	OUT
OCS 602	Data Warehouse and Data Mining	Dr Rogers Bhalalusesa	Full Time	OUT
OCS 603	Core networks, Virtualization and Cloud Computing	Dr Said Ally	Full Time	OUT
OCS 604	Advanced Programming and Algorithms	Dr Rogers Bhalalusesa	Full Time	OUT
OCS 605	Mobile and Web based Information Systems	Dr Catherine Mkude	Full Time	OUT
OCS 606	Intelligent Expert Systems	Dr Rogers Bhalalusesa	Full Time	OUT
OCS 607	Management information systems	Dr Nfuka Ngemera	Full Time	OUT
OCS 608	Ethical Hacking, Security Audit and Digital Forensics	Prof George Oreku	Full Time	OUT
OCS 609	Network Security and Cryptography	Prof George Oreku	Full Time	OUT
OIM 602	IT Security Planning and Management	Dr Said Ally	Full Time	OUT
OCS 610	Project	Supervisor		