Ministry of Higher Education
Colleges of Applied Sciences
Faculty of Information Technology

Bachelor of Information Technology Course Descriptions

College Requirements - BIT	
MTDR1102	**Mathematics for Information Technology** This course is designed as an introductory mathematics course for Information Technology students. In this course, the students will learn the concepts of sets, relation, number systems and the presentation of different types of quantities such as vectors and matrices. **Pre-requisite(s):** MATH5002 **Credit Hours: 2 Class: 2 Lab: 0**
ITDR1101	**Introduction to Information Technology** This course is designed as an introduction to undergraduate studies in Information Technology. It will introduce the student to different specializations in the information technology. On successful completion, students will be familiar with database management, computer storage, operating systems and utility programs, communications and networks, programming languages and enterprise computing. **Pre-requisite(s):** FPCS900 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR1102	**Introduction to Web Development** This course provides students with the fundamental understanding of the WWW environment. The principles and process of website design as well as the implementation of practical web design using WYSIWYG web authoring tools are introduced. E-commerce, online business information systems, web security, and ethics are also discussed in this course. **Pre-requisite(s):** FPCS900 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR1103	**Introduction to Discrete Mathematics** This course introduces students to discrete mathematics and logic and aims to further develop students' numerical skills, preparing them for the Discrete Mathematics course taught in Year3/S5 of the BIT program. Topics include the difference between discrete and continuous data, number representation, sets and relations, functions, matrices and its applications, induction, mathematical logic and Boolean algebra. **Pre-requisite(s):** MTDR1102 **Credit Hours: 3 Class: 2 Lab: 2**

ITDR1104	**Programming Fundamentals** This course highlights the basics of computer programming through the medium of the Java language. Underlining programming basics concepts, primitive data types, control statements, methods and arrays are introduced. This course also ends with an introduction to Object-Oriented Programming basic concepts (Objects, Classes, Inheritance and Polymorphism). **Pre-requisite(s):** ITDR1101 **Credit Hours: 3 Class: 2 Lab: 2 Tutorial: 2**
ITDR1105	**Web Development** This course builds an understanding of Web development using cascading style sheets (CSS), client side scripting using JavaScript and data driven design. It introduces XM and teaches fundamental concepts and professional practices needed in the design of a web site. It also enhances students' knowledge in web accessibility, Web security and search engine optimization techniques. **Pre-requisite(s):** ITDR1102 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR2101	**Principles of Information Systems** This course provides exposure to the key concepts and skills required to develop information systems successfully. Examples of topics discussed in this course include: project management, systems analysis and design, usability, requirements specification, application development, distributed architectures, Web technologies, database management, and professionalism. **Pre-requisite(s):** ITDR1101 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR2102	**Computer Organization** In this course, students will be introduced to the computer hardware architecture including the functionalities of different hardware components and dependencies among these functionalities. Students will be given the chance to take a look inside the "Black Box". In the practical aspects of this course, students will be taught how to assemble a computer hardware unit and troubleshoot common issues in computer hardware. **Pre-requisite(s):** ITDR1101 & ITDR 1103 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR2103	**Discrete Mathematics** This course extends the students' knowledge in discrete mathematics. The concepts have been selected with an eye on their relevance for computing. Some, like matrices, form a traditional part of mathematics. Others, like definition by recursion, earn their place by virtue of their role in Information Technology as a whole and the papers on data structures and algorithms in particular. **Pre-requisite(s):** ITDR1103 **Credit Hours: 3 Class: 2 Lab: 2**

ITDR2104	**Programming** In ITDR1104, "Fundamentals of Programming", students learned how to write simple Java applications using primitive data types, control statements, methods, and arrays, all of which are features commonly available in procedural programming languages. In this course students will learn object oriented programming using Java, classes and objects, inheritance, polymorphism, GUI and event driven programming. In addition, students will learn also about binary I/O, Networking and Applet programming in Java. **Pre-requisite(s):** ITDR1104 **Credit Hours: 3 Class: 2 Lab: 2 Tutorial: 2**
ITDR2105	**Data Structures (1)** This course builds on and extends the knowledge that students gained from programming and the Java language in the Java Programming course. More advanced programming ideas, such as abstract data type design, are introduced as well as their implementations in Java. Then a variety of different data structures are discussed together with the algorithms to query and modify them. Theoretical and practical analyses of efficiency are used at each stage of the course. **Pre-requisite(s):** ITDR2104 & ITDR2103 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR2106	**Introduction to Databases** Data is a critical corporate resource and the design, construction, and management of the corporate database is of strategic importance. In this course we build on previous knowledge of data storage and management by studying concepts and issues associated with database management systems (DBMS), with emphasis on the capabilities and features of "high end" relational DBMS (RDBMS) products such as Oracle10*g*. **Pre-requisite(s):** ITDR2101 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR2107	**Data Communications and Computer Networks** The course provides an introduction to understanding data communication and networks. The course lays the ground for advanced courses in the field. It gives the theoretical and technical concepts of the network technology. It also highlights the mechanisms of the different topologies and how to construct a network from different hardware components including wiring concepts to devices that compose the network. **Pre-requisite(s):** ITDR1101 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR2108	**Introduction to Security** This course provides students with the basic understanding of security concepts. It addresses security threats, measures used to protect against these threats, and risks that may result from security breaches. How to protect the availability, integrity, and confidentiality of information are also discussed. **Pre-requisite(s):** ITDR1101 **Credit Hours: 3 Class: 2 Lab: 2**

ITDR3101	**Systems Analysis and Design** This course addresses the two key phases in any System Development Life Cycle (SDLC), namely the accurate discovery and analysis of user requirements and the design of a system that satisfies these requirements. ITDR3101 discusses methods for capturing, documenting and analyzing these requirements. Object modeling using the Unified Modeling Language (UML) is addressed and implemented. **Pre-requisite(s):** ITDR2106 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR3102	**Operating Systems** This course provides students with the theoretical concepts coupled with appropriate practical work of operating system concepts and exposes students to the internal workings of operating systems as well as some of the relevant system programs. **Pre-requisite(s):** ITDR2102 & ITDR2104 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR3103	**Data Structures (2)** This course builds on and extends the knowledge students gained in data structures and algorithms analysis in the course Data Structures-1. Algorithm complexity and Big O notation will be covered. More advanced sorting algorithms, such as Quick sort will be covered with their analysis. Trees topic which was introduced in the previous course will be extended here. More topics such as Hashing and Graphs will be introduced. Theoretical and practical analysis of efficiency is used at each stage of the course. **Pre-requisite(s):** ITDR2105 **Credit Hours: 3 Class: 2 Lab: 2**
ITDR4100	**Project Management** This course introduces a number of aspects of product development including requirements specifications; process models, life-cycle models; risk management; project planning; quality measurement and product evolution. Other topics include organizing, resourcing, directing, and controlling projects. Software configuration management and MS project are also covered. **Pre-requisite(s):** ITDR3101 **Credit Hours: 3 Class: 3 Lab: 0**
ITGP4101	**Graduation Project I** Project refers to the application of principles of needs assessment and practices including, needs analysis, specification, design, construction, commissioning and evaluation of user needs. This course concentrates on the needs analysis, specification, and initial design of a solution to a unique student project, preferably sourced from industry. **Pre-requisite(s):** ITDR4100 **Credit Hours: 3 Class: 2 Lab: 2**
ITGP4102	**Graduation Project II** This course focuses on the phase of solution development and implementation including prototyping, usability testing, deployment and evaluation. **Pre-requisite(s):** ITGP4101 **Credit Hours: 3 Class: 2 Lab: 2**

Major Requirements – Computer Networks	
ITNW3101	**Introduction to Routing and Switching** This course extends students' knowledge in fundamental aspects of data communications, signals and encoding, modulation, multiplexing, data compression, error detection and correction, security, and protocols. Computer networks, Local Area Networks (LANs) and their IEEE standards, flow and error control, Wide Area Networks (WANs), routing algorithms, WAN protocols such as (x.25, Frame Relay) and ATM. **Pre-requisite(s):** ITDR2107 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW3104	**Network Technology** This course provides the students with the understanding of network technology and administration. The course teaches the practices of the network administration and management. This course is divided in two parts: The first part is based on Microsoft Windows 2003 Server OS and the second part is Network Technology. The corresponding laboratories are also split in two parts: Windows Labs and Network Software Simulation for Analysis and Design. **Pre-requisite(s):** ITNW3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW3105	**Network Management** This course aims to develop skills in system and network administration that are useful for people who need to manage a small network, or interact with people in associated roles, such as management. It also aims to develop awareness of issues that are of current concern to the industry and likely to be encountered in larger networks also. **Pre-requisite(s):** ITNW3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW4103	**Internetworking** This course is built on the "understanding of networks" gained in Network Management (ITNW3105). It develops a deeper understanding of how does application software use TCP/IP. Emphasis is on client-server paradigm & focus on parameters involved in both client and server distributed program. The second part of the course emphasizes on the common internetwork protocols, routing tables, and related network devices required. **Pre-requisite(s):** ITNW3105 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW4104	**Wireless Networking** This course offers an introduction to the basics of wireless propagation, path loss, antennas, modulation (overview only, not in-depth) also a variety of wireless networks: PAN, LAN, WAN. Also it introduces students to issues in wireless networks: multi-access, mobility, low-power, security, error detection and correction. WPANs (Bluetooth, 802.15.4, Zigbee) are also covered. **Pre-requisite(s):** ITNW3101 **Credit Hours: 3 Class: 2 Lab: 2**

ITNW4109	**Innovations in Networks and Security** The purpose of this course is to build awareness of key emerging topics in telecommunications networks, computer networks, the application, and security. These topics include GPS, vehicular networks, security of sensor networks, QoS of next generation satellite networks, Future of the Internet. In addition, students will have tutorials on topic analysis, design of advanced networks, DDoS, and Innovations in cryptography, cryptanalysis etc. **Pre-requisite(s):** ITDR2108 & ITNW3101 **Credit Hours: 3 Class: 2 Lab: 2**

Computer Networks Electives (Choice of 4 Courses)	
ITNW4111	**Fibre Optics** This course provides an introduction to the principle of the fiber optic computer network. It gives the theoretical and technical concepts of the fiber optic technology, fiber optic interface and data encoding decoding. It also highlights the FDDI and SONET/DHI network. Moreover, the course topics focus the Infinite Band Network topology Subnet Communication mechanism. **Pre-requisite(s):** ITNW3104 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW4112	**Advanced Routing and Switching** This course provides the students with the understanding of advanced routing optimization and adaptive routing algorithms. Distributed networks and cloud computing network protocols are studied and advanced internet protocols and cloud computing protocols are covered. The configuration and programing of real physical Router are performed. **Pre-requisite(s):** ITNW3104 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW4113	**Network Optimisation** This course deals with Network flow problems. It focusses on the shortest path problem, the maximum flow problem, minimum cost flow problem and multi commodity flow problem. This subject will survey some of the applications of network flows and focus on key special cases of network flow problems. **Pre-requisite(s):** ITNW4103 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW4114	**Advanced Operating Systems** This course enhances students' knowledge of the concepts, principles, and algorithms in operating systems with real implementations projects. It is a sequel to the Operating Systems course. **Pre-requisite(s):** ITDR3102 **Credit Hours: 3 Class: 2 Lab: 2**

ITNW4115	**Network and Security Programming** In this course, students will be introduced to network and security programming in Java programming language including familiarity and practice with the Java Cryptography Package. The course will start with basic concepts of making network connections using java sockets and will move up to teaching the students how to construct network frames/packages and to inject them into a network. The security perspective of this course will be concerned with encrypting/decrypting computer files and transferring them on an end-to-end network. **Pre-requisite(s):** ITDR2107 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY3105	**Network Security A** The course will provide an advanced understanding of the different techniques to secure data for network communication. When data is sent through the network different types of protection should be insured from unauthorized (accidental or intentional) modification, destruction, or disclosure. This protection includes techniques which provide data authentication, confidentiality, integrity, non-repudiation. Course subject matter will focus on security measures involving data ciphering/encryption and existing encryption protocols. **Pre-requisite(s):** ITDR2108 **Credit Hours: 3 Class: 2 Lab: 2**

Major Requirements – Software Applications Development	
ITSW3101	**Applications Software Development** In ITDR2104, "Java Programming", students learned how to write simple Java applications using object-oriented concepts and simple GUI Techniques. In this course students will learn Advanced GUI techniques and Database and web programming. **Pre-requisite(s):** ITDR2104 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW3104	**Concurrent Programming** This course examines a range of techniques for programming multi-threaded and distributed applications. Topics include synchronization mechanisms used for programs that communicate via shared memory, and message passing techniques for programs that communicate across a network. Practical work involves implementing programs using these techniques in a modern concurrent language, such as Java. **Pre-requisite(s):** ITDR2105 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW3105	**Advanced Web Development** In this course we examine the capabilities of server and server-side scripting languages before addressing the client-side issues of mark up, style sheets, and DOM-scripting. This is only possible if students already have a basic background in Web development and in basic programming concepts such as variables, loops, and arrays. **Pre-requisite(s):** ITDR1105 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW4103	**Object Oriented Programming and User-interfaces** This course builds a deeper understanding of software development in an object-oriented programming language, such as C++ or Java, including class hierarchies, the use of libraries, design patterns, and the development of suitable user interfaces. **Pre-requisite(s):** ITDR3103 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW4104	**Mobile Applications Development** The smart phones and tablets market is developing rapidly in both usage and technology. This course is designed to empower students in competing in this market. It will teach them how to build mobile applications for Android platform and test them in emulator and real devices before publishing them into Google Play. **Pre-requisite(s):** ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**

ITSW4109	**Innovations in Software Development** This course is concerned with the most recent innovations in software development, with a view to bringing CAS students up to date with international trends. The course content is both broad and deep. A wide range of topics are covered to raise the students' awareness of the macro environment, a few topics are chosen to be covered in depth. Students are expected to research and discover for themselves many of the latest trends and applications. **Pre-requisite(s):** ITSW3101 & ITDR2016 **Credit Hours: 3 Class: 2 Lab: 2**

Software Applications Development Electives (Choice of 4 Courses)	
ITSW4112	**Human Computer Interaction** Human Computer Interaction (HCI) is a multidisciplinary area concerned with the design, evaluation, and application of usable, effective, and enjoyable technologies. Interaction design is a user-centered approach to HCI that takes the interactive character of technologies seriously. The aim of this course is to introduce students to the techniques, ideas, and models involved in designing and evaluating interactive technologies. **Pre-requisite(s):** ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW4111	**Computer Graphics** This course provides an introduction to the techniques for handling pictorial data in computers. Topics include display devices, scan conversion of lines, circles, ellipse, 2D transformation, Filling algorithms, clipping in two dimensions, text generation, parallel and perspective projections.Practical work involves implementing programs using two programming languages: i) using graphical mode of C and ii) OpenGL. **Pre-requisite(s):** ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW4113	**Games Architecture & Design** This course introduces students to the core concepts and design methodologies integral to designing and developing games and other Entertainment Software. This course also introduces students to the core concepts and skills necessary for the development of games utilizing 2D graphics. Students will learn how to set up and program their own 2D graphics based game engine. The engine will integrate 2D graphics, audio, input handling and network socket programming. Students will learn how to utilize their own custom 2D graphics and sounds into their projects. Once complete, students will have created two fully functional games **Pre-requisite(s):** ITSW3101 & ITDR3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW4114	**Software Design Patterns** In this course, the students will be introduced to common techniques in application design patterns from a software architecture perspective. Such aspects will include model-view-controller, observer, adapter, abstract factory, composite, command, iterator, visitor and strategy. This course will be an advanced version of the elementary course SFDV1004 Algorithm Development. This course will be based on applying knowledge in UML and Java programing. **Pre-requisite(s):** ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW4116	**Software Troubleshooting** In this course students will learn how to test software effectively through addressing theoretical and practical methods to design tests during the phases of software development. **Pre-requisite(s):** ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**

ITDM4115	**Web Services** This course builds on the knowledge that students gained in ITSW3101 and provides students with the basics of developing interoperable web services using the Java EE platform. Students will be introduced to basic standards such as SOAP, WSDL as well as the JAX-WS API. Students will be required to develop interoperable web services and clients that can interact with existing web services such as weather web services and amazon.com web services. **Pre-requisite(s):** ITDR3101 & ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**

Major Requirements – IT Security	
ITNW3101	**Introduction to Routing and Switching** This course extends students' knowledge in fundamental aspects of data communications, signals and encoding, modulation, multiplexing, data compression, error detection and correction, security, and protocols. Computer networks, Local Area Networks (LANs) and their IEEE standards, flow and error control, Wide Area Networks (WANs), routing algorithms, WAN protocols such as (x.25, Frame Relay) and ATM. **Pre-requisite(s):** ITDR2107 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY3104	**Computer Security A** This course builds an understanding of the principles of Information Assurance. It addresses the many different but never the less related measures that can be used to protect an organization's information infrastructure. A holistic approach is used to risk assessment and selecting and implementing protective measures – whether they be software, hardware, and/or procedural. **Pre-requisite(s):** ITDR2108 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY3105	**Network Security A** The course will provide an advanced understanding of the different techniques to secure data for network communication. When data is sent through the network different types of protection should be insured from unauthorized (accidental or intentional) modification, destruction, or disclosure. This protection includes techniques which provide data authentication, confidentiality, integrity, non-repudiation. Course subject matter will focus on security measures involving data ciphering/encryption and existing encryption protocols. **Pre-requisite(s):** ITDR2108 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY4104	**Computer Security B** ITSY4104 is concerned with advanced topics of computer security including, cryptography (with a focus on single -key and public key), computer system security (database, archives, operating systems issues including authentication, access control, malicious, software); and vulnerability analysis and forensics. **Pre-requisite(s):** ITSY3104 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY4105	**Network Security B** This course provides students with an advanced understanding of the different techniques to secure data for network communication. When data is sent through the network, different types of protection must be ensured from unauthorized (accidental or intentional) modification, destruction, or disclosure. This protection includes techniques which provide data authentication, confidentiality, integrity and nonrepudiation. **Pre-requisite(s):** ITSY3105 **Credit Hours: 3 Class: 2 Lab: 2**

ITNW4109	**Innovations in Networks and Security** The purpose of this course is to build an in-depth understanding of key emerging topics in telecommunications networks, computer networks, the application, and security. These topics include GPS, vehicular networks, security of sensor networks, QoS of next generation satellite networks, Future of the Internet. In addition, students will have tutorials on topic analysis, design of advanced networks, DDoS, and Innovations in cryptography, cryptanalyst etc. **Pre-requisite(s):** ITDR2108 & ITNW3101 **Credit Hours: 3 Class: 2 Lab: 2**

IT Security Electives (Choice of 4 Courses)	
ITNW4115	**Network and Security Programming** In this course, students will be introduced to network and security programming in Java programming language including familiarity and practice with the Java Cryptography Package. The course will start with basic concepts of making network connections using java sockets and will move up to teaching the students how to construct network frames/packages and to inject them into a network. The security perspective of this course will be concerned with encrypting/decrypting computer files and transferring them on an end-to-end network. **Pre-requisite(s):** ITDR2107 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY4111	**Cyber Security** This course outfits from basic network administration security skills through advanced command line scripting, tool customization, and log analysis skills. This course addresses Cyber Security strategies that include identity management, risk management, and incident management, and also serves as a detailed guide for anyone looking to enter the security profession. The course objectives dives deeper into such intense topics as wireshark/tcpdump filtering, Google hacks, Windows/Linux scripting, Metasploit command line, and tool customizations. **Pre-requisite(s):** ITSY3105 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY4112	**IT Forensics** This course introduces the basic principles and practice of IT forensics. The tools that are required for forensics are also discussed in the lectures and demonstrated in the labs. The terminology of information security that is related or required to understand the basics of IT forensics are also covered. Legal issues are also discussed and this includes understanding of collecting evidences, investigation process, responder procedures, incident handling and creating reports to present for the court cases as well as the possible needs for testimony in a court. **Pre-requisite(s):** ITSY4104 **Credit Hours: 3 Class: 2 Lab: 2**
ITSY4113	**Cryptography** This course builds an understanding of the principles of many modern Cryptography algorithms that have been applied for Network & Computer security. It addresses the many different cryptography algorithms from contemporary to modern: RSA, Block Ciphers, DES, DH, Elliptic curves, AES, Homomorphic encryption, Chaotic and Quantum techniques. **Pre-requisite(s):** ITSY3104 **Credit Hours: 3 Class: 2 Lab: 2**

ITSY4114	**Ethical Hacking and Network Defense** The students, after the course ITSY3105, would have acquired advanced understanding of different techniques to secure data for network communications. This course is designed to learn how to look for the weaknesses and vulnerabilities in a system to become a skilled professional. It introduces the concept of Ethical Hacking, how perimeter defenses work and then are lead into scanning and attacking their own networks by different techniques to make integrity of the network infrastructure. **Pre-requisite(s):** ITSY3105 **Credit Hours: 3 Class: 2 Lab: 2**
ITNW3104	**Network Technology** This course provides the students with the understanding of network technology and administration. The course teaches the practices of the network administration and management. This course is divided in two parts: The first part is based on Microsoft Windows 2003 Server OS and the second part is Network Technology. The corresponding laboratories are also split in two parts: Windows Labs and Network Software Simulation for Analysis and Design. **Pre-requisite(s):** ITNW3101 **Credit Hours: 3 Class: 2 Lab: 2**

Major Requirements – Data Management	
ITSW3101	**Applications Software Development** In ITDR2104, "Java Programming", students learned how to write simple Java applications using object-oriented concepts and simple GUI Techniques. In this course students will learn Advanced GUI techniques and Database and web programming. **Pre-requisite(s):** ITDR2104 **Credit Hours: 3** **Class: 2** **Lab: 2**
ITDM3104	**Advanced Database Design** Data are a critical corporate resource, and the design, construction and management of the corporate database should be of strategic importance to any organisation. This course extends the material covered in earlier database and information systems courses into the realm of "large" commercial databases, particularly their design, construction, maintenance and use. The paper comprises detailed studies in database administration, distributed data management, object database management systems and decision support. **Pre-requisite(s):** ITDR2106 **Credit Hours: 3** **Class: 2** **Lab: 2**
ITSW3105	**Advanced Web Development** In this course we examine the capabilities of server and server-side scripting languages before addressing the client-side issues of mark up, style sheets, and DOM-scripting. This is only possible if students already have a basic background in Web development and in basic programming concepts such as variables, loops, and arrays. **Pre-requisite(s):** ITDR1105 **Credit Hours: 3** **Class: 2** **Lab: 2**
ITDM4102	**Distributed Data Management** This course, students will explore theoretical and practical issues associated with management of data that are distributed across a network. Topics include n-tier client/server systems, distributed and federated database systems, schema and data integration, XML as a tool for facilitating data distribution, and connecting databases to the Internet. At all times, the focus will be on how data are managed in such environments. **Pre-requisite(s):** ITDR3103 **Credit Hours: 3** **Class: 2** **Lab: 2**
ITDM4103	**Data Mining** This course will introduce the state-of-art techniques and representative algorithms of data mining. We will review and examine the present techniques and the theories behind them and explore new and improved techniques for real world data mining applications. The arrangement of the course will encourage active class participation, creative thinking, and hands-on project development among the participants. **Pre-requisite(s):** ITDR3103 **Credit Hours: 3** **Class: 2** **Lab: 2**

ITSW4109	**Innovations in Software Development** This course is concerned with the most recent innovations in software development, with a view to bringing CAS students up to date with international trends. The course content is both broad and deep. A wide range of topics are covered to raise the students' awareness of the macro environment, a few topics are chosen to be covered in depth. Students are expected to research and discover for themselves many of the latest trends and applications. **Pre-requisite(s):** ITSW3101 & ITDR2106 **Credit Hours: 3 Class: 2 Lab: 2**

Data Management Electives (Choice of 4 Courses)	
ITSW4110	**Human Computer Interaction** Human Computer Interaction (HCI) is a multidisciplinary area concerned with the design, evaluation, and application of usable, effective, and enjoyable technologies. Interaction design is a user-centered approach to HCI that takes the interactive character of technologies seriously. The aim of this course is to introduce students to the techniques, ideas, and models involved in designing and evaluating interactive technologies. **Pre-requisite(s):** ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITDM4111	**Advanced Data Modeling** The growth and diversity in modern data applications and in data sets available on the Internet place higher requirements on technology for information retrieval and storage. This course aims at acquiring theoretical and practical knowledge about principles for storage and retrieval of text, semi-structured and structured data. The course also discusses alternative data models for databases, like XML and NoSQL databases and representation of semantic information. **Pre-requisite(s):** ITDR3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITDM4112	**Information Retrieval** This course covers traditional material as well as recent advances in information retrieval (IR). Topics include the study of processing, indexing, querying, organizing, and classifying textual and hyper-textual content. Clustering and IR evaluation will also be covered. Moreover, the course covers aspects of Web information retrieval and the design of search user interfaces. The course aims at practicing knowledge from previously taken computer science courses such as data structures, web programming, databases, and much more. **Pre-requisite(s):** ITDM4102 **Credit Hours: 3 Class: 2 Lab: 2**
ITDM4113	**Database Optimisation** In this course, we go "under the hood" to learn how a relational database management system is built. Students will learn the issues involved in designing efficient database systems, and the strategies, data-structures, and algorithms used in the implementation of such systems. The course is designed in three parts: the physical database, query processing and query optimization. **Pre-requisite(s):** ITDM3104 **Credit Hours: 3 Class: 2 Lab: 2**

ITDM4115	**Web Services** This course builds on the knowledge that students gained in ITSW3101 and provides students with the basics of developing interoperable web services using the Java EE platform. Students will be introduced to basic standards such as SOAP, WSDL as well as the JAX-WS API. Students will be required to develop interoperable web services and clients that can interact with existing web services such as weather web services and amazon.com web services. **Pre-requisite(s):** ITDR3101 & ITSW3101 **Credit Hours: 3 Class: 2 Lab: 2**
ITSW4114	**Spatial Information Systems** Spatial Information Systems are computer-based systems used to collect, store and analyze geographic information. This course will present the concepts upon which this technology is based and will introduce the hardware and software components of a Geographic Information System. Topics include data structures and basic functions, methods of data capture and sources of data, and the nature and characteristics of spatial data and objects. **Pre-requisite(s):** ITDR3103 **Credit Hours: 3 Class: 2 Lab: 2**