



King Hussein School كلية
of Computing الملك الحسين
Sciences لعلم الحوسبة

Curriculum for
Cybersecurity Program
Course Descriptions

King Hussein School of Computing Sciences
Princess Sumaya University for Technology

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Appendix A : Course Description/Computer Science

The following is the list of courses will be taught in the computer science department. For each course there will be: course number, course title, Credit Hours, course pre-requisite(s) and course description.

Course No.	11100
Course Name	Computer Skills (Remedial)
C.H Dist.	0
Pre-requisite	-----
Co-requisite	-----
This course aims to develop learners' ability to use computers in various aspects of their lives. The course introduces the primary concepts of computers, and the basics of using a GUI-based desktop operating system and office productivity tools including word processing, spreadsheets, and presentation applications, in addition to basics of to using emails and navigating through the world wide web. At the end of this course, the students are expected to be able to use desktop computer for everyday tasks.	
Course No.	11102
Course Name	Introduction to Computer Science
C.H Dist.	3
Pre-requisite	-----
Co-requisite	-----
Introduction to computer science. Components of PC and Data representation. Low level data representations (Binary, hexa, octal, conversions, Binary Arithmetic). Introduction to programming computers. Evolution of programming languages and techniques. Problem solving by computers. Flowcharts. Problem solving through analysis and then through an introduction to programming language (Basic program structure, main function, I/O control structures, Functions, Arrays and Structures).	
Course No.	11103
Course Name	Structured Programming
C.H Dist.	3
Pre-requisite	11102
Co-requisite	-----
Introduction to computer science. Components of PC and Data representation. Low level data representations (Binary, hexa, octal, conversions, Binary Arithmetic). Introduction to programming computers. Evolution of programming languages and techniques. Problem solving by computers. Flowcharts. Problem solving through analysis and then through an introduction to programming language (Basic program structure, main function, I/O control structures, Functions, Arrays and Structures).	
Course No.	11151
Course Name	Structured Programming Lab
C.H Dist.	1
Pre-requisite	-----
Co-requisite	11103
This course aims to build practical skills for structured programming using a high-level programming language. At the end of this course, students are expected to be able to analyze a computing problem, design, and implement a solution using a high-level programming language.	



Course No.	11213
Course Name	Data Structures and Algorithms for Cybersecurity
C.H Dist.	3
Pre-requisite	15230
Co-requisite	-----
<p>The purpose of this course is to describe, explain, and implement abstract data types including lists, stacks, queues, trees, heaps, sets, maps, hash tables and graphs. Implement a variety of algorithms for searching and sorting, including linear search, binary search, insertion sort, selection sort, merge sort, quick sort, and heap sort. Write recursive algorithms. Understand when recursion is, and is not, appropriate. Analyze the time and space efficiency of data structures and algorithms and apply this analysis to select the best tools for solving particular problems. At the end of this course, the student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem</p>	
Course No.	11323
Course Name	Database Systems
C.H Dist.	3
Pre-requisite	15230
Co-requisite	-----
<p>This course aims to introduce the fundamental of database systems design and implementation. Topics include basic concepts of databases, DBMS components, transaction managements, data modeling, entity relationships diagrams, relational databases, database integrity constraints, relational algebra, query languages, dependencies, schema designs normalization and redundancy elimination. At the end of the course, students are expected to be familiar with many of the principles and concepts related to databases and how these are applied in real database systems.</p>	
Course No.	11354
Course Name	Database Systems Lab
C.H Dist.	1
Pre-requisite	-----
Co-requisite	11323
<p>This course aims to build practical skills on how to design and implement a complete database application using a modern relational database system: It covers relations, queries, forms, reports, objects, properties, data design, software design, and rapid application development tools.</p>	
Course No.	11335
Course Name	Operating System
C.H Dist.	3
Pre-requisite	15230
Co-requisite	-----
<p>This course aims to introduce the fundamental of Operating System (OS) design and implementation. In this course, students will explore the importance of the operating system and its functions. Topics include an overview of the modern operating systems, types of operating systems, operating system structures, process management and threads (concepts of, communication, synchronization and deadlock), CPU scheduling, memory management and virtual memory, file systems, I/O systems and security and protection. Some topics in this course are implemented by writing programs to practically know how. At the end of this course, the students are expected to be familiar with many of the principles and concepts related to most of the actual operating systems and how these are applied in real OSs.</p>	



Course No.	11355
Course Name	Operating System Lab
C.H Dist.	1
Pre-requisite	-----
Co-requisite	11335
<p>This course aims to help students understand operating systems and provide them with some practical skills managing an operating system. The students are introduced to the LINUX OS, where they get hands on experience with the most common commands performing necessary OS operations and services. The students learn to use CLI and GUI interfaces, write shell code, write programs that deal with Processes management including synchronization and threading, interact with files and learn some Network and socket programming.</p>	

Course No.	12241
Course Name	Webpage Design and Internet Programming
C.H Dist.	3
Pre-requisite	11323
Co-requisite	-----
<p>The course aims to equip students with the necessary knowledge and skills to design and implement Internet-based applications. Topics include the specific technologies of these applications (including markup language(s), styling, client and server side programming), how to employ them in building effective and efficient interactive applications. At the end of this course, the students will learn about various website design and development best practices.</p>	

Course No.	11449
Course Name	Computer and Society
C.H Dist.	1
Pre-requisite	90 Cr. Hrs
Co-requisite	-----
<p>The course aims to equip students with the necessary knowledge and skills to design and implement Internet-based applications. Topics include the specific technologies of these applications (including markup language(s), styling, client and server side programming), how to employ them in building effective and efficient interactive applications. At the end of this course, the students will learn about various website design and development best practices.</p>	



Appendix B : Course Description/Cybersecurity

The following is the list of courses will be taught in the Cybersecurity program. For each course there will be: course number, course title, Credit Hours, course pre-requisite(s) and course description.

Mandatory Courses

Course No.	15230
Course Name	Programming for Security Professional
C.H Dist.	3
Pre-requisite	11103
Co-requisite	-----
<p>The course aims to introduce a recent programming language that is proper to security professional. Topics include Flow control, Strings, Lists, Tuples, Files, Functions, Modules, and Packages, input output and file handling, Object Oriented Programming features: Classes, Objects, Inheritance, Operator Overloading, Errors and Exceptions, Regular expressions, Multithreading, Modules to handle multidimensional data. Networking: Socket module, Port Scanning, Packet Sniffing, Traffic Analysis, TCP Packet Injection, Log analysis. HTTP Communications with built in Libraries, Web communications with the Requests module, Forensic Investigations: geo-locating, recovering deleted items, examining metadata and windows registry. At the end of the course, students expected to be able to deal with security problems using this resent language.</p>	
Course No.	15231
Course Name	Programming for Security Professionals Lab
C.H Dist.	1
Pre-requisite	-----
Co-requisite	15230
<p>This course aims to practice object oriented programming main concepts and paradigm, with focusing on the definition and use of classes along with the fundamentals of object-oriented design. Topics include practicing classes and objects, encapsulation, constructors and destructors, composition, dynamic memory allocation, inheritance, polymorphism and operator overloading. At the end of this course, the students are expected to be familiar with main principles and concepts related to object oriented programming. Where they can write, build, debug and test their programs. In addition to use their built classes in different projects.</p>	
Course No.	15320
Course Name	Computer Networks Architecture and Virtualization
C.H Dist.	3
Pre-requisite	11335
Co-requisite	-----
<p>Computer Networks Architecture and Virtualization is a technology that rapidly spreads to encompass network infrastructure and its devices, which has become critical to cyber operations. Specific topics to be covered in this knowledge unit must at least include Virtualization techniques, Virtual machine architectures, uses of virtualization for simplicity, doability, security, efficiency, and cost savings. At the end of this course, the students are expected to be familiar with computer networks topologies and their architectures and also virtualization technologies as well as many of the principles and concepts related to the network simulations. In case of simulations the students can implement some scenarios by witting code and call some libraries to accomplish their security tasks.</p>	



Course No.	15110
Course Name	Cybersecurity Fundamentals
C.H Dist.	3
Pre-requisite	11103
Co-requisite	-----
<p>This course aims to provide a deep and comprehensive study of security principles and practices of information systems. Topics include security threats, vulnerabilities and countermeasures, attacks, security services (confidentiality, integrity, availability, non-repudiation, accountability), cryptography: symmetric-key and asymmetric-key cryptography, user authentication, access control, social engineering, security in operating systems, web security: SSL and TLS, electronic mail security (PGP, MOME), malicious software, and firewalls. At the end of this course, students will be able to apply these concepts to protect computing infrastructure from cyber security threats and attacks.</p>	
Course No.	15232
Course Name	Secure Assembly Coding
C.H Dist.	2
Pre-requisite	11103
Co-requisite	-----
<p>This course aims to provide an overview of Assembly Language Fundamentals of Penetration Testing. Assembly language is most used programming languages in reverse engineering. It helps to understand any malware. It is used to analyze the flaw of any malware. Specific topics to be covered in this knowledge unit must at least include computer systems, data representation, numbering systems, instruction execution, symbolic coding, data word definition, laterals, location counter, indexing, indirect addressing, relative addressing, and assembly systems, reverse engineering (it tells complete working process of any application.), malwares and analyze the flaw of any malware. At the end of this course, the students will be familiar with the assembly language and with network and operating system basics.</p>	
Course No.	15233
Course Name	Malicious Software Analysis
C.H Dist.	3
Pre-requisite	15232
Co-requisite	-----
<p>This course will introduce students to modern malware analysis techniques through readings and hands on interactive analysis of real-world samples. After taking this course, the students will be equipped with the skills to analyze advanced contemporary Malware using both static and dynamic analysis. Students will learn how to safely and thoroughly analyze malicious software using the concepts of reverse engineering. Such analysis will be aimed at understanding the behavior and potential security impacts of such code.</p>	
Course No.	15321
Course Name	Network Security and Protocols
C.H Dist.	3
Pre-requisite	15320
Co-requisite	-----
<p>The aim of this course is to cover essential Internet protocols: ARP, IP, ICMP, IGMP, UDP, TCP, routing protocols such as RIP, OSPF and BGP, multicasting and multicast routing protocols such as DVMRP, MOSPF and PIM, application protocols such as DNS, DHCP, FTP and HTTP. In addition, this course will cover network security protocols such as: https, SFTP, IPsec, VPNs, TLS, SSL, SSH, Kerberos, OSPF authentication and SNMPv3.</p>	



Course No.	15322
Course Name	Network Security and Protocols Lab
C.H Dist.	1
Pre-requisite	-----
Co-requisite	15321
The aim of this lab is to study practically in the lab the common Internet protocols: ARP, IP, ICMP, IGMP, UDP, TCP, routing protocols such as RIP, OSPF and BGP. The students will set up scenarios in the real testbed and collecting the results and then analyzing them to be able to write the final report about their experiments.	

Course No.	15421
Course Name	Network and Cloud Monitoring & Documenting
C.H Dist.	3
Pre-requisite	15321
Co-requisite	-----
This course will concentrate on monitoring all the network systems, main devices like servers, routers, gateways, also the traffic, and applications in the network. The students will learn the fundamental knowledge of common network scan tools run by attackers so that they can detect this important activity. They can explore and study attack signatures and behaviours and OS fingerprinting. Moreover, they will learn about common TCP and UDP scan types and how ARP poisoning allows attackers to funnel traffic through their stations. Also, they will learn how to use some free open source tools like; Wireshark network analyzer to capture and analyze network traffic. Finally, When the students finish this course, they will have the skills and knowledge of network monitoring needed to detect and protect against attackers.	

Course No.	15330
Course Name	Secure Coding
C.H Dist.	3
Pre-requisite	15233
Co-requisite	-----
The purpose of the course is to learn about secure software, including its design, implementation and maintenance. During the course students will be exposed to a selection of topics from the following: performing threat modelling, issues in authentication and authorisation, auditing for security, input sanitising, TOCTOU vulnerabilities, memory management issues, fixing vulnerabilities and patch distribution. The course requires previous programming experience and some understanding of computer systems.	

Course No.	15331
Course Name	Secure Coding Lab
C.H Dist.	1
Pre-requisite	-----
Co-requisite	15330
This course aims to build practical skills on how to design and implement a secure code and application.	

Course No.	15360
Course Name	Database Security
C.H Dist.	3
Pre-requisite	11323
Co-requisite	-----
This course will provide an overview of database security concepts and techniques and discuss new directions of database security in the context of Internet information management. The topics will cover database application security models, privileges, passwords, roles, database and data auditing, XML access control, trust management and privacy protection, multilevel secure relational model and poly-instantiation, auditing in relational databases, The course also covers advanced topics such as SQL injection, database management security issues such as securing the DBMS, enforcing access controls, and related issues.	



Course No.	15370
Course Name	Cryptography Principles and Practice
C.H Dist.	3
Pre-requisite	15233
Co-requisite	-----
<p>This course aims to Introduce the basic and mathematical principles of cryptography and its application to computer-network security services and mechanisms. A detailed study of classical and modern cryptosystems, including number theory: modular arithmetic, prime number, Fermat's and Euler's Theorems, testing for Primality, Cryptographic algorithms: Classical cryptography; Secret Key Encryption; Perfect Secrecy. Cryptanalysis; Block and Stream cipher; Data Encryption Standard (DES) and Advanced Encryption Standard (AES); Public Key Encryption; Diffie-Hellman Key Exchange; RSA, and ElGamal Cryptosystems; Authentication and Digital Signatures; One-time signatures; Randomized Encryption; ElGamal signature schemes; Digital Signature Standard (DSS)' Cryptographically. Identification and entity authentication. Hash algorithms, Message Authentication Codes. Key establishment protocols. Key management techniques.</p>	
Course No.	15380
Course Name	Information systems risk management
C.H Dist.	3
Pre-requisite	15110
Co-requisite	-----
<p>Introduction to Risk Management. The Risk Management Lifecycle. Risk Assessment and Analysis Techniques. Risk Exposure Factors. Security Controls and Services. Risk Evaluation and Mitigation Strategies. Reports and Consulting. Threat and Vulnerability Management.</p>	
Course No.	15420
Course Name	Mobile and Wireless Security
C.H Dist.	3
Pre-requisite	15320
Co-requisite	-----
<p>This course is to focus on advanced topics on security and privacy for wireless communication systems, including cellular and wireless networks such wireless body area networks, personal area networks and area local networks. It will discuss current security threats in wireless and mobile networks. It will cover recent technologies used to protect network security and discuss the design and operation of security protocols designated for wireless networks.</p>	
Course No.	15450
Course Name	Digital Forensics and Incident Response
C.H Dist.	3
Pre-requisite	11335
Co-requisite	-----
<p>This course serves as general introduction to the field of Digital Forensics. It covers a number of topics fundamental to the area of digital forensics investigation. Such topics include an overview of computer hardware and digital media and storage formats, data acquisition and validation techniques, forensic methodologies, network traffic analysis, legal issues surrounding forensic investigation, professionalism and ethics, and future development in the field. In addition, the course introduces students to best practices and standards related to incident response.</p>	
Course No.	15451
Course Name	Digital Forensics and Incident Response Lab
C.H Dist.	1
Pre-requisite	-----
Co-requisite	15450
<p>In this lab, students will start practicing digital forensics in a lab environment using the most commonly used and accredited tools in the field. Students will learn and practice the basics of forensics, deal with evidence media and environment, collect evidence, storage formats, apply validation techniques, evaluate forensic methodologies, conduct evidence analysis, report and present outcomes of forensic investigation.</p>	



Course No.	15460
Course Name	Hacking Techniques and Intrusion Detection
C.H Dist.	3
Pre-requisite	15450
Co-requisite	-----
<p>This course covers the most common methods used in computer and network hacking with the intention of learning how to better protect systems from such intrusions. These methods include reconnaissance techniques, system scanning, accessing systems by network and application level attacks, and denial of service attacks. Finally, Basic Malware Analysis methods and tools will be studied at the end of this course</p>	

Course No.	15361
Course Name	Secure Systems Development and Design
C.H Dist.	3
Pre-requisite	11323
Co-requisite	-----
<p>The course focus on the development of high-assurance software systems is a growing challenge in emerging complex systems. Secure by design is emerging as a basic principle for trustworthy computing and as a preferred way to ensure the security of networked information systems and infrastructures. This course will focus on this issue and fosters the design, implementation as well as verification/validation of secure software systems and architectures. A key coverage will include principles and practices of secure and high assurance software development process, including security development lifecycle models, and design/verification/validation using languages and tools such as UML. Tools and techniques for code analysis and testing, and evaluation and certification of software will also be emphasized. The course will also cover secure programming principles using different languages, with particular focus in secure software development. This course covers the security and safety analysis in software design and development. It defines and identifies vulnerability detection and avoidance. Topics include threat modeling, and the interaction between security and usability authentication, principle of least privilege, buffer overflows, race conditions, time-of-check vs. time-of-use, trust management, access control, and other security relevant issues.</p>	

Course No.	15490
Course Name	Practical Training
C.H Dist.	3
Pre-requisite	Finish 90 C.H
Co-requisite	-----
<p>The student is required to do practical training in a well-known software company for a period of (2) months, full-time training, with at least (6) hours per day, or 3 months part-time training with at least (4) hours per day. In addition to training hours, for the part-time training, the student is allowed to register not more than (10) credit hours in the first or the second semester, or (4) credit hours in the summer semester. The student is required to perform tasks that are related to his major, such as writing, developing, or learning some new software.</p>	

Course No.	15491
Course Name	Graduation Project1
C.H Dist.	1
Pre-requisite	Finish 90 C.H
Co-requisite	-----
<p>Project is aimed at developing real world problem solving skills, including problem definition, analysis, and needed software. A project should be performed by a group of students under the supervision of a faculty member. Students are required to develop a complete implementation fulfilling the project objectives and submit a final report. Project must be presented to a committee of the faculty.</p>	



Course No.	15492
Course Name	Graduation Project 2
C.H Dist.	1
Pre-requisite	15491
Co-requisite	-----
<p>Project 2 aims at implementing the planned requirements, which were collected in Project 1 Students must work in groups to achieve a functional system at the end of this course. Students must test the product / system and that should be included in the documentation.</p>	

Elective Courses

Course No.	15260
Course Name	E- Business Security
C.H Dist.	3
Pre-requisite	12241
Co-requisite	-----
<p>This course introduces the main concepts in e-commerce and e-business various modules such as Business-to-Business (B2B), Business-to-Customer (B2C), (C2C), Government-to-Government (G2G), etc. Topics include the establishment of e-commerce portal, overview of the technological infrastructure, software technologies for e-business, database solutions for e-business, e-payment methods, ethical issues, etc. The course concentrates on security issues across all aspects of e-commerce business and teaches the students how e-business can survive in an environment full of opportunities, but at the same time full of threats.</p>	

Course No.	15422
Course Name	Multimedia Security
C.H Dist.	3
Pre-requisite	11213
Co-requisite	-----
<p>This course will cover selected topics in multimedia security and privacy, including techniques for steganography, steganalysis, digital watermarking, multimedia encryption and authentication, digital rights management, multimedia content tampering, and multimedia forensics.</p>	

Course No.	15440
Course Name	Machine learning and Big Data
C.H Dist.	3
Pre-requisite	15333
Co-requisite	-----
<p>This course will give an undergraduate-level introduction of machine learning and provide foundations of machine learning, implementation of the algorithms, and their applications. Topics include supervised learning, unsupervised learning, deep learning, and reinforcement learning. This course will put an emphasis on practical applications of machine learning to artificial intelligence and data mining, such as computer vision, data mining, speech recognition, text processing, bioinformatics. Course coverage includes an understanding of the diverse, emerging computer architectures designed for efficient execution of machine learning such as CPU, GPU, Tensorflow Basics</p>	

Course No.	15441
Course Name	Open Source Analysis
C.H Dist.	3
Pre-requisite	15330
Co-requisite	-----
<p>This course aims to provide an overview about open source and its information. The course will give the students an ability to collect and analyze open source information, use open source in vulnerability assessment (Pent/Red/Blue), use open source analysis in Malware analysis.</p>	



Course No.	15442
Course Name	Intelligent Threat Detection
C.H Dist.	3
Pre-requisite	15330
Co-requisite	-----
<p>This course aims to introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given security scenario. This include non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.</p>	

Course No.	15430
Course Name	Mobile Secure Coding
C.H Dist.	3
Pre-requisite	15330
Co-requisite	-----
<p>In this course, students shall learn how mobile applications must be developed in a secure way to protect the data and resources reside in the mobile device from threats of online and offline attacks. Due to the mass usage of mobile apps in today's world, mobile application vulnerabilities have greatly increased. Millions of devices are being affected by malicious code. Students will be able to write code for mobile applications that is not easy to penetrate or reverse engineered by hackers in a bad way. They will use techniques such as continuous patching and code hardening in order to protect the apps and the platform. Topics to be given in this course include: session management and authentication, data storage and protection, communication security, working securely with online servers, online financial transactions, code obfuscation and reverse engineering, and the use of third-party and open source libraries.</p>	

Course No.	15431
Course Name	Web Secure Coding
C.H Dist.	3
Pre-requisite	12241
Co-requisite	-----
<p>This course aims to build practical skills on how to design and implement a complete database application using a modern relational database system: It covers relations, queries, forms, reports, objects, properties, data design, software design, and rapid application development tools.</p>	

Course No.	15423
Course Name	Cloud Computing Security
C.H Dist.	3
Pre-requisite	15321
Co-requisite	-----
<p>This course introduces a survey of security and privacy concerns in Cloud Computing systems, as well as an overview of current best practices and technologies available. In this course, the students will learn the concept of cloud computing, the threat model and security issues related to data outsourcing and storage, and will address practical applications of secure Cloud Computing. Topics include: an overview of Cloud Computing and security concepts, Cloud Computing architecture, key strategies and best practices for securing the cloud, and evaluating cloud security. Upon completion of this course, students will be familiar with the technology that enables and facilitates the successful use of Cloud Computing infrastructure; be familiar with a variety of security and privacy concerns in Cloud Computing systems, be familiar with Cloud Computing legal and regulatory issues; and have expertise in debating and writing about cloud computing and security-related issues;</p>	



Course No.	15480
Course Name	Security Testing Theory and Practice
C.H Dist.	3
Pre-requisite	15321
Co-requisite	-----
<p>This course presents the Security Testing foundations as a form of software testing that uncovers vulnerabilities, threats, risks in a software application, and prevents intruders from malicious attacks. In this course, the students must recognize all potential software system vulnerabilities that could result in a loss of knowledge, income, and credibility at the hands of the organization's employees or outsiders. The topics of this course will include: an overview of Security Testing and its types, how to conduct Security Testing with the provision of some Security Testing Scenarios, Security Testing Mechanisms, and Security Testing Tools. At the end of this course, the students will be able to recognize the risks in the system and calculate their possible weaknesses, so that the system does not stop working or is abused. This course will also help students detect all possible security risks in the system and how coding can fix these problems.</p>	

Course No.	15452
Course Name	Advanced Forensics
C.H Dist.	3
Pre-requisite	15450
Co-requisite	-----
<p>This course introduces the methodology and procedures associated with digital forensic analysis of incidents that involve internet, computer, network and mobile forensic. Topics including: configuring a secure OS using command line and graphical utilities. OS file systems architectures, security vulnerabilities, user security, hardening, data and file recovery. network data acquisition, network forensics analysis, network logs and traffic acquisition and analysis, managing Intrusion Detection/Prevention Systems (IDS/IPS), Managing Security Incident and Event Management (SIEM) systems, etc. mobile technology, mobile devices and cellular networks then to the processes, methods and techniques of mobile forensics. Students will learn about the importance of network forensic principles, legal considerations, digital evidence controls, and documentation of forensic procedures. They will be required to take on the role of problem solvers and apply the concepts presented to situations that might occur on any computer. Students will perform actual mobile forensics investigations using state-of-the-art tools: commercial and open-source.</p>	

Course No.	15481
Course Name	Electronic Crime for Law Enforcement
C.H Dist.	3
Pre-requisite	15233
Co-requisite	-----
<p>The global reach of the Internet, the low marginal cost of online activity, and the relative anonymity of users have contributed to a wide escalation in cybercrimes. Consequently, information and communications technologies (ICT) are being increasingly employed to instigate threats to global civil society. This course provides an overview of cybercrime and the digital law enforcement practices put in place to respond to them. The course will focus on the types and extent of current cybercrimes, how the justice system responds to these crimes, the various constitutional protections afforded to computer users, the law and policies that govern cybercrime detection and prosecution, and related technologies.</p>	



Course No.	15482
Course Name	System Auditing and Security Polices
C.H Dist.	3
Pre-requisite	15233
Co-requisite	-----
<p>This course aims at introducing the foundations of auditing information systems for the purposes of security and forensics. It covers the concepts of the policies, audit process, governance, and compliance regulations, as well as the latest technology tools. Students will learn the role of an auditor and the types of audits performed, various information security and audit frameworks, as well as the tools and techniques of auditing technical controls, foundations of auditing operating systems, and foundations of auditing applications. In addition, this course will cover the following topics: the information systems audit process, data collection methodologies, regulations and compliance, auditing, vulnerability testing, penetration testing, auditing technical controls, auditing networks & operating systems, and auditing business application systems.</p>	
Course No.	15432
Course Name	Advanced System Administration-Windows Linux/UNIX Server
C.H Dist.	3
Pre-requisite	11335
Co-requisite	-----
<p>This course shall teach the students the important role of systems administration for reliable and trustworthy operation of an information system. The students will have knowledge in underlying operating systems environments such as Linux and Windows and how they contribute, as hosts, to the success of many other applications like network operations and data centres. They will tackle many areas including networking, backup, data restoration, data security, database operations, load balancing, and more. The students should be able to manage the documentation of hardware resources as well as software resources, conduct server health checkups, plan for backup and disaster recovery, apply the necessary updates, check compatibility and interoperability of deployed software, apply and evaluate security measures, automate and monitor processes using advanced monitoring and administration tools.</p>	
Course No.	15461
Course Name	Smart Cards/Tokens Security and Applications
C.H Dist.	3
Pre-requisite	15260
Co-requisite	-----
<p>This course will introduce various applications that exploit smart cards/tokens. Examine benefits, threats and attacks. Consider systems for the development, manufacture and management of smart cards/tokens. Review smart card standards and security evaluation methodologies. Topics include: An introduction to smart cards, Smart Cards Trusted Production Environment, Introduction to IoT (Internet of Things), An Overview of Multi-Application Smart Card Operating Systems and Platforms, Smart Cards for Secure Banking and Finance, Applications & Security for Mobile Communications, USIM/SIM and Services, ID Cards and Passports, RFID/NFCs Explained, Advances in Chip-card Technology, Security For Video Broadcasting, Evaluating Smart Card Security with the Common Criteria, Security Attacks, Countermeasures and Testing for Smart Cards, Application Development Environments for Multos, Overview of Trusted Platform, Introduction to TEE and Related Processors</p>	
Course No.	15362
Course Name	Biometric Security
C.H Dist.	3
Pre-requisite	15110
Co-requisite	-----
<p>Introduce Biometric and traditional authentication methods. Describe the background theory of image processing required in biometric security. Classify algorithms related to various biometrics Evaluate the performance of various biometric systems</p>	



Course No.	15470
Course Name	Advanced Applied Cryptography
C.H Dist.	3
Pre-requisite	15370
Co-requisite	-----
<p>This course aims to Introduce the advanced mathematical principles of cryptography. Topics including: number theory: modular arithmetic, Euclidean Algorithm, prime number, Fermat's and Euler's Theorems, testing for Primality, Chinese Remainder Theorem, Integer Factorization, Discrete logarithms, Set algebra and finite fields. Computations in finite fields using standard and non-standard bases, finite fields of the form GF(p), polynomial arithmetic, finite fields of the form GF(2^n), Cryptanalysis; Block and Stream cipher; Data Encryption Standard (DES) and Advanced Encryption Standard (AES); differential and linear cryptanalysis. Public Key Encryption; Diffie-Hellman Key Exchange; RSA, ElGamal and Rabin's Cryptosystems; Authentication and Digital Signatures; One-time signatures; Randomized Encryption; Rabin and ElGamal signature schemes; Digital Signature Standard (DSS)' Cryptographically. Identification and entity authentication. Hash algorithms, Message Authentication Codes. Key establishment protocols. Key management Techniques and concepts of their application to cryptography. Mutual authentication and key distribution protocols (ex. Needham Schroeder protocol), Message Authentication Codes (MACs), and web security issues. High performance algorithms and architectures for cryptographic applications.</p>	
Course No.	15493
Course Name	Special Topics in Cybersecurity (1)
C.H Dist.	3
Pre-requisite	Department Approval
Co-requisite	-----
<p>This course aims to introduce new topics in cybersecurity. A series of advanced topics in areas of cybersecurity is offered. The course details a structured discussion of varied subjects to include technological updates related to a specific track, a more intense study of topics covered in other course offerings, and an introduction to advanced concepts. The department determine the content of the course.</p>	
Course No.	15494
Course Name	Special Topics in Cybersecurity (2)
C.H Dist.	3
Pre-requisite	Department Approval
Co-requisite	-----
<p>This course aims to introduce new topics in cybersecurity. A series of advanced topics in areas of cybersecurity is offered. The course details a structured discussion of varied subjects to include technological updates related to a specific track, a more intense study of topics covered in other course offerings, and an introduction to advanced concepts. The department determine the content of the course.</p>	
Course No.	15495
Course Name	Open Innovation for Cyber Security
C.H Dist.	3
Pre-requisite	Department Approval
Co-requisite	-----
<p>This course aims to build practical skills on how to apply cyber skills in a Capture the Flag exercise to fully integrate learning with a practical exercise to asses and develop cyber skills. Also this course aims to qualify students to the market by linking higher education to the industrial needs. This course is designed to help students to improve and maintain their professional skills in several field of computing such as: Operating Systems security, Network security, and others. The final goal of this course is to fully prepare students for getting an approved intentional certificate from an international company to meet competency and skill requirements for specified profession in cybersecurity and latest technology related to.</p>	



Appendix C : Mathematics and Science

The course description of the courses offered by the other departments/ Engineering School

Course No.	20132
Course Name	Calculus (1)
C.H Dist.	3
Pre-requisite	-----
Co-requisite	-----
<p>Topics of study: Functions and their Graphs, Combining Functions, Shifting and Scaling, Trigonometric Functions, Exponential Functions, Inverse Functions and Logarithms, Inverse Trigonometric Functions, Tangents to Curves, Limits of a Function and Limit Laws, Continuity, the Intermediate Value Theorem, Limits Involving Infinity, Asymptotes, Tangents and Derivatives at a Point, the Derivative as a Function, Differentiation Rules, Derivatives of Trigonometric Functions, the Chain Rule, Implicit Differentiation, Derivatives of Inverse Functions and Logarithms, Derivatives of Inverse Trigonometric Functions, Extreme Values of Functions, Rolle's Theorem, the Mean Value Theorem, Monotonic Functions and the First Derivative, Concavity and Inflection Points, Curve Sketching, Indeterminate Forms and L'Hopital's Rule, Antiderivatives, Definite Integrals, the Fundamental Theorem of Calculus, Indefinite Integrals and the Substitution Method, Applications of Definite Integrals: Area Between Curves, Volumes of Solids: Slicing Method, Disc Method, Washer Method, and Cylindrical Shell Method.</p>	
Course No.	20133
Course Name	Calculus (1)
C.H Dist.	3
Pre-requisite	20132
Co-requisite	-----
<p>Hyperbolic Functions, Integration of Transcendental Functions, Techniques of Integration: Integration by Substitution (Review), Integration by Parts, Integration Including Powers of Trigonometric Functions, Integration by Trigonometric Substitution, Partial Fractions, Other Techniques, Improper Integrals, Sequences, Limit of Sequence; Series: Convergent and Divergent Series; Series Tests for Convergence: Partial Sums, Telescoping Series, Geometric Series, Base Divergence Test, Integral Test, P-series Test, Ratio Test, Root Test, Absolute Convergence Test, Alternating Series Test, Conditional Convergence; Power Series and Taylor Series, Interval and Radius of Convergence, Parametric Equations of Curves in Plane, Polar Coordinates, Graphs in Polar Coordinates.</p>	
Course No.	20134
Course Name	Discrete Mathematics (1)
C.H Dist.	3
Pre-requisite	-----
Co-requisite	-----
<p>Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Rules of Inference, Proof Methods, Sets and Their Operations, Functions, Cardinality of Sets, Sequences and Summations, Matrices, Mathematical Induction, Solving Linear Recurrence Relations, Relations and Their Properties, Graphs and Graph Models, Graph Terminology and Special Types of Graphs.</p>	



Course No.	20233
Course Name	Statistical Methods
C.H Dist.	3
Pre-requisite	-----
Co-requisite	-----
<p>Introduction to Statistics: Data and Data Sources, Populations and Samples, Variables, Organizing Data, Contingency Tables; Visualizing Data: Charts, Scatter Plots; Descriptive Statistics: Central Tendency Measures, Measures of Variation, Quartiles, Symmetry and Skewness; Elements of Probability Concepts: Conditional Probability, Probability Independence, The Probability Distribution for a Discrete Variable, Binomial Distribution, Geometric Distribution, Poisson Distribution and Hypergeometric Distribution, Continuous Probability Distributions; The Normal Distribution: Sampling Distributions, Sampling Distribution of the Mean; Confidence Interval: Estimate for the Mean (σ Known), and Confidence Interval Estimate for the Mean (σ Unknown). Hypothesis-Testing for the Mean (σ Known), t-Test of Hypothesis for the Mean (σ Unknown); The Simple Linear Regression Equation Correlation.</p>	

Course No.	20234
Course Name	Linear Algebra
C.H Dist.	3
Pre-requisite	20133
Co-requisite	-----
<p>System of Linear Equations: Row-echelon Form, Gaussian Elimination, Gauss-Jordan Method; Matrix: Operations, Properties of Matrix Arithmetic, Matrix Transpose, Special Matrices; Determinants: Properties of Determinants, The Method of Cofactors, Adjoint Matrix and Inverse of a Matrix, Cramer's Rule; Euclidean n-space: Vectors, Dot Product, Cross Product, Euclidean n-space, Linear Transformations; Vector Spaces: Vector Spaces, Subspaces, Span, Basis and Dimensions, Fundamental Subspaces, Inner Product Spaces, Orthogonal and Orthonormal Basis, Least Squares, QR-decomposition, Orthogonal Matrices; Eigenvalues and Eigenvectors: Eigenvalues and Eigenvectors, Diagonalization. Linear Transformations: General Linear Transformations, Kernel and Range.</p>	



Appendix D : Special Courses for other Departments

This courses are designed and implemented according to special requirements for other department

Course No.	14468
Course Name	Security and Privacy of Big data
C.H Dist.	3
Pre-requisite	15330
Co-requisite	-----
This course explains Security protocols, authentication protocols, data integrity, digital signatures, intrusion detection, key management, and distribution, in the area of big data.	