جامعة الإسراء
Isra University

Description of Courses offered by the Department of Cyber Security.2019/2020

11021101 General Physics (1) (Prerequisite: - none) (3) Cr. Hrs

Vectors, Basics of Mechanics Description of Motion in one Dimension, Motion in two Dimensions, Applications of Newton's Laws, Work Energy Theorem, Collisions and Rotational Motion

11031101 Calculus (1) (Prerequisite:- none) (3) Cr. Hrs

Functions and Limits, Continuous functions, derivative, differentiation rules, implicit differentiation, applications integrals, definite integrals, transcendental functions, inverse trigonometric functions.

06051110 Programming Methodology (Prerequisite: - none) (3) Cr. Hrs

Problem-solving concepts: constants and variables, data types, problem-solving steps, expressions, problem solving tools, algorithms, flowcharts, pseudo-code, programming logic structures (sequential, decision, and loops), Arrays.

06051200 Discrete Mathematics (Prerequisite: - none) (3) Cr. Hrs

Introduction to discrete structures and computing techniques concerning sets, graphs and trees, functions, relation properties, recursive definitions, solving recurrences, equivalence, partial order, proof techniques, inductive proof counting techniques and discrete probability

06051220 Logic Design (Prerequisite: - 11021101**) (3) Cr. Hrs**

Fundamental concepts of numbering systems, computer codes. Boolean algebra and logic gates. Simplification of Boolean functions, Karnaugh map, combinational logic implementation including PLAs, (adders, comparators, coders, decoders, code converters, multiplexers, de-multiplexers). Sequential circuits, flip flops, counters, shift registers, memories

06051211 Programming Fundamentals (Prerequisite: - 06051110**) (3) Cr. Hrs**

Fundamental concepts of programming using C++ or Java: classes and objects, modeling object (attributes and behaviors), algorithms, problem solving flowcharts, pseudo codes. Basic blocks of programming such as variable names, data types, control structures, functions, arrays.

06032102 Data Structures (Prerequisite: - 06051211**) (3) Cr. Hrs**

Introduction to problem solving, Data Structures (static & dynamic), lists, stacks, queues, graphs, trees, sets and dictionaries). Recursion and iteration. Students are expected to do lab experiments using C# or Java.

06012232 Information Systems Analysis & Design (Prerequisite:-06032112**) (3) Cr. Hrs**

System Theory, information systems and information systems types, system analysis and design methods, object oriented system analysis and design methods. Study cases.

06032112 **Object Oriented Paradigm** **(Prerequisite: -** 06051211**)** **(3) Cr. Hrs**

Introduction to OOP, models, objects, methods, links, message passing, polymorphism, dynamic binding, classes constructors and destructors, association, generalization and specialization, inheritance, overridden methods, aggregation. Students are required to perform some lab experiments using the latest JAVA or C# language version and UML using Rational Rose software.

06012201 **Algorithmic** **(Prerequisite: -** 06032102**)** **(3) Cr. Hrs**

Introduction to the design and analysis of algorithms, mathematical algorithms. Greedy technique, manipulating data: sorting, searching, dynamic programming, space & time tradeoffs. The concept of algorithm efficiency, table, and information retrieval. Combinatorial problems, advancement in Java skills and techniques.

06032122 **Computer Architecture** **(Prerequisite: -**06051220**)** **(3) Cr. Hrs**

Hardware components of a modern computer system, history and performance, the instruction cycle, memory organization, cache memory, I/O organization, CPU, micro-programmed control, instruction formats and modes

06033113 **Visual Programming** **(Prerequisite: -** 06032112**)** **(3) Cr. Hrs**

Basic Visual Programming, solid foundation of the syntax and semantics of a visual Programming language used to develop both windows-based and web-based application. Coverage of Microsoft's. NET platform architecture.

06013214 **Web Design (1)** **(Prerequisite: -** 06032112**)** **(3) Cr. Hrs**

Basic concepts of the Internet and Internet browsers, Internet applications, web page creation tools and languages. Basic XHTML (frames, forms), cascading style sheets, scripting and scripting languages. Dynamic XHTML (object based programming and events). Students are required to do a Mini- project.

06013231 **Database Management Systems** **(Prerequisite: -** 06013130**)** **(3) Cr. Hrs**

Application development, integrated application, XML standards distributed database processing and view support. Data protection problems, recovery, concurrency, security and data integrity. Database administration and tuning, all practical applications shall be implemented in ORACLE.

06013130 **Databases** **(Prerequisite: -** 06012201**)** **(3) Cr. Hrs**

An in-depth examination of relational databases, modern database technologies, conceptual design and entity relationship modeling, relational algebra and calculus, data definition and manipulation languages using SQL, schema and view management, query processing and optimization, transaction management, security, privacy, integrity, and management. Students are required to do project work.

06044152 **Cloud Computing Security (Prerequisite: -** 06082140**)** **(3) Cr. Hrs**

This course provides the ground-up coverage on the high-level concepts of cloud landscape, architectural principles, techniques, design patterns and real-world best practices applied to Cloud service providers and consumers and delivering secure Cloud-based services. The course will describe the Cloud security **architecture** and explore the guiding security design principles, design patterns, industry standards, applied technologies and addressing regulatory compliance requirements critical to design, implement, deliver and manage secure cloud-based services.

06042255 **Network Operating System /Linux** **(3) Cr. Hrs**
(Prerequisite: - 06043150**)**

Introduction to Linux Operating System Concepts, Including Installation and Maintenance. Emphasis Is Place on Operating System Concepts, Management, Maintenance, and Resources Required. At the end of This Course, Students will understand OS Concepts, Installation, Management, Maintenance, Using Linux Operating Systems. Basic Linux Commands and Programs, Standard Program Development tools, Such as Emacs, Compilers, Debuggers, the "Make" Facility, Automated Common System Tasks Using Shell Scripts, Basic System Administration.

06043256 **Networks Security (Prerequisite: -** 06042150**)** **(3) Cr. Hrs**

Introduction to network security; network security requirements, security policy; cryptography and its applications to network security; network security threats; applications of cryptography; secret key and public key cryptographic algorithms; hash functions; authentication; security for electronic mail; Firewalls and intrusion detection techniques; building secure channels; hardening network systems and potential threats to network systems.

06044158 **Ethical Hacking (Prerequisite: -** 06043150**)** **(3) Cr. Hrs**

Introduction to the principles and techniques of using hacking skills for defensive purposes. The course covers planning, investigation, scanning, exploitation, post-exploitation, and result reporting. The student learns how system vulnerabilities can be exploited and learn to escape such problems

06043259 **Smart Phone Security (Prerequisite: -**06033113**)** **(3) Cr. Hrs**

Mobile application architecture, Mobile system programming, Security policy of Mobile, Interfaces used to define policy, Best practices for using those interfaces, Pitfalls leading to insecure applications, Design and implementation of selected software attacks (ethical hacking), Design and implementation of security extensions to the Mobile framework (e.g., access control policy enforcement)

06042261 **Network Monitoring And Documentation** **(Prerequisite: -**06082140**)** **(3) Cr. Hrs**

The concept of packet capturing and how it works. The packet/traffic analysis concepts and protocol format. Network devices for network monitoring tasks. Perform network monitoring at any small, medium or enterprise network

06044160 **Privacy Aware Computing** **(Prerequisite: -**06043257**)** **(3) Cr. Hrs**

Data perturbation, Data anonymization, Random Responses, Privacy Measures, Cryptographic methods or data privacy, Privacy preserving data mining, Private information retrieval, Secure data outsourcing, Privacy in social networks.

06043257 **Intrusion Detection System** **(Prerequisite: -** 06042255**)** **(3) Cr. Hrs**

Introduction to the data and methodologies of computer intrusion detection, Statistical and machine learning approaches to detection of attacks on computers, Network monitoring, and analysis, Estimating the number and severity of attacks; network-based attacks: probes and denial of service attacks; host-based attacks: buffer overflows and race conditions; and malicious code: viruses and worms, Statistical pattern recognition for detection and classification of attacks. Visualization of network data.

06044251 **Computer Forensic Analysis And Investigation** **(Prerequisite: -**06043256**)** **(3) Cr. Hrs**

Fundamentals of Digital Crimes and Network Forensics, Forensic Modeling, Forensic Duplication and analysis, Network Surveillance, Intrusion Detection and Prevention, Incident Response and Trace-Back. Signature and anomaly Based Intrusion Detection, Pattern Matching Algorithms, Viruses, Trojans and Worms Detection. Multicast Fingerprinting, anonymity and Pseudonym. Privacy-Protection Techniques, Cyber Law, Computer Security Policies and Guidelines, Court Testimony and Report Writing, and Case Studies.

06043253 **Risk Management Security** **(Prerequisite: -** 06082140**)** **(3) Cr. Hrs**

IT Security Management and Systems Risk Management, IT Security Control, Plans, and Procedures. Categories of Threats, Existing Risk Management Frameworks, Models, Processes, and tools to Equip Students with the theory, Science, and Practical Knowledge to Operationalize Risk Management in Private and Government Agencies, Vulnerabilities and Risks, Risk Identification, Risk Assessment, Prevention, Mitigation, Recovery.

06043254 **Information Security Protocols (Prerequisite: -**06082140**)** **(3) Cr. Hrs**

Reviews Contemporary Security Protocols and their Properties, Including Confidentiality, Authentication, Secure Group Communication, Privacy, and anonymity. Covers Cryptographic Primitives, as Well as Standard Formal Models and tools Used for Mechanized Verification of Secure Systems, Including Model Checking, Constraint Solving, Process Algebras, Protocol Logics, and Game theory.

06082140 **Computer Networks** **(Prerequisite:** - 06051220**)** **(3) Cr. Hrs**

Logical and physical of computer networks, architecture and transmission alternatives. OSI-reference model, ALOHA protocol, CSMA protocols, LAN, IEEE standards and protocols (token ring, token bus and Ethernet), physical layer basics, data link layer, framing protocols, error detecting and correcting, routing algorithms, flow control, congestion control algorithms, personal computer networks.

06043150 **Introduction to Cyber Security** **(Prerequisite: -** 11031230**)** **(3) Cr. Hrs**

This course introduces students to the interdisciplinary field of cyber security by discussing the evolution of information security into cyber security, cyber security theory, and the relationship of cyber security to nations, businesses, society, and people. Students will be exposed to multiple cyber security technologies, processes, and procedures learn how to analyze the threats, vulnerabilities and risks present in these environments, and develop appropriate strategies to mitigate potential cyber security problems.

06044293 **Graduation Project -CY** **(Prerequisite:-**Pass 90 Cr.hr.**)** **(3) Cr. Hrs**

Student picks one of the projects posted by the department as part of requirements of graduation.

06044190 **Practical Training – C¦Y** **(Prerequisite: -** Pass 90 Cr.hr.**)** **(3) Cr. Hrs**

Practical training in the public or private sector for at least 8 weeks

06043162 **Networks & Severs Programming (Prerequisite: -**06082140**)** **(3) Cr. Hrs**

Introduction to networks programming advanced JAVA (covers I/O Routines, Threading Sockets, URL connections, Server-Side programming), database connectivity, distributed programming, and network security, Students are required to do lab. Assignment.

06043270 **Security Of Network & Server Programming** **(Prerequisite: -**06043162**)** **(3) Cr. Hrs**

This course introduces to IT students, Computer programmers, IT Security professionals, who are seeking to develop network and server system security skills. Through this course, we will cover the Design and Analyze Secure Network and server Systems, Develop Secure Programs with Cryptography, Crypto API, windows crypto service provider, Hacking and Patching Web Applications, Perform Penetration Testing, and Secure Networked Systems with Firewall and IDS, which will prepare the student to perform tasks as Cyber Security Engineer, IT Security programmer, and Cyber Security Analyst.

06043272 **IoT SECURITY** **(Prerequisite: -**06013214**)** **(3) Cr. Hrs**

This course aims to introduce the concept of IoT and its impact on our daily lives, to understand the architecture and components of IoT. Introduction to IOT Security, IOT Ethics and Privacy. Building Automation and Security. Relevant Case Studies of IOT Security Vulnerabilities and Attacks, and Mitigation Controls. Use of IOT in Various Domains: Energy and Environment, Infrastructure Healthcare and Consumer Electronics. From this course, students will become aware of the cyber security issues raised by IoT and gain the knowledge of the related security techniques. Students will also gain hands-on experiences in building IoT devices and implementing security techniques.

06044276 **Cyber Crimes** **(Prerequisite: -**06044152**)** **(3) Cr. Hrs**

This course explores technical, legal, and social issues related to cybercrime. Also, introduces and explains the various types of offenses that qualify as cybercrime activity. Emphasis is placed on identifying cybercrime activity and the response to these problems from both the private and public domains. Upon completion, students should be able to accurately describe and define cybercrime activities and select an appropriate response to deal with the problem

06043275 **Advanced Cryptography** **(Prerequisite: -**06043150**)** **(3) Cr. Hrs**

Overview of Modern Cryptography, with an Emphasis on the Fundamental Cryptographic Primitives of Symmetric and Asymmetric Public-Key Encryption, Hash Functions, Message Authentication, RSA, Diffie-Hellman, Certification Authorities, Digital Signatures, Pseudo-Random Number Generation, and Basic Protocols and their Computational Complexity Requirements Introduction to Elliptic Curve Cryptography.

06043274 **Web Security** **(Prerequisite: -**06013214**)** **(3) Cr. Hrs**

Client-side (browser) vulnerabilities associated with browsing the web, system penetration, and information breach and identity threat. Encrypting data stream using SSL, Confidentiality and Integrity of data using third party transaction protocols e.g. SET, PCI DSS Standard, Server-side security: CGI security, server configuration, access control, operating system security, malicious e-mails, web scripts, cookies, web bugs spyware, rogue AV. Web Fundamentals, Web Server Architecture, Web Application Hacking, Infrastructure Mapping and Profiling, Web Authentication & Authorization, Script Hacking and Defensive Coding, Securing Databases and Database Access, Buffer Overflow Attacks Denial of Service, Client Security, Threat Modeling.

06044277 **Ethics And Law Of Cyber Security (Prerequisite: -**06044158 **) (3) Cr. Hrs**

Implementation of cyber security practices, international law and cyber security, the rights of the individual vs. Public safety and cyber law& ethics. Legal considerations related to cyber security and cyberspace such as privacy, intellectual property, cybercrime, homeland security, and global cyber security issues, develop business and governmental policies.

06014171 **Special Topics (1)** **(Prerequisite: -** Dept. Approval**) (3) Cr. Hrs**

To be set by the department.

06014115 **Web Design (2)** **(Prerequisite: -**06013214**) (3) Cr. Hrs**

This unit introduces students to design, development and implementation of server side applications, the use of multimedia and human interaction on the browser side. Students gain practical experience creating dynamic web applications that interact with a database using client side scripts, server side scripts and compiled server programs. Security, access right, financial transactions and legal issues are also covered. This unit incorporates substantial practical experience in applying theoretical concepts. Students are required to submit mini project.

06014272 **Special Topics (2)** **(Prerequisite: -** Dept. Approval **) (3) Cr. Hrs**

To be set by the department.

06044271 **Security Of Auditing** **(Prerequisite: -**06044251**) (3) Cr. Hrs**

Essential Knowledge of Cyber Security, Audit and Control Processes, Control Framework, Legal and Ethical Concerns for IT Auditors, Audit Planning, IT Service Delivery, Network Telecommunications Auditing, Application Auditing, Fraud and Forensic Auditing, E-Business Auditing, ISO Auditing, PCI Auditing, GLBA Auditing, HIPAA Auditing, and SOX Auditing.

06043273 **Advanced Programming** **(Prerequisite: -** 06033113**) (3) Cr. Hrs**

Advanced features of the language such as handling exceptions, Files and Database connectivity. Other major topics in this course include network programming serialization, properties, multithreading, and security. 3

06043141 **Wireless Networks** **(Prerequisite: -**06082140**) (3) Cr. Hrs**

Introduction to mobile and wireless networks. Designing computer networks to support, computer mobility. Mobile network architecture. Wireless technologies and protocols. Wireless LAN standards. Models for indoor and outdoor mobile networks. Systems issues such as performance. Quality of service guarantees, reliability, and security in mobile computing environment. Hardware and access protocols for mobile networks. Mobile application protocols.

06052253 Numerical Analysis (Prerequisite: - 11031101**)**

The error calculation, roots of nonlinear equations, use of numerical methods to solve systems of linear equations, approximation Functions, Find derivatives, find the values of numerical integrals by numerical methods, the use of numerical methods to solve differential equations

11031230 Statistics and Probabilities (Prerequisite: - 11031101**) (3) Cr. Hrs**

Definitions and basic elements of probability, Rules of probability, Random Variables: Discrete and continuous random variables and their probability distribution functions, the mathematical expectation. Some discrete and continues distributions: Binomal, Poisson, geometric, Hyper geometric and Normal Distributions. Point and interval estimation of the parameters of one and two populations. Tests of hypotheses concerning the above parameters, and Goodness of fit and independence tests. Simple linear Regression and inference concerning its parameters multiple linear regression: Description and estimate using matrices.