



A'Sharqiyah University

College of Engineering

Department of Electrical Engineering and Computer Science

Bachelor of Science in Cyber Security

Course Descriptions

University Requirements (12 CH)

ISLM101 Islamic Civilization (3 CH)

This course aims to introduce students to the concept of civilization, the composition and evolution factors, introduce them to the most important political and administrative systems and economic and social development in the Islamic civilization, and aims to the statement of contributions to Islamic civilization in other civilizations, especially the European civilization, also aims to publicize the importance of the site Oman and how to interact with other previous civilizations in different eras, and the factors that allowed it to be a center of cultural divisions history.

ENGL101 English Communication Skills I (3 CH)

This course develops students' proficiency through grammar instruction and fluency exercises. While the emphasis of the class is on speaking and listening, there are also reading and writing exercises which reinforce the grammar and vocabulary students learn. Finally, students are required to participate in discussions regularly basis and give several presentations.

ENGL102 English Communication Skills II (3 CH) (Pre-R: ENGL101)

This course further develops reading sub-skills, comprehension, and vocabulary. The texts are more demanding lexically and structurally than ENGL101 and are mainly literary. Written and oral activities require students to respond to these texts critically.

MNGT313 Entrepreneurship (3 CH) (Pre-R: 60 CH)

This course is an introductory course in Entrepreneurship and Innovation. The course aims to expose students to business venturing and entrepreneurial activity. The students would apply knowledge and skills acquired during the course by developing and evaluating their business ideas. This course is an introductory entrepreneurship course that focuses on the vital role played by entrepreneurs and entrepreneurship in the 21st-century global economy. The process of successfully launching and growing an entrepreneurial venture by applying the entrepreneurial process is examined. The course integrates several different disciplines, ranging from sociology and psychology to economics, finance,

marketing, and human resource management. It is a course that mixes theory with practice by applying principles, concepts, and frameworks to real-world situations

Degree requirements (105 CH)

MATH101 Calculus I (3 CH)

The aim of this course is to lay a firm foundation for students in calculus. The course will introduce students to the concepts of limits, continuity, derivatives, hyperbolic functions and integrals. It will develop mathematic critical thinking and problem-solving skills.

INTE101 Information Technology Fundamentals (3 CH)

The course intends to deliver an overview of the basic IT concepts including hardware, software, networks, databases. Also, it highlights the various applications of IT in the business area. The course will also present the basic principles of ethical and legal issues involved in the development process of related information technology applications

INTE105 Computer Programming I (3 CH)

This course introduces computer programming fundamentals. Students will be taught how computer programs work, the logic and the principles of problem solving. Students will learn about variables, array, loops and other data manipulation techniques (introductory level). Python programming language will be used to deliver this course learning objectives.

CYSE120 Fundamentals of Cyber Security (3 CH)

This is an introductory course focuses on delivering the basic aspects related to cyber security and associated issues. It covers topics including the importance of cyber security, cryptography, risk management, penetration testing and protection.

MATH102 Calculus 2 (3 CH) (Pre-R: MATH101)

The aim of this course is to lay a firm foundation for students in calculus. The course will introduce students to the concept's definite integrals, integration by substitution, integration by parts, sequences and series. This course also introduces students to the concepts of vector and scalar product, partial derivatives, solution of first-order ODE's and PDE's.

MATH140 Discrete Math (3 CH) (Pre-R: INTE105)

This course is designed for Computer Science and Information Science Technology students. This course will give a careful treatment of Logic, Sets, Functions, Integers, Mathematical reasoning, Counting, Relations, and an introduction to Graph Theory.

INTE130 Computer Programming II (3 CH) (Pre-R: INTE105)

This course extends computer programming I, where students will further develop their programming skills in terms of programming logics, real industry problem solving. Object oriented programming elements inheritance, polymorphism, abstraction and encapsulation are introduced and applied to implement common data structures and solutions.

CYSE201 Data Structures and Algorithms (3 CH) (Pre-R: CYSE140)

This course topic cover basic data structures which include arrays, queues, lists and stacks, Advanced data structures and the algorithms used in handling these data structures.

MATH215 Linear Algebra (3 CH) (Pre-R: MATH101)

Algebra of Matrices and Vector Spaces and applications to Solutions of systems of linear equations and geometric Transformations are studied in this course

CYSE202 Forensic Fundamentals and Investigations (3 CH) (Pre-R: CYSE120)

This course is designed to provide the students with the practices and principles of digital forensics and investigation, and importance of digital forensics. The students will also learn different techniques and procedure to perform a digital investigation.

CYSE203 Database Systems Development (3 CH) (Pre-R: INTE130)

This is an introductory course focus on delivering the basic concepts and theory of database architecture and database models. The course explores related topics including database design and development, data model, query language, and normalization process. MS access and/or MYSQL will be used for practical means.

CYSE204 Cyber Ethics (3 CH) (Pre-R: CYSE120)

This course is designed as an introduction to the ethical challenges related with the cyberspace. The cyberspace is a global entity without any borders. All sectors of society are linked to the cyberspace: education, health, agriculture, law, government, etc. As the opportunities and expectations are high, the challenges and issues involved with it are also immense. This course enables students to identify and analyze the ethical dilemmas in the cyberspace and how to reach a reasoned conclusion in an ethical decision-making process.

CYSE210 Computer architecture and operating systems (3 CH) (Pre-R: CYSE201)

To gain deep understanding of the cybersecurity issues, understanding of computer architecture and operating systems is inevitable. First part of the course deals with the computer architecture topics such as computer abstraction, instruction set of computers, arithmetic for computers and the processor. Second part of the course covers the operating system topics such as process management and coordination, memory management, storage management, protection and security.

MATH204 Probability and Statistics (3 CH) (Pre-R: MATH102)

Basic concepts of descriptive statistics, statistical inference, regression, correlation analysis, hypotheses test, and confidence intervals, elements of set theory, sample space and events, probability, conditional probability and independence, examples of discrete and continuous probability distributions, multivariate probability distributions, functions of random variables, and central limit theorem.

INTE 110 Web Application Development (3 CH) (Pre-R: INTE130)

The course intends to provide the students with concepts, methods and techniques related to Website design and development. The course explores the processes involved in designing and developing web applications. The course involves using HTML, CSS and JSON.

CYSE220 Cyber Forensics (3 CH) (Pre-R: CYSE120)

This course is design to helps the students in applying and demonstrating investing and analyzing techniques to collect and preserve evidence so that the evidence could be presented to the legal authorities. The students will also learn different tool and technique to achieve the goals.

CYSE230 Computational Thinking (3 CH)

The course is an introduction to computational thinking with a focus on data and data science. Student will learn algorithm design as well as fundamental programming concepts such as data, selection, iteration and functional decomposition, data abstraction and organization.

INTE207 Computer Networks I (3 CH)

Computer Networks plays a major role in the computing activities industry. This course introduces a student to the fundamental of Computer Networks, architectures and communication protocols. Students will have a broader understanding of all aspects of computer network including network medium access, routing internetworking, connection issues and internet application protocols.

INTE310 Technical writing (3 CH)

This course will build student's capacity to be able to produce technical documents for information systems projects. In particular, producing user/business need analysis document, software needed documents, manuals and procedures other technical documents.

CYSE303 Secure Software Development (3 CH) (Pre-R: CYSE220)

This course extends computer programming III, where students will further develop their programming skills to develop secure applications. Students will learn handling password encryption, authentication, access control. PHP is used as a programming language to deliver this course.

CYSE304 Biometric Authentication (3 CH) (Pre-R: CYSE202)

The course gives an overview of the introduction of Biometric traits and its aim, image processing basics, basic image operations, filtering, enhancement, sharpening, edge detection, smoothing, enhancement, thresholding, localization. The course also includes Fourier Series, DFT, inverse of DFT. Biometric system, identification and verification. FAR/FRR, system design issues. Positive/negative identification. Biometric system security, authentication protocols, matching score distribution, ROC curve, DET curve, FAR/FRR curve. Expected overall error, EER, biometric myths and misrepresentations. Selection of suitable biometric. Biometric attributes, Zephyr charts, types of multi biometrics. Verification on Multimodel system, normalization strategy, Fusion methods, Multimodel identification. Biometric system security, Biometric system vulnerabilities, circumvention, covert acquisition, quality control, template generation, interoperability, data storage. Recognition systems: Face, Signature, Fingerprint, Ear, Iris etc.

CYSE310 Ethical Hacking I (3 CH) (Pre-R: INTE207)

This course develops a critical understanding of the tools used by Ethical Hackers to examine the security of a device or network. Students will systematically investigate a computer network for possible vulnerabilities.

CYSE320 Network Security & Cryptography (3 CH) (Pre-R: INTE207)

This course develops a basic understanding of the algorithms used to protect users online and to understand some of the design choices behind these algorithms.

INTE230 Incident Response Management (3 CH) (Pre-R: CYSE202)

The course design to enable the students in managing the security incident and avoid vulnerabilities and increase the efficiency in incident response efforts. the course will cover the topic such as contingency planning and information security, IT Governance Controls, Fraud, and fraud Protection and Detection.

INTE305 Computer Programming III (3 CH) (Pre-R: INTE130)

This course extends computer programming II, where students will further develop their programming skills to develop commercial applications in a robust manner. They will further develop their object-oriented programming skills to develop a large-scale application. They will also learn how to debug and handle execution profiler.

CYSE350 Risk Analysis and Management (3 CH)

This course helps measure and quantify risks related to financial organizations and regulators. In this course students will learn about Risk Analysis and management and tools.

CYSE470 Internship (3CH)

The internship course provides students with the opportunity to gain practical experience in a typical work environment. Students will be exposed to various aspects of general business practices, along with valuable industry experience. Upon completion of their required coursework, students will be given the opportunity to be attached to an organization where they will be mentored by 2 supervisors, one from ASU and the other one from the Business where the student will commit to the practical experience. The Internship course is also intended to enhance the students' employment prospect.

CYSE401 Advanced Network Security and Forensics (Pre-R: CYSE320)

This course deals with computer security which faces major challenges in the computing industry such as digital forensic and computer network hacking. In this course students will learn about computer network security and digital forensic.

MNGT201 Principles of Management (3 CH)

This course emphasizes on the basic skills necessary for manager to achieve the goals of an organization. It introduces the concepts of managerial functions of planning, organizing, leading and controlling. Also, it focuses on the skills and roles of the manager as leader of the organization. The course gives an overview of the main concepts vital for comprehending the expectations from manager's role in 21st century organizations.

CYSE402 Ethical Hacking II (3 CH) (Pre-R: CYSE310)

This course develops a critical understanding of advanced techniques used by Ethical Hackers to examine the security of web applications.

CYSE403 Penetration Detection (3 CH) (Pre-R: CYSE310)

The course is designed to help the students to gain skill and knowledge in penetration testing. The students will also learn about malware and destructive viruses' function. In addition, the course introduces students how to attack and assess different types of networks and systems.

CYSE410 Information Security Management Systems (3 CH) (Pre-R: CYSE320)

This course covers all topics essential to understand and implement security information system in relation to ISO 27001, the requirements of information security controls required by ISO/IEC 27001, the security controls techniques and guidelines for implementation according to ISO/IEC 27002, and Method of information security audits.

CYSE430 Cyber Law and Legal Regulations (3 CH)

This course gives the students a background of relevant cyber laws, policies, and legislation. The course also includes cybercrimes and legal framework, digital signature and electronic signature, contracting, e-commerce and e-governance.

CYSE440 Malware Forensics (3 CH) (Pre-R: CYSE401)

The course is designed to help the students in understanding the core concept of Malware Investigating and Analyzing Malicious Code and how to respond to a malicious code incident.

CYSE475 Research Project (3 CH)

This course serves as a comprehensive assessment of knowledge and skills in information systems and cybersecurity. Activities include research into selected security problems and planning, designing and implementing security solutions for a user organization. A comprehensive project-driven study of network design and security, with an emphasis on the integration of knowledge, practical applications, and critical thinking.

CYSE330 Data Backup and Recovery (3 CH)

Data backup and recovery will help students in planning a backup and develop a recovery strategy as well as enable students to perform recoveries through using Recovery Manager tools. In this course, students will learn about Data backup and recovery techniques and tools.

INTE407 Block Chain Technologies (3 CH)

The course intends to explore the concepts and roles of block chain technology and discuss the viewpoint of decentralization in block chain. This course also explores the different applications of block chain and its related benefits and limitations.

CYSE420 Database and Distributed Systems Security (3 CH)

This course is designed to teach students the advanced skills needed for Database and Distributed Driven System Security i.e. developing dynamic and database driven web-based business applications. Students will extensively use client and server-side technologies, in particular, the combination of JavaScript, HTML, MySQL and PHP. The course will allow students to systematically build a dynamic application to respond to the business need.

INTE450 Internet of Things (3 CH) (Pre-R: CYSE310)

The course discusses about the basic concepts, terminology, and key components of IoT. It explains the business perspectives of IoT including the advantages of early adoption and monetization models. It further expands on the technologies enabling IoT and the various challenges to expect. Several scenarios describe the use cases and applications of IoT that result in smart applications and services to inspire organizations making the move to IoT.