

قسم نظم معلومات الحاسوب

COURSE DESCRIPTION

Course Code	2510104
Course Name	Information Technology Fundamentals
Credit hours	2 credit hours (2 lecture + 2 labs)
Prerequisite	None

This course introduces the fundamental concepts of the information technology and the use of the computer for those students in areas where the computer is a useful tool. It covers the basic hardware of a personal computer, including installation, operations and interactions with software, commercial programs, system configuration, and device-drivers. Upon completion, students should be able to select appropriate computer equipment and software, upgrade/maintain existing equipment and software.

Lab Session: Windows, Basics of MS-Office components. Internet surfing, e-mail managers.

رقم المقرر	2510104
اسم المقرر	أسس تكنولوجيا المعلومات
عدد الساعات	2 ساعات مكتسبة (2 نظري + 2 مختبر)
المتطلبات السابقة	لا يوجد

يتضمن هذا المقرر مقدمة في استخدامات الحاسوب للطلبة الذين يدرسون مجالات يكون الحاسوب مفيداً جداً في أعمالهم . ويشمل كيفية حلول المشاكل، أجهزة الحاسوب والبرمجيات ، كيفية استخدام البيانات، أنظمة النظام الثنائي، إضافة إلى أجهزة التشغيل (وندوز)، والأوفس مع استخدامات الانترنت من خلال البحث والبريد الإلكتروني . المحاضرات العملية في المختبر - الجداول الرياضية الإلكترونية، مبادئ وأساسيات، مكونات مايكروسوفت أوفيس، البحث والإبحار في الإنترنت، البريد الإلكتروني.

Course Code	2505221
Course Name	Programming Concepts
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505100

This course introduces problem solving top – down algorithmic development, the fundamental concepts programming, program development. Topics include data types, control structures, functions, arrays, String manipulation, structures, file processing, and the mechanics of running, testing, and debugging. Programming implementation should be taken in the Computer Labs.

Lab Session: Programming assignments to exercise the use of various features of the programming language taught in the course.

2505221	رقم المقرر
مبادئ البرمجة	اسم المقرر
3 ساعات مكتسبة (3 نظري + 2 مختبر)	عدد الساعات
لا يوجد	المتطلبات السابقة

يتضمن هذا المقرر ، مبادئ حلول المشاكل المتعرف على طريقة (top-down) الأعلى إلى الأسفل لتطوير الخوارزميات ، المفاهيم الأساسية للبرمجة، تطوير برمجيات باستخدام لغة برمجة. تتضمن أنواع البيانات ، التحكم البنيوي ، الدوال ، المصفوفات ، التعامل مع السلاسل الحرفية، الهيكلية، التعامل مع النايلات ، إضافة إلى التقنية المبرحة في تشغيل واختيار وتصحيح البرامج مع التطبيقات اللازمة في مختبرات الحاسوب، وحلول التاوين للتعرف أكثر على المزايا المختلفة للغات البرمجة.

Course Code	2505223
Course Name	Computer Information Systems
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505100

This course covers conceptual foundations of information systems, information requirements for decision making and problem solving, types of information systems (TPS, MIS, DSS, GIs, ES, IRS, ...etc.), information systems hardware and software, systems development (analysis, design, and implementation), data management and database development, acquiring and managing information systems, quality and performance considerations, ethical, societal and global issues.

2505223	رقم المقرر
نظم المعلومات الحاسوب	اسم المقرر
3 ساعات مكتسبة نظري	عدد الساعات
2505100	المتطلبات السابقة

يغطي المقرر المفاهيم الأساسية لنظم المعلومات ، المتطلبات المعلوماتية لاتخاذ القرار، وحلول المشاكل ، أنواع نظم المعلومات TPS, MIS, DSS, GIS, ES...etc الأجهزة المستخدمة لأنظمة المعلومات، البرمجيات، تطوير النظام مرحلة التحليل ، التصميم ، والتطبيق) إدارة البيانات ، وقاعدة البيانات، استخدام وإدارة نظم المعلومات، الأخذ بنظر الاعتبار أيضاً اعتبارات الجودة والكفاءة، والقضايا الخاصة بأخلاقيات المجتمع وبشكل شامل وعلاقته بنظم المعلومات.

Course Code	2505224
Course Name	Information Technology Infrastructure
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505102

Information technology strategies, infrastructure planning, technology standards and organizations, basic components of an IT infrastructure (architecture, resources, budgeting, strategic and capacity planning, organizational structure, security measures, metrics, vendor relations, etc.), global information infrastructures and the globalization of IT infrastructures (local vs. regional and global), IT service management, legal aspects of managing IT infrastructures, IT transfer problems, future trends.

2505224	رقم المقرر
بناء تكنولوجيا المعلومات	اسم المقرر
3 ساعات مكتسبة نظري	عدد الساعات
2505102	المتطلبات السابقة

يركز هذا المقرر التعرف على استراتيجيات تكنولوجيا المعلومات التخطيط للبنية التحتية ، المواصفات المعيارية للتكنولوجيا والمنظمات ، المكونات الأساسية للبنية التحتية لتكنولوجيا المعلومات (المعمارية ، الموارد ، الميزانية، والعلاقات..الخ) البنية التحتية لتكنولوجيا المعلومات والعولمة العلاقة بين البنية التحتية الداخلية والخارجية، تكنولوجيا المعلومات والخدمات الإدارية، المفاهيم التشريعية لإدارة البنية التحتية لتكنولوجيا المعلومات، تحويل المشاكل لتكنولوجيا المعلومات والاتجاهات المستقبلية.

Course Code	2505231
Course Name	Security and Privacy of Information
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505224

This course includes ethical uses of information and information systems, privacy considerations, policies and standards, security measures (protection, detection and reaction, attacks and threats, intrusion prevention, encryption and credentials identification and authentication, hacking security, access controls, identity management, etc.), security tricks and the human factor, data recovery, security risk analysis and assessment, security management. Viruses and anti-viruses programs

2505231	رقم المقرر
أمن وخصوصية المعلومات	اسم المقرر
3 ساعات مكتسبة نظري	عدد الساعات
2505224	المتطلبات السابقة

يغطي المقرر المفاهيم والطرق والتقنيات الحديثة التي تعتمد عليها معظم المنظمات في الحفاظ على صحة المعلومات وخصوصيتها وموثوقية عملها، كما يشير المقرر الاطلاع على المخاطر الأمنية والطرق العديدة والمتبعة في سرقة المعلومات والتحايل، يتضمن المقرر المفاهيم العامة للشبكات وكيفية حمايتها بعد عرض الأخطار التي تحدد هذه الشبكات، إضافة إلى أداء القياسات البايولوجية وكيفية تصميم وأداء هذا النظام ، كما يبحث المقرر خصائص جدار النار مع التطرق إلى أهمية موقع الويب وما هي المعايير القياسية في تصميمه والتهديدات الأمنية للمواقع مبيناً بعض التطبيقات الحديثة .

Course Code	2505233
Course Name	Human-Computer Interaction
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505221

This course covers historical development, task-centered and user-centered design. Functionality and usability. Communication human-human, human-machine. Ergonomics, cognitive ergonomics. Software/interface guidelines. Psychology memory, short and long-term; closure; control, choice reaction time experiments, perception; learning, experimental method. Engineering: bandwidth; channel capacity; information quantification. Physiology: human sense modalities. Classification of styles, their characteristics and application. Command language, menus, form-filling, direct manipulation etc. Natural language. Adaptive/non-adaptive interfaces. Hardware (keyboards, pointing devices, screens. speech synthesis, speech recognition). Interface specification and design. Implementation Issues. Interface evaluation

Lab Session: Designing interface according to the theoretical specifications.

رقم المقرر	2505233
اسم المقرر	تفاعل الانسان مع الحاسوب
عدد الساعات	3 ساعات مكتسبة (3 نظري + 2 مختبر)
المتطلبات السابقة	2505221

يشمل المقرر نظرة تاريخية حول تطوير تفاعل الإنسان مع الحاسوب، النشاط المركز، والتصميم المركز على المستخدم ، والوظائفية والاستخداماتية إضافة إلى الاتصالات، إنسان مع إنسان وإنسان مع الحاسوب ، إدارة العمل، إدارة العمل الحسي، واجهات البرمجيات وإرشادات حول كيفية تصميمها، الناحية النفسية، الخزن والسيطرة على البناءات قصيرة المدى وبعيدة المدى ، اختيار تجارب تفاعلية، الإدراك الحسي ، طرق تجريبية، هندسة موجات الاتصال وطاقتها ، الطرق الكمية للمعلومات، النماذج الحسية البشرية ، تصنيف وتصميم وتطبيق النماذج، لغة الأوامر، كيفية إملاء الواجهات، اللغة الطبيعية، التكيف وغير التكيف مع الواجهات الأجهزة (لوحة المفاتيح)، الأجهزة التأشيرية، موجات العرض، تأليف الكلام وتمييزه، تحديد مواصفات وتصاميم الواجهات التفاعلية وقضايا تطبيقية ، تقييم الواجهات .

المحاضرات العملية في المختبر :

تصميم واجهات وفقاً لمواصفات نظرية.

Course Code	2505311
Course Name	System Analysis & Design
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505223

This course includes the foundations of system development tools, cost benefit analysis, prototyping, alternate system design strategies, human interface designing, application development and CASE tools. The course also includes systems development lifecycle: systems planning and selection, system analysis, system design, system implementation and operation.

رقم المقرر	2505311
اسم المقرر	تحليل وتصميم النظم
عدد الساعات	3 ساعات مكتسبة نظري
المتطلبات السابقة	2505223

يتضمن هذا المقرر الأساسيات لأدوات تطوير البرمجيات، تحليل الكلف والفوائد، النماذج الأولية للتصاميم، الاختبارات والبدائل والاستراتيجيات لتصاميم النظم، تصاميم الواجهات، تطوير التطبيقات مع استخدام الأدوات المساندة (CASE) الأجهزة المساندة لتطوير البرمجيات، ويشمل المقرر أيضاً دورة حياة النظام، التخطيط للأنظمة والاختيار، التحليل، التصميم، والتطبيق إضافة إلى العمليات.

Course Code	2505313
Course Name	Electronic Commerce
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505223

The aim of this course is to let students understand the electronic conduction of the commercial activities. Explore the use of information technologies and concepts, key features of E-commerce and methodologies, electronic fund transfer, Internet and the world wide web, main applications of e-business and e-commerce, process of implementing ecommerce in organizations, infrastructure and architecture of ecommerce systems, development environments and methods for e-commerce, security of business transactions on the Internet.

Lab Session: Hands-on experience in developing an e-commerce Application

2505313	رقم المقرر
التجارة الإلكترونية	اسم المقرر
3 ساعات مكتسبة (3 نظري + 2 مختبر)	عدد الساعات
2505223	المتطلبات السابقة

الهدف من هذا المقرر هو تعريف الطالب العمليات والفعاليات للتجارة الإلكترونية، ويكشف استخدام تقنيات المعلومات ومفاهيمها، المزايا الأساسية للتجارة الإلكترونية ومنهجياتها، تناقل الأرصدة إلكترونياً، الإنترنت والشبكة العنكبوتية، التطبيقات الرئيسية للأعمال والتجارة الإلكترونية، عمليات بناء التجارة الإلكترونية ضمن المؤسسة، البنية التحتية ومعمارية، نظم التجارة الإلكترونية، بناء وتطوير بيئة وطرق التجارة الإلكترونية، أمنية حركات العمل ضمن الإنترنت.

المحاضرات العملية في المختبر :
إعطاء الخبرة في بناء تطبيقات التجارة الإلكترونية

Course Code	2505314
Course Name	Multimedia Systems
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505223

This course includes multimedia concepts and terminology, interactive multimedia technology, multimedia data types and formats (graphics, images, animation, audio, video, etc.), integrated multimedia authoring techniques, techniques for designing and producing multimedia applications using multimedia-authoring tools, industry standards, future directions in interactive multimedia technology, design and implementation considerations of multimedia systems, storage issues of multimedia systems.

Lab Session: Hands on developing multimedia applications by integrating different authoring techniques.

2505314	رقم المقرر
النظم المتعددة الوسائط	اسم المقرر
3 ساعات مكتسبة (3 نظري + 2 مختبر)	عدد الساعات
2505223	المتطلبات السابقة

يشمل المقرر المفاهيم والمصطلحات للوسائط المتعددة ، تقنيات الوسائط المتعددة التفاعلية، أنواع البيانات وهيكلتها المتعلقة بالوسائط المتعددة، مثل الأشكال والمخططات، الرسومات، الصور، والصور المتحركة، والصوت، الأفلام المتحركة .. الخ)، تكاملية الوسائط المتعددة وتقنياتها، تقنيات لتصميم وإنتاج تطبيقات الوسائط المتعددة باستخدام أدوات التأليف، المعايير والمواصفات المتعلقة بصناعة الوسائط المتعددة، الاتجاهات المستقبلية لاستخدامات الوسائط المتعددة التفاعلية، اعتبارات حول تصميم وتطبيق أنظمة الوسائط المتعددة الوسائط ، قضايا متعلقة بالخرن للوسائط المتعددة.

Course Code	2505321
Course Name	Fundamentals of Database System
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505223

This course introduces the concepts and techniques of database systems, Information models and systems (relational databases, hierarchical, network, temporal, etc), relational database design, data modeling, normalization, data definition languages, data manipulation languages, database query languages, transaction processing, physical database design, storage and file structure; indexed files; hashed files; signature files; b-trees; files with dense index; files with variable length records; database efficiency and tuning, data integrity, security, backup and recovery. This course will also cover briefly the concepts of object-oriented database, expert database and distributed databases.

Lab Session: Developing simple application using a data base package.

2505321	رقم المقرر
أساسيات نظم قواعد البيانات	اسم المقرر
3 ساعات مكتسبة (3 نظري + 2 مختبر)	عدد الساعات
2505223	المتطلبات السابقة

يغطي هذا المقرر المبادئ والمفاهيم الأساسية لقواعد البيانات وتقنياتها، إضافة إلى التركيز على تصميم قواعد البيانات العلائقية ، واستخدام لغات قواعد البيانات العلائقية ، لغة تعريف البيانات ، لغة التعامل مع البيانات ، لغات الاستفسارات، الخزن وتركيبية الفايلات، تكاملية وسرية البيانات، الإسناد ومعالجة الأخطاء، وقواعد البيانات الموزعة، كذلك يشمل المقرر مكونات بيئية ، نظم قواعد البيانات وهيكلية هذا النظام، إضافة إلى دراسة نموذج الكينونات والعلاقات المعيارية.

Course Code	2510316
Course Name	Computer Networks
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505102

This course provides basic concepts of computer networks, the network model components, network operating system, local area networks, design and Implementation Issues of computer networks, responsibilities of a network administrator, using network operating system (designing the user community, permissions and rights, groups and domains, adding workstations), sharing of Information across the network. fundamentals of LANs, MANS and WANs, LAN topologies and types, WAN technologies (circuit switching, packet switching, ATM, ISDN, DSL, etc), performance issues, networking protocols (OSI, TCPIIP), multiple-access and flow control, error correction and detection, emphasis on lower four layers of ISO reference model.

Lab Session: Network management, protocols programming, network simulation using packages and use of network analysis tools.

رقم المقرر	2510316
اسم المقرر	شبكات الحاسوب
عدد الساعات	3 ساعات مكتسبة (3 نظري + 2 مختبر)
المتطلبات السابقة	2505102

يشمل المقرر على مبادئ ومفاهيم شبكات الكاسوب، ومكونات نموذج الشبكات ، نظام تشغيل الشبكات، الشبكات المحلية ، تصميم وبناء شبكات الحاسوب، مسؤوليات مدير الشبكة، استخدام نظام تشغيل الشبكة (تصميم مجموعة المستخدمين، الصلاحيات والحقوق ، المجموعات والنطاق ، إضافة محطة طرفية)، مشاركة المعلومات عبر الشبكة ، أساسيات الشبكة المحلية، وشبكات متوسطة النطاق والواسعة ، أنواع وأشكال الربط ، الشبكات المحلية، تقنيات الشبكات واسعة النطاق، (محول الدائرة، محول الخدمة)، قضايا المتعلقة بالأداء، بروتوكولات الشبكة، إنسيابية السيطرة والوصول المتعدد ، اكتشاف وتصحيح الأخطاء.

المحاضرات العملية في المختبر:
إدارة الشبكات ، برمجة البروتوكولات، محاكاة الشبكة باستخدام الخادم، وأدوات التحليل.

Course Code	2505335
Course Name	Datacenters Fundamentals
Credit hours	3 credit hours
Prerequisite	2505224

The aim of the course is to study the data centers and all its aspects, starting with giving a comprehensive overview of the data centers, what these centers are and why we need them. The course is also designed to understand the main aspects of design philosophies and basic design of data center management. In addition to addressing data center architecture and how to handle client and server packages in data center-related networks. The course covers the security and safety of data centers, as well as the study of operational processes, energy management and facilities management. The future of the data center sector as a whole is discussed, including the value of the sector today, the significant growth it has seen so far, and how it will continue in the future.

2505335
اساسيات مراكز البيانات
3 ساعات مكتسبة
2505224

رقم المقرر
اسم المقرر
عدد الساعات
المتطلبات السابقة

يهدف المقرر الى دراسة مراكز البيانات في كافة محاورها، بدءاً بإعطاء لمحة شاملة عن مراكز البيانات وماهية هذه المراكز ولماذا نحتاج اليها. كما يتم التعرف عن طريق دراسة هذا المقرر على فهم الجوانب الرئيسية المتعلقة بالفلسفات التصميمية والتصميم الأساسي لإدارة مركز البيانات. إضافة الى التطرق الى معمارية مراكز البيانات وكيفية معالجة حزم الزبون والخدم في الشبكات المرتبطة بمراكز البيانات. ويغطي المقرر الأمور المتعلقة بأمنية وسلامة مراكز البيانات، إضافة الى دراسة العمليات التشغيلية وإدارة الطاقة وإدارة المرافق. كما يتم التطرق الى مستقبل قطاع مركز البيانات ككل بما في ذلك قيمة القطاع اليوم، والنمو الكبير الذي شهده حتى الآن، وكيف سيستمر هذا في المستقبل.

Course Code 2505421
Course Name Enterprise Systems
Credit hours 3 credit hours (3 lectures)
Prerequisite 2505223

This course is designed to provide students with an understanding of the theoretic and practical issues related to the application of enterprise systems within organizations. The main focus of this course is to demonstrate how enterprise systems integrate information and organizational processes across functional areas with a unified system comprised of a single database and shared reporting tools. Enterprise systems, by their multi-dimensional integrative nature, offer the depth of functionality and breadth of integration to demonstrate how global operations of organizations are managed. Thus, students will gain an appreciation of the scope of enterprise systems and the motivation for implementing them. [Optional: Example software will be used to illustrate how enterprise systems work. An integrated project, which requires the application of conceptual as well as technical (software) skills of students, will be required].

2505421
الأنظمة المؤسسية
3 ساعات مكتسبة (3 نظري)
2505223

رقم المقرر
اسم المقرر
عدد الساعات
المتطلبات السابقة

يهدف هذا المقرر إلى تزويد الطلاب بفهم القضايا النظرية والعملية المتعلقة بتطبيق النظم المؤسسية داخل المنظمات. المحور الرئيسي لهذا المقرر هو شرح كيفية دمج النظام المؤسسي المعلومات والعمليات التنظيمية عبر المجالات الوظيفية باستخدام نظام موحد يتألف من قاعدة بيانات واحدة مع أدوات إعداد التقارير مشتركة. النظم المؤسسية من خلال طبيعتها الإدماجية المتعددة الأبعاد، تقدم عمق في الوظائف المتاحة و اتساع وظيفة الإدماج لإثبات كيف يتم إدارة العمليات الشاملة للمنظمات. سوف يكتسب الطلاب معرفة تقدير النطاق للنظم المؤسسية والدافع في استخدامها.

Course Code 2505423
Course Name Mobile Computing

Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505221

This course will introduce students to mobile computing and mobile application development. Mobile computing will be discussed from three perspectives: mobile technology, application development, and user interaction. The course will be first overview various mobile computing applications, technologies and wireless communication. Next, students will learn about common paradigms in mobile computing such as low power computing, computing in an environment with limited resources, fault tolerance, and persistence. Students will be introduced to and use mobile application frameworks and development environments to reinforce concepts covered in lectures. User interface and user experience will be discussed and application development guidelines from various vendors will be discussed and analyzed. Lastly, the course will look at some current research in mobile computing.

2505423	رقم المقرر
الحوسبة بالأجهزة النقالة	اسم المقرر
3 ساعات مكتسبة (3 نظري + 2 مختبر)	عدد الساعات
2505221	المتطلبات السابقة

يتضمن المقرر تعريف الطلبة على الحوسبة بالأجهزة النقالة وتطوير التطبيقات المتعلقة بها من خلال ثلاث مداخل, تكنولوجيا الأجهزة النقالة, تطوير التطبيقات, وتفاعل المستخدم. يستعرض المقرر مختلف تطبيقات الحوسبة النقالة والتقنيات والاتصالات اللاسلكية. إضافة الى تعريف الطلبة بالنماذج المتداولة في مجال الحوسبة النقالة مثل الحوسبة ذات الطاقات القليلة والحوسبة في بيئة ذات الموارد المحدودة, وحدود الخطأ والإستمرارية. كما يهدف المقرر زيادة قابلية الطلبة من خلال التعرف على مختلف التقنيات المتعلقة ببيئات التطوير وواجهات المستخدم ونماذجها والمبادئ الإرشادية لتطوير التطبيقات, من مختلف المنتجين للأجهزة وتحليلها. وأخيراً سوف يتطرق المقرر الى النظر لبعض البحوث التطبيقية في مجال الحوسبة المتنقلة والتعرف على الإطار البنوي لبعض من هذه التطبيقات.

Course Code	2505401
Course Name	Enterprise Architecture
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505223

This course explores the design, selection, implementation and management of enterprise IT solutions. The focus is on applications and infrastructure and their fit with the business. Students learn frameworks and strategies for infrastructure management, system administration, data/information architecture, content management, distributed computing, middleware, legacy system integration, system consolidation, software selection, total cost of ownership calculation, IT investment analysis, and emerging technologies. These topics are addressed both within and beyond the organization, with attention paid to managing risk and security within audit and compliance standards. Students also hone their ability to communicate technology architecture strategies concisely to a general business audience.

2505401	رقم المقرر
بناء المؤسسات	اسم المقرر
3 ساعات مكتسبة (3 نظري)	عدد الساعات
2505223	المتطلبات السابقة

يقوم هذا المقرر باستطلاع التصميم، واختيار وتنفيذ وإدارة حلول تقنية المعلومات للمؤسسات. يتم التركيز على التطبيقات والبنية التحتية التي تتناسب مع الأعمال التجارية للمؤسسات ويتعلم الطالب الإطار والاستراتيجيات لإدارة البنية التحتية، إدارة النظم، وبناء البيانات/المعلومات، إدارة المحتوى، الحوسبة الموزعة، الأنظمة البيئية، وإدماج النظم السابقة مع النظم الحديثة، توطيد النظم، اختيار البرامج، حسابة التكلفة الإجمالية للملكية، تحليل مردودية الاستثمارات في ميدان تكنولوجيا المعلومات، والتكنولوجيا الجديدة. تعالج هذه الموضوعات داخل وخارج المنظمة على حد سواء، مع إيلاء الاهتمام لإدارة المخاطر والأمن في إطار معايير التدقيق والامتثال. يقوم الطلاب أيضا بزيادة قدراتهم على توصيل المعلومات حول استراتيجيات هندسة التكنولوجيا بطريقة مقتضية لجمهور الأعمال التجارية بصفة عامة.

Course Code	2505489
Course Name	IS Strategy, Management, and Acquisition
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505223

This course explores the issues and approaches in managing the information systems function in organizations and how the IS function integrates / supports / enables various types of organizational capabilities. It takes a senior management perspective in exploring the acquisition, development and implementation of plans and policies to achieve efficient and effective information systems. The course addresses issues relating to defining the high-level IS infrastructure and the systems that support the operational, administrative and strategic needs of the organization. The remainder of the course is focused on developing an intellectual framework that will allow leaders of organizations to critically assess existing IS infrastructures and emerging technologies as well as how these enabling technologies might affect organizational strategy. The ideas developed and cultivated in this course are intended to provide an enduring perspective that can help leaders make sense of an increasingly globalized and technology intensive business environment.

2505489	رقم المقرر
استراتيجية و إدارة و اكتساب نظم المعلومات	اسم المقرر
3 ساعات مكتسبة (3 نظري)	عدد الساعات
2505223	المتطلبات السابقة

يستكشف هذا المقرر القضايا و الطرق في إدارة وظيفة نظم المعلومات في المؤسسات و كيفية عمل وظيفة تجمع و دعم و تمكن من العديد من القدرات المؤسسية. يتبنى المقرر وجهة نظر الإدارة العليا في استكشاف اكتساب وتطوير و إنجاز الخطط والسياسات لتحقيق نظم المعلومات ذات كفاءة و فاعلية. يتناول المقرر قضايا متعلقة بتعريف البنية التحتية رفيعة المستوى لنظم المعلومات و النظم التي تدعم الاحتياجات التشغيلية و الإدارية و الاستراتيجية للمؤسسة. ويركز ما تبقى من المقرر على وضع إطار فكر يسمح لقادة المؤسسات بتقييم نقدي للبنى التحتية الحالية لنظم المعلومات وللتكنولوجيات الناشئة وكذلك كيف يمكن لهذه التقنيات المساندة أن تؤثر على استراتيجية المؤسسة. الأفكار التي يتم تطويرها في هذا المقرر الغرض منها توفير منظور دائم يمكن أن يساعد القادة على فهم بيئة أعمال كثيفة التكنولوجيا و تتجه على نحو متزايد إلى العولمة.

Course Code	2505498
Course Name	Special Topic in Computer Information Systems
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505223

This course gives the students an opportunity to have an exposure to state of the art advanced computer information systems topics.

Lab Session: projects are used to practice the concepts and techniques described in the course

2505498	رقم المقرر
مقرر خاص في نظم المعلومات	اسم المقرر
3 ساعات مكتسبة (3 نظري + 2 مختبر)	عدد الساعات
2505223	المتطلبات السابقة

يتضمن هذا المقرر تعريف الطلبة بالمواضيع المتقدمة في مجال نظم المعلومات الحاسوبية وتقنياتها المتطورة. المحاضرات العملية في المختبر : تستخدم مشاريع في التطبيقات العملية من أجل توضيح المفاهيم والتقنيات الموصوفة في المقرر.

Course Code	2505499
Course Name	Senior Project
Credit hours	3 credit hours (3 lectures + 3 labs)
Prerequisite	2505321

This is a capstone course that will provide students the opportunity to incorporate the conceptual knowledge and the practical skills in computer information systems that they have learned throughout the course of study and apply them in a project. Such a project would give the students the chance to experiment the whole life cycle of information system phases of development as well as experimenting effectively different roles of project management team. It aims at providing the students an increasing range of diverse technical skills, including those for systems analysis, design, development, implementation, testing and maintenance. This course emphasizes teamwork on a substantial project.

2505499	رقم المقرر
مشروع تخرج	اسم المقرر
3 ساعات مكتسبة (3 نظري + 2 مختبر)	عدد الساعات
2505321	المتطلبات السابقة

هذا المقرر يمثل الحد الأعلى الذي سوف يجهز الطلبة بالفرصة لتطبيق المعرفة الضمنية والمهارات العملية في نظم المعلومات الحاسوبية والتي تم اكتسابها خلال المراحل الرئيسية والتي سوف يتم تطبيقها في المشروع ، مشروع التخرج يعطي للطلبة الفرصة ومحاولة للتعرف على دورة حياة نظم المعلومات وكيفية تطوير المراحل المقابلة لتنفيذ النظم مع الأخذ بنظر الاعتبار مختلف الأدوار لإدارة مشروع البرمجيات، كما يهدف المقرر بزيادة قابلية الطلبة على استخدامات مختلف التقنيات مثل تحليل

وتصميم الأنظمة، وتطويرها، مع إجراء الاختبارات لها، وصيانتها، وهذا المقرر يؤكد على عمل الفريق لتنفيذ مشروع جوهري ومهم.

Course Code	2505487
Course Name	Web Services and Distributed Computing
Credit hours	3 credit hours
Prerequisite	2505321

The technology of web services and distributed systems aims to provide the integrated environment to provide support for business enterprises, which rely mainly on the Internet environment using the XML frame message system. Web services are distributed and dynamic systems that can be configured and deployed on networks to create products, processes and distribution chains. Typically, these systems are designed over TCP / IP stacks, HTTP, Java, HTML, and XML.

2505487	رقم المقرر
خدمات الوب والنظم الموزعة	اسم المقرر
3 ساعات مكتسبة	عدد الساعات
2505321	المتطلبات السابقة

تهدف تقنية خدمات الوب و الظم الموزعة على توفير البيئة المتكاملة لتقديم الدعم الازم للمؤسسات التجارية و التي تعتمد بشكل رئيسي على محيط الشبكات (Internet) بأستخدام نظام الرسائل المؤطر XML. خدمات الوب هي انظمة موزعة و ديناميكية و من الممكن توصيفها و نشرها على الشبكات لأنشاء منتجات و عمليات و سلسلة توزيع. عادة هذه الانظمة تكون مصممة فوق مكدسات البروتوكول (TCP/IP) و HTTP و Java و HTML و XML.

Course Code	2510310
Course Name	Cyber Law
Credit hours	3 credit hours (3 lectures)
Prerequisite	2510304

This course will explore the legal, regulatory, and policy issues of cybercrime. The course will define cybercrime, teach students about types of cybercrime, and inform them on the methods of cyber criminals. The course distinguishes itself from the introductory law and policy of cybersecurity course in that it will not only offer an analysis of the legal, regulatory, and policy issues with which students may be confronted in their places of work, but also offer them practical solutions to preventing and responding to cybercrime. Students will learn about resources and best practices that they can easily apply to the context of their own jobs and other practical, real-life situations.

Course Code	2510205
Course Name	Cyber security Essential
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505322

This course provides students basic knowledge and skills in the fundamental theories and practices of Cyber Security. This course will provide a basic introduction to of all aspects of cyber-security including business, policy and procedures, communications security, network security, security management, legal issues, political issues, and technical

issues. Understand the broad set of technical, social & political aspects of Cyber Security. Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure. Understand the nature of secure software development, operating systems and data base design. Recognized the role security management plays in cyber security defense. Understand the security management methods to maintain security protection. Understand the legal and social issues at play in developing solutions.

Course Code	2510309
Course Name	Digital Forensics
Credit hours	3 credit hours (3 lectures)
Prerequisite	2510205

This course will provide, the science, technology, procedures, and law of acquiring and analyzing digital evidence from computers and devices. Selected focused topics on acquiring and analyzing evidence from digital devices. Details on analysis of specific operating system artifacts.

Course Code	2501216
Course Name	Statistics and Probability
Credit hours	3 credit hours (3 lectures)
Prerequisite	None

Classification of Data. Graphical representation. Arithmetical description. Probability theory, probability of an event and composite events. Addition rule and multiplication rule, independent events. Counting techniques. Random variables and probability distributions. Expected values. Continuous and discrete random variables. Normal distribution. Binomial distribution. Poisson distribution. Joint and marginal probability distributions. Independence of random variables. Covariance and correlation. Random sampling. Unbiased estimates. Statistical intervals and test of hypothesis for a single sample.

Course Code	2510308
Course Name	Network Security
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505322

In this course, we will examine the various areas of network security including intrusion detection, evidence collection and defense against cyber attacks. ... We will learn the principles and concepts of wired and wireless data network security. The issues and facilities available to both the intruder and data network administrator will also be

examined to illustrate their effect. We will analyze attack/defend scenarios and determine the effectiveness of particular defense deployments against attacks.

Lab : We will be guided through a series of laboratories and experiments in order to explore various mechanisms for securing data networks including physical layer mechanisms, filters, applications and encryption

Course Code	2510318
Course Name	Design and Analysis of Algorithms
Credit hours	3 credit hours (3 lectures)
Prerequisite	2510202

Analysis, design, and efficiency of algorithms illustrated by a comprehensive exposure to fundamental algorithms and various adopted techniques to solve different types of problems. Analysis of sorting, searching, and other algorithms; designing algorithms using techniques for problem-solving such as greedy methods, divide-and-conquer, backtracking, dynamic programming, and branch-and-bound techniques; complexity of algorithms.

Course Code	2510313
Course Name	Data mining
Credit hours	3 credit hours (3 lectures)
Prerequisite	2510306

Principles concepts of data mining techniques and their practical application in pattern recognition and knowledge discovery from large data sets. Fundamental strategies and methodologies of various classification, clustering, association rules extraction algorithms applied on tabular data sets. Hands-on experience with a variety of different data mining tools.

Course Code	2510315
Course Name	Modeling & Simulation
Credit hours	3 credit hours (3 lectures)
Prerequisite	2510306

Fundamentals of studying systems by modeling and simulation focusing on developing discrete-event simulations. Reasons for simulation, basic simulation modeling; systems modeling; developing discrete-event simulations; queuing models; random number generators, generating random varieties; analysis of simulation data; verification and validation of simulation models.

Course Code	2510306
Course Name	Software Engineering

Credit hours	3 credit hours (3 lectures)
Prerequisite	2505223

Fundamental principles of classical and modern software engineering theory and practice. Taxonomy of software systems; software project management, process models; requirements engineering, design, architectures, user interface design; software development methods; verification, validation, testing; software management (people, cost, quality, process improvement, configuration); emerging technologies.

Course Code	2510201
Course Name	Numerical Analysis
Credit hours	3 credit hours (3 lectures)
Prerequisite	2501109

This course covers the following major topics: Errors in numerical computation. Solutions of nonlinear equations. Direct methods for solving linear systems. Interpolation and polynomials approximations. Numerical differentiation. Numerical integration. This course covers the following major topics: Iterative methods; Approximation theory; Eigenvalues; Numerical solutions of the initial value problems; Numerical solutions of the boundary value problems; and Numerical solutions of partial differential equations.

Course Code	2510305
Course Name	Artificial Intelligence
Credit hours	3 credit hours (3 lectures)
Prerequisite	2510203

Fundamental concepts of artificial intelligence, logic, and knowledge representation with associated algorithms and techniques supported by logic programming applications. Motivation for logic and knowledge representation by horn clauses; logic and propositional equivalencies; predicates and quantifiers; matching, backtracking, forward and backward chaining; logic programming applications.

Course Code	2510317
Course Name	Project Management in computing
Credit hours	3 credit hours (3 lectures)
Prerequisite	2505223

Project management course attempts to equip students with the necessary skills for successful project management. The course covers project components definition, project organisation, project planning methods and techniques, resource allocation,

project monitoring and control, project termination. Workshops and real world case studies will be used to help students gain hands-on experience.

Course Code: 2510307
Course Name: Senior project
Credit Hours: (3 hours)
Prerequisites: 2505321

The purpose of this course is to help students develop the necessary skills and knowledge which they have acquired during their academic life in studying and analyzing problems. This is accomplished according to the methodology used in these fields and under the supervision and guidance of an assigned academic staff advisor. This course helps students establish a practical base line of methodological approaches. It also aims to help students develop their abilities in collecting and organizing data and writing well structured reports to help them make rational decisions. In addition, the course aims in helping students develop team work skills which enabling them to conduct significant studies and improve project skills.

Course Code	2510314
Course Name	Special Topic in Computer Science
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505312, 2505411

This course gives the students an opportunity to have an exposure to state of the art advanced computer information systems topics.

Lab Session: projects are used to practice the concepts and techniques described in the course

Course Code	2505222
Course Name	Discrete Mathematics
Credit hours	3 credit hours (3 lectures + 1 tutorial)
Prerequisite	2505104

This course examines the propositional logic, logical connectives, truth tables, normal forms (conjunctive and disjunctive), validity, predicate logic, universal and existential quantification, Modus ponens and modus tollens, Limitations of predicate logic, Functions (surjection, injection, inverse, composition); Relations (reflexivity, symmetry, transitivity, equivalence relations), Sets (Venn diagrams, complements, cartesian products, power sets), pigeonhole principle, cardinality and counting, the structure of formal proofs, direct proofs, proof by counterexample, Proof by contraposition, proof by contradiction, mathematical induction, strong induction, Recursive mathematical definitions, basics of counting, graphs and trees, discrete probabilities.

Course Code	2510203
Course Name	Data Structures
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2510202

This course focuses on topics that help students to structure and store data in an efficient way. Logical and physical data representation, algorithms, complexity and efficiency, data structure operations, dense lists, and matrix representations, linked lists and their different variations, string storage representation and manipulation, queues and stacks and their applications, tree structures and their different variations, graphs and networks, sorting techniques, searching techniques. Students should also program what they learned by using a high-level programming language in order to enhance their understanding of the main data structures concepts including stacks, queues, linked list, trees, graphs etc.

Lab Session: Programming assignments of applications that use the data structures studied in class. The use of abstract data types concept in programming is stressed. Implementation of well known algorithms.

Course Code	2510202
Course Name	Object-Oriented Programming
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505221

This course introduces design concepts of Object-oriented, programming principles, features, foundations of the model, classes and objects, relationships among classes, relationships among objects, interplay of classes and objects, approaches to identifying classes and objects, object-oriented design methodologies, methodology notation (elements of UML or any other selected notation, class and object diagrams, interaction diagrams, state transition diagrams, process and module diagrams, etc.), the object-oriented software development process (analysis, design and implementation), code reusability, management issues. Student practice OOP in the software development life cycle by using Java or C++ .

Lab Session: Using an Object oriented programming language for project realization.

Course Code	2505312
Course Name	Computer Organization and Architecture
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505104

This course focuses on fixed- and floating-point systems, signed and twos-complement representations, representation of nonnumeric data (character codes, graphical data), Basic organization of the Von Neumann machine, control unit; instruction fetch, decode, and execution, Instruction sets and types (data manipulation, control, I/O), assembly / machine language programming, Instruction formats, Addressing modes, Subroutine call and return mechanisms, I/O and interrupts, memory hierarchy, main memory organization and operations, Latency, cycle time, bandwidth, and interleaving, Cache memories

(address mapping, block size, replacement and store policy), virtual memory (page table, TLB), I/O fundamentals, control unit: hardwired realization vs. micro-programmed realization, Instruction pipelining, multiprocessing and alternative architectures.

Lab Session: Assembly language programming.

Course Code	2510311
Course Name	Computer Graphics
Credit hours	3 credit hours (3 lectures + 2 Labs)
Prerequisite	2505221

This course covers an introduction to computer graphics, with an emphasis on application programming using OpenGL software. Applications of computer graphics, a graphics system, The Programmer's Interface, Graphics Architectures, Graphics Programming, Primitives and attributes, Input and Interaction, geometric objects and transformations, viewing, shading, discrete techniques, buffers and mapping, texture mapping.

Lab Session: Designing and manipulating object in 2D and 3D.

Course Code	2505411
Course Name	Web Development and Programming
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505221

This course reviews the Internet programming concepts, web servers, design methodologies, client-side & server-side programming, web applications in the software development life cycle, web development basic concepts, develop dynamic web pages, web development languages, JSP and servlets to coldfusion code, flash emoting. Develop web applications by integrating different web technologies, using HTML, SML, XML, CFMX, flash. Monitoring system performance, Working with XML, Manipulating XML with XSLT and XPath, Using WDDX, Using Server-Side HTTP and FTP. Programming common gateway Interfaces, programming User Interface for the web applications.

Lab Session: Hands on Developing web applications by integrating different web technologies.

Course Code	2505413
Course Name	Operating Systems
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505312

This course focuses on operating system structure and services, processor scheduling, concurrent processes, synchronization techniques, deadlocks, memory management, virtual memory, cache memory, input/output, secondary storage management, and file systems.

Lab Session: Use of Unix and Windows NT as examples of general purpose operating systems for Laboratory assignments.

Course Code	2510312
Course Name	Advanced Database Systems
Credit hours	3 credit hours (3 lectures + 2 labs)
Prerequisite	2505321

This course introduces students to advanced topics in database systems such as transaction management, concurrency control, security; optimization, Object-Oriented Databases, distributed databases, Specialized topics such as data warehousing/mining, current developments in database technology, and the integration of databases to the Internet-worked environment will also be explored.

Lab Session: Implementing advanced database applications.

Course Code	2510111
Course Name	Computer Ethics
Credit hours	3 credit hours
Prerequisite	2505223

This course is intended to give students a chance to reflect on the humanitarian, social, and professional impact of computer technology by focusing on ethical issues faced by and brought about by computing professionals, including those related to networking and the internet, intellectual property, privacy, security, reliability, and liability. We will also focus on issues raised by the possible emergence in the future of highly intelligent machines. Make students aware of the ethical codes of the various professional organizations and alternative viewpoints. Also stimulate critical discussion of the codes and the principles behind them. Give the students a comparative overview how to obtain reliable information using Internet resources

Course Code	2505386
Course Name	Business Process Management
Credit hours	3 credit hours
Prerequisite	2505223

In this course students will be introduced to key concepts and approaches to business process management and improvement. The main focus of this course is both understanding and designing business processes. Students will learn how to identify, document, model, assess, and improve core business processes. Students will be introduced to process design principles. The way in which information technology can be used to manage, transform, and improve business processes is discussed. This course also covers the study of how to coordinate the organizational units of the organization through the three core functions of marketing, finance, and operations. The course also examines the subject of operations strategies and the role of operations in the organization's strategy to achieve its objectives. The course also covers the operational aspect of the concept of operations management through the study of the information

management system technologies, which includes many components including content management, document management, records management, workflow management, in addition to document archiving management, how to operate interactive call centers and interactive response, and management Correspondence, administrative communications, and mobile device solutions. Finally, the course deals with how to control quality and the importance of the quality of goods and services for the consumer and for the product.

<i>Course Code</i>	2511101
<i>Course Name</i>	Cyber Law and Ethics
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2502101 – Principles of Law

The emergence of the digital environment at a global scale has brought with it a host of new legal issues with which cyber-practitioners need to familiarize themselves with. While lawyers are the principal advisers when it comes to law, cyber practitioners need to be aware of these laws to protect themselves and the organizations that they represent.

This course focuses on national and international laws dealing with cybersecurity and with the ethics of cybersecurity practices. The students become familiar with different laws governing cyber operations within and outside of Qatar; the importance of bilateral agreements; the reasons why such agreements exist; and the importance of collaboration on cyber intelligence at the international level. The course addresses the risks associated with hacking and engaging in cyber operations activities. The course also addresses the difficulties associated with proving attribution in the new world where cybercriminals can hide their identities. The course also addresses the limits of regulation of cyberspace.

<i>Course Code</i>	2511201
<i>Course Name</i>	Introduction to Risk Management for Cybersecurity
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2503101 – Principals of Management

This course introduces the students to the concept of risk management in support of decision-making. The course focuses with focus on cybersecurity. The student learns

methods to use to identify and capture risks; and approaches for strategizing and mitigating these risks by looking at risk from different points of view using industry standards and best-practice processes.

The course covers the risk management framework and its fundamental principles and application. The students learn how to identify security risks and perform risk analysis, risk assessment, and risk mitigation using real-world scenarios. The students use qualitative and quantitative methodologies to mitigate risk. For quantitative methodologies, the students learn about leading and lagging metrics. In addition, the students learn how successful organizations compartmentalize and prioritize metrics to monitor and manage risk.

The course begins with the concept that no one organization is capable of eliminating risk. Therefore, the best approach is to acknowledge that there are risks and work towards balancing the risks with other needs of the organization.

<i>Course Code</i>	2511102
<i>Course Name</i>	Fundamentals of Operation Systems and Databases
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course introduces the students to two critical components of the information technology realm: Operating Systems and databases.

The students learn about the world of modern operating systems and gain an understanding of the different operating system platforms. The course teaches the primary operating system abstractions, mechanisms, and their implementations. The course covers topics such as operating system concepts and structure; processes and threads; memory management; security; file systems; scheduling; and deadlocks.

This course also includes the fundamentals of data such as structured data; databases; database design; and the use of databases in applications. In this course, we introduce the students to SQL (Structured Query Language) basics; database design; s Entity Relationship Diagrams (ERD); the Relational database mode developing practical

applications utilizing the Oracle platform. The course provides the foundation required for database development and management.

<i>Course Code</i>	2511202
<i>Course Name</i>	Introduction to Programming for Cybersecurity
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

The course introduces the students to the fundamentals of programming, from algorithms to problem solving and debugging. The course provides students with the right set of tools to enter the programming world. The course contains many practical exercises with real-world applications to cybersecurity.

The course covers fundamental concepts of programming like functions, arrays, variables, files, syntax, algorithms implementation, debugging and much more.

<i>Course Code</i>	2511104
<i>Course Name</i>	Information Technology Infrastructure
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course takes a deep dive into the infrastructure that enables computer computers to communicate through networks. The course teaches advanced computer network design and operation with a focus on network security. The course covers the Open Systems Interconnection (OSI) model, from Layer 1 (the Physical layer) to Layers 2 and 3 (the Data link and Network layers), to Layers 4 through 7 (the Transport, Session, Presentation, and Application layers).

Students learn how to plan, establish and maintain network protocols, support and configure equipment including, but not limited to, TCP/IP, firewalls, routers, and VPN's based industry-leading vendors such as network components from Cisco, Juniper, and Fortinet.

Throughout the course, students build different networks to validate their designs and enhance their skills.

<i>Course Code</i>	2511103
<i>Course Name</i>	Fundamental of Network Defense
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course introduces students to the concepts of network defense. It encompasses people, technology, and processes. It focuses on the importance of addressing all of these three aspects to achieve a balanced network defense.

The course teaches the fundamental functions of network defense such as governance, policies, security operations, access control, identity management, encryption, forensics, malware analysis, and open source intelligence.

The course also teaches the techniques for monitoring networks and responding to cyber events. Students learn about sensors such as anti-virus and insider threat monitoring; taps; intrusion detection; and intrusion protection. The students also learn about the various roles of individual performing network defense and the kinds of analysis that takes place in a typical cybersecurity operations center (CSOC).

The students practice their learning in the laboratory-based CSOC by monitoring real networks, performing Netflow analysis and "deep packet" capture analysis.

<i>Course Code</i>	2511203
<i>Course Name</i>	Integrated Computer Network Defense
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511103

This course builds on the knowledge gained from Fundamental of Network Defense and expands it to cyber defense at the system level, the enterprise level, and the national level.

The course focuses on wired and wireless computer networks, devices, and protocols. It covers network security tools and their use to protect a network and the ways to deal with cybersecurity issues. Moreover, the students learn the techniques for hardening systems and networks. They learn about tools that cyber professionals use within the

cyber defense domain – tools such as Kerberos, Golden Ticket and other enterprise defenses tools.

The course also teaches the principles and importance of Configuration Management and compliance to organizational security policies. The students learn to conduct trade studies for enterprise tools to make informed decisions.

<i>Course Code</i>	2511204
<i>Course Name</i>	Ethical Hacking
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course focuses on hacking techniques for the "good guys." The students gain an understanding of the attack kill chain, hacking concepts, exploitation methodologies, and different types of hackers and hacks.

The students also learn to build their hacking tools, investigate vulnerabilities and weaknesses and develop automation for existing tools and scripts.

The students practice different exploitation techniques with tools and hacking distributions using simulated networks. Targeted systems include Wi-Fi, wired networks, operating systems, databases, and applications. They also practice exploitation with the tools and scripts developed during the course, build their hacking environment and hacking distributions and hack into networks.

<i>Course Code</i>	2511205
<i>Course Name</i>	Forensics
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course focuses on Computer and Digital Forensics. The students learn about a variety of different digital forensics areas such as network forensics and host forensics. The course enforces the discipline of structured and methodical investigation and analysis techniques to gather and preserve data evidence from a particular computing device and to find a solution for a particular use case and challenge. The course covers basic as well as advanced forensic techniques and challenges.

During the course, the students encounter many different forensics challenges requiring the use of different tools and distributions dedicated to forensics experts. Also, the students learn basic malware analysis techniques such as static and dynamic analyses.

<i>Course Code</i>	2511206
<i>Course Name</i>	Malware Analysis
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course focuses on malware analysis tools and techniques. The students learn to perform sandboxing, dynamic code analysis, and static code analysis. They apply the different types of analyses on all major file types. They learn how to carve malicious executables from documents and how to recognize common malware tactics, and debug and disassemble malicious binaries.

The latter part of the course focuses on advanced malware analysis and reverse engineering. By the completion of the course, the students would gain a deep understanding of reverse engineering in the malware analysis process using advanced disassembly and debugging tools. Moreover, the student learns Assembly as a part of this course.

<i>Course Code</i>	2511207
<i>Course Name</i>	Cyber Range Operations and Applications
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course focuses on the multiple roles and uses of cyber ranges in cybersecurity. The course addresses the use of cyber ranges for testing applications for security weaknesses, understanding how an entire network behaves under certain cyber attacks, developing scenarios for red team / blue team exercises, and performing penetration testing on mission-critical systems to harden them against future cyber attacks.

The course also addresses the role of cyber ranges in testing policies and operating procedures before deployment to a large organization such as Qatar Armed Forces.

The students learn how to wipe clean the cyber range, set up a scenario, build the model for the scenario and organize an exercise. The students also use Open Source Code to analyze it for malware and security vulnerabilities.

<i>Course Code</i>	2511301
<i>Course Name</i>	CSOC Management and Operations
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course focuses on teaching the management the day-to-day operations of a Cybersecurity Operations Center (CSOC) including organization, process, operations, design considerations, continuous improvement, and accounting for growth in term of size of the organization, growth in the capabilities of the CSOC, and growth of the infrastructure to be protected.

The course teaches how to analyze the design, plan for deployment, and develop security policies and operations procedures. The students learn the role of the CSOC in the enforcement of security policies and learn about the tools and processes to enforce the policies.

This course covers topics such facility requirements, organization, roles and responsibilities, the separation between the role of the Network Operations Center (NOC) and CSOC, 24/7 operations, emergency response, escalation, and industry best practices.

<i>Course Code</i>	2511302
<i>Course Name</i>	Network Management and Operations
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course deals with the activities, methods, procedures, and tools that pertain to the operation, administration, maintenance, and provisioning (OAM&P) of networked systems. The student learns to manage, monitor, control, allocate and deploy the security of the network, through an understanding of the standard protocols, such as SNMP and MIB.

Students learn about the role of the Network Operations Center (NOC) and that of the Security Operations Center (SOC), and how the two collaborate to provide services to organizations.

<i>Course Code</i>	2511304
<i>Course Name</i>	Advanced Risk Management
<i>Credit Hours</i>	2
<i>Prerequisite</i>	[TBD] – Introduction to Risk Management for Cybersecurity

The Advanced Risk Management course builds on the learning gained in Introduction to Risk Management for Cybersecurity course and advances the students' knowledge to highlight their ability to identify and address project risks, mitigate threats and capitalize on opportunities. Using different realistic scenarios, the students learn to proactively reduce the probability of project failure and actively manage the different risks introduced at different stages of the project. Students learn to use proven methods and techniques specific to risk management such as identification and analysis to address uncertainty throughout the project lifecycle and incorporate lessons learned and industry best practices related to risk management.

The students practice exploitation with the tools and scripts developed during the course, building their hacking environment and hacking distributions, hack into networks (both Wi-Fi and wired), and hack into operating systems and applications.

<i>Course Code</i>	2511305
<i>Course Name</i>	Data Privacy and Security
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

The course teaches the students about the fundamentals of data privacy and security. It provides the background knowledge and highlights the need to protect personal data and information, the consequences of not adhering to applicable laws and regulations, and the importance of cybersecurity professionals to respect data privacy given their access to a wide range of data.

This course focuses on the methods and concepts for creating data privacy policies, establishing data loss prevention (DLP) policies, designing data classification schema, obeying applicable laws and regulations, and understanding their responsibilities concerning data protection.

The students practice using tools and techniques for DLP and privacy taking into consideration the regulatory aspects of data privacy and security.

<i>Course Code</i>	2511306
<i>Course Name</i>	Data and Information Management
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

In this course, the students learn about the most valuable asset to an organization: it's data. During the course, the students acquire an understanding of the principles, practices, and technologies required for data management across the data lifecycle, and an awareness of the emerging issues in the realm of data management.

The course covers practices such as encryption at rest, encryption in motion, data classification, data model design, data storage design, access control, backing up and restoring data, protection of personal identification data, and deletion and recovery of data. The students also learn how to, correctly, calculate the storage necessary to hold data to make useful data retention policies. The course also addresses the different methods for disposing of old data based on security levels.

<i>Course Code</i>	2511308
<i>Course Name</i>	Mobility
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course focuses on the need for organizations to protect themselves from cyber threats given the way they operate. Being part of a global economy, taking advantage of the benefits of cloud-based computing, and dealing with employees wanting to use their own devices to conduct business all need a balanced approach.

During this course, the students gain an understanding of the risks associated with mobility and ways to mitigate such risks. Students learn about the technologies available to them, and the need for mobility policies that balance access and security.

The course addresses the advantages and disadvantages of different techniques such as VPN, Cloud, and application wrappers to give the students a comprehensive understanding of all aspects of mobility.

<i>Course Code</i>	2511307
<i>Course Name</i>	Social Engineering
<i>Credit Hours</i>	2
<i>Prerequisite</i>	None

This course shapes the skills of the student to allow them to engage in social engineering as a technique for cyber offense and Computer Network Operations (CNO). The course covers the principles of persuasion and the psychological principles required to construct effective attacks. The students learn about many forms of social engineering such as spear phishing and whaling, and how to match their target to the method that would be most successful in luring their target.

The students learn how to gather information on targets using a wide variety of tools, create and track phishing campaigns, and develop media payloads that conclusively demonstrate compromise scenarios.

<i>Course Code</i>	2511311
<i>Course Name</i>	Open Source Intelligence
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

This course covers the aspects of open source intelligence (OSINT). The students learn to exploit the vast resources of the internet including the open web, the dark web, social

media, and chat platforms for research and evaluation. The course focuses on Web intelligence (WEBINT) as a viable intelligence method that has proven itself in the world of Web 2.0. The students learn about the requirements for collecting intelligence, the rules of engagement, and the laws that might apply to such activities. The students also learn the potential damage that such activities carry with them.

The course covers the different technologies available in the market, rules of engagement, and analyses conducted to harvest the vast amounts of data available. The course also covers the role of OSINT in cybersecurity from gathering threat intelligence to lawful interception.

Throughout the course, the students practice using state-of-the-art open source intelligence systems, preparing them for real-life operational scenarios.

<i>Course Code</i>	2511312
<i>Course Name</i>	Darknet and TOR
<i>Credit Hours</i>	3
<i>Prerequisite</i>	None

Darknet is a marketplace where many criminals and bad state actors conduct illicit activities, almost without fear. The Darknet/TOR course is designed for students who are preparing to become experts in Computer Network Operations and Computer Network Attack and for students who are interested in Cyber Intelligence.

This course teaches the students how to access and use the TOR browser and gain access in a safe way to the Darknet. The course focuses on the most important online services that the Darknet offers, such as email providers and search engines.

The course shows how to install and use specific software to run on PCs after accessing the Darknet to ensure security while accessing the Darknet. In addition, the course teaches how to install and use ransomware software.

<i>Course Code</i>	2511303
<i>Course Name</i>	Penetration Testing
<i>Credit Hours</i>	2
<i>Prerequisite</i>	None

In this course, the students learn advanced attacks and how to build their hacking tools using python in addition to learning how to investigate vulnerabilities and weaknesses and develop automation for existing tools and scripts. The students learn about white-box penetration testing, grey-box penetration testing, and black box penetration testing. They learn about the rules of engagement and the procedures involved including the importance of communication while conducting penetration testing.

<i>Course Code</i>	2511314
<i>Course Name</i>	Advanced Cyber Intelligence
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511311

The Advanced Cyber Threat Intelligence course builds on the Open Source Intelligence course and allows the students to dive deep into the topic of threat intelligence as it applies to cybersecurity. The course introduces the Threat Intelligence Maturity Model and discusses capabilities that cyber professional can implement at each stage. The course walks the students through the process of building Primary Intelligence Requirements (PIR) as well as how to derive secondary intelligence requirements based on organizational needs. The course then walks the students on how to construct requirements for gathering threat intelligence based on the PIRs. The students learn about Indicators of Compromise (IOC) and adversary Tactics, Techniques and Procedures (TTP). They also learn how to build knowledge databases.

The students learn about the importance of sharing threat intelligence and the logistics associated with threat sharing. Although threat sharing sounds simple, it is quite complicated when one considers what information to share and with whom (vendors, international partners, Qatari Government agencies, Qatari Civil Industry, and Qatari Critical Infrastructure – among others).

This course helps future intelligence professionals to go beyond data collection. The students learn to balance data collection and data cleansing in an efficient way that allows them to perform their duties.

<i>Course Code</i>	2511315
<i>Course Name</i>	Advanced Cyber Techniques
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511204

This course focuses on the advanced methods for preparing cybersecurity attacks, and on how to deploy such techniques. The course covers the main domains of the attacks such as reconnaissance, scanning, and mapping, gaining access, evasion techniques, command and control, exfiltration and exploitation, and cleaning up footprints.

This course cover attacks in the various environments of the Web, operating systems, networks, operational technology, and industrial control systems.

This course prepares the students for the advanced Offensive Security Certified Professional certification exam.

<i>Course Code</i>	2511316
<i>Course Name</i>	Advanced Computer Network Operations
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511102

This course focuses on the active techniques available for Computer Network Defense (CND) and Computer Network Operations (CNO).

For active CND, the course focuses on real-time network situational awareness and a single source of integrated, comprehensive network knowledge. During this course, the students learn how to build secure architecture and implement defenses using defense-in-depth techniques. The students also learn how, when attacked, to trick the attackers to stay in the network to observe them and learn about their identities and methods.

For CNO, the students learn about the concepts that military organizations and government organizations protect, defend and retaliate against computer network-related attacks. The students learn how to search for and find vulnerabilities originating from enemy targets, or how to target enemy networks or information systems. CNO is a broad military computing concept that encompasses tools, processes, and

methodologies that utilize, optimize and gain strategic advantages over computer networks.

Through both CND and CNO, students learn how to trick attackers and fool them to gain knowledge about their identity (attribution) and how they operate (i.e., their Tactics, Techniques and Procedures).

<i>Course Code</i>	2511313
<i>Course Name</i>	Big Data Analytics
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511311

This course deals with the essential skills needed to become a proficient Big Data analyst.

During the course, the students develop and enhance their skills in the architecture of big data systems; designing and developing analytics using mathematics and algorithms; and using tools such as Apache Spark and the R programming language.

The course covers cloud-based big data analysis, big data applications, algorithms for big data statistical analysis, large-scale data problems and predictive analytics. The course also addresses critical considerations such as storage, quality of the data, normalization of the data, and different ways to view and analyze big data.

<i>Course Code</i>	2511324
<i>SQL Databases</i>	Cybersecurity for Operational Technology
<i>Credit Hours</i>	3
<i>Prerequisite</i>	

This course focuses on the protection of critical infrastructure. The course teaches the differences between Information Technology and Operational Technology (OT) such as Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition (SCADA). The students learn about the threat vectors associated with ICS/SCADA, and the techniques and standards used to protect these systems. The students learn extensively about the challenges associated with OT and ICS/SCADA security and gain a very good understanding of control systems and controllers. In addition, because one

cannot simply take such systems offline to perform security tests on them, the students learn how to model these systems in the cyber range.

<i>Course Code</i>	2511318
<i>Course Name</i>	Computer Architecture
<i>Credit Hours</i>	2
<i>Prerequisite</i>	2511104

This course covers the computer architecture concepts and the essentials of processor design, and operating systems. Students learn instruction set architecture, microarchitecture and efficient implementation of microarchitecture. Upon conclusion of the course, the students understand the functionality and operation of the essential elements of a computer system including processors, memory and hardware interfaces.

<i>Course Code</i>	2511319
<i>Course Name</i>	Advanced OS
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511102

This course covers advanced topics for Windows and Linux operating systems such as memory management, OS architecture, virtualization, security, file system, scalability, and concurrent execution.

The course enables the students to become specialists in Windows and Linux. They learn to plan and implement multiple Linux servers on the Red Hat Enterprise Linux version, create images for next-generation platforms, and troubleshoot issues with drivers for hardware.

The course exposes the students to recent developments in the Windows OS research and the different platforms that support the Windows OS.

<i>Course Code</i>	2511320
<i>Course Name</i>	System and Security Architecture, Design & Analysis
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511318

In this course, students learn the concepts governing the analysis and design of large software systems. Using UML, SysML and other visual tools, students become familiar with conventional architectures and their qualities. During the course, students learn how to develop and evaluate software architectures, apply object-oriented design techniques, utilize UML and SysML, and express the specification and design of an application.

The students perform initial risk analysis on their designs and recommend changes to the infrastructure of an organizations Information and Data security systems. Students analyze several architectures and designs, learn to identify missing or weak security controls, learn about secure design best practices like defense-in-depth. They learn how to implement security controls and mitigate security flaws that increase the organization's risk.

<i>Course Code</i>	2511306
<i>SQL Databases</i>	Virtualization & Cloud Computing
<i>Credit Hours</i>	2
<i>Prerequisite</i>	

This course covers the concepts of Cloud Computing, Virtualization and Distributed Computer Networks. The students learn how to design, build, and secure cloud-computing environments, and how to design and deploy virtual environments and dockers. They learn how to establish the processes for effective network management with a focus on security. The students also gain familiarity with defense tools and techniques for protecting these environments.

<i>Course Code</i>	2511316
<i>Course Name</i>	Advanced Programming for Cybersecurity
<i>Credit Hours</i>	3
<i>Prerequisite</i>	2511202

This course focuses on the fundamentals of secure software development. The source of most vulnerabilities is in the code and programming flaws. Therefore, the course

enforces the concept of integrating security at every phase of software development lifecycle.

The students learn how to test for vulnerabilities in their software using techniques such as sandboxing, static code analysis, dynamic code analysis, and penetration testing. The students learn to fix the vulnerabilities and avoid them in the future. The students learn to follow proper procedures from the start like those described in OWASP.

The student enforces his knowledge by testing his code as well as testing code developed by other students.

<i>Course Code</i>	2511321
<i>SQL Databases</i>	SQL Databases
<i>Credit Hours</i>	3
<i>Prerequisite</i>	

SQL is the world's most popular language for managing and manipulating databases. This course teaches the students the basics of tables, queries, aggregate functions, and such. This course is designed to give the students an understanding of the SQL language. It covers SQL commands for DML, DDL, Query and Transaction Control operations. At the end of the course, the students would know how to write advanced queries and scripts to manipulate databases, build, and display reports.

<i>Course Code</i>	2510202
<i>SQL Databases</i>	Object-Oriented Programming
<i>Credit Hours</i>	3
<i>Prerequisite</i>	

This course introduces students to the concepts of object-oriented programming (OOP). In this course, the students learn Object-Oriented Concepts, Object-Oriented Analysis, and OOP Design. The students learn about the fundamentals of classes, instances, inheritance, and methods. A particular focus is on Python and PowerShell. The students learn to apply OOP tools to the design and development of databases and other applications. The students apply their knowledge in a state-of-the-art programming lab.

<i>Course Code</i>	2511325
<i>SQL Databases</i>	Java Programming
<i>Credit Hours</i>	3
<i>Prerequisite</i>	

Java is one of the most popular programming languages in the world. Java is fast, secure and reliable, and serves as the programming language for numerous applications (e.g., data centers, game consoles, internet, cell phones, among others)

This course includes the study of object-oriented programming through the study and utilization of the Java programming language. The students develop a deep understanding of Java programming and development and write advanced Java-based programs.

The students use the software lab to gain hands-on programming experience.

<i>Course Code</i>	2511326
<i>SQL Databases</i>	.Net Programming
<i>Credit Hours</i>	3
<i>Prerequisite</i>	

This course is intended for beginner programmers. It covers programming software in the .Net Core platform. The course deals with the Microsoft .NET programming framework. It introduces the design and guidelines of the latest version of the .Net programming framework. The students learn everything required to get up and running, describing the Common Language Runtime (CLR) and the Framework Class Library (FCL). The students use C# (C Sharp) or VB (Visual Basic) throughout the course. The course takes the student through a progression that starts with the basics and allows the students to reach a level where they can develop complete web applications including the user interface, business logic, and data access layers. The course covers techniques including design, code generation, testing and debugging using ASP.NET (Active Server Pages) and the SQL Server database.

The students use the software lab to gain hands-on programming experience using the Windows .Net programming framework using the Visual Studio development environment.

<i>Course Code</i>	2511327
<i>SQL Databases</i>	Programming for Android
<i>Credit Hours</i>	3
<i>Prerequisite</i>	

This course covers the Android application development. Students gain the knowledge and skills necessary to develop and maintain Android mobile applications. The course includes the learning and utilization of Java programming for Android, Android app development tools, app design visuals, an Android creation project.

The students start with the simple development of application user interfaces using built-in widgets and components. The students progress to utilizing databases.

The course covers the Android development environment, the Android Software Development Kit, Android libraries, software stack, and libraries.

The students use the software lab to gain hands-on programming.

<i>Course Code</i>	2511328
<i>SQL Databases</i>	Web and Web Services Design & Development
<i>Credit Hours</i>	3
<i>Prerequisite</i>	

In this course, the students learn how to design, build and maintain a website. The course takes the student through a systematic process that provides the students with the tools and teaches them the skills required to go from a blank screen to a fully developed website.

The students learn useful skills such as HTML and CSS (common languages upon which most websites are based), UI (User Interface) essentials and practical tools for building a successful and proficient website.

<i>Course Code</i>	2511309
<i>SQL Databases</i>	Junior Capstone Project
<i>Credit Hours</i>	Pass/Fail
<i>Prerequisite</i>	

The Junior Capstone Projects is an all-encompassing assignment that serves as an academic and intellectual milestone experience for the students. Every student is required to do a practical project within one of the domains covered of the course of their studies.

<i>Course Code</i>	2511310
<i>SQL Databases</i>	Senior Capstone Project
<i>Credit Hours</i>	Pass/Fail
<i>Prerequisite</i>	

The Senior Capstone Projects is an all-encompassing assignment that serves as an academic and intellectual milestone experience for the students. Every student is required to do a practical project within one of the domains covered of the course of their studies.