

APPENDIX A – COURSE SYLLABI

Course Code & Title: ECTE 329 - Computer Networks
Weight: (2-2-3)
Prerequisite: ITCS 214/ECCE 203

Coordinator/ Instructor: Dr. Ayman Ahmed Alaiwi

Description: This course focuses on the underlying concepts and technologies of computer networking. Topics covered include standards; transmission basics and media; TCP/IP protocol; network topologies; network hardware, switching, routing, and virtual networks; and network applications such as e-mail and the Web, peer-to-peer file sharing.

Objectives:

1. To critically understand the concepts and specialist theories of data communication and networks.
2. To describe the data communications and telecommunications models, topologies, protocols.
3. To discuss the concepts and the building blocks of today's data communication networks such as switches, routers, and cabling.
4. To critically understand the bandwidth characteristics of several types of physical communication media.
5. To understand the effect of various topologies, applications and devices on network performance.
6. To overview the methods of error detection/correction and data compression.
7. To provide an overview of the Internet and its applications.
8. To demonstrate an advanced knowledge and understanding of Network Management and Administration using different protocols

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical understanding of data communications and telecommunications models, topologies, protocols, OSI model, and the building blocks of data communication networks such as switches, routers, and cabling.
B. Subject-specific Skills	
B1	Problem Solving: Critically analyze and identify different problems of computer networks, and solve them using various devices, techniques, and communication protocols.
B2	Modeling and Design: Demonstrate an ability to model and design communication protocols for solving communication problems.
B3	Application of Methods and Tools: Apply computer networks simulation tools in order to implement the concepts of computer networks (packet Tracer).
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze the efficiency of computer networks, by analyzing the effect of different types of physical communication media, topologies, and devices on computer networks performance.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Express and communicate ideas in written and oral form.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- Introduction Computer Network
- The different layers of Model OSI
- Physical Layer
- Data Link Layer
- Network Layer
- Network Layer: IP/ TCP protocol
- Transport Layer
- Session and presentation layers
- Network Management and Administration Applications layer
- The Internet
- Wireless LANs

Teaching Materials:

Textbook(s):	1. Kurose, Ross, <i>Computer Networking: A Top-Down Approach Featuring the Internet</i> , 7 th Edition, Pearson, 2017.
Handout(s):	Notes will be provided on Moodle.
Reference(s):	<ol style="list-style-type: none">1. Nader F. Mir (2014), <i>Computer and Communication Networks</i>, 2nd Edition, Prentice Hall.2. Larry L. Peterson, Bruce S. Davie (2012), <i>Computer Networks: A Systems Approach</i>, 5th Edition, Morgan Kaufmann Publishers Inc..3. William Stallings (2014), <i>Data and Computer Communications</i>, 10th Edition, Pearson Education.4. Behrouz A. Forouzan (2013), <i>Data Communications and Networking</i>, 5th Edition TMH.

Course Code & Title: ECTE 421 - Network Design and Security
Weight: (2 - 2 - 3) Required/ Elective: Elective
Prerequisite: ECTE329/ECCE 401

Coordinator/ Instructor: Dr. Ayman Ahmed Alaiwi

Description: This course provides an overall scheme for designing secure multimedia networks. It covers the following concepts: Application requirements Analysis, Switching Technology, Traffic Modeling, QoS, and Network Security.

Objectives:

1. To demonstrate critical knowledge and understanding of application requirements in Network Design and Security.
2. To integrate the core theories, principles and concepts of Traffic Modelling and Security Protocols in Network Design.
3. To critically analyze and evaluate switching techniques and the QoS (Quality of Service) improvements techniques.
4. To discuss security issues in the internet.
5. To compare between the different security methods in a Network Design such as IPSec, SSL/TLS, PGP and Firewall.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate a critical and detailed knowledge and understanding of concepts and required theories of Network Application Requirements Analysis, Switching Technology, Traffic Modelling and QoS and Security in the internet.
A2	Contemporary Trends, Problems and Research: Grapple with contemporary issues and investigative techniques in Network Design and Security using different security protocols such as IPSec, SSL/TLS, PGP, VPN and others.
B. Subject-specific Skills	
B1	Problem Solving: Solve problems related to Network Switching, QoS improvements and congestion prevention and Network Security protocols.
B2	Modeling and Design: Plan and design secured networks using simulation software i.e. Packet Tracer to meet desired needs within realistic engineering constraints.
B3	Application of Methods and Tools: Apply standard research and investigative methods and tools to undertake defined projects of development in Network Designing and Security.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze and evaluate issues and problems associated with Network Switching, Congestion, QoS techniques and Security protocols used in the internet with a view to practical implementation and solutions in Network designs.
C2	Synthetic: Identify and integrate information and concepts within the common understating of Network Design to implement Secured Network with respect to Application Requirement Analysis, Switching Technologies, Traffic Modelling and QoS.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Convey ideas and describe processes rigorously through oral discussions, laboratory exercises and research report related to Network Design and Security.
D2	Teamwork and Leadership: Work effectively as a member of a team project on Network Design and Security to implement Secure Networks Designs with undefined and unpredictable security parameters.

List of Topics:

- **Introduction to Networking technology**
- **Application Requirements Analysis:** System Approach, Requirement Analysis, Business goal and constraints, Application types
- **Application Requirements Analysis:** User Requirements vs. Performance Requirements, Host requirements, Network management and migration
- **Switching Technology:** Circuit, Packet and Message Switching
- **Switching Technology:** Structure of Network switches
- **Lab1:** Network Design
- **Traffic Modeling and QoS:** Data Traffic, Congestion, Congestion Control, Two Examples
- **Traffic Modeling and QoS:** Quality of Service (QoS), Techniques to improve QoS
- **Lab 2:** Connectivity and Troubleshooting
- **Traffic Modeling and QoS:** Integrated Services, Differentiated Services, QoS in Switched Networks
- **Security in the Internet:** IP Security
- **Lab 3:** Routing and Security
- **Security in the Internet:** SSL/TLS
- **Security in the Internet:** PGP
- **Security in the Internet:** Firewalls
- **Lab 4:** Firewalls
- Submission of Research Report: Static IP, is it secure?

Teaching Materials:

Textbook(s):	1. James F. Kurose and Amherst Keith Ross (2021), <i>Computer Networking</i> , 8 th Edition.
Handout(s):	Lecture notes and course materials are available on Moodle.
Reference(s):	1. B. A. Forouzan (2013), <i>Data Communications and Networking</i> , 5 th Edition, McGraw-Hill education. 2. W. Stallings (2014), <i>Data and Computer Communications</i> , 10 th Edition, Pearson.

Course Code & Title: ETHC 392 – Ethics and Professional Practice in IT and Engineering**Weight: (3-0-3)****Required/ Elective: Required****Prerequisite:****Completing at least 66 Credits****Coordinator/ Instructor:** Dr. Yousif Janahi

Description: The course explores and discusses key ethical, legal and professional issues and responsibilities in Computing and other related fields. It examines emergent technologies within frameworks that highlight their ethical, legal and social implications. Topics include privacy, confidentiality, security, intellectual property, software piracy, cybercrime, digital identity, software reliability, risk and safety and professional standards of conduct and codes of ethics. The students critically examine current and relevant research and particular case studies to enhance their understanding of the subject. The students learn that careers in IT and Computer Engineering are not purely technical professions but ones with moral, legal and social implications that impact the everyday lives of professionals.

Objectives:

1. To review and apply ethical concepts, frameworks and analysis tools to identify and evaluate ethical choices within the computer-related professions.
2. To explore various ethical and legal issues and controversies commonly faced by computing professionals and their impacts on society.
3. To examine some of the relevant professional code of ethics and code of conduct.
4. To highlight the importance of professional and social responsibilities for computing professionals.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Present advanced knowledge and understanding of ethical, social and legal concepts that relate to the Computing professions.
A2	Contemporary Trends, Problems and Research: Identify, describe and discuss controversies arising in the computing related fields including intellectual property, privacy and cybercrime, professional and social responsibilities, legal accountability, responsibility and liability.
A3	Professional Responsibility: Demonstrate the ability to examine and apply the code of ethics and the codes of conduct in relation to IT and computing professions.
B. Subject-specific Skills	
B1	Problem Solving: Inspect, analyze, and investigate ethical behavior in real-life IT and computing business environments through critical thinking and examination of IT and computing-related ethical codes of conduct.
C. Critical-Thinking Skills	
C1	Analytic skills: Identify, analyze, and justify the ethical, legal and social ramifications and implications of certain actions within the computing related fields.
C2	Synthetic: Formulate and justify ethical decisions taken when examining and analyzing certain behaviors within the computing professions and in the delivery of services.
C3	Creative: Demonstrate originality in the creation of solutions to ethical dilemmas that arise in the computing profession.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Share ideas and knowledge relating to the computing profession and the delivery of its services effectively, in both oral and written form.
D2	Teamwork and Leadership: Develop an experience of leadership and teamwork.
D3	Organizational and Developmental Skills: Value the role of life-long learning and

	professional development in maintaining professional behavior and up-to-date knowledge on ethical, legal and professional issues.
D4	Ethical and Social Responsibility: Value and embrace ethically and socially responsible behavior in the profession of computing and the delivery of its services.

List of Topics:

- **Overview:** Introduction, ethical concepts, theories, perspectives and frameworks, moral philosophy and critical thinking skills needed to establish and justify a moral system.
- Definitions, methods and tools of analysis for identifying and evaluating ethical choices. Relationship between Computer engineering and IT codes of ethics, law, professionalism and their social implications. **Case Studies:** E-mail & Spam, the Cyber City Network
- **Professionalism:** Ethical and social responsibilities. Loyalty and whistle-blowing, lifelong learning, professional development, relationships with professional societies, professional codes of conduct and codes of ethics, such as ACM, IEEE, BCS, AITP and ICCP.
- **Workplace issues:** Harassment, discrimination, system use policies, monitoring, surveillance.
- **Privacy:** confidentiality and secrecy; monitoring, recording, tracking, intrusion and encryption. **Case Studies:** Wikileaks, Facebook
- **Intellectual property** laws and rights, ownership of information, plagiarism, copyrights, patents, trademarks and trade secrets, software piracy, fair use, free and open source movement, Digital Millennium, Copyright Act (DMCA), Non-Disclosure Agreements (NDAs). **Case Studies:** P2P Networks (Napster), Google Books
- **Trust and Trustworthiness in Computer Engineering and IT:** Social responsibility, safety, reliability, assurance, security, risk within computer-based systems, computerized medicine. **Case Studies:** To Test or not to Test the Software.
- **Legal Issues:** Legal liability and accountability, compliance, computer and cyber-related crimes, hacking/cracking, ethical hacking, piracy, trespassing, vandalism, community and identity in cyberspace, identify theft, viruses, regulating commerce and speech, Censorship. **Case Studies:** US Children's Internet Protection Act

Teaching Materials:

Textbook(s):	1. M. J. Quinn (2016), <i>Ethics for the Information Age</i> , 7 th Ed., Wiley.
Handout(s):	PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<p>Books:</p> <ol style="list-style-type: none"> 1. George Reynolds (2018), <i>Ethics in Information Technology</i>, Cengage Learning; 6th Edition. ISBN: 978-1337405874. 2. W. J. Brinkman and A. F. Sanders (2013), <i>Ethics in a Computing Culture</i>, 1st Edition. 3. Herman T. Tavani (2015), <i>Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing</i>, Wiley, 5th Edition. 4. M. Quinn (2015), <i>Ethics for the Information Age</i>, 6th ed., Pearson. 6. R. Spinello (2010), <i>Cyberethics: Morality and Law in Cyberspace</i>, 4th Edition, Jones & Bartlett Publishers. 7. J. Rachels and S. Rachels (2011), <i>The Right Thing to Do: Basic Readings in Moral Philosophy</i>, McGraw-Hill College; 6th Edition

Course Code & Title: IERM 498-Research Methods in Information Technology & Engineering
Weight:(3- 0 - 3)

Required/ Elective: Required
(Completion of at least 90 credits)

Prerequisite:

Coordinator/ Instructor: Dr. Ammar Sami Aldallal

Description: The course introduces the essential aspects of designing, supporting, and conducting a research project. It enables students to develop capacity to conduct small, simple research projects while at the university. The course spans multiple elements including time management, writing and presentation skills, literature search and general considerations for experiment design and planning.

Objectives:

1. To use a significant range of experimental methods of IT/Engineering research.
2. To understand research ethics and importance of effective time management.
3. To demonstrate with literature, search the use of electronic databases.
4. To design and write a research proposal.
5. To conduct the academic report writing and research projects.
6. To discuss the University guideline for the major project: xxx 499.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of the concepts and theories related to research methods as applied to IT and Engineering fields.
A2	Contemporary Trends, problems and Research: Demonstrate creativity in the application of knowledge, understanding and/or practices the established research methods to enable students to grapple with contemporary issues and investigative techniques in the field of IT and engineering.
A3	Professional responsibility: Operate and lead multiple project tasks with personal decisions making and responsibilities in the field of IT and Engineering.
B. Subject-specific Skills	
B1	Problem Solving: Identify techniques, quantitative and qualitative, utilize in addressing components of the research problem and, where appropriate, generate solutions using a wide range of routine skills and some advanced and specialized skills. Particular to the research discipline
B2	Modelling and Design: Discuss and adapt various steps involved in an academic research process including problem formulation, proposal and academic report writing to plan defined projects of development, research or investigation of issues and problems in the field of IT and Engineering.
B3	Application of Methods and Tools: Apply standard research and investigative methods and tools to undertake defined projects of development in the field of IT and Engineering.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyse and evaluate complex professional level problems and issues encountered in the articulated research problem, including diagnostics, with a view to generating professional level insights and interpretations germane to the particular discipline concerned in the field of IT and Engineering.
C2	Synthetic: Identify and devise solutions related to research problems and make judgements in situations where data is limited and comes from variety of sources through structured proposals, reports and presentations.
C3	Creative Thinking and innovation: Demonstrate originality and creativity in the formulation and tackling of the articulated research problem in a way that addressed professional level issues associated with the particular discipline in varied contexts.

D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Convey ideas and describe processes rigorously through oral discussions and presentations related to research questions in the field of IT and Engineering.
D3	Organizational and Developmental Skills: Recognize the need for and demonstrate ability to engage in life-long learning and continuing self-development to hone professional and organizational skills.
D4	Ethics and Social Responsibility: Emphasis on personal and organization ethical and accept accountability for conducting independent learning according to ethical and social norms in the field of IT and Engineering research.

List of Topics:

- **Introduction:** General concepts
- **Research:** “A way of thinking”
- **The research process:** a quick glance
- **Reviewing the literature**
- **Formulating a research problem**
- **Citation and reference list**
- **Writing Abstract**
- **Writing a research proposal**
- **Academic report writing**
- **Project Poster Presentation Skills**
- **University Guideline for the major project 499**
- **Proposed Project and project Presentation**

Teaching Materials:

Textbook(s):	Ranjit Kumar (2019), <i>Research Methodology: A Step-by-Step Guide for Beginners</i> , Sage Publications Ltd, 5 th Edition.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none"> 1. William, Trochim & James P. Donnelly (2007), <i>The Research Methods Knowledge Base</i>, Atomic Dog, 3rd Edition. 2. University Guideline for the major project: xxx 499. <p>In addition, students are free to choose other specialized references within their field that support their research studies and dissertations in consultation with their supervisors.</p>

Course Code & Title:

INTR463 – BSIT Internship

Weight: (0-0-3)

Required/ Elective: Required

Prerequisite: Completion of at least 90 Credits and CGPA \geq 2.0

Coordinator/ Instructor: Dr. Suresh Subramanian

Description: In today's turbulent economic environment, a country workforce is increasingly pivotal to business success. Stemmed from the desire and sense of responsibility that Ahlia University has against the society and their own students, and as part of their vision, of being leaders in the market of higher education, they do understand the need to invest in their capital made of partially their students in order to equip the market with talented workforce. Based on this INTR 463 course was introduced, representing a structured opportunity to incorporate academic, professional and personal skills development which enables the student to gain a planned and directed learning experience. It enables the student to integrate knowledge gained through their classroom learning with the competencies made available through actual experience in a professional setting. The internship program requires a minimum of 240 hours of work at the internship worksite. Students will receive academic credit after a successful completion of the program. The numbers of credits that are earned by the student as a result of successful completion of the internship program are 3 credits.

Objectives:

The BSIT Internship is a form of experiential learning and the aims are:

1. To provide students from the college with an opportunity to integrate knowledge, skills and competencies learned in the classroom with practical application and skills enhancement in an IT-related work-based/professional environment.
2. To give students an opportunity to gain experience of an IT- work environment and to develop links with professionals in the field they are considering for a future career.
3. To ultimately enhance student employability and at the same time to build relationships between the university, businesses and the local community.
4. To give employers an opportunity to guide and also evaluate future talent in the field of IT: software development, networking, database management and web design.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A3	Professional Responsibility: Demonstrate awareness of business professional etiquette during the achievement of internship responsibilities including a holistic appreciation of day-to-day obligations as a practitioner in the field of IT.
B. Subject-specific Skills	
B1	Problem Solving: Solve practical real-world problems in an organization using computing techniques and algorithms.
B2	Modeling and Design: Apply design skills in terms of software component model, data model, and system–user interaction model.
B3	Application of Methods and Tools: Gain proficiency in programming skills in oracle, java, visual basic, web programming, O-O programming and/or scripting languages.
C. Critical-Thinking Skills	
C1	Analytic skills: Apply skills of internal and external criticism, employ logic and, where appropriate, interpret output of crunched numeric data utile in a decision-making process in an IT-context.
C2	Synthetic: Draw together information and, where relevant, output of analysis, to yield cogent conclusions in an IT-context.

C3	Creative Thinking and innovation: Think out of the box as an aid to generating innovative solutions in an IT-context.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Communicate effectively orally and written to a variety of stakeholders of the organization who manifest different levels of technical expertise and knowledge. Make IT information cognizable to non-IT professional and address technical issues to both technical and non-technical audiences.
D2	Teamwork and Leadership: Take part, where applicable, in designated teamwork, shouldering burdens, as part of a team, which adds value to group output in the organization. Exercise initiative to support, encourage and contribute to the output of other team members fostering a positive team environment.
D3	Organizational and Developmental Skills: Demonstrate skills utile to keeping organized and meeting deadlines and develop a facility to learn on the job, such organizational skills may include storing and presenting data and the use of logical diagrams (flow charts, time-lines).
D4	Ethics and Social Responsibility: Perform job functions in light of ethical and social norms in a way that contribute to the social responsibility of the organization.

Teaching Materials: On job training and mentoring tasks supervision.

Handout(s):	Ahlia University Undergraduate Internship Program Guidelines
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Course Code & Title:

ITCS 101 - Introduction to Computers and IT

Weight: (2 - 2 - 3)

Required/ Elective: Required

Prerequisite:

None

Coordinator/ Instructor: Dr. Baraa Sharif

Description: This course is an introduction to computer and information technology. It introduces computers (their uses, development, components, hardware and software) to the students and to teach them how to use MS Office.

Objectives:

1. To provide an introduction to the basic concepts of computers and information processing.
2. To describe the set of programs that lies between application software and the computer hardware with its type.
3. To explain the job of the most important component in computer (CPU) that helps to run instruction in it.
4. To identify and describe the most important software for editing, storing, retrieving and printing data.
5. To explore the basic security threats and techniques to prevent them.
6. To create awareness of the basics of computers and the internet with emphasis on online information and service resources.
7. To recognize green techniques, equipment and processes
8. Gain facility in the use of Microsoft Office (WORD/EXCEL) leading to professional certification acquisition.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate a broad knowledge of principles and theories of computers and Information Technology following the latest developments.
B. Subject-specific Skills	
B1	Problem Solving: Use a range of numerical in combination to solve specific computational problems.
B3	Application of Methods and Tools: Gain aptitude in the use of productivity software (Computer Essentials/Online essentials/Word/Excel).
C. Critical-Thinking Skills	
C1	Analytic Skills: Evaluate arguments, information and ideas germane to alternative technologies and computational methods.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Convey complex ideas, conventionally and electronically, in a well-structured and coherent form using MS Software and cultivate presentational skills in a range of contexts involving developing creative posters, memos, advertisement, birthday cards and business cards.
D3	Organizational and Developmental Skills: Organize information systematically involving, for instance the use of automated table of contents and update table of contents page numbers and files automatically.

D4	Ethics and Social Responsibility: Gain an appreciation of ethics in the realm of information technology, for example, in terms of data confidentiality and integrity of data. Understand socially irresponsible behavior inherent in hacking and phishing, juxtaposed with socially responsible behavior involving green IT technologies, in gaining a comprehensive world view of the role of ethics in the life of the IT professional.
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List of Topics:

Computer Essentials: 1.1 ICT, 1.2 Hardware

Computer Essentials: 1.3 Software and Licensing, 1.4 Start Up, Shut Down, 2.1 Desktop and Icons, 2.2 Using Windows, 2.3 Tools and Settings

Computer Essentials: 3.1 Working with Text, 3.2 Printing, 4.1 Introducing Files and Folders, 4.2 Organizing Files and Folders

Computer Essentials: 5.1 Network Concepts, 6.1 Protecting Data and Devices, 6.2 Malware

Online Essentials: 1.1 Key Concepts, 1.2 Security and Safety, 2.1 Using the Web Browser, 2.2 Tools and Settings, 2.3 Bookmarks, 2.4 Web Outputs

Online Essentials: 3.1 Search, 3.2 Critical Evaluation, 3.3 Copyright, Data Protection, 4.1 Online Communities, 4.2 Communication, 4.3 E-mail Concepts.

Online Essentials: 5.1 Sending E-mail. 5.2 Receiving E-mail. 5.3 Tools and Settings. 5.4 Organising E-mails. 5.5 Using Calendars.

Word Processing: 1.1 Working with Documents. 1.2 Enhancing Productivity. 2.1 Enter Text. 2.2 Select and Edit.

Word Processing: 3.1 Text, 3.2 Paragraphs, 3.3 Styles, 4.1 Table Creation, 4.2 Table Formatting, 4.3 Graphical Objects.

Word Processing: 5.1 Preparation, 5.2 Outputs, 6.1 Setup, 6.2 Check and Print

Spreadsheets: 1.1 Working with Spreadsheets. 1.2 Enhancing Productivity. 2.1 Insert, Select. 2.2 Edit, Sort. 2.3 Copy, Move, Delete

Spreadsheets: 3.1 Rows and Columns, 3.2 Worksheets, 4.1 Arithmetic Formulas, 4.2 Functions

Spreadsheets: 5.1 Numbers/Dates, 5.2 Contents, 5.3 Alignment, Border Effects, 6.1 Create, 6.2 Edit

Spreadsheets: 7.1 Setup, 7.2 Check and Print

Teaching Materials:

Textbook(s):	Four Original ICDL textbooks, <i>Computer Essentials</i> , <i>Online Essentials</i> , <i>MS Word and MS Excel</i> , in addition to Tutorials created by ITCS101 instructors.
Handout(s):	Available on http://www.ahlia.edu.bh/moodle .
Reference(s):	Timothy O'Leary Linda O'Leary, Daniel O'Leary (February 5,2020), <i>Computing Essentials</i> , 28 th INTL. Edition, McGraw-Hill Education. ISBN: 9781260570755

Course Code & Title: ITCS 122– Introduction to Programming Techniques
Weight: (2-2-3) **Required/ Elective:** Required
Prerequisite: ITCS 101

Coordinator/ Instructor: Ms. Jenan Moosa Hasan

Description: This course introduces the fundamental concepts of computer programming. The covered topics are primitive data types and operators, input/output, control statements, methods and functions, arrays and strings, classes and objects, and an introduction to Java applications and object-oriented design techniques. Emphasis is placed on the development of problem-solving skills.

Objectives:

1. To understand the fundamentals of computer programming and programming languages.
2. To understand how to model and design a solution for a problem using algorithms and flowcharts.
3. To understand the programming language principles, operators, conditional and repetition statements, various built-in-functions such as mathematical, and string functions.
4. To create and implement user-defined data types such as arrays.
5. To gain facility in the writing, executing and debugging programs written in java language.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate a detailed knowledge and understanding of the main theories, principles and concepts embedded in the process, properties and techniques, employed in computer programming in a Java environment.
B. Subject-specific Skills	
B1	Problem Solving: Solve simple problems using programs written in the computer programming language JAVA.
B2	Modeling and Design: Formulate overall structure of the program & design the algorithms that meet specifications.
B3	Application of Methods and Tools: Apply Java tools to build, develop, design, implement, test, debug and deploy java programs.
C. Critical-Thinking Skills	
C1	Analytic skills: Analyze problem specification and effectively use fundamental programming constructs to meet the specification.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- Introduction to Computers and Problem Solving.
- Problem Solving and Solution Design.
- Introduction to Java environment.
- Arithmetic manipulation and Operators.
- Introduction to classes, Objects and Methods.
- Numbers and String variables (local and global variables), Common Programming Errors.
- Assignment operators, Logical operators, java API Packages, Math and String functions.
- Control statement: simple-if and nested-if.
- Control statement: switch statement, Math class methods.
- Repetition (while-loop, do- while, for-loop).
- Arrays (1D Array).
- 2D Arrays.
- File handling: reading data from files and writing data into files.

Teaching Materials:

Textbook(s):	Deitel T. R. Nieto. (2017) <i>Java How to Program</i> , 11 th Edition, Prentice Hall.
Handout(s):	- Internal handouts (Hardcopies) prepared by course instructors. - PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	1. Malik D. (2012) <i>Java Programming: From Problem Analysis to Program Design</i> , 5 th Edition, Cengage Learning. 2. Liang Y. D. (2013) <i>Introduction to Java Programming, Brief Version</i> , 9 th Edition, Pearson Education. 3. Savitch W. (2014) <i>Java: An Introduction to Problem Solving and Programming</i> , 7 th Edition, Pearson Education.

Course Code & Title: ITCS 201 – Object Oriented Programming I
Weight: (2-2-3) **Required/ Elective:** Required
Prerequisite: ITCS 122

Coordinator/ Instructor: Ms. Jenan Moosa Hasan

Description: This course emphasizes on object-oriented programming techniques using Java. It covers the implementation of object-oriented concepts, such as: classes, objects, inheritance and polymorphism.

Objectives:

1. To develop an understanding of the principles underpinning object-oriented programming.
2. To designate the important features of an object-oriented programming language.
3. To understand how to design and implement object-oriented concepts and software.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate detailed knowledge and understanding of the concepts involved in Java programming for implementing object oriented software.
B. Subject-specific Skills	
B1	Problem Solving: Solve defined and some undefined problems by writing Java programming code.
B2	Modeling and Design: Design the prototype for solving different kinds of real world problems, by clearly stating the concepts involved; such as Constructors, Abstract class, Inheritance, Polymorphism, Interface and their respective set of Properties and Methods using algorithms and UML models.
B3	Application of Methods and Tools: Apply Java programming language constructs and tools to write, run, trace, and debug object oriented programs.
C. Critical-Thinking Skills	
C1	Analytic skills: Evaluate and find the best Java object oriented concepts needed to develop efficient and effective programs.
C2	Synthetic: Integrate different application objects and object oriented concepts into complete computer applications needed to solve real world problems.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Demonstrate the ability to present Java programs clearly in a well-structured manner.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignments.

List of Topics:

- Introduction to object-oriented programming language.
- Introduction to Classes, Objects, Methods and Instance Variables, Default, Public, and Private Access Modifiers, UML Notations.
- Declaring a Class and Instantiating an Object, Setter, Getter, and Operational Methods.
- Constructor, Default, No- Argument and Arguments Constructors, Initializing Objects with Constructors.
- Overloading Methods, this Keyword, Encapsulation and Data Hiding.
- Static Variables, Static Methods, Static Class Members, Static Import.
- Enumerations, Garbage Collection and Method finalize, Final Instance Variables, Creating Packages, Package Access, and UML Package Notations.
- Association, Aggregation Relationships and UML Notation.
- Inheritance and UML Notation.
- Protected Access Modifier, Software Engineering with Inheritance, Object Class and super Keyword.
- Polymorphism and Overriding Methods.
- Static and Dynamic Binding.
- Abstract Class, Abstract Method and UML Abstract Notation.
- Final Methods and Classes.
- Interfaces, Common Interfaces of the Java API and UML Interfaces Notation.

Teaching Materials:

Textbook(s):	Deitel T. R. Nieto. (2017) <i>Java How to Program</i> , 11 th Edition, Prentice Hall.
Handout(s):	- Internal handouts (Hardcopies) prepared by course instructors. - Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. White B. (2018) <i>Mastering Java: An Effective Project Based Approach including Web Development, Data Structures, GUI Programming and Object-Oriented Programming</i>, independently published.2. Gaddis T. and Muganda G. (2018) <i>Starting Out with Java, From Control Structures through Data Structures</i>, 4th Edition, Pearson Education.3. Liang Y. D. (2017) <i>Introduction to Java Programming Comprehensive Version</i>, 11th Edition Prentice Hall.4. Barnes D. J. and Kölling M. (2016) <i>Objects First with Java: A Practical Introduction Using BlueJ</i>, 6th Edition, Prentice Hall.5. Litvin M. and Litvin G. (2015) <i>Java Methods: Object-Oriented Programming and Data Structures</i>, 3rd AP Edition, Skylight Publishing. ISBN: 9780982477564

Course Code & Title:

ITCS 209 – Discrete Structures

Weight: (3-0-3)

Required/ Elective: Required

Prerequisite:

MATH 102

Coordinator/ Instructor: Dr. Suresh Subramanian

Description: The course covers the fundamental concepts of discrete mathematics that are widely used in information technology and engineering. The covered topics are logic and mathematical reasoning, sets, functions, counting and combinatorial techniques, graphs and trees.

Objectives:

1. To provide understanding of basic concepts and ideas in discrete mathematics.
2. To enable learners to gain an insight into the use of basic mathematical ideas useful in various fields of study including computer science, information technology, physical sciences and engineering.
3. To explain with examples the basic terminology of functions, relations, and sets as well as perform operations associated with them.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate detailed knowledge and understanding of discrete mathematical structures
B. Subject-specific Skills	
B1	Problem Solving: Use basic skills to solve mathematical and logical problems using various discrete structure aspects
B2	Modeling and Design: Adapt practices to model real-life problems including those arising in computing context.
C. Critical-Thinking Skills	
C1	Analytic skills: Evaluate different areas of problems to determine the underlying logic, structure or recurrence relations.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D3	Organizational and Developmental Skills: Operate with accountability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Introduction**
- **Logic:** propositions, truth tables, logical connectives.
- Tautologies, contradictions, logical equivalences, predicates and quantifiers.
- **Proofs:** induction and contradiction.
- **Sets:** operations on sets, cardinality of sets, power set, Cartesian Product.
- **Functions:** 1-1, onto, bijection, graph of function, inverse and composition functions.
- **Counting Techniques:** Sum and Product Rules, Permutations and Combinations, Pigeonhole Principle, Binomial Coefficients.
- Sequences, Summations, Applications of Recurrence Relations, Solving Recurrences.
- **Graphs:** types of graphs, special graphs, paths and connectivity, isomorphism, Euler and Hamilton paths and circuits, Chromatic number, planar graphs.
- **Trees:** Tree Traversal, applications of trees.

Teaching Materials:

Textbook(s):	Rosen K. H. (2019) <i>Discrete Mathematics and Its Applications</i> , Global Edition, 8 th Edition, McGraw-Hill.
Handout(s):	PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. Gordon J. (2012) <i>Mathematics of Discrete Structures for Computer Science</i>, Springer.2. Bernard Kolman, Robert Busby, Sharon C. Ross. (2017), <i>Discrete Mathematical Structures (Classic Version) (Pearson Modern Classics for Advanced Mathematics Series)</i>, Pearson; 6th Edition (March 30, 2017). ISBN: 978-01346964473. A. Tucker, Hoboken, NJ (2012) <i>Applied Combinatorics</i> – 6th Edition, John Wiley and Sons. ISBN: 97804704583894. More references are available in the course website in Moodle.

Course Code & Title:

ITCS 214 - Computer systems

Weight:(3 - 0 - 3)

Required/ Elective: Required

Prerequisite:

ITCS 101

Coordinator/ Instructor: Dr. Wasan Shakir Awad

Description: This course is an introduction to the fundamental concepts of computer systems and their performance analysis. It explores how computers execute programs and manipulate data. Topics covered include data representation of primitive data types, machine-level programming, digital logic, memory organization and management, I/O devices and storage devices. In addition, it covers the techniques used to improve computer performance and to solve its problems.

Objectives:

1. To explain various data representation methods of the basic data types.
2. To introduce the physical structure of ALU and logic design.
3. To help students understand the behavior of processor by introducing the instruction set and assembly programming.
4. To recognize and describe different kinds of storage systems and I/O devices.
5. To introduce the concepts of evaluating and improving computer system performance.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate a broad knowledge of the concept and theories of computer system, such as digital logic, data representation and manipulation, and storage systems.
A2	Contemporary Trends, Problems and Research: Demonstrate awareness of the current trends and advancements in computer systems.
B. Subject-specific Skills	
B1	Problem Solving: Demonstrate knowledge of the methods and techniques used to solve the problems of computer systems and thus improve its performance, as well as to solve computational problems using logic circuit design and assembly programming.
B2	Modelling and Design: Model the structure of ALU and design simple logic circuits to implement different kind of operations.
C. Critical-Thinking Skills	
C1	Analytic skills: Demonstrate the ability to analyse the computer system performance and identify the computer problems.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Express and communicate ideas in written and oral form.
D3	Organizational and Developmental Skills: Ability to work effectively as a member of a development team.

List of Topics:

- **Data Representation:** To describe numbering systems, data type size and numeric range, as well as different representation techniques to represent real, integer, Boolean, memory address, and characters together with performance evaluation.
- **Data Storage:** To describe the three types of storage devices, with performance evaluation and data format.
- **Processor Technology and Architecture:** To describe Boolean Algebra, logic design.

- **Processor Technology and Architecture:** To describe instruction set, assembly programming.
- **Processor Technology and Architecture:** To describe addressing modes and CPU concepts.
- **System Integration and Performance:** To describe system bus, I/O ports, interrupt, fault tolerance, Cache and Buffers.
- **System Integration and Performance:** To describe parallel processing.
- **I/O Devices:** Common I/O device types with their characteristics
- **I/O Devices:** Memory mapped I/O and DMA.

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none"> 1. Stallings W. (2019) <i>Computer Organization and Architecture: Designing for Performance</i>, 11th Edition, Pearson, ISBN-13: 9780134997193. 2. Burd, S. D. (2015) <i>Systems Architecture</i>, 7th Edition, Cengage Learning.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none"> 1. Siewiorek, D. and Swarz, R., (2017). <i>Reliable Computer Systems: Design and Evaluation</i>. Digital Press. 2. King-Sun Fu, (2017), <i>Special Computer Architectures for Pattern Processing</i>, 1st Edition, CRC Press; (December 12, 2017). ISBN: 978-1315897684 3. Glenn Brookshear, Dennis Brylow, (2014), <i>Computer Science: An Overview</i>, Pearson; 12th Edition (April 11, 2014);0133760065, 978-0133760064 4. Hamacher C., Vranesic Z., Zaky S. and Manjikian N. (2011) <i>Computer Organization and Embedded Systems</i>, McGraw-Hill. 5. Patterson D. and Hennessy J. (2013) <i>Computer Organization and Design</i>, 5th Edition, Newnes 6. 6. Brookshear J. (2019) <i>Computer Science: An Overview</i>, 13th Edition, Addison- Wesley. ISBN: 978-0-13-489172-9

Course Code & Title: ITCS 221 – Object Oriented Programming II
Weight:(2 - 2 - 3) **Required/ Elective:** Required
Prerequisite: ITCS 201
Coordinator/ Instructor: Dr. Suresh Subramanian

Description: This course is built on the information gained from the previous Java programming courses. It concentrates on modeling the GUI and advanced software programming issues such as: Java Applets, Multimedia (applets and applications) and Multithreading.

Objectives:

1. To understand advanced concepts of Java Programming Language such as exception and error handling, Multithreading and applets.
2. To explain how to create and use generic methods and types effectively.
3. To teach students how to write multimedia and multithreaded applets and applications.
4. Write applications and applets and develop a GUI interface.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate an understanding of advanced Java programming concepts, such as exception and error handling, generic methods and classes, Java applets, multimedia and multithreading.
B. Subject-Specific Skills	
B1	Problem Solving: Analyze and identify real world and computer application problems and develop effective java applications and applets to solve these problems.
B2	Modeling and Design: Design computer programs that meet user specifications utilizing Java programming language.
B3	Application of Methods and Tools: Apply Java programming language constructs and tools to write, run, trace, and debug object-oriented programs.
C. Thinking Skills	
C1	Analytic: Analyze user requirements and problems and evaluate the effectiveness and performance of java programs needed to meet users' expectations.
C2	Synthetic: Integrate Java application components into one java project to organize the data and make the program more flexible.
C3	Creative: Demonstrate creativity in solving new problems by developing Java programs and applets.
D. General and Transferable Skills (Other Skills Relevant to Employability and Personal Development)	
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Introduction.**
- **Exception Handling:** Exceptions and Exception Types, Throwing Exceptions, Catching Exceptions.
- **Exception Handling:** Creating user defined exception classes. The final Clause Cautions, chained exceptions, precondition and preconditions Assertions.
- **Generics:** Introduction and motivation for Generic methods and overloading generic methods.

- **Generics:** Generic classes, Generic and inheritance.
- **Introduction to Java Applets:** Sample Applets, simple Java Applet, Applet Life-Cycle methods, Security in Applets.
- **Java Applets:** Generic methods, Generic classes and Java Applets.
- **Multimedia:** Introduction, manipulating images, loading and playing audio clips, Java media framework.
- **Multimedia:** Manipulating images, loading and playing audio clips, Java media framework.
- **Multithreading and RMI:** Introduction, lifecycle of a thread, thread's properties and thread scheduling, thread synchronization, Dead Lock, Socket Class.
- **Remote Method Invocation.**

Teaching Materials:

Textbook(s)	Deitel T. R. Nieto. (2017) <i>Java How to Program</i> , 11 th Edition, Prentice Hall.
Handout(s)	PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s)	<ol style="list-style-type: none"> 1. Savitch, W. (2017). <i>Java: An Introduction to Problem Solving and Programming Plus MyProgramming Lab with Pearson eText-Access Card Package</i>. Pearson. 2. Gaddis T. and Muganda G. (2019) <i>Starting Out with Java, From Control Structures through Data Structures</i>, 4th Edition, Pearson Education. ISBN: 9780134787961 3. Barnes D. J. and Kölling M. (2016) <i>Objects First with Java: A Practical Introduction Using BlueJ</i>, 6th Edition, Prentice Hall.

Course Code & Title: ITCS 222 - Visual Programming

Weight: (2 - 2 - 3) Required/ Elective: Required

Prerequisite: ITCS 122

Coordinator/ Instructor: Ms. Khadija Almohsen

Description: This course introduces Windows programming environment. Students learn how to write and develop programs with a polished graphical user interface (GUI) using event-driven programming language, which is Visual Basic. Topics include data types and structures, arithmetic and logical operators, declarations and input/output, control structures, and functions. Emphasis is placed on the development of problem- solving skills.

Objectives:

1. To understand the concepts and techniques of event-driven programming.
2. To examine the modular programming using subroutine, function, and modules.
3. To create and implement user-defined data types such as arrays, structures, files, and database using Visual Basic.
4. To understand the Visual Basic Integrated Development Environment (IDE) and Windows programming by writing, executing and debugging Visual Basic programs.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate understanding and detailed knowledge of the concepts of event-driven programming, IDE environment and GUI Programming techniques.
B. Subject-specific Skills	
B1	Problem Solving: Identify a real-world problem and solve it by using visual basic programming language.
B2	Modeling and Design: Design computer applications and create prototypes to meet given requirements.
B3	Application of Methods and Tools: Apply Visual Studio software to write, execute and correct the syntax, logical and run time errors.
C. Critical-Thinking Skills	
C1	Analytic skills: Analyze problem specification and use appropriate visual programming constructs to meet these requirements.
C2	Synthetic: Integrate different visual programming constructs such as database and modules while developing real life projects.
C3	Creative Thinking and innovation: Apply new and/or using conventional programming techniques innovatively for solving real world problems.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Introduction to Event-Driven Programming.**
- **GUI:** Labels, Textboxes, Buttons, Group Boxes, Panels, Check box, Radio buttons ToolTips, Event Handling.
- **Relational Operators:** Compound Assignment Operators, Equality and Relational Operators.
- **Math Built-in Function:** Sqrt, Round, Int, Implicit Argument Conversions, Option Strict and Data-Type Conversions.
- **String:** Create and Manipulate the String Objects of String and String Builder Classes.
- **Control Statements- GUI:** Mouse-event Handling, Keyboard-Event Handling, checklist box control, Menus, Tab control.
- **Control Statements - GUI:** List control, Combo Box control, Date Time Picker, Month calendar control.
- **Repetition Statements:** Different types of loops.
- **Modules and Procedures:** Creating procedures, specifying the scope, types of procedures and calling the procedures.
- **Other Control Statements:** Logical Operators, Exit Terminate Repetition Statements, Continue Repetition Statements.
- **SyntaxError Correction:** Using the Debugger by locating Logic Errors and Run Time Errors.
- **Sub Procedures, Function and Modules**
- **Arrays:** One-Dimensional and Multidimensional
- **Accessing Text Files:** Read/Write a text file line by line.
- **Accessing Databases:** Creating a Database Application in Visual Basic
- Student Project

Teaching Materials:

Textbook(s):	Tony Gaddis, Kip R. Irvine (2019) <i>Starting Out with Visual Basic</i> , 8 th Edition, Pearson, ISBN: 978-0135204658
Handout(s):	PowerPoint slides available on Moodle i.e., http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. Gaddis T. and Irvine K. (2016) <i>Starting Out with Visual Basic</i>, 7th Edition, Pearson.2. Schneider D. (2019) <i>Introduction to Programming Using Visual Basic</i>, 11th Edition, Pearson.3. McGrath M. (2019) <i>Visual Basic in easy steps: Updated for Visual Basic</i>, In Easy Steps Limited, 6th Edition.4. Alessandro Del Sole (2016), <i>Visual Basic – 1st Edition</i>. Unleashed, Sams Publishing. PUBLICATION: Indianapolis, Ind.: Sams, ISBN: 9780672334504

Course Code & Title: ITCS 224 - Data Structures
Weight:(2 - 2 - 3) **Required/ Elective:** Required
Prerequisite: ITCS 201

Coordinator/ Instructor: Ms. Sara Alaswad

Description: This course introduces different data structures such as: arrays, linked list, stacks, queues, hash tables, and graphs. It covers the design and analysis of different algorithms to manipulate these data structures, such as: create, traverse, delete data, and insert data. The students will implement the data structure algorithms and apply them using a programming language.

Objectives:

1. To overview various types of data structures.
2. To explain the algorithms associated with each data structure and their implementations.
3. To provide an analysis of the efficiency of algorithms associated with each data structure in terms of both time and space.
4. To demonstrate the effective use of data structures in computational problem solving.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate a broad knowledge of the concepts and theories of various data structures and their algorithms.
B. Subject-specific Skills	
B1	Problem Solving: Identify problems and choose the appropriate and efficient data structures to solve these problems.
B2	Modelling and Design: Formulate data model, and design software solution through the application of the appropriate data structures.
B3	Application of Methods and Tools: Use a programming language to implement various data structures and apply different methods of designing algorithms.
C. Critical-Thinking Skills	
C1	Analytic: Evaluate and analyse the performances of algorithms associated with the various data structures.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Express and communicate ideas in written and oral form.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Arrays:**
- Array creation and initialization.
- Insertion and deletion of an element.
- Multidimensional arrays and their representations.
- Performance Analysis.
- **Arrays:**
- Sequential and binary search operations.
- Selection and insertion sort operations.
- **Stack:**
- Applications of stack.

- Push and pop operations.
- Performance Analysis.
- **Queue:**
- Types of queues like circular one.
- Insertion and deletion operations on queues.
- Performance Analysis.
- **Linked list:**
- Linked list, doubly linked list and circular linked list.
- Insertion and deletion operations on linked list.
- Performance Analysis.
- **Hash Tables:**
- Hash function.
- Collision resolution.
- Performance Analysis.
- **Trees:**
- Definitions and basic terminologies.
- In-order, pre-order and post- order traversal.
- Tree creation, insertion and deletion of a node.
- Performance Analysis.
- **Graphs Concepts:**
- Undirected and directed graphs.
- Representing graphs.

Teaching Materials:

Textbook(s):	1. Hemant Jain (2018) <i>Problem Solving in Data Structures & Algorithms Using Java</i> , 2 nd Edition, Independently Published, ISBN: 978-1723982101
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none"> 1. Weiss M. A. (2011) <i>Data Structures and Problem Solving using Java</i>, 4th Edition, Pearson Education. 2. Goodrich M. T., Tamassia R. and Goldwasser M. H. (2015) <i>Data Structure and Algorithms in Java</i>, 6th Edition, Wiley, *9781118808573. 3. James Cutajar (2018) <i>Beginning Java Data Structures and Algorithms</i>, Packt Publishing 4. Dale N., Joyce D. and Weems C. (2016) <i>Object Oriented and data structures using Java</i>, 4th Edition, Jones & Bartlett Publishers, ISBN: *9781284089097

Course Code & Title: ITCS 303 - Design and Analysis of Algorithms
Weight:(2 - 2 - 3) **Required/ Elective:** Elective
Prerequisite: ITCS 224 & ITCS 209

Coordinator/ Instructor: Dr. Suresh Subramanian

Description: The course covers classical techniques and paradigms used in the design and analysis of algorithms. Some of the covered techniques are induction and recursion, divide and conquer, dynamic programming, and greedy approach. Techniques like backtracking and randomization are also introduced to deal with NP-Complete problems. Students will be able to practice their skills on many well-known algorithms and data structures designed to solve practical problems.

Objectives:

1. To introduce the specialist theories, concepts and principles of problems and algorithms design.
2. To design efficient algorithms for solving different kinds of problems using various classical techniques and paradigms.
3. To analyze the time and space complexities of algorithms.
4. To introduce computability and complexity theories and study a number of techniques for solving hard problems.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate advanced knowledge and understanding of the concepts and specialist theories of algorithmic design and analysis, algorithm design paradigms, optimal algorithms, complexity theory, P and NP problems, etc.
B. Subject-Specific Skills	
B1	Problem Solving: Identify real world problems and solve them by designing efficient algorithms.
B2	Modeling and Design: Develop formal definitions of real world problems, and design their efficient algorithmic solutions using different techniques, such as, divide and conquer, dynamic programming, and the greedy approach.
B3	Application of Methods and Tools: Apply a computer programming language to implement algorithms designed for solving real world problems.
C. Thinking Skills	
C1	Analytic: Critically analyze and evaluate the asymptotic performance of different algorithms and find the best and optimal solution for a problem.
C3	Creative: Demonstrate ability to analyze and design efficient algorithm for solving new problems using different algorithmic techniques.
D. General and Transferable Skills (Other Skills Relevant to Employability and Personal Development)	
D1	Communication: Show ability to convey ideas and describe processes of designing efficient algorithms in appropriate oral and written forms.
D2	Teamwork and Leadership: Work effectively as a member/leader of a team who may plan, design, and implement an algorithm for solving real world problem.
D3	Organizational and Developmental Skills: Demonstrate ability to utilize ideas of classical algorithms to develop procedures and processes to solve real world problems and effectively allocate time in given assignment.

List of Topics:

- **Introduction to problems:** Types and sizes of problems, problem search space and instances.
- **Problem Formulation and Modeling Algorithm Analysis:** Best, worst and average cases, asymptotic analysis.
- **Algorithm Analysis:** Asymptotic notations.
- **Divide and Conquer:** Problem solving such as sorting problems.
- **Data Structures:** Heaps, operations on heaps and Heap Sort.
- **Greedy Approach:** Problem solving such as MST, Prim's and Kruskal's Algorithms.
- **Dynamic Programming:** Problem solving, such as shortest paths problem and knapsack problem.
- **Complexity Theory:** P, NP, NP-complete problems and Exhaustive search.
- **Coping with NP-complete:** Backtracking, branch, bound and randomization, parallelization.
- Student Projects.

Teaching Materials:

Textbook(s):	1. Sandeep Sen, Amit Kumar. (2019) <i>Design and Analysis of Algorithms: A Contemporary Perspective</i> , 1 st Edition, Cambridge University Press, ISBN: 978-1108496827.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. Dormehl L. (2015) <i>The Formula: How Algorithms Solve All Our Problems-And Create More</i>, WH Allen, TarcherPerigee; Reprint Edition. ISBN: 978-0399170546.2. Weiss M. A. (2012) <i>Data Structures and Algorithm Analysis in Java</i>, 3rd Edition, Pearson Education.3. Wayne K. and Sedgewick R. (2014) <i>Algorithms</i>, 4th Edition, Addison-Wesley Professional.4. Sedgewick R. and Flajolet P. (2013) <i>An Introduction to the Analysis of Algorithms</i>, 2nd Edition, Addison-Wesley.5. Levitin A. (2014) <i>Introduction to the Design & Analysis of Algorithms</i>, 3rd Edition, Pearson Education.

Course Code & Title:

ITCS 313 – Software Engineering I

Weight: (2-2-3)

Required/ Elective: Required

Prerequisite:

ITCS 201

Coordinator/ Instructor: Dr. Sohail Safdar

Description: This course is to give a clear understanding of the concepts of software engineering. It imparts knowledge of developing a software system from scratch, different software process models, software requirement engineering, and software design with object-oriented technology using UML.

Objective:

1. To understand software process models and how to select the suitable model to be used in software development.
2. To develop the skills to gather different kinds of user requirements, various requirements modeling techniques, and requirements verification and validation.
3. To explain the process of object-oriented design, and modeling techniques using UML.
4. To translate a requirements specification into an implementable design, following a structured and organized process.
5. To help students gain experience of working as a member of a software engineering project team.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate advanced knowledge and understanding of the software engineering concepts such as software development process and life cycle, object-oriented design methodology.
B. Subject-specific Skills	
B1	Problem Solving: Identify real world problems, elicit the requirements of stakeholders, design solutions, and test them against user requirements.
B2	Modeling and Design: Model using UML and design a computer-based system architecture, process and component needed to solve real world problem.
B3	Application of Methods and Tools: Apply the appropriate Computer Aided Software Engineering (CASE) tools to model and design computer software effectively.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze a problem, identify needs and define the computing requirements appropriate to its solution.
C2	Synthetic: Review and extend knowledge and skills in software development to construct and reuse the multiple components of software.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Organize and relate ideas effectively, in written, oral, and graphical form.
D2	Teamwork and Leadership: Function and work effectively as member/leader of a software development project team.
D3	Organizational and Developmental Skills: Demonstrate the ability to effectively manage and allocate appropriate time to develop computer software.

List of Topics:

- **Introduction:**
- Software Engineering
- Software Engineering Problems.
- **Software Development Life Cycle**
- **Software Process Models**
- **Software Analysis Phase:**
 - Requirements Engineering process.
 - Requirements Elicitation.
 - Types of Requirements.
 - Fishbone Diagram
- **Software Analysis Phase:**
 - Business Process.
 - Functional Modeling.
 - DFD.
 - Use Case Diagrams.
- **Software Analysis Phase:** Business Process Modeling With Activity Diagrams.
- **Software Analysis Phase:**
 - Structured Modeling.
 - CRC Cards.
- **Software Analysis Phase:** Class Diagram.
- **Software Analysis Phase:** Behavioral Modeling.
- **Software Analysis Phase:** Interaction Diagram.
- **Software Design Phase:** Evolving the Analysis Models into Design Models.
- **Software Design Phase:** Class and Method Design.
- **Software Design Phase:** User Interface Design and Dialog Diagram.
- **Software Design Phase:** Architecture Design.
- Student Projects

Teaching Materials:

Textbook(s):	1. Tagarden D. and Dennis A. (2015) <i>Systems Analysis and design with UML</i> , 5 th Edition, Wiley. 2. Sommerville I. (2015) <i>Software engineering</i> , 10 th Edition, Pearson.
Handout(s):	PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	1. Pressman R. and Maxim B. (2019) <i>Software Engineering: A Practitioner's Approach</i> , 9 th Edition, McGraw-Hill, ISBN: 978-1260548006. 2. Bruegge B. and Dutoit A. H. (2013) <i>Object-Oriented Software Engineering: Using UML, Patterns and Java</i> , 3 rd Edition, Pearson. 3. Bennett S., McRobb S. and Frammer R. (2010) <i>Object-Oriented System Analysis and Design using UML</i> , 4 th Edition, McGraw Hill. 4. More references are available in the course website on Moodle.

Course Code & Title: ITCS 323 – Database Systems: Design and Application
Weight: (2-2-3) **Required/ Elective:** Required
Prerequisite: ITCS 222
Coordinator/ Instructor: Dr. Wasan Shakir Awad

Description: This course provides a comprehensive knowledge of database (DB) development and management by using database management systems (DBMS). It details the concepts necessary for designing, implementing and using database systems. Topics include database and file system, database design, relational data model, normalization of relations and data modeling using entity-relationship diagrams.

Objectives:

1. To explain the characteristics that differentiates programming with data file approach from database approach.
2. To cite the goals, functions and models of database system.
3. To demonstrate knowledge of database management systems together with its functions and architecture.
4. To explain data modeling using EERD.
5. To recognize and describe the relational model, its terminologies and properties of database relations.
6. To design efficient and normalized database tables.
7. To explain concepts of conceptual and logical database design.
8. To demonstrate proficiency in using declarative query language, i.e. Structured Query Language to design, build and implement relational database.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate an understanding of advanced concepts, principles and theories related to designing, implementing and using both Database and Database Management System.
B. Subject-Specific Skills	
B1	Problem Solving: Identify and analyze real life information management problems in order to solve them by developing efficient database systems.
B2	Modeling and Design: Model business data using EER and relational models and design database systems to meet user needs.
B3	Application of Methods and Tools: Apply modern DB design and implementation tools such as (Power Designer) and Microsoft SQL Server.
C. Thinking Skills	
C1	Analytic: Analyze the efficiency of databases systems developed for solving real world problems by applying the normalization rules and implementing the best practices in database design and modeling.
C2	Synthetic: Demonstrate ability to combine the entities into a unified database design.
D. General and Transferable Skills Development)	
D1	Communication: The ability to express and communicate ideas in oral and written form.
D2	Teamwork and Leadership: Work effectively as a member/leader of a team who may plan and design the database.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment or project.

List of Topics:

- **Introduction to Databases:** Introduction, Traditional File-Based Systems, Database Approach. Advantages &disadvantages of DBMSs.
- **Lab:** File-based approach.
- **Database Environment:** The Three-Level ANSI-SPARC Architecture. Database Languages. Data Models and Conceptual Modeling. Functions of a DBMS.
- **Lab:** Database implementation using Access.
- **The Relational Model:** Terminology. Integrity Constraints. Views.
- **Entity Relationship Modeling:** Entity Types. Relationship Types. Attributes.
- **Lab:** Database implementation using Access.
- **Entity Relationship Modeling:** Strong and Weak Entity Types. Attributes on Relationships. Structural Constraints. Problem with ER Model.
- **Lab: SQL DML**
- SQL SELECT Statement
- Using Single-Row Functions to Customize Output.
- Using Conversion Functions and Conditional Expressions
- Working with Power Designer for ER Diagram.
- **Enhanced Entity Relationship Modeling:** Specialization/Generalization. Aggregation. Composition.
- **Lab: SQL DML**
- Displaying Data from Multiple Tables.
- Using Subqueries to Solve Queries.
- **Relational Algebra**
- **Lab:** Structured Query Language.
- **Normalization:** The purpose of Normalization. How Normalization Supports Database Design. Data Redundancy and Update Anomalies. Functional Dependencies. The process of Normalization (1NF, 2 NF, and 3 NF).
- **Lab:** Structured Query Language. Using DDL Statement Create and Manage Tables.
- **Selected Database Issues: Security and Administration:** Efficient Entity Design. Database Security. Countermeasures Computer- Based Controls.
- **Lab:** Structured Query Language.
- Student Projects

Teaching Materials:

Textbook(s):	Connolly T. and Begg C. (2015) <i>Database Systems, A practical Approach to Design, Implementation, and Management</i> , 6 th Edition, Pearson.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. Elmasri R. and Navathe S. (2016) <i>Fundamentals of Database Systems</i>, 7th Edition, Pearson, ISBN: 978-1292097619.2. Coronel C. and Morris S. (2017) <i>Database Systems Design, implementation and Management</i>, 13th Edition, Cengage Learning.3. Kroenke D. and Auer D. (2015) <i>Database Concepts</i>, 7th Edition, Pearson.4. Molina H., Ullman, J. and Widom, J. (2013) <i>Database Systems: The Complete Book</i>, 2nd Edition, Pearson.

Course Code & Title:

Weight: (3-0-3)

Prerequisite:

Coordinator/ Instructor: Dr. Sohail Safdar

Description: The aim of this course is to hone skills in developing and testing of code, executing a program, and improving software's performance or locating certain types of faults. Students actively participate in the main software development activities that straddle the production of an initial implementation and the delivery of the complete system. The following topics are covered: software implementation, software testing in the broader context of software engineering, Software Quality that testing aims to achieve, Control flow testing, and Data flow testing.

Objective:

1. To critically understand the definitions of software implementation, testing and software qualities.
2. To demonstrate the types of various software testing techniques.
3. To understand the importance of considering static techniques for the assessment of software work product.
4. To apply the principal approaches to software testing, together with their associated techniques.
5. To critically understand implementation patterns, coding style and standard to produce quality code.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate advanced knowledge and understanding of essential facts, concepts and specialist theories relating to the implementation, testing, and software quality.
B. Subject-specific Skills	
B1	Problem Solving: Solve the problems of software implementation, installation, and quality using advanced specialized techniques.
B2	Modeling and Design: Design test cases for testing software quality characteristics, such as effectiveness, reliability and accuracy.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze software problems, identify what to test and choose the test conditions using test cases.
C3	Creative: Demonstrate creativity in the development of effective software testing cases for producing reliable, accurate and compatible software.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Show the ability to communicate clearly to convey complex information and ideas in appropriate oral and written forms.
D3	Organizational and Developmental Skills: Demonstrate the ability to organize ideas and effectively allocate time in given assignment.
D4	Ethical and Social Responsibility: Demonstrate an understanding and adhere to the ethical, legal and professional issues and significant responsibilities pertaining to software testing.

List of Topics:

- **Introduction to Software Engineering II**
- **Software Implementation and Installation**
- **Software Testing:** Basic Concepts A Software Testing Lifecycle.
- **Testing throughout the software life cycle:** V-Model.
- **Static Techniques:** Review Process Inspection.
- **Control Flow Testing:** Statement Coverage.
- **Control Flow Graphs:** Branch Coverage.
- **Control Flow Coverage:** Path Coverage.
- **Data-Flow Testing:** Data-Flow Graph.
- **Data-Flow Testing:** Data Flow Coverage
- **Mutation Testing**
- **Unit Testing:** Static Unit Testing, Dynamic Unit Testing.
- **Integration Testing:** System Testing.
- **Acceptance Testing:** Types of Acceptance Testing.
- **Software Quality:** Software Quality Standard.

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none">1. Brian Hambling, Peter Morgan, Angelina Samaroo, Geoff Thompson, Peter Williams (2019) <i>Software Testing: An ISTQB-BCS Certified Tester Foundation guide</i>, 4th Edition. BCS, Chartered Institute for IT.2. Spillner A., Linz T. and Schaefer H. (2014) <i>Software Testing Foundations</i>, 4th Edition, ISTQB certification Compliant.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. Aditya M.P. (2014) <i>Foundations of Software Testing</i>, 2nd Edition, Addison-Wesley.2. Tagarden D.P. (2015) <i>Systems Analysis and design with UML</i>, 5th Edition International Student Version, Wiley.3. Sommerville I. (2015) <i>Software engineering</i>, 10th Edition, Addison Wesley.4. Ammann P. and Offutt J. (2017) <i>Introduction to Software Testing</i>, 2nd Ed. Cambridge University Press.5. Naik K. and Tripathy P. (2011) <i>Software Testing and Quality Assurance: Theory and Practice</i>, John Wiley & Sons.6. Mili A. and Tchier F. (2015) <i>Software Testing: Concepts and Operations</i>, John Wiley & Sons.7. Hoffer J. A., George J. and Valacich J. A. (2016) <i>Modern Systems Analysis and Design</i>, 8th Edition, Pearson.

Course Code & Title:

ITCS 335 - IT Infrastructure

Weight: (2 – 2 – 3)

Required/ Elective: Elective

Prerequisite:

ITCS 214

Coordinator/ Instructor: Dr. Baraa Tariq Sharif

Description: This course provides the fundamental networking skills required to deploy and support Network Operating System (NOS) in most organizations. It covers IP fundamentals, remote access technologies, and more advanced content including Software Defined Networking. This course is intended for existing IT professionals who have some networking knowledge and experience and are looking for a single course that provides insight into core and advanced networking technologies in NOS.

Objectives:

1. To critically understand, plan and implement IPv4 network, DHCP, IPv6, DNS, IPAM, Direct Access and VPN.
2. To gain expertise in implementing networking for branch offices, Software Defined Networking, network virtualization, and Network Controller.
3. To be competent in planning networks and remote access.
4. To develop the skills to configure advanced networking features, and advanced Microsoft Hyper-V networking features.
5. To help students gain experience of working as a member of a networking team.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Recognize advanced concepts and principles related to IT infrastructure solution, such as clients, servers, network devices, wired and wireless network.
B. Subject-specific Skills	
B1	Problem Solving: Use advanced level skills to evaluate and select an integrated IT infrastructure (hardware, software, architectures, and services) to best fulfill a real-life organizational requirement.
B3	Application of Methods and Tools: Apply advanced tools and techniques to plan and implement a computer network.
C. Critical-Thinking Skills	
C1	Analytic skills: Analyze an existing IT infrastructure, identify its strengths and weaknesses, and develop a roadmap for future evolution.
C2	Synthetic: Identify and diagnose basic computer communication problems and to develop the necessary strategies to work towards their resolution.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D2	Teamwork and Leadership: Operate an advanced level and work collaboratively in a team to complete a task.
D3	Organizational and Developmental Skills: Demonstrate accountability to organize ideas and effectively allocate time in given assignment or project.

List of Topics:

- Introduction to computer networks, the definition of IT infrastructure and IP addressing basics.
- Planning IPv4 network, Configuring an IPv4 host, Managing and troubleshooting IPv4 network connectivity
- Planning the IPv4 address assignments, Verifying IPv4 and Troubleshooting IPv4 Implementing and troubleshooting an IPv4 network
- Overview of the DHCP server role, Deploying DHCP, Managing and troubleshooting DHCP Implementing DHCP
- Planning a DHCP server implementation, Implementing the DHCP configuration, Validating the DHCP implementation
- Overview of IPv6 addressing, Configuring an IPv6 host, Implementing IPv6 and IPv4 coexistence.
- Transitioning from IPv4 to IPv6, Configuring and evaluating IPv6 transition technologies
- Implementing DNS servers, Configuring zones in DNS, Configuring name resolution between DNS zones
- Configuring DNS integration with Active Directory Domain Services (AD DS)
- Planning and implementing name resolution by using DNS
- Overview of IPAM, Deploying IPAM. Managing IP address spaces by using IPAM
- Implementing IPAM
- Installing the IPAM Server feature, Provisioning the IPAM Server, Managing IP address spaces by using IPAM
- Overview of remote access, Implementing the Web Application Proxy, Implementing Web Application Proxy, Validating the Web Application Proxy deployment
- VPN concepts, Planning VPNs, Implementing VPNs, Validating the VPN deployment, Troubleshooting VPN access
- Networking features and considerations for branch offices, Implementing Distributed File System (DFS) for branch offices, Implementing BranchCache for branch offices
- Overview of high-performance networking features, Configuring advanced Microsoft Hyper-V networking features
- Overview of SDN, implementing network virtualization, Implementing Network Controller

Teaching Materials:

Textbook(s):	Greg Tomsho, (2018), <i>MCSA Guide to Networking with Windows Server 2016</i> , Exam 70-741, Cengage Learning, ISBN: 978-1337400787
Handout(s):	- Internal handouts (Hardcopies) prepared by course instructors. - PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	1. Laan, S., (2017). <i>IT Infrastructure Architecture-Infrastructure Building Blocks and Concepts</i> , 3 rd Edition. Lulu. com. 2. Comer, Douglas E., (2018) <i>The Internet book: everything you need to know about computer networking and how the Internet works</i> . CRC Press, 2018. ISBN-13: 978-1138330290. 3. - Drago Hercog (2020), <i>Communication Protocols: Principles, Methods and Specifications</i> 1 st Edition. 2020 Edition. Springer.

Course Code & Title:

ITCS 336 – Database Administration I

Weight: (2 – 2 – 3)

Required/ Elective: Required

Prerequisite:

ITCS 323

Coordinator/ Instructor: Dr. Yousif Janahi

Description: This course gives students critical knowledge and expertise on administrating the industry's most advanced database (DB) management system. This includes installing Database, controlling the databases, backup and recovery and administrating users' security.

Objectives:

1. To critically identify the tools for administrating a DB.
2. To deeply understand the different types of users, their roles and responsibilities.
3. To identify the types of failure that can occur in DB.
4. To deeply understand essential security-related aspect of DB and its users.

INTENDED LEARNING OUTCOMES (ILOS)

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical understanding and knowledge of administrating Database.
B. Subject-Specific Skills	
B1	Problem Solving: Use advanced level skills to install, configure and maintain Database as well as manage its users.
B3	Application of Methods and Tools: Apply specialized tools to create, manage, and maintain databases.
C. Thinking Skills	
C1	Analytic: Critically evaluate DBMS applications and tools and choose the most appropriate one as per user requirements.
D. General and Transferable Skills (Other Skills Relevant to Employability and Personal Development)	
D1	Communication: Demonstrate the ability to express and communicate ideas in formal oral and written form.
D3	Organizational and Developmental Skills: Demonstrate accountability to organize ideas and effectively allocate time in a given assignment.

List of Topics:

- **Introduction.**
- **Introduction to SQL / PL-SQL:**
- SQL DML, DCL Commands.
- Declaring PL/SQL Variables
- Writing Executable Statements
- **PL/SQL Program:**
- Writing Control Structures
- Working with Composite Data Types

- **PL/SQL Program:**
- Using Explicit Cursors
- **PL/SQL Program:**
- Creating Stored Procedures and Functions
- **Oracle Environment:**
- Exploring the Oracle Database Architecture
- Preparing the Database Environment
- Creating an Oracle Database and Managing
- **Oracle Environment**
- Configuring the Oracle Network Environment
- Managing Database Storage Structures
- **Oracle Environment**
- Administering User Security
- Managing Data and Concurrency
- **Oracle Environment**
- Managing Undo Data
- Implementing Oracle Database Security
- **Database Maintenance**
- **Performance Management**
- **Intelligent Infrastructure Enhancements**
- **Backup and Recovery Concepts**
- **Performing Database Backups**
- **Performing Database Recovery**
- **Moving Data**
- **Working with Support**

Teaching Materials:

Textbook(s):	<p>1- Bob Bryla (2015), <i>Oracle Database 12c DBA Handbook</i> (Oracle Press), McGraw-Hill Education, ISBN: 978-0071798785.</p> <p>2- Bob Bryla & Kevin Loney (2014), <i>Oracle Database 12c The Complete Reference</i> (Oracle Press), McGraw-Hill Education, ISBN: 978-0071801751.</p>
Handout(s):	<p>1. Available on Moodle i.e. http://www.ahlia.edu.bh/moodle</p> <p>2. Oracle Learning Library available through: http://www.oracle.com/technetwork/tutorials/index.html</p>
Reference(s):	<p>1. Biju Thomas (2014) <i>OCA: Oracle Database 12c Administrator Certified Associate Study Guide: Exams 1Z0-061 and 1Z0-062</i>, 1st Edition BY. PUBLICATION: Sybex; (May 12, 2014).</p>

Course Code & Title: ITCS 341 - System Administration I
Weight: (2-2-3) **Required/ Elective:** Elective
Prerequisite: ITCS 214

Coordinator/ Instructor: Dr. Baraa Tariq Sharif

Description: This course provides broad knowledge and experience for IT professional. Student will have the knowledge required to assemble components based on customer requirements, install, configure PCs and software for end users, and understand the basics of networking, properly and safely.

Objectives:

1. To explain PCs, Laptops, printers & network hardware standards.
2. To explain Professional conduct & professional communications with clients.
3. To explain assembling, disassembling and installing PCs, laptops, printers & network cards, and expansion cards.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate detailed knowledge and understanding of computer components, peripheral devices and networking basic settings requirements.
A3	Professional Responsibility: Demonstrate advanced knowledge and understanding of the professional conducts for IT professionals.
B. Subject-specific Skills	
B1	Problem Solving: Show ability to install, configure and troubleshoot various hardware and device components.
B3	Application of Methods and Tools: Install and expand devices by adding additional equipment through the usage of different tools such as standard technician toolkit and maintenance kit.
C. Critical-Thinking Skills	
C1	Analytic skills: Compare and Contrast various configurations and choose the most appropriate as per user requirements as well as evaluate and select the appropriate component and operational procedures for a user configuration.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Express and communicate ideas in written and oral form.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Motherboards and expansion cards**
- Differentiate between motherboard components and their purposes.
- Differentiate between expansion slots/ expansion cards and their properties.
- **CPUs and power supplies**
- Differentiate among various CPU types and features and select the appropriate cooling method.
- Power supply: know connector types, their voltages and properties.
- **Memory and physical storage**
- Compare and contrast RAM types and features.

- **Connections:** Compare and contrast various connection interfaces and explain their purpose.
- **Peripherals devices:** Install and configure various peripheral devices like input devices, output devices and multimedia devices
- **Printers:**
 - perform printer maintenance
 - Install, and configure printers
 - Explain the differences between the various printer types and summarize the associated imaging process.
- **Notebooks**
 - Compare and contrast laptop features.
 - Compare and contrast the components within the display of a laptop.
 - Install and configure laptop hardware and components.
- **Networking Basics:** Identify various types of networks.
- **The Physical Network**
 - Identify types of network cables and connectors.
 - Categorize characteristics of connectors and cabling.
 - Compare and contrast network devices, their Functions, and features.
- **Networking Protocols**
 - Explain properties and characteristics of TCP/IP.
 - Explain common TCP and UDP ports, protocols, and their purpose.
- **Wireless Networking:** Compare and contrast wireless networking standards and encryption types.

Teaching Materials:

Textbook(s):	1- Faithe Wempen, Jane Holcombe, (2019) <i>CompTIA A+ Certification Study Guide</i> , 10 th Edition (Exams 220-1001 & 220-1002), McGraw-Hill Education, ISBN: 978-1260456653
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	https://certification.comptia.org/getCertified/certifications/a.aspx

Course Code & Title:

ITCS 401 – Software Project Management

Weight:(2-2-3)

Required/ Elective: Required

Prerequisite:

ITCS 327

Coordinator/ Instructor: Dr. Sohail Safdar

Description: The course focuses on the key aspects of software project management. It develops the ability of managing software projects, including organizing the software development team; selecting the best approach and tailoring the process model; estimating software cost and schedule; planning and documenting the plan; risk management and resource allocation.

Objective:

1. To explain the key components of a project plan.
2. To explain roles and responsibilities for key project personnel and stakeholders.
3. To explain the importance of a cost/benefit analysis to the successful implementation of a project plan.
4. To critically understand project budgeting, scheduling, and evaluation.
5. To prepare a project plan, as part of a team, for an IT project and demonstrate ability to follow standard project management methodology.
6. To use appropriate project planning and tracking tools.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of the process of developing and managing software projects.
A2	Contemporary Trends, Problems and Research: Recognize emerging aspects and trends in software project management.
A3	Professional Responsibility: Acquaint students with tasks undertaken during project management, tasks of each team member, and the skills needed for a project manager to lead his team.
B. Subject-specific Skills	
B1	Problem Solving: Demonstrate the ability to estimate efforts, estimate budget, solve resource allocation together with project schedule problems and address any obstacles that may jeopardize the completion of projects.
B3	Application of Methods and Tools: Apply appropriate project planning and tracking tools such as ROI, COCOMO, Gantt charts, CPM, PERT utilizing EXCEL and Microsoft Project.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze project requirements in order to define the scope of work, conduct organizational planning, identify and evaluate risks and assess how well a project follows its project plan.
C2	Synthetic: Integrate various components of project plan to implement the project.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Demonstrate ability to communicate information in appropriate oral and written forms to a variety of audience.
D2	Teamwork and Leadership: Function and work effectively as member/leader of a team.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignments and project.
D4	Ethical and Social Responsibility: Predict and learn the impact of one's behavior on the work and colleagues in a software project management process.

List of Topics:

- **Course Overview & Introduction:** Why is Project Management Important?
- **Introduction to Software Project Management:** Characteristics of Projects
- **Project Evaluation & Program Management:** The Business Case for a Project, Project Portfolios, Project Evaluation, Cost Benefit Analysis, Cash Flow Forecasting, Program Management, Benefits Management
- **Overview of Project Planning:** Step Wise, Gantt Charts
- **Software Effort Estimation:** What Makes a Successful Project? Estimating Methods
- **Activity Planning:** Scheduling, Activity Networks, PERT Diagram
- **Risk Management:** Definition of 'Risk' and 'Risk Management', Some Ways of Categorizing Risk, Risk Management
- **Resource Allocation:** Resource Smoothing
- **Managing Contracts:** Types of Contracts, The Tendering Process
- **Managing Teams:** Becoming a Team, Virtual Projects
- **Software Quality:** The Importance of Software Quality, ISO 9126 Software Qualities
- **Student Projects**

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none">1. Schwalbe K. (2018) <i>Information Technology Project management</i>, 9th Edition, Cengaged learning.2. Anna P. Murray (2016) <i>The Complete Software Project Manager: Mastering Technology from Planning to Launch and Beyond</i>, Wiley, ISBN: 978-1119161837
Handout(s):	PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. Hoffer J. A., George J. and Valacich J. A. (2016) <i>Modern Systems Analysis and Design</i>, 8th Edition, Pearson2. Gray C. and Larson E. (2017) <i>Project Management the Managerial Process</i>, 7th Edition, McGraw-Hill3. Alan Dennis, Barbara Haley Wixom, David Tegarden, (2012), <i>Systems analysis design, UML version 2.0: An object oriented approach</i>, 4th Edition International Student Version, Wiley.4. Hughes B. and Cotterell M. (2009) <i>Software Project Management</i>, 5th Edition, McGraw- Hill5. Other references can be found on Moodle.

Course Code & Title: ITCS 404- Information Security Engineering
Weight: (2-2-3) **Required/ Elective:** Required
Prerequisite: ITCS 327

Coordinator/ Instructor: Dr. Wasan Shakir Awad

Description: This course is to cover technical and administrative aspects of Information Security and Assurance. Topics covered: Information Security Concepts, The Need for Security, Security Services and Mechanisms, Security System Development, and Security Mechanisms, such as: Cryptographic systems, Information Hiding, Entity Authentication, and Digital Signature.

Objectives:

1. To critically understand the specialist theories, standards, and concepts of information security.
2. To understand the phases needed to develop security systems.
3. To understand the business needs for security.
4. To critically evaluate different security techniques for providing different security services.
5. Research on new trends in information security.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical understanding of principles, standards, and concepts related to information security goals, mechanisms, and development.
A2	Contemporary Trends, Problems and Research: Demonstrate critical understanding of major current issues of information security, and research on new trends in protecting information.
B. Subject-Specific Skills	
B1	Problem Solving: Critically analyze, assess, and identify the information security risks, vulnerabilities, threats, and possible attacks, as well as critically choose the appropriate security mechanisms to control security risks.
B2	Modeling and Design: Design effective security systems to meet user requirements and to control information security risks of information systems.
B3	Application of Methods and Tools: Apply IT tools to implement different kinds of security techniques needed to protect information.
C. Critical Thinking Skills	
C1	Analytic: Critically assess, compare and select emerging and existing information security techniques, and analyze the security level of security systems.
C2	Synthetic: Integrate appropriate information security components into one effective security system.
C3	Creative: Demonstrate creativity in the development of effective security systems to control the problems of information systems.
D. General and Transferable Skills	
D1	Communication: Express and communicate complex ideas related to information security in written and oral forms.
D2	Teamwork and Leadership: Demonstrate the ability to work as a group member/leader and share the ideas together.
D3	Organizational and Developmental Skills: Demonstrate the ability to organize ideas and effectively allocate time in given assignments and project.

D4	Ethical and Social Responsibility: Demonstrate an understanding of the role of culture as it applies to ethics in information security.
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List of Topics:

- **Introduction to Information Security:** Definitions. Critical Information, Characteristics. Security Model. SDLC Overview.
- **The Business Need for Security:** Threats. Attacks.
- **Legal, Ethical, and Professional Issues in Information Security Risk Management:** Asset Identification and Valuation. Threat Identification. Vulnerability Identification. Risk Identification and Assessment.
- **Lab:** Vulnerability Identification
- **Risk Management:** Controlling Risk.
- **Lab:** Data Backup and Recovery
- **Logic Design**
- **Physical Design:** Cryptography and Cryptanalysis.
- **Lab:** Implementation of cryptographic systems and attacking methods.
- **Physical Design:** Entity Authentication.
- **Lab:** Implementation of Entity Authentication techniques.
- **Physical Design:** Message Authentication.
- **Lab:** Implementation of Message Authentication techniques.
- **Physical Design:** Information Hiding.
- **Student Projects**

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none"> 1. Whitman M. and Mattord H. (2014) <i>Principles of Information Security</i>, 5th Edition, Delmar Cengage Learning. 2. Stallings W. (2020) <i>Cryptography and Network Security: Principles and Practice</i>, 8th Edition, Pearson.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none"> 1. Michael G. Gelles (2016), <i>Insider Threat: Prevention, Detection, Mitigation, and Deterrence</i>, Elsevier. 2. Tipton H. F. and Nozaki M. K. (2011), <i>Information Security Management Handbook</i>, 6th Edition, Auerbach Publications. 3. Schneier B. (2015) <i>Applied Cryptography: Protocols, Algorithms and Source Code in C</i>, 20th Anniversary Edition, John Wiley & Sons. 4. Darren Death (2017), <i>Information Security Handbook: Develop a threat model and incident response strategy to build a strong information security framework</i>, Packt. 5. Katz J. and Lindell Y. (2014) <i>Introduction to Modern Cryptography</i>, 2nd Edition, Chapman and Hall. 6. Rhodes-Ousley M. (2013) <i>Information Security the Complete Reference</i>, 2nd Edition, McGraw Hill Professional. 7. Smith R. E. (2015) <i>Elementary Information Security</i>, 2nd Edition, Jones & Bartlett Learning. 8. Gibson D. (2014) <i>Managing Risk in Information Systems (Information Systems Security & Assurance)</i>, 2nd Edition, Jones & Bartlett Learning.

Course Code & Title:

ITCS 409 - Operating systems

Weight:(3 - 0 - 3)

Required/ Elective: Required

Prerequisite:

ITCS 214

Coordinator/ Instructor: Dr. Baraa Tariq Sharif

Description: This course is to cover the concepts, structure, and functions of operating system (OS). Students will learn how an operating system provides an environment in which users can execute programs in a convenient and efficient manner. Topics covered include computer system and OS structure; process management: process, threads, CPU scheduling, process synchronization, deadlocks; memory management; mass storage management, and file systems.

Objectives:

1. To critically understand the specialist theories, principles and concepts of modern operating systems.
2. To explain the fundamental structure of modern operating system and its core functions and services.
3. To critically examine and evaluate different strategies and techniques used by operating systems to manage computer resources.
4. To examine the algorithmic ideas integrated in the design and implementation of different operating systems.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of the concepts of operating system, its architecture and functions.
A2	Contemporary Trends, Problems and Research: Demonstrate critical knowledge and understanding of major current issues of computer resources management and methods of handling these problems in modern operating systems.
B. Subject-specific Skills	
B1	Problem Solving: Use a range of approaches to critically analyse and evaluate practices of operating systems in identifying, defining and solving problems by using alternative effective and efficient algorithms.
B2	Modeling and Design: Use a range of specialist models to model the problems of computer and communication systems, such as deadlock, and design efficient and effective handling procedures.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyse and evaluate the performance and effectiveness of different algorithms used by different operating systems.
C3	Creative Thinking and innovation: Extend knowledge in operating system to construct specific and effective solution to manage and control computer resources.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Show ability to communicate information in appropriate oral and written forms.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Introduction**
- **Computer Hardware Structure Overview**
- **Operating System Concepts and Structure**
- **Process:** Concepts, States, Operations, Process Communication
- **Threads:** Benefits, Multi- core Systems
- **Memory Management**
- **Virtual Memory**
- **Process Management:**
- Process Synchronization and Scheduling
- **Process Management:**
- Deadlocks
- **Mass Storage Management**
- **System administrations and File- Systems**
- **System administration:** Linux

Teaching Materials:

Textbook(s):	1. Silberschatz A., Galvin P. B. and Gagne G. (2018) <i>Operating System Concepts</i> , 10 th Edition, Wiley.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none">1. Jain, Manish. (2018) <i>Basic System Administration. Beginning Modern Unix</i>. Apress, Berkeley, ISBN: 978-1484235270.2. Tanenbaum, Andrew S. (2014), <i>Modern operating system</i>. 4th GLOBAL Edition, Pearson Education, Inc. ISBN: 97812920614293. Mchose A. and Flynn I. M. (2018) <i>Understanding Operating Systems</i>, 8th Edition, Cengage Learning. ISBN10: 1-305-67425-14. Richard Blum and Christine Bresnahan (2021), <i>Linux Command Line and Shell Scripting Bible</i>, Wiley; 4th Edition, ISBN-13: 978-1119700913.

Course Code & Title:

ITCS 413 - Intelligent Systems

Weight:(2 - 2 - 3)

Required/ Elective: Elective

Prerequisite:

ITCS 303

Coordinator/ Instructor: Dr. Wasan Shakir Awad

Description: This course is to cover the specialist theory, concepts, and methods of intelligent systems. It enables students to solve complex problems using various Artificial Intelligence (AI) techniques, and to develop effective intelligent systems using range of AI tools. It covers the concepts of intelligent agent and problem formulation; search-based problem-solving techniques, such as A*; knowledge-based problem-solving techniques: knowledge representation, knowledge reasoning, and expert systems.

Objectives:

1. To critically understand the specialist theories, principles, and concepts of AI.
2. To study and critically analyze various AI techniques and knowledge representation methods including semantic nets, frames, propositional calculus, predicate calculus, and production system.
3. To solve complex real-world problems using AI methods.
4. To develop effective AI systems using specialized AI tools and techniques.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of specialist theories, principles, concepts, and detailed knowledge of some of AI techniques and applications.
B. Subject-specific Skills	
B1	Problem Solving: Identify and critically analyse problems, and solve these problems using range of specialized skills, and techniques of AI.
B2	Modeling and Design: Formulate problems and knowledge, and design components needed to implement intelligent systems to meet the desired needs within realistic constraints.
B3	Application of Methods and Tools: Apply specialized AI tools and techniques to implement intelligent system components.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically evaluate AI algorithms, methods, and techniques in terms of efficiency, optimality, and completeness.
C2	Synthetic: Integrate different AI components in order to develop effective and efficient intelligent system.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Demonstrate ability to communicate information in appropriate oral and written forms to a variety of audience.
D2	Teamwork and Leadership: Work effectively as a member/leader of a team in order to complete a pre-defined project.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignments.

List of Topics:

- **Introduction and Intelligent Agents:**
- AI and Intelligent Agent Concepts
- **Problem Solving:**
- Problem Definition and Formulation, Problem Solving Agents.

- **Search-Based Problem Solving:**
- Search Space Graph and Tree
- **Search-based Problem solving:**
- Simple and Uniformed Search Strategies
- **Search-Based Problem Solving:**
- Best First Search: Greedy, A* Search, Hill Climbing Algorithms
- **Knowledge-Based Problem Solving:**
- Concepts, Components
- **Knowledge Representation:**
- Propositional Logic, First Order Logic
- **Knowledge Representation:**
- Production Rules
- **Knowledge Representation:**
- Semantic Network, Frames and Objects
- **Knowledge and Reasoning:**
- Inference Engine
- **Knowledge and Reasoning:**
- Forward and Backward Chaining
- **Knowledge Based Systems:**
- Concepts and Development
- **Expert Systems**
- **Student Projects**

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none"> 1. Stuart Russell and Peter Norvig (2020), <i>Artificial Intelligence: A Modern Approach</i>, Prentice Hall, 4th Edition. ISBN-13 : 978-0134610993 2. Vinod Chandra S.S. and An and Hareendran S. (2014) <i>Artificial Intelligence and Machine Learning</i>, PHI Learning.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none"> 1. Alberich-Bayarri, A., Pastor, A.J., González, R.L. and Castro, F.G., (2019). <i>How to Develop Artificial Intelligence Applications. In Artificial Intelligence in Medical Imaging</i>. Springer, Cham. 2. Slade, Stephen. (2019), <i>Artificial Intelligence Applications on Wall Street</i>. Routledge. 3. Negenvistsky M. (2011) <i>Artificial Intelligence: A Guide to Intelligent Systems</i>, 3rd Edition, Pearson. 4. Association for Advancement of Artificial Intelligence (AAAI) Website: http://www.aaai.org/home.html 5. Michael Wooldridge (2021), <i>A Brief History of Artificial Intelligence: What It Is, Where We Are, and Where We Are Going</i>. Flatiron Books. ISBN-13: 978-1250770745. 6. Roy Freedle (2016), <i>Artificial Intelligence and the Future of Testing</i> 1st Edition BY. Psychology Press, ISBN: 9781138987562 7. Vinod Chandra S.S. and Anand Hareendran S. (2014) <i>Artificial Intelligence and Machine Learning</i>, PHI Learning, 1st Edition, ISBN: 9788120349346

Course Code & Title:

ITCS 422 - Distributed Systems

Weight: (2-2-3)

Required/ Elective: Required

Prerequisite:

ITCS 409

Coordinator/ Instructor: Dr. Subhashini Bhaskaran

Description: The course focuses on the key aspects of distributed systems. It imparts knowledge of distributed systems principles, design, and implementation. It covers transparency in a distributed system, architectures, processes, virtualization, RPC, message passing, communication, quality of service, and naming.

Objectives:

1. To critically understand the concepts, specialist theories, and techniques behind the design of distributed systems.
2. To analyze the clustering and cluster computing.
3. To apply simulation tools in distributed systems problems solving.
4. To develop advanced skills for selecting appropriate solutions to meet the user requirements.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical understanding of concepts, and specialized theories relating to distributed systems.
A2	Contemporary Trends, Problems and Research: Recognize up-to-date trends, applications, tools available, and methods in distributed systems.
B. Subject-specific Skills	
B1	Problem Solving: Identify real life problems and solve them by designing efficient and effective distributed systems.
B2	Modeling and Design: Design distributed systems by choosing appropriate components and models that satisfy user specifications.
B3	Application of Methods and Tools: Apply simulation software tools to solve the problems of distributed computing.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze a problem and user specification to choose the appropriate distributed system architecture to solve this problem.
C2	Synthetic: Integrate the components of distributed systems into incorporated system.
C3	Creative Thinking and innovation: Demonstrate creativity in designing distributed systems for new applications.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Show ability to communicate information in appropriate oral and written forms.
D2	Teamwork and Leadership: Show ability to work effectively as a member/leader of a development team.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Introduction:**
- Introduction to Distributed System
- **Definitions, Goals, and Examples:**
- Definitions and Goals of Distributed System, Real Examples of Distributed Systems
- **Challenges in Distributed System Design:**
- Lack of global knowledge, Scalability, Communication Cost, Transparency, Security, Mobility
- **Architectures:**
- Architectures-I Layered Architectures
- Architectures-II Object-Based Architectures
- **Architectures:**
- Architectures-III Data-Centered Architectures
- Architectures-VI Event-based Architectures
- **Network as a graph:**
- Spanning Tree and MST, Traversal of graphs, Broadcasting messages, Communication complexity
- **P2P:**
- P2P Algorithms
- **Process and Thread:**
- Process Thread, Thread Implementation
- **Time synchronization:**
- Time synchronization in Distributed System
- **Virtualization**
- **Communication and Modeling:**
- Communication Fundamentals
- **Communication and Modeling:**
- Communication between Nodes, RPC
- **Distributed Database:**
- Distributed transaction management, Distributed concurrency control, Distributed deadlock handling, Maintaining consistency
- **Student Project**

Teaching Materials:

Textbook(s):	1. Tanenbaum A. and Steen M. V. (2017) <i>Distributed Systems And networks</i> , 3 rd Edition, Prentice Hall.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	1. Tanenbaum A. and Steen M. V. (2013) <i>Distributed Systems Principles and Paradigms</i> , 2 nd Revised Edition, Pearson Education Limited. 2. M. Tamer Özsu, Patrick Valduriez (2020) <i>Principles of Distributed Database Systems</i> 4 th Edition. 2020 Edition. 3. Gerardus Blokdyk(2020) <i>Distributed File System A Complete Guide</i> 2020 Edition 4. Kartikeya Mishra(2020) <i>Guide to Big data Hadoop Distributed File System: A book for beginners/intermediate</i>

Course Code & Title:

ITCS 425 – Web Engineering

Weight: (2-2-3)

Required/ Elective: Required

Prerequisite:

ITMS 205 & ITCS 327

Coordinator/ Instructor: Dr. Sohail Safdar

Description: Modern web applications are complex systems; therefore, a systematic approach is required for developing web-based information systems. This course is to study the concepts, methods, and techniques needed for developing web-based applications. Topics covered: concepts and architecture of web-based information systems, web system development phases, web technologies and the desired quality characteristics of web applications.

Objectives:

1. To critically understand concepts, standards, and specialist theories of web applications.
2. To understand the architecture of Web-based information systems.
3. To understand the development phases of web-based information systems.
4. To critically analyze the quality metrics of web-based information systems.
5. To implement web-based information systems using various specialized web tool and technologies.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical understanding of principles, standards, and concepts related to World Wide Web and web-based applications.
A2	Contemporary Trends, Problems and Research: Demonstrate critical understanding of current issues of web applications as well as research on new trends and web technologies needed to handle these issues.
B. Subject-specific Skills	
B1	Problem Solving: Critically analyze and identify real world problems and choose the appropriate web design to solve these problems.
B2	Modeling and Design: Model different aspects of web applications such as: data, presentation, and hypertext, as well as design a web application that meets web standards by designing front end web page and connecting it to the back end databases.
B3	Application of Methods and Tools: Use specialized web technologies to implement various web applications such as: Web Markup languages, Web GUI technologies, PHP, and XML.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically assess, compare and select emerging and existing web technologies, as well as analyze the quality metrics of web applications to meet the web standards and user needs.
C2	Synthetic: Integrate websites with other IT applications as well as implement web interface for underlying databases.
C3	Creative: Demonstrate creativity in the application of web technologies as well as in the development of effective and efficient web applications to solve real world problems.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Express and communicate critical ideas, such as, system specification, system analysis, in written and oral forms.
D2	Teamwork and Leadership: Demonstrate the ability to work as a group member/leader and share the ideas of each other.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignments and project.

List of Topics:

- **Introduction to Internet & World Wide Web:** History of the Internet & World- Wide Web, Web Browsers, Web Servers, Uniform Resource Locator, Tools and Web Programming Languages.
- **Introduction and overview:** Definitions, Web Standards, Categories of Web Applications, Characteristics of Web. Applications.

- **Hypertext Mark Up Language (HTML) Revision:** Basic HTML page, Text Formatting, Table, Headers, Linking, Images, List, Meta Elements
- **Web-Based Information System Architecture:** Fundamentals, Components of a Generic Web, Application Architecture, Categorizing Architectures based on integrated components, Layered Architectures.
- **Cascading Style Sheets (CSS) Revision:** Inline, Internal and External, Style Sheet, Conflicting Styles, Positioning Elements Backgrounds, Element Dimensions, Text Flow and the Box Model, User Style Sheet
- **Requirements Collection:** Where Do Requirements Come From? Requirements Engineering Activities, RE Specifics in Web, Engineering, Principles for RE of Web, Applications, Adapting RE Methods to Web, Application Development.
- **Writing Basic PHP Programs:** Creating PHP Programs, Numbers and Strings, Literals and Variables, Operators and Functions
- **Modeling:** Fundamentals, Modeling Requirements, Content Modeling, Hypertext Modeling, Presentation Modeling
- **Forms & PHP:** Creating Form Controls, Using Values Returned from Forms Using PHP.
- **Web Applications Design.**
- **Web Applications Design and Relational Database:** Relational Database Model, SQL (SELECT, WHERE, ORDER BY, INNER JOIN, INSERT, UPDATE and DELETE statements).
- **The Quality Characteristics of Web Applications:** Usability, Performance and Security.
- **PHP Database Connectivity (Integration of application to data layer):** Connecting to Database Server, Selecting Databases, Checking for Errors, Closing the MySQL Server Connection.
- **Manipulating Data in MySQL Using PHP:** Inserting, Viewing, Updating and Deleting Records, Manipulating joined tables.
- **User Authentication:** Creating Session, Authorization Level
- **Security in Web:** Synchronous and Asynchronous Communication among web services, Same session protocol, Same Origin Protocol, Improving security.
- **Extensible Markup Language (XML):** Introduction, Structuring Data, Document Type Definition, XML Vocabularies, Document Object Model (DOM) with JavaScript, Extensible Style sheet Language, Transforms (XSLT).
- **Student Project**

Teaching Materials:

Textbook(s):	1. Rajiv Chopra. (2016) <i>Web Engineering</i> , 1 st Edition, PHI Learning Pvt Ltd, ISBN: 978-8120352544 2. Robin Nixon (2018) <i>Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5</i> , 5 th Edition, O'Reilly Media, ISBN: 978-1491978917
Handout(s):	PowerPointslidesavailableonMoodlei.e. http://www.ahlia.edu.bh/moodle
Reference(s):	1. Robert W. Sebesta, (2015), <i>Programming the World Wide Web -8th ED.</i> , University of Colorado at Colorado Springs,Boston, Pearson, ISBN: 9780133775983 2. Ullman L (2016) <i>PHP for the Web: Visual Quick Start Guide</i> , 5 th Edition, Peach pit Press. 3. Pressman R. and Lowe D. (2008) <i>Web Engineering: a practitioner's approach</i> , 1 st Edition, McGraw Hill 4. www.w3schools.com 5. www.php.net 6. Any development frameworks shared on moodle.

Course Code & Title:

ITCS 427 – Mobile Computing

Weight: (2-2-3)

Required/ Elective: Required

Prerequisite:

ITCS 221 & ECTE 329

Coordinator/ Instructor: Dr. Subhashini Bhaskaran

Description: This course is to cover the concepts and technologies of mobile computing such as 2G/3G/4G networks, and mobile applications development. It imparts knowledge of mobile communication architectures and related communication protocols in addition to location management and messaging. The course also covers the mobile applications development tools and techniques needed to create efficient and effective mobile applications.

Objectives:

- 1- To critically understand the concepts, specialist theories, and technologies of mobile computing.
- 2- To cover both theoretical and practical issues of mobile computing.
- 3- To develop advanced skills for developing mobile computing applications utilizing specialized mobile programming tools.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of the mobile computing technologies and applications.
A2	Contemporary Trends, Problems and Research: Recognize the current computing issues and research on emerging mobile computing technologies.
B. Subject-specific Skills	
B1	Problem Solving: Critically identify and analyze mobile computing and real-world problems and choose/develop appropriate techniques and applications to solve these problems.
B2	Modeling and Design: Design mobile applications, including programs, data, and user interface that meet user requirements.
B3	Application of Methods and Tools: Apply advanced specialized mobile programming tools to develop mobile applications.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze the performance of the developed mobile applications.
C2	Synthetic: Integrate components of an application such as Database into one complete mobile application.
C3	Creative Thinking and innovation: Demonstrate ability to propose solutions for problems related to mobile computing through investigation of different protocols, tools, and technologies.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Show ability to communicate clearly to convey complex information and ideas in appropriate oral and written forms.
D2	Teamwork and Leadership: Work effectively as a member/leader of a team who may plan, design, and implement a mobile application.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignments.

List of Topics:

- **Mobile Computing an Overview:**
- Motivations, Concepts, Challenges, and Applications of Mobile Computing.
- Introduction to mobile development, and SPA
- Overview of iOS and Android operating system.
- Types of mobile apps (Native, Web, Hybrid)

- **Lab:** Introduction to JavaScript programming.
- **Distributed Systems**
- **Pervasive Computing**
- **Mobile communications:**
- Wireless Transmission,
- Cell Design and Area Planning for Cellular Networks. Frequency Reuses and Channel Designs.
- **Cellular Network and Architectures:**
- GSM And Other 2G, 3G and 4G Networks.
- **Introduction to Visual Studio Code, Git, NodeJS**
- **Hybrid App Mobile Development**
- **Version Control Systems: Git**
- **NodeJS**
- **IONIC**
- **Lab:** Create first hybrid mobile app, Running Ionic app using android Studio
- **Know the different templates of IONIC**
- **Lab:** Build 3 different hybrid mobile app using the different ionic templates, Ionic Creator
- **Lab:** Creating a project using Ionic Creator, Importing a project into ionic
- **Ionic Lists and Ionic Inputs**
- **Lab:** Creating a project using the different types of Ionic Lists and Ionic Inputs
- **Ionic Tabs and Ionic Form Validation**
- **Lab:** Creating a project using the different types of Ionic Tabs and Ionic Form Validation
- **Student Projects**

Teaching Materials:

Textbook(s):	<p>1- Rahat Khanna, Sani Yusuf, Hoc Phan (2017). <i>Ionic: Hybrid Mobile App Development</i>, Packt Publishing. ISBN: 978-1788293112.</p> <p>2- Victor Savkin, Jeff Cross (2017). <i>Essential Angular 4</i>, Packt Publishing. ISBN: 978-1788293761</p>
Handout(s):	Available on http://www.ahlia.edu.bh/moodle .
Reference(s):	<p>1- Cory Beard, William Stallings (2015). <i>Wireless Communications Networks and Systems</i> Global Edition, Pearson Higher Ed. ISBN: 9781292108711</p> <p>2- Herve Franceschi (2017). <i>Android App Development</i>, Jones & Bartlett Learning. ISBN: 978-1284092127</p> <p>3- Trish Cornez, Richard Cornez (2015). <i>Android Programming Concepts</i>, Jones & Bartlett Learning. ISBN: 978-1284070705.</p> <p>4- Kyle Mew (2017). <i>Android Design Patterns and Best Practices</i>, Packt Publishing. ISBN: 978-1786467218.</p> <p>5- Clifton I. G. (2015) <i>Android User Interface Design: Implementing Material Design for developers</i>, 2nd Edition Addison-Wesley Professional. ISBN: 978-0134191409</p> <p>Websites Google, Android Developer Resources: https://developer.android.com/index.html AngularJS by Google https://angularjs.org/ Ionic Framework Doc http://ionicframework.com/</p>

Course Code & Title:

Weight: (2-2-3)

Prerequisite:

Coordinator/ Instructor: Dr. Yousif Janahi

ITCS 435 - Database Administration II

Required/ Elective: Elective

ITCS 336

Description: This course provides students with critical knowledge and advanced training on diagnostic resources, globalization support, managing resources, flashback databases and recovering from user errors. It also provides details on maintaining and management of memory as well as automating tasks with the scheduler.

Objectives:

1. To diagnose and repair data failures with Flashback technology.
2. To manage space and optimize database storage in response to growing space requirements.
3. To monitor and manage major database components, including memory, performance and resources.
4. To secure the availability of Oracle database through appropriate backup and recovery strategies.
5. To automate DBA tasks with the scheduler.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of concepts and principles of the most important responsibilities a DBA has, like performing backup and recovery as well as automating tasks via the scheduler.
B. Subject-specific Skills	
B1	Problem Solving: Use Specialist Skills to manage and optimize database storage, diagnose and repair data failure, perform backup and data recovery as well scheduler to automate different tasks.
B3	Application of Methods and Tools: Apply specialized tools while monitoring, diagnosing and securing Oracle database, such as Recovery Manager (RMAN) command-line and enterprise manager, Data Recovery Advisor (DRA) and Automatic Diagnostic Repository (ODR).
C. Critical-Thinking Skills	
C1	Analytic skills: Critically evaluate the various tools of configuring, managing, monitoring, diagnosing and securing an Oracle database and choose the appropriate tools for a given situation.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Use specialist skills to express and communicate critical ideas related to data base administration in oral and written form.
D3	Organizational and Developmental Skills: Demonstrate responsibility ability to organize ideas and effectively allocate time in a given assignment.

List of Topics:

- Introduction.
- Core Concepts and Tools of the Oracle Database
- Configuring for Recoverability
- Using the RMAN Recovery Catalog
- Configuring Backup Settings
- Creating Backups with RMAN
- Restore and Recovery Task
- Using RMAN to Perform Recovery

- Monitoring and Tuning RMAN
- Diagnosing the Database
- Using Flashback Technology, I
- Using Flashback Technology II
- Performing Flashback Database
- Managing Memory
- Managing Database Performance
- Managing Performance by SQL Tuning
- Managing Resources Automating Tasks with the Scheduler
- Managing Space in Blocks
- Managing Space in Segments
- Managing Space for the Database
- Duplicating a Database

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none"> 1- Bob Bryla (2015), <i>Oracle Database 12c DBA Handbook (Oracle Press)</i>, McGraw-Hill Education, ISBN: 978-0071798785. 2- Bob Bryla & Kevin Loney (2014), <i>Oracle Database 12c The Complete Reference (Oracle Press)</i>, McGraw-Hill Education, ISBN: 978-0071801751.
Handout(s):	<p>Oracle Learning Library available through:</p> <p>http://www.oracle.com/technetwork/tutorials/index.html</p> <p>Available on Moodle i.e. http://www.ahlia.edu.bh/moodle</p>
Reference(s):	<ol style="list-style-type: none"> 1. Gehani N. and Annamalai M. (2013) <i>The Database Book – Principles and Practice using the Oracle Database System</i>, Universities Press. 2. Biju Thomas (2014), <i>OCA: Oracle Database 12c Administrator Certified Associate Study Guide: Exams 1Z0-061 and 1Z0-062</i> 1st Edition, Sybex; 1 edition ISBN: 978-1118643952 3. Website: http://www.oracle.com

Course Code & Title:

ITCS 441 - System Administration II

Weight: (2-2-3)

Required/ Elective: Elective

Prerequisite:

ITCS 341

Coordinator/ Instructor: Dr. Baraa Tariq Sharif

Description: This course provides critical knowledge and experience for IT professionals. Student will have the knowledge required to assemble components based on customer requirements, install, configure and maintain devices, PCs and software for end users, understand the basics of networking and security/forensics, properly and safely diagnose, resolve and document common hardware and software issues while applying troubleshooting skills. Student will also provide appropriate customer support; understand the basics of virtualization, desktop imaging, and deployment.

Objectives:

1. To explain commercial operating Systems functionality and components.
2. To configure commercial operating systems to suite personnel & corporate uses.
3. To explain troubleshooting techniques and executing them.
4. To explain the differences between mobile devices and standard PC architecture and functionality.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical understanding of various Microsoft operating systems, its command line tools, some of its networking and security utilities as well as different Mobile devices and troubleshooting techniques.
B. Subject-specific Skills	
B1	Problem Solving: Detect various system symptoms and choose the appropriate tool for troubleshooting it.
B3	Application of Methods and Tools: Perform preventive maintenance procedures using appropriate tools as well as use different command line tools to customize and configure the operating system.
C. Critical-Thinking Skills	
C1	Analytic skills: Analyze specific scenario to choose appropriate security methods and tools.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Communicate efficiently and fluently.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- **Introduction**
- **Operating Systems**
- The Windows OS, Windows XP, Windows Vista, Windows 7 32 or 64 bit, Upgrading Windows
- Windows Upgrade Advisor, Upgrade Paths
- **Installing Windows**
- Hardware Requirements, Boot Methods, Hard Disk Partitioning, Partition Schemes and Types
- File System Formatting- part I, File System Formatting- part II, Workgroup Vs. Domain
- Factory Recovery Partitions
- **Windows command Line Tools**
- OS Commands, TASKKILL, BootRec, Shutdown, Working with Directories- Part I, Working with Directories- Part II, FDISK, FORMAT, Copying Files, DISKPART, CHKDSK, DEL

- **Networking Command Line Tools**
- PING, IPCONFIG, TRACERT, NETSTAT, NET, NSLOOKUP
- **Administrative Tools**
- Computer Management, Device Manager, Local Security Policy, Performance Monitor, Services
- Windows Memory Diagnostic, Windows Firewall, WFAS, MSCONFIG, Task Manager
- Disk Management
- **Control Panel Utilities**
- Internet Options, Display, Folder Options, User Accounts System, Power Options
- **Configuring Windows Networking**
- Windows 7 Homegroups, Network Shares, Mapping Drives, Network Types, Alternative IP Addresses
- **Sharing Resources**
- NTFS Vs. Share Permissions, Allow Vs. Deny, Moving Vs. Copying.
- **Security**
- Physical Security, Digital Security, User Education, Common Security Threats, Malware - Part I, Malware - Part II, Hard Drive Disposal, Securing A Wireless Network
- **Mobile**
- Android Vs. iOS., Mobile Features., Bluetooth, Laptops Vs. Tablet PCs
- **Troubleshooting**
- Common Hard Drive Symptoms, Hard Drive Troubleshooting Tools, Common Display Symptoms, Troubleshooting Network Issues, Network Troubleshooting Tools, Common OS Symptoms, OS Troubleshooting Tools, Common Printer Symptoms

Teaching Materials:

Textbook(s):	1- Faithe Wempen, Jane Holcombe, (2019) <i>CompTIA A+ Certification Study Guide</i> , 10 th Edition (Exams 220-1001 & 220-1002), McGraw-Hill Education, ISBN: 978-1260456653
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	COMPTIA A+ CERTIFICATION Website https://certification.comptia.org/getCertified/certifications/a.aspx

Course Code & Title:

Weight: (2-2-3)

Prerequisite:

Coordinator/ Instructor: Dr. Suresh Subramanian

Description: This course is designed primarily for IT professionals who have some experience with NOS. It is designed for professionals who will be responsible for managing storage servers and computing elements by using NOS, and who need to understand the scenarios, requirements, and storage and compute options that are available and applicable to NOS.

Objectives:

1. Prepare and install Nano Server, a Server Core installation, and plan a server upgrade and migration strategy.
2. Describe the various storage options, including partition table formats, basic and dynamic disks, file systems, virtual hard disks, and drive hardware, and explain how to manage disks and volumes.
3. Describe enterprise storage solutions and select the appropriate solution for a given situation.
4. Implement and manage Storage Spaces and Data Deduplication.
5. Install and configure host virtualization and configure virtual machines and host virtualization containers.
6. Describe the high availability and disaster recovery technologies in NOS.
7. Plan, create, and manage a failover cluster and implement failover clustering for Hyper-V virtual machines.
8. Configure a Network Load Balancing (NLB) cluster, and plan for an NLB implementation.
9. Create and manage deployment images.
10. Manage, monitor, and maintain virtual machine installations.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of various virtualization requirements, storage and compute technologies for local and enterprise.
B. Subject-specific Skills	
B1	Problem Solving: Demonstrate ability to use specialist skills to prepare, install and configure nano server, server core, host virtualization, containers and virtual machines.
B2	Modeling and Design: Demonstrate creativity in Designing a well thought out plans for configuring storage technology and implementing disaster recovery.
B3	Application of Methods and Tools: Apply specialized tools while installing, managing and configuring nano and core servers, host virtualization, containers and virtual machines.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically evaluate the various tools of configuring and managing servers, failover clusters, virtual hosts and machines as well as choose the appropriate tools for a given situation.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Use Specialist skills to express and communicate critical ideas related to virtualization and storage technologies in oral and written form.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in a given assignment.

List of Topics:

- Introduction
- Installing, upgrading, and migrating servers and workloads
- Configuring local storage
- Implementing enterprise storage solutions
- Implementing Storage Spaces and Data Deduplication
- Installing and configuring Hyper-V and virtual machines
- Deploying and managing Windows and Hyper-V containers
- Overview of high availability and disaster recovery
- Implementing failover clustering
- Implementing failover clustering with Windows Server 2016 Hyper-V
- Implementing Network Load Balancing
- Creating and managing deployment images
- Managing, monitoring, and maintaining virtual machine installations

Teaching Materials:

Textbook(s):	Craig Zacker (2017), <i>Exam Ref 70-740 Installation, Storage and Compute with Windows Server 2016</i> , Microsoft Press, ISBN: 978-0735698826
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	Microsoft Course 20740C Website https://www.microsoft.com/en-ca/learning/course.aspx?cid=20740

Course Code & Title:

ITCS 443 - Security Services

Weight: (2- 2 - 3)

Required/ Elective: Elective

Prerequisite:

ITCS 404

Coordinator/ Instructor: Dr. Wasan Shakir Awad

Description: This course provides layers of protection that helps to address both known and emerging threats at Windows Server 2016. Students will learn how to secure your infrastructure and see how protections were built to mitigate an array of attack vectors and to deal with overall threat of ongoing attacks inside the datacenter. Explore ways to configure network security, including firewalls, and look at secure virtualization, like encryption-supported virtual machines. Further, students will learn security service concepts such as threat detection, privileged identity, desired state configuration and more.

Objectives:

1. To critically understand the core theories, standards, security metrics, threat landscape, vulnerabilities, system hardening and concepts of information security.
2. To design specialist solutions for system hardening, threat detection, privileged identity and mitigation of threats.
3. To critically understand and analyze the supporting security external infrastructure.
4. To work on specialist security implementation using security features of Hyper-V, Desired State Configuration (DSC) and Encrypting File System (EFS).
5. To critically evaluate the nature of attacks using malware analysis techniques along with the relevant security forensics to provide specialized security solutions.
6. To research modern trends of information security, such as cloud security as well as software security assurance.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of core concepts, and specialist theories related to security services and underlying infrastructure.
A2	Contemporary Trends, Problems and Research: Demonstrate critical understanding of major current issues of security services, and research in new cybersecurity trends.
B. Subject-specific Skills	
B1	Problem Solving: Critically analyze and identify the existing security problems in order to reduce and overcome the systems vulnerabilities.
B2	Modeling and Design: Design effective security services to meet user requirements and aid in threat detection and mitigation.
B3	Application of Methods and Tools: Apply specialized security tools and metrics to implement relevant security services, malware analysis and forensics.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically assess, compare and select the proper malware analysis technique along with the relevant security forensics in evaluating the nature of attacks.
C2	Synthetic: Demonstrate insight to integrate appropriate information security components into one effective security system.
C3	Creative Thinking and innovation: Demonstrate creativity in the development of effective security systems to control the problems of information systems.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Demonstrate specialist skills to express and communicate complex ideas related to security services in written and oral forms.
D2	Teamwork and Leadership: Demonstrate the ability and responsibility to work as a group member/leader and share the ideas together

D3	Organizational and Developmental Skills: Demonstrate the specialist level skills to organize ideas and effectively allocate time in given assignments and project.
D4	Ethics and Social Responsibility: Demonstrate the specialist level skills in applying ethics in information security.

List of Topics:

- **Introduction:** CIA principle, Attacks types, Vulnerabilities, IDS, Common Security Measures.
- **Vulnerabilities and system hardening:** System Hardening significance, Analyzing Vulnerabilities, configure disk and file encryption, Implementing malware protection.
- **System Hardening Solutions:** Protect credentials, Create security baselines.
- **Securing Cloud and Virtualization Infrastructure:** Cloud Security Model, SaaS as Virtualization Infrastructure, Design Guarded Fabric solution, Synthesize the shielded and encryption-supported VMs.
- **Securing Datacenter and underlying Network Infrastructure:** Configure Windows Firewall, Implement a Software Defined Datacenter Firewall, Secure network traffic.
- **Manage Privileged Identities:** Design and Implement, Just-In-Time (JIT) Administration, Local Administrator Password Solution (LAPS).
- **Manage Privileged Identities:** Implement Just-Enough-Administration (JEA), Analyze the implementation of Privileged Access Workstations (PAWs) and User Rights Assignments.
- **Malware Analysis:** Malware Categorization, Static Malware Analysis, Static properties analysis of malware, Dynamic Malware Analysis, Interactive behavior analysis of malware, Manual Code Reversing.
- **Data Forensics Digital evidence controls:** Uncovering data acquisition, disk imaging, recovering swap files, temporary & cache files, memory forensic and various attacks by GUI tools.
- **Network Forensics:** Collecting and analyzing network-based evidence Reconstructing web browsing, e-mail activity, and registry changes, intrusion detection and tracking offenders.
- **Threat Detection Solutions:** Configure advanced audit policies, Install and configure Microsoft Advanced Threat Analytics (ATA)
- **Threat Detection Solutions:** Determine threat detection solutions using Operations Management Suite (OMS).
- **Security Standards and Controls:** Security Standards, Security Metrics and Key Performance Indicators (KPIs), Challenge of security metrics, Metrics and FISMA, Security Ethics.
- **Software Assurance:** Secure application design and development, Securing server workload, Secure file services infrastructure, Dynamic Access Control (DAC).
- **Student Projects.**

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none"> 1. Warner, Timothy L., and Craig Zacker. (2017), <i>Securing Windows Server 2016</i>. Microsoft Press, 978-1509304264 2. Yuri Diogenes, Erdal Ozkaya. (2019), <i>Cybersecurity – Attack and Defense Strategies: Counter modern threats and employ state-of-the-art tools and techniques to protect your organization against cybercriminals</i>, 2nd Edition Kindle Edition, Packt Publishing, ISBN: 978-1-83882-779-3
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	<ol style="list-style-type: none"> 1. Palmer, Michael. (2017), <i>Hands-On Microsoft Windows Server</i>, Cengage Learnin, 978-1305078628. 2. Liu, Dale, and RemcoWisselink. (2016), <i>Securing Windows Server</i>. 3. Monnappa K A (2018), <i>Learning Malware Analysis: Explore the concepts, tools, and techniques to analyze and investigate Windows malware</i> 1st Edition, Kindle Edition, Packt Publishing, ISBN: 978-1-78839-250-1

Course Code & Title:

Weight: (2- 2 - 3)

Prerequisite:

Coordinator/ Instructor: Dr. Sohail Safdar

ITCS 444 - Cloud Services Implementation

Required/ Elective: Elective

ITCS 442

Description: This course teaches IT students how to provide and manage services in cloud environment. Students will learn critical knowledge about how to implement infrastructure components such as virtual networks, virtual machines, containers, web apps, and storage in cloud. Students will also establish the specialist ability to plan, configure and manage private, public and hybrid cloud infrastructures along with the integration of on-premises Active Directory domains. Moreover, dealing critically with non trivial issues in the cloud such as load balancing, caching, distributed transactions, and identity and authorization management is also meant to be learned. The course also provides the students with insight of intelligent and highly scalable services.

Objectives:

1. To understand critical knowledge about Cloud architecture components, infrastructure, virtual clouds, containers, databases and storages, tools, and portals.
2. To plan, design, create, configure, manage and monitor specialist cloud services/components such as virtual machines, storage, backups, containers, dynamic load balancing and scalability to optimize availability and reliability.
3. To integrate in-house active directory to the cloud services.
4. To apply critical knowledge about cloud security models for the privacy of information as core assets.
5. To critically evaluate the best cloud contract negotiation that can guarantee the optimal and cost effective solution in the given scenarios with the assurance of ROI.
6. To implement cloud services that deals with high performance computation and large scalability.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of specialist theories, principles, and concepts of some of cloud services, cloud security, performance optimization and its implementations.
B. Subject-specific Skills	
B1	Problem Solving: Analyze and identify the complex real world problems in order to provide solutions using cloud services.
B2	Modelling and Design: Use specialised skills to design components needed to implement cloud services to meet the desired needs within realistic constraints.
B3	Application of Methods and Tools: Apply specialized tools for planning and implementing cloud frameworks.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically evaluate various approaches and techniques to provide effective cloud services to meet user needs.
C2	Synthetic: Use range of specialized cloud computing approaches to design cloud frameworks for real problems.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Demonstrate the use of special skills to communicate technical information in appropriate oral and written forms to a variety of audiences.
D2	Teamwork and Leadership: Demonstrate specialist level skill set to work effectively as a member of a development team.
D3	Organizational and Developmental Skills: Demonstrate the specialist level skills to organize ideas and effectively allocate time in given assignments and project.

List of Topics:

- **Topic 1:** Concepts and Fundamentals, Introduction to Cloud Architectures and Services, Cloud computing model, IaaS, SaaS, PaaS, General Benefits and Challenges, Main Players in the Field.

- **Lab:** Awareness of cloud Environment
- **Topic 2:** Cloud computing services, Classification and categorization of Key Cloud Services, Elastic instances, Storage, Queue, networking, communication, security and privacy, performance analyzer.
- **Lab:** Using a deployment templates and wizard to implement basic cloud infrastructure
- **Topic 3:** Virtual cloud and underlying network, Public Cloud, Private Cloud, Virtual Private Cloud, Real world application of virtual clouds.
- **Lab:** Configuring basic cloud type and underlying network
- **Topic 4:** Cloud Instances, Types of Cloud Instances, Significance of each instance in real world cloud Infrastructure.
- **Lab A:** Creating and Configuring instances
- **Topic 5:** Working with Virtual Machines in Cloud, Implementation and management of Virtual Machines, Resource virtualization and management.
- **Lab B:** Deploying virtual machine using wizard.
- **Topic 6:** Working with Web Server in Cloud, Web server instance and web app implementation on cloud.
- **Lab:** Implementing and hosting real world web app on Cloud web server
- **Topic 7:** Planning and implementing file system and data storage.
- **Lab:** Creating and managing relational and non relational Data storages.
- **Topic 8:** Containers and Load balancing, Types of Containers, Implementing and managing containers, Load balancing.
- **Lab:** Implementing containers on Virtual Machines
- **Topic 9:** Establishing cloud communication services, Communication within cloud, Simple Queuing and Simple notification services, Communication across clouds, Active directory management.
- **Lab:** Pooling, sharing and Peering various cloud instances/services/ resources
- **Topic 10:** Security and privacy in Cloud, Overview of Security Issues, Security reference model, Implementation and management of security and privacy services within cloud, IAM, backup, and recovery services.
- **Lab:** Implementing security services on existing cloud for data privacy assurance
- **Topic 11:** Capacity planning and contracts in Cloud, Contract types for various cloud services, Cost plans for Cloud services, Scalability w.r.t. Cost optimization and ROI.
- **Lab:** Planning and Selecting optimal services for cost effective infrastructure
- **Topic 12:** Scaling in the Cloud, Working with Elastic Load Balancing, Caching, Auto Scaling for optimal cloud utilization.
- **Lab:** Implementing and managing load balancing and auto scaling
- **Topic 13:** Performing Large Distributed computation using cloud services.
- **Lab:** Automation of cloud that is largely Scaled environment and underlying management
- **Topic 14:** High performance computations and intelligent computation services
- **Lab:** Automation of cloud based handling of big data and applying intelligent algorithms
- **Student Projects**

Teaching Materials:

Textbook(s):	1. Bhowmik, Sandeep. (2017), <i>Cloud Computing</i> . Cambridge University Press. 2. Washam, Michael, Rick Rainey, Dan Patrick, and Steve Ross. (2018), <i>Implementing Microsoft Azure Infrastructure Solutions</i> . Microsoft Press.
Handout(s):	Available on Moodle i.e. http://www.ahlia.edu.bh/moodle
Reference(s):	1. Rittinghouse, John W., and James F. Ransome. (2016), <i>Cloud computing: implementation, management, and security</i> . CRC press. 2. Raja, C. Venish, K. Chitra, and M. Jonafark. (2018), <i>A Survey on Mobile Cloud Computing</i> . 3. Anthony J. Sequeira (2019), <i>AWS Certified Cloud Practitioner (CLF-C01) Cert Guide (Certification Guide)</i> 1st Edition, Kindle Edition, Pearson IT Certification, ISBN: 978-0789760487

Course Code & Title:

ITCS 499 – Major Project

Weight: (0-6-3)

Required/ Elective: Required

Prerequisite:

IERM 498 & ETHC 392

Coordinator/ Instructor: Ms. Khadija Almohsen

Description: Each student is required to select a theoretical and/or a practical problem related to his major area, and work under the supervision of a faculty member. All stages of project development should be emphasized including problem identification, library search, planning, design and/or construction of equipment upon completion of the project, the student must submit a final written report outlining the various phases of the project and make an oral presentation.

Objectives:

1. To conduct an independent research project on certain chosen topic in the field of IT that involves formulating a real-world problem, developing its requirements, developing, designing and testing software-based solution, and finally writing a report highlight the results of the project.
2. To employ the knowledge of IT in the project of developing and providing IT solutions to a real-world problem.
3. To demonstrate independence, research ethics, academic integrity and originality, critical thinking and problem-solving, practical and written skills, as well as organization and time-management skills.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A2	Contemporary Trends, Problems and Research: Demonstrate an informed and critical awareness of research issues and methods, technological advancements, and current solutions related to some problems in the field of Information Technology.
A3	Professional Responsibility: Demonstrate cognition of and adhere to professional code of conduct as an IT practitioner and researcher.
B. Subject-specific Skills	
B1	Problem Solving: Solve IT problems; plan, design, and implement their computable solutions.
B2	Modeling and Design: Design and develop models for computational systems, components, or processes to meet desired needs within realistic constraints.
B3	Application of Methods and Tools: Use effective research methods to gather data and demonstrate proficient use of programming languages and software as required for the research being undertaken
C. Critical-Thinking Skills	
C1	Analytic skills: Analyze problems; identify the appropriate computational resources (input) needed to solve them and analyze the effectiveness and efficiency of output accordingly generated.
C2	Synthetic: Develop computerized solution to real life problem and document it in a well-structured project.
C3	Creative: Create new or improve existing ideas, concepts, techniques, methods, tools, and theories in the field of IT
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Communicate ideas cogently, persuasively and effectively, in written and oral form, to a diverse range of audiences and stakeholders.
D3	Organizational and Developmental Skills: Engage in life-long learning and continuing self-development to hone professional and organizational and time management skills to write a project within certain timeline.

D4	Ethics and Social Responsibility: Follow research ethics and social responsibility and respond positively to the needs of society by employing effectively the advanced computing and information solutions and technologies.
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Course Structure (Outline):

The course consists of the following components that may span up to two semesters.

1. Writing and submitting project proposal that identify a problem in the field of IT and highlight the research methods and tools to be used.
2. Conducting scientific research and writing project in consultation with the supervisor through regular meetings using Ahlia University’s Undergraduate Project Guidelines XXXX 499.

List of topics:

- **Introduction and Problem Definition**
- Propose and study an important research topic/problem
- Define research problem, history, motivation, and objectives
- Write a draft introduction chapter and seek advice from supervisor
- Revise the chapter accordingly
- **Literature Review**
- Search and gather literature on the research topic/problem
- Study research methods and solutions developed for such research problem
- Write a draft chapter on Literature Review and discuss with supervisor
- Revise the chapter accordingly
- **Approach, Conceptual Model, Research Method and Tools**
- Select and study conceptual model and effective research methods to be used
- Choose and study any other requirements, e.g., programming languages, software and other tools.
- Write a draft chapter on Conceptual Model, Research Methods and Tools
- Consult with supervisor and revise accordingly
- **Software Development, Experiments, Data Gathering and Analysis**
- Solicit any software requirements and specifications if needed
- Design, implement and evaluate any software or experiments
- Gather and record any required data
- Record, study, analyze and interpret findings and raw data
- Discuss with supervisor results and conclusions and revise accordingly
- **Drafting Main Chapters in Project**
- Describe the development and implementation process of your software and experiments, if any
- Summarized your raw findings and data using, e.g., tables and charts
- Discuss scientifically and critically your findings, implications and conclusions
- Document any limitations and possible future work
- Discuss the final chapters with supervise, revise and finalize the dissertation accordingly

Teaching Materials:

Textbook(s):	N/A
Handout(s):	Undergraduate Project Guidelines, Ahlia University.
Reference(s):	Students are free to choose the references that support their research studies in consultation with their supervisors.

Course Code & Title:

ITMA 401 – E-commerce

Weight: (3-0-3)

Required/ Elective: Required

Prerequisite:

ITCS 101

Coordinator/ Instructor: Dr. Yousif Albastaki

Description: This course is a comprehensive, market-leading text designed for undergraduate and graduate business school students; this course emphasizes the three major driving forces behind e-commerce: technology change, business development, and social controversies

Objectives:

1. Provide knowledge of the subject of E-Commerce for business students in term uniqueness features and discuss their business significance.
2. Distinguish between the e-commerce and e-business and categorize the different types of e-commerce.
3. Outline and apply the steps managers need to follow in order to build a commercial website.
4. Understand the building of E-commerce website and marketing Strategies.
5. Understand the e-commerce and interaction among technology, managerial and policy issues that will shape its futures.
6. Focus on e-commerce consumer behavior, the internet audience, online marketing and branding strategies.
7. Discuss and expand on issues related to ethical and legal, social dimensions of e-commerce.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1.	Concepts and theories: Demonstrate knowledge and understanding of essential facts, concepts, principles, and theories relating to e-commerce.
A2.	Contemporary Trends, problems and Responsibility: Critical awareness of the latest trends, hot topics and research in the field of e-commerce, such as online group consumer behavior and the factors influencing use of e-commerce by small/medium businesses.
A3.	Professional responsibilities: Demonstrate an awareness of best practices and occupational standards in the field of e-retail
B. Subject-specific Skills	
B1.	Problem Solving: Evaluate data and information using quantitative and qualitative techniques to determine Internet business activities within a business plan framework.
B2.	Modeling and design: Specify, design and construct an e-commerce system.
B3.	Application of methods and tools: Use open source software for the purposes of website design
C. Thinking Skills	
C1.	Analytical: Analyze the impact of e-SMEs on the economy including for example e-shops
C3.	Creative: Develop novel solutions for SMEs that provide competitive edge in the market.
D. General and Transferable Skills	
D1.	Communication: Communicate effectively e-commerce information in written, oral and electronic format (e.g. e-platforms) to class peers and the course instructor
D2.	Teamwork and leadership: Work effectively as a member, and where appropriate group leader, to complete the course project.
D3.	Organizational and developmental skills: Demonstrate time-management and project-management skills at all stages of the development of the course project.

D4.	Ethics and social responsibility: Apply ethical codes of conduct (e.g. privacy agreements) in the context of the group project and establishment of virtual business model, e.g. the project portfolio.
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List of Topics:

- Course Introduction & Familiarization
- Introduction to E-Commerce
- E-Commerce Infrastructure: The internet and the web
- Building E-Commerce web sites
- E-Commerce Security and Payment
- Business Model for E-Commerce
- E-commerce Marketing
- E-Commerce Advertising
- Building an E-commerce Web Site Portfolio
- Ethics, law and E-commerce
- Social Networks and Communities
- Student Independent Learning Presentation
- Course project report submission

Teaching Materials

Textbook(s):	Kenneth C. Laudon, Carol Guercio Traver (2019), <i>E-Commerce</i> , 15 th Edition. Global Edition. Pearson Custom Business Resources; Prentice Hall
Handout(s):	Available on Moodle.
Reference(s):	<ol style="list-style-type: none"> 1. <i>Digital Business and E-Commerce Management</i>, 7th Edition, 2019. 2. Chaffey, Hemphill & Edmundson-Bird. Pearson, 2019.

Course Code & Title: ITMS 205 - Internet Applications and Services
Weight: (2-2-3) Required/ Elective: Required
Prerequisite: ITCS 101

Coordinator/ Instructor: Ms. Sara Alaswad

Description:

This course focuses on designing and implementing websites using HTML5 and CSS3. Students get hands-on practice working with fundamentals through superior techniques to get the most out of their experience by teaching them the basics coding for web design, HTML5 and CSS3. In addition, students learn the new features of HTML5 and CSS3 styles.

Objectives:

1. To critically understand the basic concepts and terminology of static web sites.
2. To acquire the foundation of design techniques for static web sites.
3. To gain the different techniques of designing and development for entire static web sites using HTML 5 and CSS 3.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate knowledge and understanding of Web Design, how to plan, organize, and create a website from start to finish using HTML5 and CSS3.
B. Subject-specific Skills	
B2	Modeling and Design: Design the architecture of static websites by choosing appropriate components and models that satisfy user specifications.
B3	Application of Methods and Tools: Employ appropriate methods, techniques, and tools used in modern Multimedia practical packages and web design methods to design websites.
C. Critical-Thinking Skills	
C1	Analytic skills: Analyze websites through source coding to explore the content of pages.
C3	Creative: Use a range of a creative approach to develop insightful projects ideas in the term of design and layout during the lab sessions.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Express and communicate ideas effectively through storyboards and oral form through presentations.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas for developing websites and to manage resources efficiently.

List of Topics:

- **Introduction:** Introduction to HTML5, Editing HTML5, First HTML5 Example.
- **Using HTML5:** Headings, Linking, Images, alt Attribute, Void Elements.
- **Using HTML5:** Using Images as Hyperlinks, Special Characters and Horizontal Rules, Lists
- **Using HTML5:** Tables
- **Using HTML5:** Forms
- **New HTML5 Form input:** input Type color, input Type date, input Type datetime, input Type datetime-local, input Type email, input Type month, input Type number, input Type range , input Type search, input Type tel., input Type time, input Type url, input Type week.
- **Using HTML5:** input and datalist Elements and autocomplete Attribute, input Element autocomplete Attribute, datalist Element.

- **Using HTML5:** Page-Structure Elements: header Element, nav Element, figure Element and figcaption Element, article Element, summary Element and details Element, section Element, aside Element, meter Element, footer Element, Text-Level Semantics: mark Element and wbr Element.
- **Using CSS3:** Introduction to CSS, Inline Styles, Embedded Style Sheets
- **Using CSS3:** Linking External Style Sheets, Positioning Elements: Absolute Positioning, z-index, Backgrounds.
- **Using CSS3:** Box Model and Text Flow, Media Types and Media Queries, Drop-Down Menus
- **Using CSS3:** Text Shadows, Rounded Corners, Color, Box Shadows.
- **Using CSS3:** Linear Gradients; Introducing Vendor Prefixes, Reflections, Image Borders.
- **Using CSS3:** Animation; Selectors, Transitions and Transformations, Transition and transform Properties, Skew, Transitioning Between Images .

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none"> 1. Ranjan Parekh, (2013), <i>Principles of Multimedia</i> 2nd Edition, McGraw Hill. 2. I Code Academy, (2017), <i>HTML & CSS For Beginners: Your Step by Step Guide to Easily HTML & CSS Programming in 7 Days</i>
Handout(s):	Available on http://www.ahlia.edu.bh/moodle .
Reference(s):	<ol style="list-style-type: none"> 1. Tay Vaughan, (2017), <i>Multimedia: Making It Work, Ninth Edition</i>, McGraw Hill. 2. Prabhat K. Andleigh, Kiran Thakrar, (2015), <i>Multimedia Systems Design</i>, Pearson. 3. J.M. Gustafson, (2013), <i>HTML5 Web Application Development By Example Beginner's guide</i>, Packt Publishing, ISBN 978-1-84969-594-7 4. Z-N. Li, M.S. Drew, and J. Liu, (2014), <i>Fundamentals of Multimedia</i>, 2nd Edition, Springer. 5. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, (2016), <i>HTML, CSS & JavaScript Web Publishing in One Hour a Day, Sams Teach Yourself: Covering HTML5, CSS3, and jQuery</i>, Pearson Education (US)

Course Code & Title: ITMS 302: Human Computer Interaction (HCI)
Weight: (2 - 2 - 3) **Required/ Elective:** Required
Prerequisite: ITCS 222

Coordinator/ Instructor:

Description: Dr. Hassan Razzaqi

The course is intended to introduce the concepts of human-computer interaction (HCI), a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. It will cover theories of human psychology, human information processing, user interface design principles, information presentation, and issues involved in using technologies for different purposes.

Objectives:

1. To understand the advanced theories, tools and techniques in HCI.
2. Differentiate between a good or bad design.
3. To implement the basics of interaction design and design rules.
4. To gather and understand user requirements.
5. To apply appropriate HCI techniques to design systems that are usable by different users.
6. To provide students with the knowledge and skills needed to create highly usable software systems.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate advanced understanding of essential facts, concepts, principles, and theories relating to the human computer interaction.
B. Subject-specific Skills	
B1	Problem Solving: Solve real life problems using efficient interactive systems design.
B2	Modeling and Design: Design and evaluate user interface of low and medium complexity.
B3	Application of Methods and Tools: Implement graphical user interfaces with modern software tools.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically evaluate and analyze the system design and user interfaces.
C2	Synthetic: Demonstrate creativity to produce a high quality interactive HCI system design from its basic components.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Show ability to describe an interactive system design appropriate oral and written forms.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- Introduction to usability of Interactive Systems
- Guidelines, Principles, and Theories
- Evaluating Interface Designs
- Direct Manipulation and Virtual Environments
- Menu Selection, Form Fill- in, and Dialog Boxes

- Command and Natural Languages
- Collaboration and Social Media Participation
- Design Issues
- Balancing Function and Fashion
- Information Search
- Information Visualization

Teaching Materials:

Textbook(s):	1. Rogers, Sharp, and Preece. (2019), <i>Interaction Design: Beyond Human Computer Interaction</i> , John Wiley & Sons.
Handout(s):	Available on http://www.ahlia.edu.bh/moodle .
Reference(s):	<ol style="list-style-type: none"> 1. Ben Schneiderman and Catherine Plaisant. (2018), <i>Designing the User Interface</i>, 6th Edition. Addison Wesley. 2. Mirjam Augstein (2019), <i>Personalized Human-computer Interaction</i>, ISBN:978-3110552478, Walter de Gruyter; Illustrated Edition 3. I.Scott Mackenzie (2013), “<i>Human Computer Interaction, An Empirical Research Perspective</i>”, Elsevier-MK-Moegan KaupMann (1st Edition) ISBN : 978-0124058651 4. Alan Dix, Janet E. Finlay, Gregory D. Abowd, Russell Beale (2004), “<i>Human-Computer Interaction</i>”, Pearson, (3rd Edition) ISBN-13: 978-0130461094. 5. Prophets Agency. (2013), <i>Trends in Interactive Design</i> http://www.slideshare.net/ProphetsAgency/trends-in-interactive-design-2013.

Course Code & Title:

ITMS 351 – Graphics and Multimedia

Weight: (2-2-3)

Required/ Elective: Elective

Prerequisite:

ITMS 205

Coordinator/ Instructor: Dr. Hassan Razzaqi

Description:

This course is to cover the concepts and technologies as two dimensional: one dimension introduces the students to the essential practical packages such as the world of digital video, video-capture card, a quick tour of Premiere, Premiere editing video and transitions. The other dimension deals with vector graphics.

Objectives:

1. To critically understand the concepts of vector graphics.
2. To apply the stages of creating vector base documents.
3. To cover both theoretical and practical issues of a video processing tool.
4. To develop advanced skills for developing movies utilizing specialized multimedia tools.

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	
A1	Concepts and Theories: Demonstrate critical knowledge and understanding of the vector graphics and video processing, how it works and how to create them using the appropriate software, a quick tour of Adobe Illustrator and a quick tour of Adobe Premiere.
B. Subject-specific Skills	
B1	Problem Solving: Describe and solve problems related to Vector graphics documents processing and Video Files processing by using efficient vector graphics processing tool and Video editing tool.
B2	Modeling and Design: Design, implements, and evaluates a vector graphics documents and video files.
B3	Application of Methods and Tools: Apply appropriate methods, techniques, and tools used in modern vector graphics documents and video files practical packages.
C. Critical-Thinking Skills	
C1	Analytic skills: Critically analyze a problem and choose the appropriate methods in a vector graphics documents tools and video files tools to solve this problem.
C3	Creative: Demonstrate creativity in relation to apply the concepts of vector graphics and video files methods and techniques effectively to create new ideas and concepts.
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1	Communication: Show the ability to express and communicate ideas effectively, in written and oral form.
D3	Organizational and Developmental Skills: Demonstrate ability to organize ideas and effectively allocate time in given assignment.

List of Topics:

- Introduction
- Adobe Illustrator: getting to know the work area
- Paths
- Selecting and aligning
- Creating shapes
- Transforming objects

- Drawing with the pen tool
- Color and painting
- Working with type, layers
- Working with gradients
- Introduction: The world of digital video
- Video-capture card
- A quick tour of Premiere
- Premiere Editing Video and Transitions
- Titles and Credits and Creating a DVD

Teaching Materials:

Textbook(s):	<ol style="list-style-type: none"> 1. Brian Wood (2019), <i>Adobe Illustrator CC Classroom in a book</i> (2019 Release), Adobe Press, ISBN: 978-0135262160 2. Maxim Jago (2019), <i>Adobe Premiere Pro CC Classroom in a book</i> (2019 Release), Adobe Press, ISBN: 978-0135298893
Handout(s):	Power point slides, http://www.ahlia.edu.bh/moodle .
Reference(s):	<ol style="list-style-type: none"> 1- David Karlins (2020), “<i>Adobe Illustrator CC For Dummies</i>”, John Wiley & Sons, ISBN: 978-1-119-64153-7 2- Jason Hoppe, (2020), “<i>Adobe Illustrator: A Complete Course and Compendium of Features</i>”, Rocky Nook Inc, 1st Edition, ISBN: 978-1-68198-531-2 3- Jarle Leirpoll , Dylan Osborn , Paul Murphy , Andy Edwards (2017), “<i>The Cool Stuff in Premiere Pro</i>”, APress, 2nd Edition, ISBN : 978-1-4842-2889-0 4- Brian Wood, <i>Adobe Illustrator CC Classroom in a book</i>, Adobe Press, 2014, ISBN: 978-0-13-390565-6 5- Maxim Jago (2015), <i>Adobe Premiere Pro CC Classroom in a book</i>, Adobe Press, ISBN: 978-0-13-430998-9