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**College of Information Technology**

**Department of Information Technology**

**Course Syllabus/Specification**

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| **Code& Title:** | **ITCS 427 – Mobile Computing** |
| **Weight:** | **(2 - 2 - 3)** |
| **Prerequisite:** | **ITCS 221 & ECTE 329** |
| **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.
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| **Semester:** |  | **Academic Year:** |  |
| **Instructor:** |  |
| **Office Tel.:** |  |
| **Email:** |  |
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**Intended Learning Outcomes (ILOs)**

Upon successful completion of the course, students should be able to:

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| 1. **Knowledge and Understanding**
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| **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. |
| **A3** | Professional Responsibility: NA |

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| 1. **Subject-Specific Skills**
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| **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. |

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| 1. **Thinking Skills**
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| **C1** | Analytic: 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: Demonstrate ability to propose solutions for problems related to mobile computing through investigation of different protocols, tools, and technologies. |

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| 1. **General and Transferable Skills (Other Skills Relevant to Employability and Personal Development)**
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| **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. |
| **D4** | Ethical and Social Responsibility: NA |

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| **Course Structure (Outline)** |
| **Week** | **Hours** | **ILOs** | **Unit/Module or Topic Title** | **Teaching Method** | **Assessment Method** |
| **Lec.** | **Lab** |
| 1 | 2 | 2 | A1,B3 | **Mobile Communications-****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:*** SDK, and hybrid framework installation.
* Introduction to JavaScript programming.
* Create basic mobile app based on templates.
* Test apps on browser, emulator and device.
 | Lecture/ Lab Demonstration |   |
| 2 | 2 | 2 | A1, B3 | **Mobile Communications An Overview:*** Distributed Computing, Internet Computing,
* Ubiquitous/Pervasive Computing, Mobile Computing Models and Architectures.
* Introduction to MVC

**Lab:*** Basic navigation (Tabs)
* Introduction to AngularJS
* App views and routing
 | Lecture/ Lab Demonstration/ In-Lab Supervised Work | Oral Participation/ In-Lab Exercises |
| 3 | 2 | 2 | A1, B3 | **Mobile Devices and SystemsLab:*** Design app components (buttons, list, card, card list)
* Colors and style
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Oral Participation |
| 4 | 2 | 2 | A1, B1, B2, B3 | **Mobile communications:*** Wireless Transmission,
* Cell Design And Area Planning For Cellular Networks. Frequency Reuses And Channel Designs.
* Different types of data (relational, XML, JSON)

**Lab:*** Data binding
* Data services
* Debugging and testing
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Oral Participation |
| 5 | 2 | 2 | A2, B3, C1 | **Cellular Network And Architectures:*** GSM And Other 2G, 3G and 4G Networks.

**Lab:*** SASS
* Create app resources (icon, splash screen)
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Oral Participation |
| 6 | 2 | 2 | A1, B1, B2, B3, C1 | **Communication protocols:*** Mobile/ Wireless TCP, Media Access Control

**Lab:*** Working with Data based apps
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Oral Participation |
| 7 | 2 | 2 | A1, B1, B3, C1, C3 | **Mobile IP network layer and Mobile Transport Layer****Lab:*** Advanced list
* Angular filters
* Search bar
* Platform CSS style & JavaScript
 | Lecture/ In-Lab Supervised Work | Lab Project1/ Oral Participation |
| 8 | 2 | 2 | A1, B3 | **Mobile Ad-hoc And Wireless Sensor Networks****Lab:*** Nested States (master and details views)
* Sharing objects between views
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Oral Participation |
| 9 | 2 | 2 | A1, B1, B2, B3, C1 | **Mobility Management*** Handoff And Location Management Concepts; Mobility Management in PLMN.

**Lab:*** Location-Based Services.
* Access geolocation API
* Maps
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Major Test |
| 10 | 2 | 2 | A1, B1, B2, B3, C1 | **Mobility Management*** Mobility Management In Mobile Internet, Adaptive Location Management Methods.

**Lab:*** Understanding Google feed API
* Create apps based on public RSS data
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Oral Participation |
| 11 | 2 | 2 | A1, A2, C1, B3, D1, D3 | **Cloud data and**  **Backend as a Service (BaaS)****Lab:*** Introduction to cloud Application Programming Interface (API).
* Backend as a Service and mobile APIs
 | Lecture/ In-Lab Supervised Work/ Independent Learning | In-Lab Exercises/ Assignment 1 (Literature Review) |
| 12 | 2 | 2 | A1, B1, B2, B3, C1, C2, C3 | **Messaging****Lab:*** Loading and spinners
* MbasS - REST API
* Create responsive mobile app using grid
* Orientation Support
 | Lecture/ In-Lab Supervised Work | Lab Project2 |
| 13 | 2 | 2 | A1,B1,B3,C1,C2 | **Databases And Mobile Computing****Lab:*** Access native API (Sqlite, Camera)
* Creating forms
 | Lecture/ In-Lab Supervised Work | In-Lab Exercises/ Oral Participation |
| 14 | 2 | 2 | A2, B1, B2, B3, D1, D3 | **Smart Phone Technology and Mobile Application Development Platforms****Lab:*** Graphics and Multimedia
* Build app installation file
* Preparing and Publishing apps
 | Lecture/ In-Lab Supervised Work/ Independent Learning | In-Lab Exercises/ Assignment 2 (Literature Review) |
| 15 | 2 | 2 | A2, B1, B2, B3, C1, C2, C3, D1, D2, D3 | Student Projects | Project Supervision | Evaluation of Project Presentations and Reports |
| 16 | 2 | - | A1, A2, B1, B2, C1 | All Topics |  | Final Exam |

**Teaching Materials:**

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| **Textbook(s):** | 1. Rahat Khanna, Sani Yusuf, Hoc Phan (2017). Ionic: Hybrid Mobile App Development, Packt Publishing. ISBN: 978-1788293112.
2. Victor Savkin, Jeff Cross (2017). *Essential Angular 4*, Packt Publishing. ISBN: 978-1788293761
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| **Handout(s):** |  PowerPoint slides available on Moodle i.e. http://www.ahlia.edu.bh/moodle |
| **Reference(s):****website(s):** | 1. Cory Beard, William Stallings (2015). *Wireless Communications Networks and Systems* Global Edition, Pearson Higher Ed. ISBN: 9781292108711
2. Herve Franceschi (2017). *Android App Development*, Jones & Bartlett Learning. ISBN: 978-1284092127
3. Trish Cornez, Richard Cornez (2015). *Android Programming Concepts,* Jones & Bartlett Learning. ISBN: 978-1284070705.
4. Kyle Mew (2017). *Android Design Patterns and Best Practices*, Packt Publishing. ISBN: 978-1786467218.
5. Clifton I. G. (2015) *Android User Interface Design: Implementing Material Design for developers*, 2nd Edition Addison-Wesley Professional. ISBN:  978-0134191409

Google, Android Developer Resources: <https://developer.android.com/index.html>AngularJS by Googlehttps://angularjs.org/Ionic Framework Dochttp://ionicframework.com/ |

**Assessments:**

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| **Type of Assessment** | **Description** | **ILOs** | **Weighting** |
| Oral Participation | Students will be questioned orally to demonstrate their understanding and knowledge of the topics covered during class lectures and lab sessions. | A1 | Formative |
| In-Lab Exercises | Each of the lab exercises consists of a set of practical tasks to be implemented by students individually in class as shown in the above weekly structure. Students work will be observed and directly during the lab sessions. | B3 | Formative |
| Assignments | Two assignments for Literature review. Average will be taken. | A2, D1, D3 | 15% |
| Lab Projects  | Students will be asked to use and apply appropriate development tools to develop and manipulate specific mobile applications. Students has to code, test and deploy interactive mobile applications with more emphasizes on the use of creative efficient modern User Interfaces, communication, telephony, graphics and multimedia components. | B1, B2, B3, C1, C2, C3 | 10% |
| Major Test | The test will be an in-class 90 minutes exam that will consist of short-answer, essay, and problem solving questions and cover the topics studied in the first 8 weeks. | A1, B1, B2, C1 | 20% |
| Project | Each group of 2-4 students has to develop a mobile application for solving a real world problem. Each group has to go though all phases of system development cycle, and submit a report and present the work in the class. | A2, B1, B2, B3, C1, C2, C3, D1, D2, D3 | 15% |
| Final Exam | The final exam is comprehensive and will be of two hours duration. It will consist of short-answer, analysis, essay, and problem-solving questions. | A1, A2, B1, B2, C1 | 40% |
| **Overall** |  |  | **100%** |

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| ***Ahlia University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see*** [***www.ahlia.edu.bh/integrity***](http://www.ahlia.edu.bh/integrity) ***for more information).*** |