

## متطلبات القسم الدراسية:

تقدم مقررات المنهج الدراسي لتخصص الحوسبة المتنقلة على النحو الآتي:

- بناء المعرفة والمهارات التطبيقية الكافية في العلوم الأساسية للتخصص والعلوم المتعلقة بدعم الحوسبة المتنقلة.
- التعلم الواسع في مجال الحوسبة المتنقلة. وذلك من خلال دراسة مقررات متطلبات القسم (التخصصية والاختيارية). (عليه فإن مقررات القسم مصممة بعناية لتزود الدارسين بالمعارف والمهارات التقنية والنظرية للجوانب الثلاثة للحوسبة المتنقلة (الاتصالات، الأجهزة، البرمجيات).

## متطلبات القسم التخصصية :

يدرس طلبة قسم الحوسبة المتنقلة (55) وحدة دراسية من بين مقررات متطلبات القسم ومقررات اختيارية على النحو التالي 40: وحدة دراسية متطلبات القسم الإلزامية التخصصية وعلى الطالب أن يختار 5 مقررات من بين مقررات التخصص الاختيارية .

الجدول التالي يوضح مقررات القسم الإلزامية:

رمز المقرر	اسم المقرر	اسم المقرر بالانجليزية	الأسبقيات
ITGS301	تصميم وتحليل الخوارزميات	Design and Analysis of Algorithms	ITGS220
ITMC311	تطوير التطبيقات المتنقلة	Mobile Applications Development	ITGS211
ITMC312	مبادئ الشبكات اللاسلكية المتنقلة	Principle of Mobile and Wireless Networks	ITGS215
ITGS302	نظم تشغيل	Operating Systems	ITGS223
	اختياري 1	Elective 01	
	اختياري 2	Elective 02	
ITMC313	نظم تشغيل الأجهزة المتنقلة	Mobile Operating Systems	ITGS302
ITGS304	الكتابة العلمية	Scientific Writing	ITEL121
ITMC321	التصميم التفاعلي في الأجهزة المتنقلة	Mobile Interaction Design	ITMC311
ITMC322	قواعد البيانات المتنقلة وغير المتجانسة	Heterogeneous and Mobile Databases	ITGS228, ITMC312
ITMC323	تطوير التطبيقات باستخدام لغة الجافا مي	Application Development / Java ME	ITMC311
ITGS303	إدارة مشاريع تقنية المعلومات	IT Project Management	ITGS213
ITMC411	الأمن في الحوسبة المتنقلة	Security in mobile computing	ITGS224 ITMC313
ITMC412	شبكات المنطقة الشخصية	Personal Area Networks	ITMC312
ITMC413	الشبكات الاجتماعية	Social Networking	ITMC323
414ITMC	برمجة الشبكات	Network programming	ITGS226 ITMC323
	اختياري 3	Elective 03	
	اختياري 4	Elective 04	
ITMC421	أساسيات الحوسبة في كل مكان	Fundamentals ubiquitous computing	ITMC312 ITMC313

ITMC323	Cloud Computing	الحوسبة السحابية	ITMC422	الثامن
	Elective 05	اختياري 5		
ITGS303	BSc Project	مشروع التخرج	ITMC500	

*جميع المقررات تعادل 3 وحدات دراسية والجدول التالي يوضح مقررات القسم الاختيارية:			
رمز المقرر	إسم المقرر	إسم المقرر بالانجليزية	الأسبقيات
ITMC301	المعالج الدقيق أي آر إم	ARM microprocessor	ITGS223
ITMC317	نماذج البرمجة	Programming Paradigms	ITGS211
ITMC303	اختيار الكلية الحر	Faculty Free Elective	-
ITMC304	التجارة المتنقلة	Mobile Commerce	ITMC311
ITMC305	مواضيع خاصة	Special Topics	-
ITMC401	رسومات ثلاثية الأبعاد المتنقلة	Mobile 3D Graphics	ITMC323
ITMC402	الوسائط المتعددة المتنقلة	Mobile Multimedia	ITMC321
ITMC403	الحوسبة المتوازية والموزعة	Parallel and Distributed Computing	ITMC412
ITMC404	مبادئ تطوير الألعاب المتنقلة	Principles of Games Development	ITMC412
ITMC405	اختيار الجامعة الحر	University Free Elective	-

توصيف المقررات الدراسية لقسم الحوسبة المتنقلة:  
1. المقررات الإلزامية:

Course title	Mobile Applications Development		
Course code	ITMC311	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITGS 211		
Department	Mobile Computing		
Course Description: This course is concerned with the development of applications on mobile and wireless computing platforms. Any mobile platform (Android, iOS, and Windows 8) could be used as a basis for teaching programming techniques and design patterns related to the development of standalone applications and mobile systems. Emphasis is placed on the processes, tools and frameworks required to develop applications for current and emerging mobile computing devices. Students will work at all stages of the software development life-cycle from inception through to implementation and testing. In doing so, students will be required to consider the impact of user characteristics, device capabilities, networking infrastructure and deployment environment, in order to develop software capable of meeting the requirements of stakeholders.			

Course title	Principle of Mobile and Wireless Networks		
Course code	ITMC312	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITGS215		
Department	Mobile Computing		
Course Description: This course gives an introduction to mobile and wireless networks. Designing computer networks to support computer mobility. Mobile network architecture. Wireless technologies and protocols. Wireless LAN standards. Models for indoor and outdoor mobile networks. Systems issues such as performance. Quality of service guarantees, reliability, and security in mobile computing environment. Hardware and access protocols for mobile networks. Mobile			

application protocols.
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Course title	Mobile Operating Systems		
Course code	ITMC313	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITGS302		
Department	Mobile Computing		
<p>Course Description:            Introduction to operating systems designed for mobile devices. Topics covered: A comprehensive overview of Mobile operating systems); the opportunities and challenges in designing them; mobile OS architectures( Android, iOS, Windows), mobile OS features (Multitasking, Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security , Multimedia).</p>			

Course title	Mobile Interaction Design		
Course code	ITMC321	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC311		
Department	Mobile Computing		
<p>Course Description:            This course covers a series of advanced topics in of mobile interaction design. Topics covered, Understanding User Behavior (Knowledge and understanding of theoretical frameworks for understanding human behavior), Interacting with mobile Computing Systems (the design and evaluation of interactive mobile systems), and Interacting with Information (Transferable skills: Information gathering and organizing skills, argumentation skills and the ability to synthesis information from multiple sources), theoretical models of movement and perception (e.g. Fitts' law, Steering law, Hick-Hyman law), and Evaluation of techniques (designing to support information interactions; visual analytics; and evaluating information interaction systems). This project-oriented course and the lab focuses on rapid development tools for building apps on native mobile systems, like the Android, iOS, Windows platform. Introduction to embedded Mobile Linux.</p>			

Course title	Heterogeneous and Mobile Databases		
Course code	ITMC322	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC312	ITGS 228	
Department	Mobile Computing		
<p>Course Description: A mobile computing environment involves accessing information through a wireless network connection. A mobile database is either a stationary database that can be connected to by a mobile computing device over a mobile network, or a database which is actually stored by the mobile computing device. This course extensively discusses multi-database systems (MDBS) and mobile data access systems (MDAS); moreover, it will studies traditional distributed database issues within the framework of MDBSs and MDASs. Topic include: introduction to Mobile Database System; Database System architectures; Distributed Database systems( Query, Transaction, Recovery and Concurrency control, Security) MDBS ( Definition, Issues in MDBS systems, Approaches to MDBS systems, Query Processing, Transaction Processing, Recovery and Concurrency Control, Security); Mobile Data Access systems( Mobility issues, On-demand services, Broadcast services, Transaction, Security). The course balance theory with practice; Students will gain experience working with databases for mobile devices.</p>			

Course title	Application Development with Java ME
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Course code	ITMC323	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC311		
Department	Mobile Computing		
<p>Course Description: This course covers J2ME mobile application programming for mobile platforms using the following models:</p> <ul style="list-style-type: none"> <li>Web applications using mobile client frameworks •</li> <li>Native applications using appropriate SDKs •</li> </ul> <p>The core principles covered in this course are those which underpin a practical ability to write code for operating on a mobile platform – OOP for robust application design, library support for mobile web apps and native platforms, UI design for limited screen size, packaging applications and connectivity using online services. Course Topics: Device and Network architecture; Developing Java applications for Android devices; Development Tools; MIDP Programming details (both MIDP 1.0 and 2.0); User Interface and Canvas; Timers, Tasks, Threads, Events; Storage (PIM, File Connection, RMS); Networking, wireless messaging; Performance optimization and tuning; Design for portability; Testing and debugging.</p>			

Course title	Security in mobile computing		
Course code	ITMC411	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC313	ITGS 224	
Department	Mobile Computing		
<p>Course Description: This course focuses on aspects of mobile interaction, mobile application, wireless communication that arise in mobile computing.</p> <p>Topics covered: Mobile Interaction (principles of usability, security, and privacy; Methodologies for evaluating usable security; Security and usability analysis Phishing and Risk; Knowledge-based authentication; Biometric and alternative authentication; Security and privacy; Usable security software design principles; Human- in-the- loop design framework; Security indicators and warnings; Usable security for security administrators (.</p>			

Course title	Personal Area Networks		
Course code	ITMC412	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC312		
Department	Mobile Computing		
<p>Course Description: This is a course on the concepts, architecture, design, and performance evaluation of personal area networks protocols and applications. At the conclusion of this course the student will have an understanding of these principles and be capable of implementing network protocols and applications for personal pervasive systems.</p> <p>Topics Covered: Wireless Information devices and wearable computers; PAN applications; PAN issues and challenges; Wireless PAN technology; PAN models and architectures; Wireless Technologies; Wireless LANs; IEEE 802.15, 805.11 standards; Bluetooth technology; Wireless access protocol – WAP; HomeRF protocol; Ad-hoc network protocols; Mobile and wireless networking; PAN middleware and agent architecture; Personal information system.</p>			

Course title	Social Networking		
Course code	ITMC413	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC323		
Department	Mobile Computing		
<p>Course Description: Introduction to virtual communities overlay networks and social networking. Topics include architectural principles for heterogeneous</p>			

social networking platforms, trust and reputation as social concepts, agent-based computing, and extraction of trends and patterns from information exchanged between community members. Course requires supervised and unsupervised lab, and intensive programming as a group project and individual assignment.

Course title	Network Programming		
Course code	ITMC414	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITGS226	ITMC311	
Department	Mobile Computing		
Course Description: Students will learn how to write applications in Java that make use of network programming. This course covers the following topics: Introduction to network programming, Transport Layer Protocols, User Datagram Protocol, Client-Server Model, TCP Sockets, UDP Sockets; SCTP Sockets; Java's input/output system and how it works; Multicast Sockets implementation; client/server implementations; Threads Programming; multi-threaded applications; Multiplexing and De-multiplexing Applications; Implementing Application Protocols; Distributed computing technologies including remote method invocation, plus small project that addresses different departments disciplines.			

Course title	Fundamentals ubiquitous computing		
Course code	ITMC421	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC312	ITMC313	
Department	Mobile Computing		
Course Description: The aim of this course is to provide students with knowledge and understanding of how computing will be used in the future. It is about moving beyond the traditional desktop computing model, into embedding computing into everyday objects and everyday activities. Topics covered will include the visions of Ubiquitous Computing and some of its applications, Location in Ubiquitous Computing, Context awareness in Ubiquitous Computing, P2P networks systems, Human-computer interaction, Privacy in Ubiquitous Computing.			

Course title	Cloud Computing		
Course code	ITMC422	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC323		
Department	Mobile Computing		
Course Description: Hands-on introduction to cloud computing and developing mobile applications. Topics include: Cloud computing services and infrastructures (virtualization, datacenter networking, wide-area storage/replication, distributed filesystems); development tools (MapReduce, Hadoop, OpenStack); fundamental tradeoffs and algorithms (CAP theorem, NoSQL systems, Paxos) and applications (big-data analysis, real-time data systems, large-scale webservices); iOS and Android programming to develop mobile applications with backend storage and computing components running on the cloud (Amazon AWS, Microsoft Azure, or Google AppEngine); Accessing cloud services with mobile devices; Extending mobile app with cloud processing and resources; Extending cloud services with the collective power of mobile devices; Partitioning of service functions between mobile devices and clouds; Data management for mobile cloud; Developing mobile cloud services with GAE proxy and Android.			

2.المقررات الاختيارية:

Course title	ARM microprocessor		
Course code	ITMC301	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITGS223		
Department	Mobile Computing		
Course Description: This course on 32 bit ARM Programming covers in-depth learning of ARM processors, its architecture, Programming for both ARM7 and ARM9 families. Also included are Introduction to GNU tool chain, ARM programming model, Exception handling, Introduction to thumb instruction set, ARM THUMB procedure call standards (ATPCS), ARM optimization techniques, Building RTOS image and porting.			

Course title	Programming paradigm		
Course code	ITMC317	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITGS 211	ITGS 226	
Department	Mobile Computing		
Course Description: This course introduces to a variety of programming paradigms, programming languages, and language implementation. Topics include: Object-oriented programming and design; ambient-Oriented Programming; Functional and logical languages; Event-driven programming; Data and demand driven languages; Concurrent programming.			

Course title	Faculty Free Elective		
Course code	ITMC303	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	-		
Department	Mobile Computing		
Course Description: This course is a subject chosen by the student from amongst subjects are being thought by other departments in the Faculty.			

Course title	Mobile Commerce		
Course code	ITMC304	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC311		
Department	Mobile Computing		

<b>Course Description:</b>
This course introduces students to the basics of Mobile Commerce. Topics include: introduction Mobile Commerce (Infrastructure of M–Commerce ; Types of M–Commerce Services ; Technologies of Wireless Business ; Benefits and Limitations, Support, Mobile Marketing and Advertisement; Non – Internet Applications in M–Commerce ; Wireless/Wired Commerce Comparisons); Mobile Commerce: Technology ( A Framework for the study of M–Commerce; NTT Docomo’s I – Mode ; Wireless Devices for M–Commerce; Towards a Classification Framework for Mobile Location Based Services ; Wireless Personal and Local Area Networks ; The Impact of Technology Advances on Strategy Formulation in Mobile Communications Networks); Mobile Commerce: Theory and Practices (The Ecology of M–Commerce; The Wireless Application Protocol ;Mobile Business Services ; Mobile Portal ; Factors Influencing the Adoption of Mobile Gaming Services ; Mobile Data Technologies and Small Business Adoption and Diffusion ; M–Commerce in the Automotive Industry ; Location – Based Services: Criteria for Adoption and Solution Deployment ; The Role of Mobile Advertising in Building a Brand ; M–Commerce Business Models); Business – To – Business Mobile E-Commerce ( Enterprise Enablement ; Email and Messaging ; Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) ; Field Sales Support (Content Access, Inventory) ; Asset Tracking and Maintenance/Management ; Remote IT Support ; Customer Retention (B2C Services, Financial, Special Deals) ; Warehouse Automation ; Security.

Course title	Special Topics		
Course code	ITMC305	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	-		
Department	Mobile Computing		
<b>Course Description:</b>			
This course is a topic or a collection of topics selected by Mobile Computing Department according to the current developments in technology, curriculum, and job market.			

Course title	Mobile 3D Graphics		
Course code	ITMC401	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites	ITMC323		
Department	Mobile Computing		
<b>Course Description:</b>			
The course explores the theory and application software needed for deploying native3D Graphics applications on mobile platforms. The topics covered are: Introduction to Computer Graphics; Graphics Display Devices ; Drawing Based Graphics Primitives ; Transformation of Object - 3D Affine Transformation; Three-Dimensional Viewing ; Tools for Raster Displays ; Scan conversion Algorithms ; Defining and Filling Regions of Pixel; Filling Polygon; Defined Regions; Aliasing: Anti-aliasing Techniques; Creating more Shades and Colors Ray Tracing Algorithm; Virtual camera model optics; Animation; 3D content (file format) is also introduced. It also aims to provide an in depth, practical coverage of two standard application programming interfaces used for mobile 3D graphics, viz., OpenGL-ES-2.0, J2ME-M3G, 3D Studio Max, Ac3d,and Virtual Reality Modeling Language (VRML).			

Course title	Mobile Multimedia		
Course code	ITM C402	Credits	3
Course type	Core	Compulsory	Elective

Prerequisites	ITMC321		
Department	Mobile Computing		
<p>Course Description:</p> <p>Introduction to the creation, delivery and analysis of multimedia content in systems with mobile devices. Topics include analysis of webs of documents, social network analysis, recommender systems and problems of trust, reputation and influence in mobile e-commerce systems. Topics covered: RESTful applications: architecture, JAX-RS, Jersey; Introduction to information retrieval: document structure and similarity; Introduction to (social) network science: types of social network structures and their structural analysis; Creation and analysis of webs of documents: web crawlers, pagerank; Introduction to social network data analysis: tools and simple data mining techniques; Recommender systems; Problems in social networks: trust, reputation, influence and community detection; Introduction to facial and fingerprint recognition; Multimedia content: recognition, transmission and similarity.</p>			

Course title	Parallel and Distributed Computing		
Course code	ITMC403	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites code	ITMC414		
Department	Mobile Computing		
<p>Course Description:</p> <p>This course covers a broad range of topics related to parallel and distributed computing (PDC), including architectures and systems, programming paradigms, parallel algorithms, and scientific and other applications of PDC. The lab portion of the course includes programming projects using different programming paradigms, and students will have the opportunity to examine one course topic in depth through a project of their own choosing. Course topics may include: multi-core, SMP, MMP, client-server, clusters, clouds, grids, peer-to-peer systems, GPU computing, scheduling, scalability, resource discovery and allocation, fault tolerance, security, data parallel languages, MapReduce, parallel debugging, coordination, mobility, heterogeneity, and fault-tolerance.</p>			

Course title	Principles of Games Development		
Course code	ITMC404	Credits	3
Course type	Core <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input checked="" type="checkbox"/>
Prerequisites code	ITMC414		
Department	Mobile Computing		
<p>Course Description:</p> <p>The course provides an introduction to the core concepts involved in designing and programming computer games. Subjects covered are: graphics; sprites, threads, sound; 2D platform games; 3D graphics; interaction and animation; lighting. Class's assignments and a small are designed to cover a number of topics in game design and programming on mobile platforms.</p>			

Course title	University Free Elective		
Course code	ITMC405	Credits	3
Course type	Core	Compulsory	Elective
Prerequisites code	-		
Department	Mobile Computing		
<p>Course Description: This course is a subject chosen by the student from</p>			



amongst subjects are being thought by other Faculties in the University.