Title (Units): **COMP 3670 Mobile Computing (3,2,2)**

Course Aims: This course introduces the basic concepts and principles in mobile computing. This includes the major techniques involved, and networks & systems issues for the design and implementation of mobile computing systems and applications. This course also provides an opportunity for students to understand the key components and technologies involved and to gain hands-on experiences in building mobile applications.

Prerequisite: COMP2330 Data Communications and Networking

Learning Outcomes (LOs):
Upon successful completion of this course, students should be able to:

No.	Learning Outcomes (LOs)
	Knowledge
1	Describe the basic concepts and principles in mobile computing
2	Understand the concept of Wireless LANs, PAN, Mobile Networks, and Sensor Networks
3	Explain the structure and components for Mobile IP and Mobility Management
4	Understand positioning techniques and location-based services and applications
5	Describe the important issues and concerns on security and privacy
	Professional Skill
6	Design and implement mobile applications to realize location-aware computing
7	Design algorithms for location estimations based on different positioning techniques and platforms
8	Acquire the knowledge to administrate and to maintain a Wireless LAN
	Attitude
9	Recognize the important issues and concerns on security and privacy

Calendar Description: This course introduces the basic concepts and principles in mobile computing. This includes the major techniques involved, and networks & systems issues for the design and implementation of mobile computing systems and applications. This course also provides an opportunity for students to understand the key components and technologies involved and to gain hands-on experiences in building mobile applications.

Assessment:

No.	Assessment Methods	Weighting	Remarks
1	Continuous Assessment	40%	Written and laboratory assignments are designed to evaluate the students understanding of the principles and practice of device level programming, as well as the design and implementation of mobile applications
2	Examination	60%	Final examination questions are designed to assess students understanding of the methodology, characteristics, techniques, issues and concerns about mobile computing and its applications

Rubrics:

	Excellent (A)	Good (B)	Satisfactory (C)	Marginal Pass (D)	Fail (F)
Describe the basic concepts and principles in mobile computing on different platforms	• Fully understand all the concepts and principles	• Understand most of the concepts and principles	• Sufficiently understand the concepts and principles	• Understand a minimum set of concepts and principles	• Do not understand most of the concepts and principles
Explain the structure and components for Mobile IP, Mobility Management, and technologies for location-aware computing	• Fully understand the structure and components of a mobile system	• Understand most of the structure and components of a mobile system	• Sufficiently understand the structure and components of a mobile system	• Understand a minimum set of the structure and components of a mobile system	• Do not understand most of the structure and components of a mobile system
Understand	• Fully	• Understand	• Sufficiently	• Understand a	• Do not

	Excellent (A)	Good (B)	Satisfactory (C)	Marginal Pass (D)	Fail (F)
positioning techniques and location-based services and applications	understand all the concepts and principles on positioning techniques and location-based services and applications	most of the concepts and principles on positioning techniques and location-based services and applications	understand the concepts and principles on positioning techniques and location-based services and applications	minimum set of concepts and principles on positioning techniques and location-based services and applications	understand most of the concepts and principles on positioning techniques and location-based services and applications
Describe the important issues and concerns on security and privacy	• Fully understand all the issues and concerns on security and privacy	• Understand most of the issues and concerns on security and privacy	• Sufficiently understand the issues and concerns on security and privacy	• Understand a minimum set of the issues and concerns on security and privacy	• Do not understand most of the issues and concerns on security and privacy
Design and implement algorithms and applications to realize location-aware computing	• Able to design and implement complex algorithms and applications to realize location-aware computing	• Able to design and implement algorithms and applications to realize location-aware computing	• Able to design and implement most of the common algorithms and typical applications to realize location-aware computing	• Able to design and implement some of the common algorithms and typical applications to realize location-aware computing	• Not able to design or implement algorithm and applications for location-aware computing
Acquire the knowledge to administrate and to maintain a Wireless LAN	• Capable to administrate and to maintain a WLAN	• Capable to handle most of the cases when administrating a WLAN	• Capable to handle a WLAN except for some special cases	• Capable to handle all normal cases when administrating a WLAN	• Not able to administrate a WLAN

Learning Outcomes and Weighting:

Content	LO No.
I. Basic Principles and Concepts in Mobile Computing	1, 2
II. The Concept of Wireless LAN, PAN, Mobile Networks and Sensor Networks	1, 2, 9
III. Positioning Techniques on Different Networks	4
IV. Mobility Management and Mobile IP	3
V. Wireless LAN Management	3, 5, 8, 9
VI. Device-level Programming	6, 7
VII. Case Studies on Location-based Services and Applications	2, 4, 5

References:

Asoke K. Talukder, Roopa R. Yavagal, *Mobile Computing Technology, Applications, and Service Creation*, McGraw-Hill Communications Engineering, 2005.

Martyn Mallick, *Mobile and Wireless Design Essentials*, Wiley Publishing, 2003.

J. Schiller, *Mobile Communications*, 2nd edition, Pearson Education, 2003.

D.P. Agrawal and Q.-A. Zeng, *Introduction to Wireless and Mobile Systems*, Brooks/Cole, Thomson Learning, 2003.

H.M. Deitel, P.J. Deitel, T.R. Nieto, and K. Steinbuhler, *Wireless Internet & Mobile Business – How to Program*, Prentice Hall, 2002.

J. Burkhardt, H. Henn, S. Hepper, K. Rindtorff and T. Schaeck, *Pervasive Computing: Technology and Architecture of Mobile Internet Applications*, Addison-Wesley, 2002.

Yi-Bing Lin, and Imrich Chlamtac, *Wireless and Mobile Network Architectures*, John Wiley & Sons, Inc. 2001.

Evaggelia Pitoura and George Samaras, *Data Management for Mobile Computing*, Kluwer

Academic Publishers, 1998.

Course Content in Outline:

Topic

I. Basic Principles and Concepts in Mobile Computing
   A. Wireless Communication Technology
   B. Radio-based Communication

II The Concept of Wireless LAN, PAN, Mobile Networks and Sensor Networks
   A. WLAN (e.g. IEEE 802.11 Family Network)
   B. PAN (e.g. Bluetooth Network)
   C. Mobile Phone Networks
   D. RFID and Sensor Networks

III. Positioning Techniques on Different Networks
   A. Signal Strength Based Location Estimation Algorithms
   B. Propagation Models and Probabilistic Models
   C. Triangulation, and Trilateration
   D. Finger Print and Pattern Recognition

IV Mobility Management and Mobile IP
   A. Location Management
   B. Location Update Algorithms
   C. Paging Schemes, Handoff and Roaming Management
   D. Operation of Mobile IP & DHCP for Mobility

V. Wireless LAN Management
   A. Setting up the WLAN and Router Configuration
   B. Network Performance Fine Tuning
   C. Security Concerns and WLAN Administration

VI Device-level Programming (e.g.)
   A. J2ME (Java) Programming for Java Enabled Device
   B. C Programming for Symbian Device
   C. C# Programming for Windows Platform PDA Device
   D. Programming / Interfacing with RFID Systems, Bluetooth and GPS Device

VII Case Studies on Location-based Services and Applications
   A. Location Estimation Systems and its Applications
   B. Short Message Services (SMS)
   C. Multimedia Message Services (MMS)