ECE4607 Course Syllabus

ECE4607

Mobile and Wireless Networks (3-0-0-3)

CMPE Degree
  This course is Elective for the CMPE degree.

EE Degree
  This course is Elective for the EE degree.

Lab Hours
  0 supervised lab hours and 0 unsupervised lab hours

Prerequisites
  ECE 3076*/3600* * Prerequisites indicated with an asterisk may be taken concurrently with ECE4607

Corequisites
  None

Catalog Description
  Basics of mobile and wireless networking. Architectures and communication protocols for wireless sensor networks, wireless local area networks, ad-hoc networks, cellular systems, WiMAX, and Wireless Mesh Networks.

Textbook(s)
  No Textbook Specified.

Course Outcomes
  Upon successful completion of this course, students should be able to:
  1. Analyze the fundamentals of wireless networking and communications
  2. Design medium access control protocols for Wireless Local Area Networks
  3. Design and analyze routing algorithms for Ad Hoc Networks and Vehicular Ad Hoc Networks.
  4. Perform the operations of basics of Bluetooth architectures and protocol functionalities
  5. Demonstrate many use cases for the architectural framework of Internet of Things
  6. Analyze the performance the architectural evolution of cellular systems.
  7. Write algorithms for the mobility management (location registration, paging, handovers) algorithms in all generations of cellular systems
  8. Analyze the different access schemes such as TDMA, CDMA, OFDMA, for different generations of cellular systems.
  9. Design future wireless communication systems

Student Outcomes
  In the parentheses for each Student Outcome:
  "P" for primary indicates the outcome is a major focus of the entire course.
  "M" for moderate indicates the outcome is the focus of at least one component of the course, but not majority of course material.
  "LN" for "little to none" indicates that the course does not contribute significantly to this

outcome.

1. (P) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. (M) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. (M) An ability to communicate effectively with a range of audiences
4. (LN) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. (LN) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. (LN) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. (M) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topical Outline

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1 Introduction
2 Basics of Wireless Communications (Revisited)
3 Wireless Local Area Networks (WiFi)
4 Ad Hoc Networks (MANETs)
5 Bluetooth
6 Vehicular Ad Hoc Networks (VANETs)
7 Internet of Things
8 Fundamentals of Personal Communication (Cellular) Systems
9 2G Cellular Systems: GSM, IS-54, IS-95
10 3G (IMT 2000) Cellular Systems
11 4G (LTE and LTE-A) Systems
12 5G Systems
13 6G Wireless Systems
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