

CSE 5463 (Approved): Introduction to Wireless Networking

Course Description

Fundamental concepts in cellular design, Wireless-LANs, MANETs, and sensor networks will be explored. Specific topics will include propagation, fading, cellular-design, power-management, routing, scheduling, and control.

Transcript Abbreviation: IntroWireNetwrks

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Junior, Senior, Masters, Doctoral

Course Offerings: Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 6.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: CSE 3461 or 677 or ECE 3367 or 561 or graduate standing in engineering or math & physical sciences.

Exclusions:

Cross-Listings: Cross-listed with ECE 5101.

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001

Subsidy Level: Doctoral Course

Programs

| Abbreviation | Description |
|--------------|--------------------------------------|
| BS CSE | BS Computer Science and Engineering |
| MS CSE | MS Computer Science and Engineering |
| PhD CSE | PhD Computer Science and Engineering |

Course Goals

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|--|
| Exposed to basics of propagation and fading |
| Be familiar with notions of SINR and cell design, as well as notions of handoffs and channel allocation. |
| Be familiar with different forms of multi-access systems (FDMA, CDMA, TDMA, OFDMA, etc.) |
| Be familiar with power management and current implementations in cellular systems |
| Be familiar with routing and current implementations in both cellular |

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|---|
| Be familiar with cellular scheduling as well as be exposed to scheduling in multi-hop networks |
| Be familiar with various wireless systems such as cellular, Wireless LAN, sensor, mobile ad hoc, sensor, etc. |
| Be exposed to some major issues facing the design of future wireless systems. |

Course Topics

| Topic | Lec | Rec | Lab | Cli | IS | Sem | FE | Wor |
|--|-----|-----|-----|-----|----|-----|----|-----|
| Historical Milestones and Current Wireless Networks | 3.0 | | | | | | | |
| Understanding the Wireless Communication Channel | 5.0 | | | | | | | |
| Multiple Access Techniques (FDMA, TDMA, CDMA) | 3.0 | | | | | | | |
| Concept of Cellular Communications, Handoff, and Location Management | 5.0 | | | | | | | |
| Power Control | 3.0 | | | | | | | |
| Opportunistic Scheduling for cellular networks and extensions to multi-hop networks. | 4.0 | | | | | | | |
| Proactive and Reactive Routing | 5.0 | | | | | | | |
| Congestion control | 2.0 | | | | | | | |
| System case studies (802.11, Bluetooth, etc.) | 4.0 | | | | | | | |
| Energy management in sensor networks | 5.0 | | | | | | | |
| Project presentations | 3.0 | | | | | | | |

Grades

| Aspect | Percent |
|---------|---------|
| Project | 40% |
| Midterm | 20% |
| Final | 40% |

ABET-EAC Criterion 3 Outcomes

| Course Contribution | | College Outcome |
|---------------------|---|---|
| *** | a | An ability to apply knowledge of mathematics, science, and engineering. |
| | b | An ability to design and conduct experiments, as well as to analyze and interpret data. |
| *** | c | An ability to design a system, component, or process to meet desired needs. |
| | d | An ability to function on multi-disciplinary teams. |
| *** | e | An ability to identify, formulate, and solve engineering problems. |
| | f | An understanding of professional and ethical responsibility. |
| | g | An ability to communicate effectively. |
| | h | The broad education necessary to understand the impact of engineering solutions in a global and societal context. |
| | i | A recognition of the need for, and an ability to engage in life-long learning. |
| | j | A knowledge of contemporary issues. |
| | k | An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. |

BS CSE Program Outcomes

| Course Contribution | | Program Outcome |
|----------------------------|---|--|
| *** | a | an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering; |
| | b | an ability to design and conduct experiments, as well as to analyze and interpret data; |
| *** | c | an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations; |
| | d | an ability to function on multi-disciplinary teams; |
| *** | e | an ability to identify, formulate, and solve engineering problems; |
| | f | an understanding of professional, ethical, legal, security and social issues and responsibilities; |
| | g | an ability to communicate effectively with a range of audiences; |
| | h | an ability to analyze the local and global impact of computing on individuals, organizations, and society; |
| | i | a recognition of the need for, and an ability to engage in life-long learning and continuing professional development; |
| | j | a knowledge of contemporary issues; |
| | k | an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional; |
| ** | l | an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution; |
| ** | m | an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices; |
| * | n | an ability to apply design and development principles in the construction of software systems of varying complexity. |

Prepared by: Ness Shroff