

ECE 407 Syllabus

Course: ECE 407
Credit Hours: 3
Course Title: Introduction to Computer Communications
Course Description:

Engineering principles of computer communications: summary of digital transmission, media and switching; error control, layering concept, overview of protocols; architectures for local, metropolitan, and wide-area networks; emerging issues in digital communications systems.

Prerequisite(s): Generic background in systems theory; ECE 301 is a corequisite.

Textbook(s) and/or other required material:

"Computer Networking: A Top-Down Approach Featuring the Internet", 4th edition, James F. Kurose and Keith W. Ross, Addison Wesley, 2008.

Course objectives. By the end of this course, the student should be able to (use demonstrative verbs):

1. Introduce the students to the fundamental concepts of how computer networks operate,
2. Identify the fundamental elements of protocols,
3. Discuss some of the technical problems we encounter in the areas of access, routing and traffic management,
4. Apply these fundamentals in router design and operation,
5. Practice these fundamentals in translating a standards document into a functional specification document suitable for implementation, and in producing a test plan for standards conformance,
6. Calculate network performance metrics, such as throughput and delays.

Topics covered:

1. Fundamental concepts common to all computer networks and fundamental problems encountered in all computer networks (6)
2. Network classification and taxonomies (2)
3. Application layer (fundamental issues and examples) (6)
4. Transport layer (objectives, functional description, examples from the Internet - TCP and UDP) (8)
5. Network Layer (routing algorithms, the architecture of a router, addressing options, examples from the Internet - the IP protocol).(8)
6. Link Layer and Medium Access Control (common problems and solutions at this layer, examples from Ethernet, IEEE 802.11).(8)

Class/laboratory schedule (sessions per week and duration of each session):

Two 75-minutes lectures per week

Contribution of course to meeting the requirements of Criterion 5 - other:

Contribution of course to meeting the requirements of Criterion 5 - math and basic

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sciences:

Contribution of course to meeting the requirements of Criterion 5 - engineering topics:

3 hours.

Contribution of course to meeting the requirements of Criterion 5 - general education:

Relationship of this course to program learning outcomes:

Learning Outcome	Level of Instruction	Related Course Content
Outcome A	Major	Most trade-offs involved in computer networks will be explored in a quantitative way; determining the performance of the network often involves non-trivial mathematics. The students will have to use math and engineering science to make justifiable design decisions.
Outcome B	N/A	The students are asked to design tests that will check the correct functionality of a protocol
Outcome C	Basic	implementation: this requires major creative design as most tests are far from trivial. The course has one semester-long project; the students will work in teams of two or three, giving them the chance to split the work and/or do double
Outcome D	Basic	

Relationship of this course to program learning outcomes:

Learning Outcome	Level of Instruction	Related Course Content
Outcome E	Major	<p>checks to make sure that everything is completed correctly.</p> <p>Most of the course concerns the design choices for computer networks, and each design choice is practically an engineering problem. Thus, the students will be asked to apply engineering principles and mathematics in class, for homework and exams, but also for the project.</p>
Outcome F	N/A	
Outcome G	N/A	
Outcome H	Basic	<p>The course, while using the Internet as an example, presents the computer networks in a more general setting. Thus, the students will have a considerably broader view than if they were just studying the commercially successful products, as those can change in the blink of an eye.</p> <p>With over 3000 networking standards, it is clear that the students have to learn the fundamental concepts to be able to understand any future networking ideas, trends and standards that continue to come</p>
Outcome I	Basic	

Relationship of this course to program learning outcomes:

Learning Outcome	Level of Instruction	Related Course Content
Outcome J	Basic	at an ever increasing pace. Many of the current issues encountered in the Internet (e.g., security, privacy, commercial aspects) are discussed during the lectures and in the homeworks. While during the project the students will not be asked to write a program, they will be asked to do the most important tasks required when translating a real
Outcome K	Basic	standard to a software program: they will be asked to extract the functional requirements of the standard and to produce a test plan that will test the correctness of a hypothetical implementation.

Person who last prepared this description and date of preparation:

- Eun, Do Young (dyeun) - Apr 2nd, 2009 (04:50pm)