ECE3600 Course Syllabus

ECE3600

Computer Communications (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

Course Coordinator
Ji,Chuanyi

Prerequisites
ECE 2020 [min C] and ECE 2026 [min C]

Corequisites
None

Catalog Description
Basic concepts of computer communication network protocols.

Textbook(s)
Kurose & Ross, *Computer Networking : A Top-Down Approach Featuring the Internet* (7th edition), Addison-Wesley, 2016. ISBN 0133594149, ISBN 9780133594140 (required)

Course Outcomes
Upon successful completion of this course, students should be able to:

1. Describe the theoritical fundamentals of how the internet works
2. Use a layered model to explain the primary functionalities of internetworking
3. Identify algorithms and functionalities to allow reliable data transport over an unreliable network
4. Explain the fundamental protocols in the internet and have the ability to apply them to new networks
5. Describe Software Defined Networking?s fundamental concept and its impact on the internet
6. Explain the fundamentals of link layer protocols

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. (LN) 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. (M) 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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Introduction
network edge
end systems, access networks, links
network core
packet switching, circuit switching, network structure
delay, loss, throughput in networks
protocol layers, service models
Application Layer
Web and HTTP
Electronic mail
Domain Name System
video streaming and content distribution networks
Socket programming with UDP and TCP*
Transport Layer
multiplexing and demultiplexing
connectionless transport: UDP
principles of reliable data transfer
connection-oriented transport: TCP
principles of congestion control
TCP congestion control
Network layer: The Data Plane
data plane
control plane
Router architecture
IP: Internet Protocol
Generalized Forward and SDN
Network Layer: The Control Plane
routing protocols
intra-AS routing in the Internet: OSPF
routing among the ISPs: BGP
The SDN control plane
Link Layer and LANs
error detection, correction
multiple access protocols
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LANs
data center networking
day in the life of a web request
Wireless Networking*
Wireless links, characteristics
IEEE 802.11 wireless LANs (?Wi-Fi?)
Network Security*
Message integrity, authentication
Securing e-mail
Securing TCP connections: SSL
Firewalls and IDS
*Advanced materials which will be taught if time permits.