

1. Course Number and Course Title:

COE530 Advanced Computer Networks

2. Credits Hours:

3 – 0 – 3

3. Prerequisites and/or Co-Requisites:

Prerequisite: Admission to MSCOE Program

Co-requisites: None

4. Name and Contact Information of Instructor:

Dr. Rana E. Ahmed

Office: EB1-249

Email: rahmed@aus.edu

Phone: (06) 515-2947

Office Hours: TBA

5. Course Description (Catalog Description):

Focuses on advanced topics in computer networking and performance modeling. Covers the following: Performance modeling and simulation, congestion control and quality of service (QoS) techniques, overview of computer networks security, and recent advances in computer networks.

6. Textbook and other Supplemental Material:

Primary: J. F. Kurose and K.W. Ross, *Computer Networking: A Top-Down Approach*, 2013, Sixth Edition, Pearson.

Supplementary:

- K. S. Trivedi, *Probability and Statistics with Reliability, Queuing, and Computer Science Applications*, 2001, Second Edition, John Wiley and Sons.
- W. Stallings, *High-Speed Networks and Internets: Performance and Quality of Service*, 2002, Second Edition, Prentice Hall.
- J.M. Pitts, *Introduction to IP and ATM Design and Performance*, 2000, Second edition, John Wiley.
- Selected material from recent transactions, journals and conferences.

7. Learning Outcomes:

1. Understand key principles in computer networking such as reliable data transfer, congestion control, and network security
2. Develop queuing models suitable for computer networks
3. Calculate delay and other performance metrics in packet-switched and circuit-switched networks
4. Model bursty Internet traffic with self-similar characteristics.

5. Simulate networking scenarios and estimate various performance metrics
6. Understand advanced design and performance criteria in computer networks.

8. Teaching and Learning Methodologies:

Lectures; Simulation Projects

9. Course Topics and Schedule:

Topic	Weeks
Computer networks overview	1
Principles of network performance evaluation	3
Simulation principles of computer networks	3
Congestion control techniques (e.g. in TCP, ATM)	3
Principles of computer networks security	1
Recent advances in computer networks (e.g. wireless, multimedia, optical, etc.)	3
Exams & Project Presentations	2
Total:	16

10. Schedule of Laboratory and other Non-Lecture Sessions:

11. Out-of-Class Assignments with Due Dates:

Assignment	Due Date (tentative)
HW1: Probability and Random Variables	20/02/2017
HW2: Stochastic Processes	6/03/2017
Mini Project #1: Discrete-event simulation of networking protocols in C++	10/04/2017
Mini Project #2: Network Simulation using Riverbed	24/04/2017
Mini Project #3: Network Simulation using JMT (Java Modeling Tools)	8/05/2017

12. Student Evaluation:

Assignment	Weight (tentative)
Homework	10%
Projects	25%
Midterm Exams	30%
Final Exam	35%

13. Contribution of Course to Student Outcomes

This course contributes to the accomplishment of the following program outcomes:

Student Outcome	Extent of Contribution
Perform research emphasizing creativity, independent learning and scientific methods in a chosen area of computer engineering.	
Apply advanced mathematics and engineering knowledge in identifying, formulating and solving engineering problems.	●
Select and use techniques, skills and modern tools necessary for research or professional practice.	●
Communicate effectively	○
Recognize the need for, and engage in, lifelong learning	○
Attend to professional and ethical responsibilities	

Extent of contribution: ● high; ● medium; ○ low