ECE 465 – Computer Networking Protocols

Department of Electrical and Computer Engineering
George Mason University
Spring 2018

Class meetings: Tuesdays and Thursdays, 1:30 – 2:45 pm
Merten Hall, Room 1200

Instructor: Brian L. Mark
Nguyen Engineering Building (ENGR), Room 3220
phone: 703-993-4069 email: bmark [at] gmu.edu
web: `http://ece.gmu.edu/~bmark`
office hours: Wednesdays, 2:30 - 4 pm and by appointment

Teaching Assistant: Jay Raval
email: jraval2 [at] gmu.edu
office hours: Mondays, 11 am - 12 noon in ENGR 3204

Course Description: This course covers the basic principles of computer network protocols and architectures from the application layer down to the network layer, with a focus on Internet protocols. Students will gain an understanding of the inner workings of the Internet. Topics in multimedia networking and network security will be covered.

Course website: Log in to your account on `http://blackboard.gmu.edu`

- Log into Blackboard using your GMU email account credentials.
- Assignments, solutions, announcements, and other course materials will be posted on Blackboard.
- Piazza:
  - We will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com Find our class page at: `https://piazza.com/gmu/spring2018/ece465/home`

Required textbook:

- *Computer Networking: A Top-Down Approach*, 7th ed., by J. F. Kurose and K. W. Ross, Pearson Education, Inc., 2017. (ISBN-13: 978-0133594140; ISBN-10: 0133594149)
  - One copy of the text is on reserve at Gateway Library inside the Johnson Center Library. It may be borrowed for 2 hours at a time. To borrow the book, students will need this call number: TK5105.875.I57 K88 2017.

Prerequisites: C or higher in (STAT 346 or STAT 344) and (CS 222 or CS 211).

- The course includes two to three programming projects, which will be done in groups of two, that require basic knowledge of the Python and C programming languages.

Grading:

- Quizzes/Homework= 10%, Labs = 10%, Programming Assignments = 20%
- Midterm Exam = 25%, Final Exam = 35%.

Course topics:

- Computer Networks and the Internet (2 weeks)
  - Overview of networking concepts
  - Packet-switching vs. circuit-switching
  - Network delays
- Application Layer (3 weeks)
  - Principles of network applications
  - The Web and HTTP
  - Domain Name Service
  - File transfer and FTP, Electronic Mail
  - Peer-to-peer applications
  - Socket programming
- Transport Layer (3 weeks)
  - Transport layer services
  - Connectionless transport: UDP; Connection-oriented transport: TCP
  - Reliable data transfer
  - Congestion and flow control
- Multimedia Networking (1 week)
  - Multimedia networking applications
  - Streaming stored video
  - Voice-over-IP
- Network Layer (3 weeks)
  - Internet Protocol (IP); Addressing
  - Data Plane vs. Control Plane
  - Routing Protocols
  - Software-Defined Networking (SDN)
- Security in Computer Networks (2 weeks)
  - Principles of cryptography
  - Message integrity; Digital signatures
  - Securing E-mail; Securing TCP connections: SSL
  - Network-layer security: IPsec and virtual private networks

Quizzes and Homework Assignments

- Pop quizzes will be given and graded.
- Homework problems will be assigned weekly.
- Sample solutions to quizzes and homework assignments will be posted on Blackboard.

WireShark Labs and Programming Projects:

- WireShark Lab exercises will be assigned and should be done in groups of two students.
- Programming Projects will be assigned and should be done in groups of two students.

Midterm Exam: Thursday, March 23, 2018 (in-class).

Final Exam: Tuesday, May 15, 2018: 1:30 - 4:15 pm.

Student disability: If you are a student with a disability and you need academic accommodations please see me and contact the Office of Disability Services (ODS) at 703.993.2474. All academic accommodations must be arranged through that office. Students must inform the instructor at the beginning of the semester, and the specific accommodation will be arranged through ODS.

Academic Integrity: GMU is an Honor Code university. Please see the University Catalog for a full description of the code and the honor committee process.

Honor Code: To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this honor code: Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

Course Schedule:

Week 1: Jan. 23, Jan. 25	Computer Networks and the Internet (Chapter 1)
Week 2: Jan. 30, Feb. 1	Computer Networks and the Internet (Chapter 1)
Week 3: Feb. 6, Feb. 8	Application Layer (Chapter 2)
Week 4: Feb. 13, Feb. 15	Application Layer (Chapter 2)
Week 5: Feb. 20, Feb. 22	Application Layer (Chapter 2)
Week 6: Feb. 27, Mar. 1	Transport Layer (Chapter 3)
Week 7: Mar. 5, Mar. 7	Transport Layer (Chapter 3)
Week 8: Mar. 12, Mar. 16	Spring Break [no class]
Week 9: Mar. 19, Mar. 23 [midterm]	Transport Layer (Chapter 3)
Week 10: Mar. 26, Mar. 30	Multimedia Networking (Chapter 9)
Week 11: Apr. 3, Apr. 5	Network Layer: Data Plane (Chapter 4)
Week 12: Apr. 10, Apr. 12	Network Layer: Control Plane (Chapter 5)
Week 13: Apr. 17, Apr. 19	Network Layer: Control Plane (Chapter 5)
Week 14: Apr. 24, Apr. 26	Security in Computer Networks (Chapter 8)
Week 15: May 1, May 3	Security in Computer Networks (Chapter 8)

WAVES: Wellness, Alcohol and Violence Education and Services

WAVES promotes wellness within the Mason community through health education, alcohol/drug assessment and education, and violence awareness, prevention and sexual assault response. We help students make healthy, safe choices and encourage lifelong, thoughtful healthy decision-making through individualized support, creative programming, and evidence-based education and outreach.

WAVES office 703-993-9999
SUB I, Suite 3200
24-Hour Sexual and Intimate Partner Violence Crisis Line 703-380-1434
waves.gmu.edu

- 703-360-7273 (Fairfax County Office for Women and Domestic and Sexual Violence Services 25 hotline)
- 703- 228-4848 (Arlington County Domestic Violence Services Hotline)
- 703-368-4141 (Prince William County Sexual Assault Victims Advocacy Services (SAVAS) hotline
- 1-800-838-8238 (Virginia Family Violence and Sexual Assault Hotline)
- 1-800-656-HOPE (Rape, Abuse and Incest National Network) https://ohl.rainn.org/online/

CAPS: Counseling and Psychological Services

Counseling and Psychological Services (CAPS) provides a wide range of free *confidential* services to students, faculty, and staff. Services are provided by a staff of professional clinical psychologists, social workers, counselors, learning specialists, and psychiatric providers. CAPS individual and group counseling, workshops, and outreach programs are designed to enhance students' personal experience and academic performance.
Visit us at **caps.gmu.edu** for additional resources.

- For consultation or emergency assistance during office hours call 703-993-2380.
- For assistance during non-office hours, call University Police at 703-993-4357.
- 703-527-4077 (CrisisLink)
- 1-800-273-8255 (National Suicide Prevention Lifeline)
- 1-877-838-2838 (Veterans' Crisis Hotline)

Student Health Services (SHS) — Provides *confidential* health care to enrolled students in emergency and non-emergency circumstances on the Fairfax, Arlington and Prince William campuses. If there is a medical emergency and Student Health Services (SHS) is closed, please contact the free after-hours nurse ((703) 993-2831), a hospital emergency room, an urgent care facility, or call 911.

SUB 1, Suite 2300
703-993-2831

University Police:

Emergency: 911 Non-Emergency: (703) 993-2810
Reporting a Crime (Crime Solvers Anonymous Tip Hot-Line): (703) 993-4111
Mason Police Website: http://police.gmu.edu/
Eric Heath, Chief of Police Phone: (703) 993-3840 E-mail: eheath2@gmu.edu