



# ECE/CS 4570

## Wireless Networks and Mobile Systems

### Spring 2005

## 1. Sections and Meeting Times

ECE/CS 4570, Wireless Networks and Mobile Systems, is taught in Blacksburg and at the Northern Virginia Center (NVC). Lecture sessions are shared between the two sites once per week using interactive videoconferencing. Separate laboratory sessions are held once per week at each site. Meeting times and responsible instructors are listed below.

CRN	Department	Instructor of Record	Location	Common Lecture Sessions	Laboratory Sessions
15906	CS	Dr. Chen	Blacksburg	Mondays, 4:00-5:15 Torgersen 1000	Wednesdays, 4:00-5:15 McBryde 233
15049	ECE	Dr. Midkiff			
15481	CS	Dr. Chen	NVC	Mondays, 4:00-5:15 NVC, Room TBD	Mondays, 5:30-6:45 NVC, Room TBD
15479	ECE	Dr. Midkiff			

## 2. Staff

This class is team-taught by two faculty members with the help of several graduate students. Contact the instructor of record (see above) for your section with questions or concerns about grades and any administrative matters. All instructors and graduate assistants monitor the discussion board.

### 2.1. Instructors

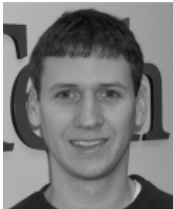


Dr. Ing-Ray Chen  
 Department of Computer Science  
 Northern Virginia Center  
 Virginia Polytechnic Institute and State University  
 7054 Haycock Road, Suite 400  
 Falls Church, Virginia 22043  
 ☎: 703.538.8376; 📠: 703.538.8348; ✉: irchen@cs.vt.edu  
 Office Hours: Mondays 3:00-3:45 p.m. (NVC 304) or by appointment



Dr. Scott F. Midkiff  
 Bradley Department of Electrical and Computer Engineering  
 Alexandria Research Institute  
 Virginia Polytechnic Institute and State University  
 206 North Washington Street, Suite 400  
 Alexandria, Virginia 22314  
 ☎: 703.535.3468; 📠: 703.518.8085; ✉: midkiff@vt.edu  
 Office Hours: Mondays 3:00-3:45 p.m. (NVC 442) or by appointment

### 2.2. Laboratory Instructor (Blacksburg)



Mr. Michael S. Thompson  
 Bradley Department of Electrical and Computer Engineering  
 Virginia Polytechnic Institute and State University  
 2010 Torgersen Hall  
 Blacksburg, Virginia 24061  
 ✉: mithomp4@vt.edu  
 Office Hours: By appointment

### 2.3. Graduate Assistants



Ms. Jin-Hee Cho  
Department of Computer Science  
Virginia Polytechnic Institute and State University  
Northern Virginia Center  
Blacksburg, Virginia 24061  
✉: jinheechogwb@yahoo.com  
Office Hours: TBD or by appointment



Mr. Baoshan Gu  
Department of Computer Science  
Northern Virginia Center  
Virginia Polytechnic Institute and State University  
7054 Haycock Road  
Falls Church, Virginia 22043  
✉: bgu@vt.edu  
Office Hours: By appointment



Mr. Unghee Lee  
Bradley Department of Electrical and Computer Engineering  
Virginia Polytechnic Institute and State University  
2040 Torgersen Hall (0281)  
Blacksburg, Virginia 24061  
✉: ulee@vt.edu  
Office Hours: TBD or by appointment

### 3. Course Overview and Objectives

This is a multidisciplinary, project-oriented design course that integrates topics at all layers of wireless and mobile systems, from wireless physical layer constraints through mobile application design. The course emphasizes “hands-on” learning through experiments, case studies, and design projects.

Having successfully completed this course, you will be able to:

- Describe the characteristics and operation of contemporary wireless network technologies such as the IEEE 802.11 wireless local area network and Bluetooth wireless personal area network;
- Describe the operation of the TCP/IP protocol suite in a mobile environment, including the operation of Mobile IP and a mobile ad hoc routing protocol;
- Describe security issues and current solutions for wireless networks and mobile systems;
- Use application program interfaces (APIs), such as Microsoft's .NET Compact Framework (CF) or Universal Plug-and-Play (UPnP), to realize mobile applications;
- Design, implement, and test a prototype mobile application;
- Design, implement, and test a wireless access service;
- Measure and characterize the performance a wireless local area network, mobile routing protocol, and mobile application; and
- Monitor the operation of mobile network protocols and applications using standard tools.

### 4. Prerequisites

This course requires programming ability in a programming language such as C++ or Java; a basic understanding of operating systems and distributed systems; and sufficient maturity to undertake substantial design projects. These prerequisites are satisfied by CS 4254 (Computer Network Architecture and Programming) or ECE 4564 (Network Application Design). Students who have taken ECE/CS 5565 (Network Architectures and Protocols I) and can program in C++, C#, or Java should also have sufficient background knowledge for the course. Other students should discuss their qualifications with an instructor.

## 5. Course Credit

The course carries 3 hours credit and counts as a technical elective for BSEE and BSCPE students and as a design technical elective for BSCPE students. It is approved for graduate credit and counts as an area "5" (computer engineering area) course for MSEE students and as a software breadth course for MSCPE students.

Note that CS graduate students can apply at most one approved 4000-level course to their plan of study. Limits on the number of 4000-level courses used on the plan of study also apply to EE and CPE graduate students.

## 6. Resources

This course relies on web, software, and hardware resources. There is no textbook.

- Lecture notes, assignments, supplemental readings, and other resources are provided via the class "Blackboard" site accessible at <http://learn.vt.edu/>. Use your Virginia Tech PID and password to access the web site. The "Blackboard" site is also used for announcements, discussion, and submissions.
- Teams of two students are loaned a "kit" for laboratory experiments and design projects. All team members must sign an equipment loan agreement. Each kit consists of (i) a notebook computer preloaded with Red Hat Linux, Windows 2000, and necessary software tools; (ii) a Compaq iPAQ handheld computer with dual-card sleeve running Pocket PC 2000; (iii) an IEEE 802.11a wireless LAN card; (iv) two IEEE 802.11b wireless LAN cards; (v) a Bluetooth card; and (vi) an IEEE 802.11b wireless LAN access point. Both team members are jointly responsible for all borrowed equipment. All equipment must be returned by May 4, 2005. Students not returning borrowed equipment will not receive a grade and may be subject to legal action.
- A listserv will be used for announcements. If you are not subscribed to a list for your section, please send email to your instructor of record.

## 7. Grading

Semester grades will be based on the following weights.

In-Class Laboratory Exercises	10%	(See described below)
At-Home Exercises	45%	(5% each for 9 at-home exercises)
Design Projects	20%	(10% each for 2 design projects)
Midterm Exam	10%	
Final Exam	15%	

Semester grades will be determined after all work is completed and graded. Point ranges for letter grades will be based on a several factors, including absolute and relative performance. Letter grades will not be based on a fixed, predetermined curve or point range. If you have questions or concerns about your performance or grades, please discuss them with your instructor of record.

Unless otherwise stated on the class "Blackboard" site, **all graded assignments must be submitted by 4:00 p.m. on the specified due date.** Assignments submitted after that time will not be accepted unless extenuating circumstances exist and arrangements are made prior to the due date.

If you feel that an error is made in grading an assignment or an exam, you must present a written appeal within one week after the assignment or exam is returned to you. Verbal appeals are not allowed and grades will not be changed after the one week period. Your appeal should be specific. Submit all appeals to your instructor of record.

## 8. Assignments

**In-Class Laboratories.** There are 13 laboratory sessions during the semester. The laboratories include demonstrations and experiments. Laboratories usually involve collaboration of all students with their

equipment. You must complete all pre-lab reading and any other pre-lab assignments *before* the in-class laboratory session. **You must bring all necessary equipment to the in-class laboratory sessions.** All students must participate in the in-class laboratories.

Ten percent of the semester grade is assigned to the in-class laboratory sessions. One-half percent of the semester grade is assigned to laboratory sessions 5, 10, 11, and 14, for a total of two percent. These four sessions do not have an associated at-home exercise and the half-percent grade is based on a required submission during the laboratory session. The remaining eight percent is based solely on attendance and preparedness for the laboratory. Full credit (8 percent) will be given if you miss or are not prepared for no more than two sessions. **You will receive a 0 out of 8 percent for this grading category if you miss or are not prepared for three or more sessions during the semester.**

**At-Home Exercises.** There are a total of nine at-home exercises (E1, E2, E3, E4, E6, E7, E8, E12, and E13). These exercises require configuration, experimentation, and/or analysis of different protocols and systems. Each exercise requires a concise written report that must be submitted electronically through the “Blackboard” site.

**Design Projects.** There are two design projects (P5 and P11). The projects require the design, implementation, testing, and documentation of a mobile application or service. Each project requires a validation to be performed by an instructor or graduate assistant and a written report that must be submitted electronically through the “Blackboard” site.

**Exams.** There will be one in-class midterm exam and an in-class final exam. The final exam will be comprehensive, but material covered since the midterm exam will receive the greatest emphasis. Exams will be open book and open notes. (If weather or other factors force cancellation of a class, then the midterm exam may be changed to a take-home exam.)

## 9. Honor Code Policy

Adherence to Virginia Tech's honor code is expected in all phases of this class. Design projects and at-home exercises are expected to be solely the work of you and your partner. You are not to collaborate with other students on design projects and at-home exercises unless instructed to do so. Exams are expected to be your original work. Collaboration is required for in-class laboratory exercises.

Projects and at-home exercises are to be the work of you and your partner. You may discuss general concepts, such as software issues, hardware configurations, Internet resources, or class topics, with others. However, any discussion or copying of project or exercise solutions, specific code or data, or report content is an honor code violation. All source material used in code and reports must be properly cited. If you are using a shared computer or disk, it is an honor code violation to leave your source, report, or other files on the computer where others may access them and it is an honor code violation to access other students' files.

Please discuss any concerns about the honor code or any questions that you may have about what is or is not permitted with your instructor of record.

## 10. Special Needs or Circumstances

Please feel free to meet with or otherwise contact your instructor of record if you have any special needs, including need for accommodation of any religious or ethnic holidays.

## 11. Class Schedule

The official up-to-date class schedule, which includes due dates, is maintained on the class “Blackboard” site. Note that lectures are held on the date indicated in the “week” column of the schedule, which is a Monday. In-class lab sessions will be held on the same day at the Northern Virginia Center and on the following Wednesday in Blacksburg. Assignment due dates are the same for both locations.