TCP/IP and Internet Technologies

Spring 2011
Syllabus
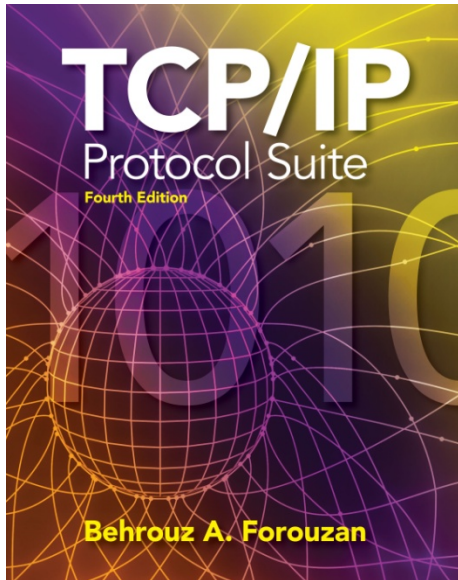
Course Title:	TCP/IP and Internet Technologies
Instructor:	Dr. Vasil Y. Hnatyshin
Contact Info:	Department of Computer Science, 3rd floor, Robinson Building
Email:	hnatyshin@rowan.edu
Phone:	(856) 256-4758
Office Hours:	Tue./Thur.: 2:00 – 3:00 pm Mon.: 5:00 – 6:00 pm
Meeting Time:	T/R: 3:15 – 4:30 pm, BOZ 135
Required Book:	Behrouz A. Forouzan, "TCP/IP Protocol Suite", 4th edition

Catalog Description: CS.06.416, **TCP/IP and Internet Protocols** (3 credits)

Prerequisites: 0706.410. Data Communications and Networking or permission of instructor

This is an advanced computer networking course that will expand students knowledge received in the Data Communications and Networking course. This course will examine operation of the TCP/IP protocol as well as design and architecture of the Internet. This course will cover such topics as: medium access protocols, address resolution protocols, Internet routing, Internet Protocol (IP), Quality of Service, Transport Protocol, and congestion control mechanisms. This course will also include selected topics on network security and network management. Students will prepare and deliver technical presentations on state-of-the-art research topics in the Internet.

Class Policies

Expected Work and Grading:

Final	25%
Midterm	20%
Assignments	25%
Research Project	10%
Quizzes	15%
Attendance and class participation	5%

The Final Letter Grade is assigned based on the following numeric grade to letter grade conversion table:

F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A
< 60	60-63	64-66	67-69	70-73	74-76	77-79	80-83	84-86	87-89	90-93	>= 94

Assignments/Exams Description:

- **Assignments**: Homework assignments will be in a form of a written assignment or a laboratory study using OPNET or Wireshark software. Laboratory assignments will require you to submit a written report. Laboratory assignments will be conducted as a group project, while written assignment will be individual. When working as a group, you will submit a single set of solutions per group, and you will be graded as a group. When working as a group each member of the group is expected to contribute. Members of the group who do not contribute will receive 0 points for the assignment. If you miss a class period during which work is assigned, you are still responsible for handing in the work by the due date. Each assignment will be due by the beginning of the lecture period.

- **Quizzes**: All quizzes will be unannounced and will emphasize the material that was covered during recent lectures. Make up quizzes will only be given if the instructor was notified in advance of a reasonable absence or in extenuating circumstances.

- **Exams**: Both midterm and final will be written exams (i.e. pen and paper). Midterm exam will be conducted during one half of the class period. Final exam will be conducted at the time scheduled by Rowan University registrar office.

- **Semester Long Project:** There will be one semester long group research project. Students will form groups of 2-4 participants and will investigate a topic of their choice related to the material covered in class. To complete this project each member of the group is required to read 3 different papers on the topic. Each member of the group should read a different paper. List of possible topics will be provided. However students are encouraged to come up with the ideas for their own projects.

  Tentative schedule of project progress is as follows:
    o Week 1: Identify the topic and select first batch of papers to read.
    o Week 3: Submit summary #1 of read papers and select the next batch of papers to read
    o Week 5: Submit summary #2 of read papers and select the next batch of papers to read
    o Week 7: Submit summary #3 of read papers and identify the main points and venues for improvement/study of the research topic.

- o Week 8: Submit a document that describes the design of the simulation for testing properties/improvements for the topic of research. You may use OPNET network simulator for testing your research project.
- o Week 10: Set-up and run simulation.
- o Week 11: Collect and analyze the results
- o Week 13: Final report and presentation.

Semester Long Project Grade Distribution:
- o Paper summaries   20%
- o Experimental Study   40%
- o Final report   30%
- o Presentation   10%

Policies:

- **Class attendance/participation/conduct:** Attendance is mandatory. The attendance/class participation portion of the course grade will be computed based on the number of missed classes and student's contribution to class discussion. It is unlikely that you'll be able to complete the assignments and pass the exams without regular attendance. Since many quizzes will be unannounced, you may miss a quiz if you miss a class. Please inform the instructor in advance, preferably by email, if you will be absent from a class or lab session. See official rowan University Attendance policy at:

  http://www.rowan.edu/open/provost/policies/documents/AttendancePolicy-FacultyandStudentsResponsibilities-webrevS2009.pdf

- **Late Assignment Submission Policy:** Assignments not submitted on time will receive zero as a grade. However, most professors are reasonable people. If for some reason, you believe you will not be able to turn in homework on time, let me KNOW AHEAD OF TIME and I MAY give you an extension.

- **Missing exams or class due to illness:** It is important to get a note from student health services, or your personal doctor, or other form of documentation if you miss a class or a lab meeting. If you are not feeling well on a given day, please email or call me ahead of time. In this case, if you miss a quiz, I may let you make that quiz up. If you have to miss an exam (and I hope you will not) re-tests will be given only in cases of extreme hardship as defined by the rules of Rowan University, and I always require documentation of the reasons for your absence.

- **Policy on Plagiarism:** Plagiarism is a form of academic dishonesty which includes but is not limited to submitting someone else's work as your own and working on the individual assignments in groups. It is college policy that students who commit an act of academic dishonesty may be subject to failure in the course, suspension from the College, or both. See the official Rowan University Academic Integrity Policy at:

  http://www.rowan.edu/provost/policies/AcademicIntegrity.htm

  If you use materials that you've obtained on the Internet, from a book, etc., for example as part of a programming assignment, you must include an appropriate reference. To use such materials without proper attribution is a form of plagiarism. I will make a reasonable effort to catch plagiarizers, and it will not be tolerated.

- **Email:** E-mail is a primary form of communication with me outside the class periods and official office hours. I often send email messages to the class to make important course announcements (i.e. changes in the due dates, additional assignments, etc.). I send course email announcements to the Rowan University Web Email account. You are required to read your email daily (not including holidays and weekends). (If you are not on campus every day and are unable to read your email from home, please let me know immediately and we'll work something out). The Rowan Web Email system will allow you to automatically forward your email to another account so you can read your mail somewhere else more frequently. Early in the semester you may receive an assignment via email that WILL NOT BE ANNOUNCED IN CLASS to ensure that you are reading your email.

- **Blackboard:** I will use Blackboard-CE software package to maintain course information such as syllabus, assignments, solutions, lecture notes, etc. You are required to use Blackboard-CE for this course. You can login onto the Blackboard-CE using your Rowan University login information. Blackboard-CE is available at: http://webct3.rowan.edu/webct/entryPageIns.dowebct

- **Withdrawal from the class**: Drop/Add period ends on **Monday, January 24th, 2011**! During the first half of the semester, a student can withdraw from a course by filing the appropriate form at the Registrar's office; all such withdrawals will be approved. The last date for automatic approval for the Spring 2011 semester is **March 7th** (professor's signature is required). After this date, no withdrawals will be approved without extenuating circumstances beyond the control of the student, such as serious illness, that prevent completion of the course. For complete list of withdrawal dates see http://www.rowan.edu/provost/registrar/RIG/Spring2011RIGV1.pdf.

- **Classroom Decorum/Behavior:** In order to show proper respect for the instructor and for your fellow students, please observe the following:
    - Be on time! Class will begin promptly at the scheduled time. Allow yourself enough time to park and get to class, ready to learn, before the period begins. Quizzes will be given at the start of the class so if you are late you may miss a quiz.
    - Do not eat in class. It's very distracting, especially since other students may be hungry too!
    - Do your best to remain in the room during the period. Exiting and entering during the period breaks the concentration of your fellow students, and makes it hard for you to get the full value of the class.
    - Turn off all cell phones, pagers, and anything else that would cause a distraction to yourself or others around you.

    Please refer to Rowan University's policy on student conduct and classroom behavior, in particular, available at:

    http://www.rowan.edu/provost/policies/conduct_OfficeofTheProvostRowanUniversity.htm
    http://www.rowan.edu/provost/policies/documents/classroom_behavior_policy_nov-1020.pdf

- **Getting Help:** I have scheduled office hours for your convenience; please take advantage of them. In addition, I can always be reached quickly via email or telephone (see contact information above). If you are having a problem with the course, the sooner we discuss it the more likely we'll be able to deal with it.

NOTE: *Questions about the assignment asked less than 24 hours before is due date may receive no answer.*

List of Topics

1. **Introduction to Networking and brief History of Internet**
2. **OSI and TCP/IP Reference Models**
3. **Supporting Software**
   a. OPNET IT Guru and Modeler
   b. Ethereal/Wireshark
4. **Underlying Technologies**
   a. Local Area Networks
   b. Wide Area Networks
   c. Connecting Devices
5. **Internet Protocol (IP)**
   a. Internet Addressing
   b. Classful vs. Classless Addressing
   c. Routing Principles and Protocols: RIP, OSPF, and BGP
   d. Address Resolution Protocol (ARP)
   e. Internet Control Message Protocol (ICMP)
   f. Operation of Internet Protocol
   g. IPv6
6. **Transport Protocol**
   a. User Datagram Protocol (UDP)
   b. Transmission Control Protocol (TCP)
   c. TCP operation
   d. TCP Congestion Control (Slow Start, Congestion Avoidance)
   e. TCP flavors and variations: Fast Retransmit, Selective ACK, Forward ACK, Reno, New Reno, Vegas, and Tahoe.
7. **Internet Technologies:**
   a. *Quality of Service*: Integrated Services and RSVP, Differentiated Services, MPLS, and RTP.
   b. *Active Queue Management:* Random Early Detection, FIFO, Fair Queuing, Weighted Fair Queuing
   c. *Network Management:* Simple Network Management Protocol and Management Information Base.
   d. *Network Security*