ECE 7428 (Computer Comm. Networks) [Fall 2018]

Instructor: Dr. Sarvesh Kulkarni

1 General Information

Class: Mon 3:00 pm - 5:30 pm in CEER 314, and online via web-streaming

Instructor: Sarvesh Kulkarni (sarvesh.kulkarni@villanova.edu)
Office: Tolentine 431A
Office Hours: Wed, Thu, Fri 10:30 am - 11:30 am, or immediately after class, or by appointment
Phone: (610) 519-6533

TA: none

Textbook: Peter L. Dordal, "An Introduction to Computer Networks (ver 1.9.19, July 26 release)." Get it HERE. This is an open source textbook and has been released under the *Creative Commons* license. Be sure to repect the terms of the license stated HERE.

2 Student Evaluation and Grading Scheme

Grades are based on your performance on the following components.

HW: 20% weightage
Project: 15% weightage
Survey paper: 20% weightage
Mid-term exam: 20% weightage
Final Exam (non-comprehensive): 25% weightage

The average grade in this class is a 'B'.

HW assignments and project deliverables are to be uploaded to the Blackboard e-learning site before the due date/time, or handed-in during class hours. Late HW assignments will be assessed a 10% penalty per day, up to the cut-off date (usually three days later). After the cut-off date, assignments/projects WILL NOT be accepted. Questions in the exams will be based on the material taught in class, class discussions and homework assignments.

In addition, you will be required to write a technical paper **(survey paper)** surveying a particular research area of interest in networks. The topic(s) for the paper will be provided by the instructor. This is a challenging task and you will not do a good job if you write the paper the night (or even the week) before it is due. So plan ahead, and allow at least 3-4 weeks to give yourself a chance to understand the state of current research in the field in which you intend to write your paper. More instructions on how to proceed with this task will be provided as the semester progresses.

3 Course Information

3.1 Objectives

This course is a follow-up to the undergraduate course "Computer Networks (ECE 4470)", but is designed to be independent of ECE 4470 as much as possible. The only firm requirement is that you understand the ISO OSI

and the TCP/IP reference models for computer networks. A brief review will be provided in class, but you may have to do additional reading on your own in order to catch up; check with the instructor.
We will study specific topics of interest in computer networks as outlined below. The aim is to provide you an insight into fundamental concepts in network architectures and higher-level protocol design, their theoretical underpinnings and some current and future trends in networking technologies.

3.2 Course topics

1. Review of the ISO-OSI and the TCP/IP reference models for computer networks.
2. TCP, its operation, its flavors (variations) and some of its performance and behavioral implications.
   Subtopics: Protocol mechanism, ports and usage, state machine, timer algorithms, congestion control techniques, performance implications of timer selection, wireless environments, socket programming.
   Some UDP topics may also find their way into the discussion, for completeness.
3. Queuing Disciplines and Quality of Service (QoS). Subtopics: Traffic shaping & policing, queuing schemes for fairness, performance & prioritization; elements of INTSERV and DIFFSERV protocols.
4. Wireless networking: Concepts and their application in the IEEE 802.11 protocol.
5. Layer 7 Routing, and Content Distribution.
   Subtopics: Elementary concepts in overlay networks (specifically p2p systems) and Content Distribution Networks (CDNs).
6. Elements of Queuing Theory and Performance Analysis of Networks.
7. Voice over Internet Protocol (VOIP).

We will have to leave some material out if we run short of time. Please interrupt me in class if you don't understand the topic under discussion, or if you need clarifications. Class discussions will be informal and everyone is encouraged to participate. No question is foolish!

4 Policy on Academic Integrity

We expect and require all our students to display a strong sense of ethical decision-making and academic integrity. Academic dishonesty devalues the quality of education and tarnishes the reputations of students, faculty and the university. As engineers, our code of conduct requires us to place honor and integrity at the forefront of everything we do; it is expected that you will adopt these values and instill them into your work habits. The University's academic integrity policy can be found HERE. Students violating the academic integrity policy will receive a zero on that assignment or examination and the violation will be reported to the Associate Dean for Academic Affairs.

For the purpose of this course, students are allowed to collaborate on a *very limited basis* in their HW assignments and project. The collaboration is limited to asking questions about problem-solving techniques and general directions in search of solutions. However the work products and final solutions must be *your own* and *in your own words*. Similarly, you are allowed to seek help from one another in trying to understand the research papers that you read for writing your "survey paper." However, the survey paper must be *in your own words, the way you understood the material*. Students may not ask their peers to show them their work, or ask their peers for details of answers.

Of course, no collaboration with anyone is permissible during an examination. If in doubt about the scope of your information-sharing, please consult the instructor first.

5 Taking Examinations

It is assumed that in-class students will take their examinations in class, and distance-learning students will take their examinations off-site (online). **However**, regardless of your status as an "in-class" or a "distance-learning" student, you can opt to take all or some of your examinations in class, or off-site (online).

5.1 In-class Examinations

Any student, even a distance-learning registrant, may opt to take any examination in class during class hours as long (s)he informs the instructor at least three days (72 hours) in advance.

5.2 Off-site i.e. Online Examinations

Distance Learning students, as well as in-class students who are unable take examinations on campus at the appointed time(s), may take their examinations online. You will need a high-speed Internet connection, a webcam and microphone (internal or external), a printer nearby, a government-issued photo ID, and the required monitoring software (to be announced later).

6 Special Accommodations for Classes and Examinations

Make-up examinations requested by students due to business trips shall be with **PRIOR** arrangement and shall be usually taken **EARLIER** than the one on our regular schedule. Make-up examinations due to health reasons and unforeseen circumstances will be administered on a case by case basis, if suitable and compelling documentation is provided.

It is the policy of the university to make reasonable academic accommodations for qualified individuals with disabilities. Students with physical and/or non-physical disabilities are supported by two different offices. If you are a person with a *non-physical* disability please register with the office of Learning Support Services (LSS) by emailing Learning.support.services@villanova.edu or by phoning 610-519-5176 as soon as possible. Registration is *required* in order to receive accommodations.

The Office of Disability Services (ODS) collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with *physical disabilities* the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed physical disability and plan to utilize academic accommodations, please contact Gregory Hannah, advisor to students with disabilities at 610-519-3209 or visit the office on the second floor of the Connelly Center.