

CN 8825: Network Design

Calendar Description

This course addresses the background and experiences on Wide Area Network (WAN) design approaches/tools, mathematical problem formulations and how to develop and apply algorithms/methods to do WAN planning and designs. We present basic network design techniques for local, metro and wide area communication networks. For achieving this, we start with the design of typical voice and data networks that meets functional, performance and cost goals. Then, we provide an overview of various factors that are important for the planning and design of WAN. The course also covers foundation materials in queuing models and graph theory. The course also addresses selected materials in computer and communication networks through topological optimization, network dimensioning, and routing, coupled with analysis tools such as DELITE and OPNET IT GURU, for each problem domain.

Objective

At the end of the course, students should have a good knowledge of the fundamental concepts related to basic network design and optimization techniques for local, metro and wide area communication networks.

Course Details

Required Textbook:

Wide Area Network Design- Concepts and Tools for Optimization, Robert S. Cahn, Morgan Kaufmann Publishers Inc., 1998. □ISBN 1558604588

Other Textbooks:

- Routing, Flow and Capacity Design in Communication Networks, by M. Pioro and D. Medhi. Elsevier, 2004, □ISBN: 0125571895.
- Top Down Network Design, by Priscilla Oppenheimer. Cisco Press, 1st Ed., (August 15, 1999), □ISBN 1578700698, 1999.

Topics: Readings are from the textbook and Handouts

Basic Network Design Principles, Requirements and Planning	Readings: Chap 1, 2
Some theory: Graphs, Trees, Tours	Readings: Chap 3
Traffic Characterization & Logical Design	Readings: Chap 4
Some theory: Graphs, Trees, Tours	Readings: Chap 3
Importance of Data	Readings: Handouts
Traffic and Cost Generators	Readings: Chap 4
Access and Backbones	Readings: Chap 5, 6, 7, 8
Capacity, Routing and Reliability	Readings: Handouts

A combination of lectures and laboratory assignments will be used as course delivery methods.

Evaluation

- The evaluation will consist of assignments, class participation, laboratories, and class projects, as indicated in the table below:

Item	Percent
Assignment	20%
Class Participation	5%
Labs	25%
Project Report	40%
Project Presentation	10%

- The class project will consist of larger scale projects using most of the concepts covered during the course. It is recommended that the project be worked on in teams of maximum 2 or 3 students. Projects are due during the last week of classes (date to be announced by the professor). Late projects will not be accepted for marking. Projects must be submitted in the format detailed in class, and are to be submitted as directed by the professor. Projects submitted in any other fashion are deemed void.
- Grades on assignments and labs will be available on the Blackboard system or other means specified by your Professor. As per Ryerson regulation, final grades (including the class project marks) will be disclosed only by a date specified by the registrar's office.

Missed Classes and/or Evaluations

Students are required to inform the professor of any situation which arises during the semester which may have an adverse effect upon their academic performance, and must request any considerations and accommodations according to the relevant policies and well in advance. Failure to do so will jeopardize any academic appeals.

- *Medical certificates* – If a student misses the deadline for submitting an assignment, or the date of an exam or other evaluation component because of illness, he or she must submit a Ryerson Student Medical Certificate AND an Academic Consideration form within 3 working days of the missed date. Both documents are available at www.ryerson.ca/senate/forms/medical.pdf. If you are a full-time or part-time degree student, then you submit your forms to your own program department or school. If you are a certificate or non-certificate student, then you submit your forms to the staff at the front desk of the Chang School.
- *Religious observance* – If a student needs accommodation because of religious observance, he or she must submit a Request for Accommodation of Student Religious, Aboriginal and Spiritual Observance AND an Academic Consideration form within the first 2 weeks of the class or, for a final examination, within 2 weeks of the posting of the examination schedule. If the required absence occurs within the first 2 weeks of classes, or the dates are not known well in advance as they are linked to other conditions, these forms should be submitted with as much lead time as possible in advance of the required absence. Both documents are available at <http://www.ryerson.ca/senate/forms/reobservforminstr.pdf>. If you are a full-time or part-time degree student, then you submit the forms to your own program department or school. If you are a certificate or non-certificate student, then you submit the forms to the staff at the front desk of the Chang School.
- *Students with disabilities* – In order to facilitate the academic success and access of students with disabilities, they should register with the Access Centre <http://www.ryerson.ca/studentervices/accesscentre/index.html>. Before the first graded work is due, students should also inform their instructor through an “Accommodation Form for Professors” that they are registered with the Access Centre and what accommodations are required.

Academic Integrity and Plagiarism

Ryerson’s Policy 60 (the *Student Code of Academic Conduct*) applies to all students at the University. The policy and its procedures are triggered in the event that there is a suspicion that a student has engaged in a form of academic misconduct.

Forms of academic misconduct include plagiarism, cheating, supplying false information to the University, and other acts. The most common form of academic misconduct is plagiarism. Plagiarism is a serious academic offence and penalties can be severe. In any academic exercise, plagiarism occurs when one offers as one’s own work the words, data, ideas, arguments, calculations, designs or productions of another without appropriate attribution or when one allows one’s work to be copied.

All academic work must be submitted using the citation style approved by the instructor. The most common citation style is APA. Students may refer to the Ryerson Library for APA style guide references: <http://library.ryerson.ca/guides/toolbox/style/>

It is assumed that all examinations and work submitted for evaluation and course credit will be the product of individual effort, except in the case of group projects arranged for and approved by the course instructor. Submitting the same work to more than one course, without instructor approval, is also considered a form of plagiarism.

Students are advised that suspicions of academic misconduct may be referred to the Academic Integrity Office (AIO). Students who are charged with academic misconduct will have a Disciplinary Notation (DN) placed on their academic record (not on their transcript) and will be assigned one or more of the following penalties:

- A grade reduction for the plagiarized work
- A zero for the plagiarized work
- An F in the course
- More serious penalties up to and including expulsion from the University

For more detailed information on these issues, please refer to the full online text for the *Student Code of Academic Conduct* at <http://www.ryerson.ca/senate/policies/pol60-F2014.pdf> and the Academic Integrity Website at www.ryerson.ca/ai.

Turnitin.com is a plagiarism prevention and detection service to which Ryerson subscribes. It is a tool to assist faculty members in determining the similarity between student work and the work of other students who have submitted papers to the site (at any university), internet sources, and a wide range of journals and other publications. While it does not contain all possible sources, it gives faculty some assurance that students' work is their own. No decisions are made by the service; it simply generates an "originality report". Faculty must evaluate that report to determine if something is plagiarized.

Important Resources Available at Ryerson

Use the services of the University when you are having problems writing, editing or researching papers, or when you need help with course material:

- **The Library** (LIB 2nd floor) provides research workshops and individual assistance. Inquire at the Reference Desk or at www.ryerson.ca/library/info/workshops.html
- **The Writing Centre** (LIB 272- B) offers one-on-one tutorial help with writing and workshops www.ryerson.ca/writingcentre/workshops.htm
- **Learning Success** (VIC B-15) offers individual sessions and workshops covering various aspects of researching, writing, and studying. You must book these directly through their website <http://www.ryerson.ca/student-services/learningsuccess/>
- **English Language Support** (VIC B-17) offers workshops to improve overall communication skills www.ryerson.ca/student-services/els/

There is one general site where you may see and register for all of the workshops offered by all of these areas: <http://www.ryerson.ca/academicintegrity/workshops.html>