COMMUNICATIONS AND NETWORKS II

School of Advanced Technology

Course Number: **CST8165**	**Contribution to Program:** Core	**Educator(s):** I. Allen
		Approved For: Fall 2007
Applicable Program(s): Computer Engineering Technology Computer Engineering Technology - Computer Science	**AAL:** 06 06	**Approved By:**
	Prerequisites: CST8155 & CST8244	Claude Brulé, Chair Computer Studies Department
Course Hours: Delivered: 60 Normative: 60	**Corequisites:** None	**Approved for Academic Year:** 2007-2008

COURSE DESCRIPTION

This course introduces the common architectures and implementation of wide-area networks. The primary focus of the course is on TCP/IP protocols and applications. Theory will be reinforced by developing practical client/server solutions to problems of varying degrees of complexity.

RELATIONSHIP TO PROGRAM LEARNING OUTCOMES

This is a vocational course that supports the following program vocational learning outcomes: http://www.edu.gov.on.ca/eng/general/college/progstan/techno/comp_eng3.html	This course contributes to your program by helping you to achieve the following provincial essential employability skills learning outcomes: http://www.edu.gov.on.ca/eng/general/college/progstan/essential.html
1,2,3,6,7	2,4,5,7

COURSE CURRICULUM

I. Course Learning Requirements/Embedded Knowledge and Skills

Course Learning Requirements	Knowledge and Skills
To earn credit for this course, you must reliably demonstrate your ability to:	
1. Develop complete programs using top-down design and structured programming techniques	• Demonstrate considerable facility with strict ANSI C (C89; also known as ISO C90) without compiler or library extensions, complete with suitable documentation;
2. Illustrate one or more of the common protocols of the Internet (TCP/IP, SMTP, FTP, etc.) with well-designed running programs	• Make use of standard POSIX-compliant services for socket-based network and inter-process communication services; • Select client and/or server application models as directed to address communication needs;
3. Appropriately use static, automatic, and dynamic memory, with careful attention to scope	• Choose memory allocation schemes depending upon each problem's requirements;
4. Acquire a good, basic understanding of the structure of the Internet and its communication essentials including the IP layer, the transport protocols UDP and TCP, and application protocols such FTP, SMTP and HTTP	• Demonstrate the ability to apply sockets to communicate using these Internet Protocols;
5. Acquire knowledge beyond the lecture notes, lab exercises, and practical assignments	• Use the recommended textbooks, online "man" pages, and Internet resources to gain information.

II. Learning Resources

Recommended Reference:

1) TCP/IP Illustrated, Volume 1: The Protocols, by W. Richard Stevens, Addison-Wesley, 1994, ISBN 0201633469

2) Internetworking with TCP/IP, Volume III: Client-Server Programming and Applications, BSD Socket Version, 2nd ed., by Douglas E. Comer and David L. Stevens, Prentice-Hall, 1996, ISBN 013260969X

3) UNIX Network Programming: The Sockets Networking API – Volume I , 3rd ed. by Stevens, Fenner, and Rudoff, Addison-Wesley, 2004, ISBN 0-13-141155-1

See also textbooks from previous semesters, including:
- The C Programming Language, 2nd ed., by Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988, ISBN 0-13-110362-8
- Advanced Programming in the UNIX Environment, 2nd ed., by Richard Stevens and Stephen Rago, Addison-Wesley, ISBN: 0-201-43307-9

III. Teaching/Learning Methods

The course consists of 2 hours of lectures and 2 hours of lab per week. It is anticipated that you will need to spend an additional 4 hours per week, on average, of your own time for assignments and study.

During this course you are likely to experience:

Lectures:

Lectures will present the theoretical material of the course.

Students are expected to attend all of the lectures. Students are encouraged to ask questions during lectures and to consult with the professors on topics, which they do not clearly understand. Professors will inform students, at the beginning of the course, of suitable times for consultations.

Labs:

Students are expected to perform initial analysis and design **before** their scheduled lab, in order to take advantage of the limited lab time. Laboratory assignments will be done in a lab equipped with personal computers running Linux and other networking hardware and software. The computers in the lab are connected to the Internet. Lab assignments will be closely integrated with the lecture material.
The students' ability to successfully complete the assigned exercises will directly correlate with their level of success on tests and the final exam.

Students are expected to work in the lab and to attempt to solve problems encountered on their own or with assistance from other students. When a difficult problem arises, the professor will not be expected to solve it directly, but will try to assist the student in finding resources and developing strategies for solving the problem

Students will be expected to complete all required assignments in a satisfactory manner and demonstrate their competence in the lab as requested.

Students will be expected to read and understand specific sections of the textbook. Some of this material may not be directly covered in class lectures.

IV. Learning Activities

Samples of learning activities include:

- classroom lectures
- laboratory work
- practical and reading assignments
- research of course-related material

V.   Course Content

Lectures will include detailed analyses of different aspects of TCP/IP. Clients and servers will be developed for some common TCP/IP application protocols. Students are expected to observe carefully and ask for clarifications or further examples.

- A selection of the following topics will be covered in lectures (not necessarily in this order):

Introduction to WAN's and the Internet:

- Standards and regulatory organizations, open systems architectures, TCP/IP protocol layering, terminology. Introduction to the Internet including Internet terminology, addressing, host names, common TCP/IP protocols.

IP Layer:

- IP services, IP address classes, subnetting, supernetting, IP header and datagram structure, routing and physical transport of IP datagrams.

Transport protocols:

- UDP. Datagram and header structure. UDP clients and servers, TCP segment and header structure, TCP clients and servers connection establishment, TCP data flow, flow control, retransmission and connection release.

Application protocols. Analysis of some common application protocols like TELNET, FTP, HTTP, SMTP, and POP3.

Current Trends in Networking:

- CDMA, IxRTT, EVDO, Bandwith Management, DHCP, DNS, RADIUS, RMI, XML

Laboratories will include the following exercises:

- Use of Internet applications for gathering information.

- Examination of existing client-server resources on the Internet.

- Design and development of TCP/IP clients and servers.

- RFC Interpretation

VI.   Evaluation/Earning Credit

The following will provide evidence of your learning achievement:

Assessment of student learning will be done by means of two class tests, final exam and laboratory assignments.

Laboratory attendance is compulsory, and absence from three or more laboratory sessions without the prior consent of the professor will result in a final grade of "F". Students are responsible for keeping a record of the number of laboratory sessions they have missed. Professors will not inform students of an impending failure because of missed laboratory sessions.

All laboratory assignments must be successfully completed in order to obtain course credit. Late assignments will be penalized and receive a mark of zero, but they must still be completed. Any missed evaluation points will result in a grade of "0". In the case of a documented emergency the professor, in consultation with the Chair, will determine how the marks will be made up and/or final grade adjusted.

The Computer Studies Department requires that all course assignments (homework exercises, laboratory work, projects, etc) be submitted by students using a standard which could be specific to one or more courses. Professors will ensure, at the beginning of the term, that students are advised of the exact details of these course specific submission requirements. Professors will also post them online alongside the course outline. Student submissions that do not meet the course published submission standards may not be marked, and may incur a penalty of up to 100% of the submission mark.

The factors in the final grade are:

1. Class Test 20%
2. Class Test 20%
3. Final Examination 30%
4. Lab Assignments 30%

In order to pass the course, the student must have a grade of at least 50% or **"D-"** on tests and final exam combined, as well as on the lab exercises component.

Lab assignments will not be included in the final grade unless the student achieves at least a grade of 50% or **"D-"** on the combined tests and final exam. (Students who have a failing grade on the combined tests and the exam will receive a grade of **"F"**.)

All students are required to write the final exam. There are no provisions for "making up" a missed final exam. If, as a result of being off-track in your program or some unforeseen circumstance, you note that there is a scheduling conflict in your final exam schedule, it is your responsibility to alert your course professor no later than one week before final exams start, to allow for any special arrangements.

VII. Related Information

Retention of course material. It is your responsibility to retain copies of all assignments, labs and mid-term tests (returned from the professor), and any other evaluations and pertinent records (except for final exams, which are not returned) in case you become involved in an appeal hearing at a later date.

It is also your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

See College Directives E15 or E24 for details in your Instaguide.

College email account. Algonquin College provides all full-time students with an email account. This is the address that will be used when the College, your professors, or your fellow students communicate important information about your program or course events. It is your responsibility to ensure that you know how to send and receive email using your Algonquin College account, and check it regularly.

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether involving a professor and a student or amongst students, will not be tolerated on the college premises. Action taken will start with a formal warning and proceed to the full disciplinary actions as outlined in Algonquin College Directive - A8.

Harassment means one or a series of vexatious comment(s) (whether done verbally or through electronic means), or conduct related to one or more of the prohibited grounds that is known or ought reasonably to be known to be unwelcome/unwanted, offensive, intimidating, derogatory or hostile.

This may include, but is not limited to: gestures, remarks, jokes, taunting, innuendo, display of offensive materials, offensive graffiti, threats, verbal or physical assault, stalking, slurs, shunning or exclusion related to the prohibited grounds.

For further information, a copy of the official policy statement can be obtained from the Student Association.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offences a student can commit. Anyone found guilty will, on the first offence, be given a written warning and an "F" on the plagiarized work. If the student commits a second offence, an "F" will be given for the course along with a written warning. A third offence will result in suspension from the program and/or the college.
For further details on this directive, consult the Algonquin College Directive – E43 in your Instaguide, and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Violation of the Copyright Act.

- General – The Copyright Act makes it an offence to reproduce or distribute, in whatever format, any part of a publication without the prior written permission of the publisher. For complete details, see the Government of Canada website at http://www.cb-cda.gc.ca/info/act-e.html . Make sure you give it due consideration, before deciding not to purchase a textbook or material required for your course.

- **Software Piracy** - The Copyright Act has been updated to include software products. Be sure to carefully read the licensing agreement of any product you purchase or download, and understand the term and conditions covering its use, installation and distribution (where applicable). Any infringement of licensing agreement makes you liable under the law.

The Use of Electronic Devices during classes, other than those sanctioned by the course professor is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Directive E39 on the use of Electronic Devices in Class and Exams.

Disruptive Behaviour is any conduct, or threatened conduct, that is disruptive to the learning process or that interferes with the well being of other members of the College community. It will not be tolerated.

Members of the College community, both students and staff, have the right to learn and work in a secure and productive environment. The College will make every effort to protect that right.

Incidents of disruptive behaviour must be reported in writing to the departmental Chair as quickly as possible. The Chair will hold a hearing to review available information and determine any sanctions that will be imposed. Disciplinary hearings can result in penalties ranging from a written warning to expulsion.

For further details, consult the Algonquin College Directive - E27 in your Instaguide.

Students with Disabilities. If you are a student with a disability that affects your learning ability, and wish to receive special dispensation or academic accommodation, you are first required to identify your needs to the Centre for Students with Disabilities (CSD) so that support services can be arranged for you.

If, as a result of that consultation process, you are issued a letter from the CSD office prescribing certain special academic accommodations for that academic term, it is your responsibility to present this letter to each of your course professors, in order to obtain the special dispensation you are entitled to.

For further details, consult the Algonquin College Directive – E4 in your Instaguide.

Prior Learning Assessment (PLA)

See College Directive E35 for details on eligibility and process.

For this course, evidence of learning achievement for PLA candidates will include the successful completion of:

- A challenge exam with a breadth of coverage and level of difficulty equivalent to the final examination in the course;

- A hands-on or practical component to ensure that the requisite skill level has been achieved; and

- A computer programming (where applicable) assignment comparable to a representative assignment in the course.