COMP ENG 4DN4
Advanced Internet Communications
Winter 2018
Course Outline

CALENDAR/COURSE DESCRIPTION

This is an advanced course on computer network communications and will focus on Internet design and operational principles. It will enable students to develop software that implements network communications using the Berkeley socket application programming interface and introduces many of the tools that are used by Internet application developers. The assignment and laboratory components involve Internet communication experiments and software development using the Python programming language.

PRE-REQUISITES AND ANTI-REQUISITES

Prerequisite(s): Registration in Level III or greater in any Computer Engineering or Electrical Engineering Program; COMP ENG 4DK4.

SCHEDULE

Lectures: Monday and Thursday in ABB/163 at 9:30 am – 10:20 am
Tuesday in ABB/163 at 10:30 am – 11:20 am.

Tutorial: Thursday in BSB/163 at 8:30 am – 9:20 am.

Labs: Monday, Tuesday, Wednesday, Thursday and Friday in ITB/155 at 2:30 pm – 5:20 pm.

INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION

Dr. Terry Todd
ITB-A324
todd@mcmaster.ca
905 525 9140 ext. 24343
Office Hours: Mondays and Thursdays, 10:30 -12.

TEACHING ASSISTANT OFFICE HOURS AND CONTACT INFORMATION

Arvin Hekmati
ITB-A302
hekmatia@mcmaster.ca
905-525-9140 ext. 27264

Haleh Shahzad
ITB-A303
shahzah@mcmaster.ca
905-525-9140 ext. 27138

Office Hours: TBA
COURSE WEBSITE/ALTERNATE METHODS OF COMMUNICATION

https://owl.ece.mcmaster.ca/coe4dn4

COURSE OBJECTIVES

1. Learn the concepts, principles and protocols used in the Internet.

2. Develop networking software using the Berkeley socket application programming interface (API) in Python.

ASSUMED KNOWLEDGE

COMP ENG 4DK4: Computer Communication Networks.

COURSE MATERIALS

Required Text:

Reference Text:

Other Materials:
Lecture presentations and notes.
Personal Computer or laptop with a C compiler and Python 3 installed.

COURSE OVERVIEW

<table>
<thead>
<tr>
<th>Date/Week</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Review of Internet communications, IPv4, UDP, TCP, etc. Python IP networking support features, e.g., ip_address module functions.</td>
<td>Chapters 7 and 8 in textbook.</td>
</tr>
<tr>
<td>2</td>
<td>Network software tools, e.g., telnet, mnap, ncat, tcpdump, windump and WireSHARK.</td>
<td>Class notes.</td>
</tr>
<tr>
<td>3</td>
<td>IPv6, DNS, DHCP and NAT. Python support.</td>
<td>Class notes.</td>
</tr>
<tr>
<td>4-6</td>
<td>Introduction to the Berkeley socket application programming interface (API). Illustration using C and</td>
<td>Class notes.</td>
</tr>
<tr>
<td>Week</td>
<td>Topic</td>
<td>Readings</td>
</tr>
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<tr>
<td>7</td>
<td>Network message transmission. Unicode and its support in Python.</td>
<td>Class notes.</td>
</tr>
<tr>
<td>8</td>
<td>Non-blocking sockets with native polling.</td>
<td>Class notes.</td>
</tr>
<tr>
<td>9</td>
<td>UDP sockets and broadcasting. Using socket timeouts.</td>
<td>Class notes.</td>
</tr>
<tr>
<td>10</td>
<td>Threaded and multiprocessing sockets in Python.</td>
<td>Class notes.</td>
</tr>
<tr>
<td>11-13</td>
<td>Methods for data framing in network communications. IP multicast and Python examples.</td>
<td>Class notes.</td>
</tr>
</tbody>
</table>

**LABORATORY AND ASSIGNMENT OVERVIEW (SUBJECT TO CHANGE)**

<table>
<thead>
<tr>
<th>Date/Week</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBA</td>
<td>Network Packet Sniffing</td>
<td>See course web site.</td>
</tr>
<tr>
<td>TBA</td>
<td>Online Grade Retrieval Network Application</td>
<td>See course web site.</td>
</tr>
<tr>
<td>TBA</td>
<td>Online File Sharing Network Application</td>
<td>See course web site.</td>
</tr>
<tr>
<td>TBA</td>
<td>Online Group Chatting Network Application</td>
<td>See course web site.</td>
</tr>
</tbody>
</table>

**ASSESSMENT**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments and Laboratories</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**ACCREDITATION LEARNING OUTCOMES**

Note: Learning Outcomes are measured throughout the course and form part of the Department's continuous improvement process. They are a key component of the accreditation process for the program and will not be taken into consideration in determining a student’s actual grade in the course. For more information on accreditation, please ask your instructor or visit: [http://www.engineerscanada.ca](http://www.engineerscanada.ca).

**ACADEMIC INTEGRITY**

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences,
e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity

### Academic Accommodations

Students who require academic accommodation must contact Student accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contact by phone at 905.525.9140 ext. 28652 or e-mail at sas@mcmaster.ca. For further information, consult McMaster University’s Policy for Academic Accommodation of Students with Disabilities.

### Notification of Student Absence and Submission of Request for Relief for Missed Academic Work

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work": http://www.mcmaster.ca/msaf/

### Notice Regarding Possible Course Modification

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

### Reference to Research Ethics

The two principles underlying integrity in research in a university setting are these: a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities. Any departure from these principles will diminish the integrity of the research enterprise. This policy applies to all those conducting research at or under the aegis of McMaster University. It is incumbent upon all members of the university community to practice and to promote ethical behaviour. To see the Policy on Research Ethics at McMaster University, please go to http://www.mcmaster.ca/policy/faculty/Conduct/ResearchEthicsPolicy.pdf.
# Electrical and Computer Engineering Lab Safety

This document is for users of ECE instructional laboratories in the Information Technology Building.

This document provides important information for the healthy and safe operation of ECE instructional laboratories. This document is required reading for all laboratory supervisors, instructors, researchers, staff, and students working in or managing instructional laboratories in ECE. It is expected that revisions and updates to this document will be done continually. A McMaster University lab manual is also available to read in every laboratory.

## General Health and Safety Principles

Good laboratory practice requires that every laboratory worker and supervisor observe the following:

1. Food and beverages are not permitted in the instructional laboratories.
2. A Laboratory Information Sheet on each lab door identifying potential hazards and emergency contact names should be known.
3. Laboratory equipment should only be used for its designed purpose.
4. Proper and safe use of lab equipment should be known before using it.
5. The course TA leading the lab should be informed of any unsafe condition.
6. The location and correct use of all available safety equipment should be known.
7. Potential hazards and appropriate safety precautions should be determined, and sufficiency of existing safety equipment should be confirmed before beginning new operations.
8. Proper waste disposal procedures should be followed.

## Location of Safety Equipment

<table>
<thead>
<tr>
<th>Safety Equipment</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Extinguisher</td>
<td>On walls in halls outside of labs</td>
</tr>
<tr>
<td>Telephone</td>
<td>On the wall of every lab near the door</td>
</tr>
<tr>
<td>First Aid Kit</td>
<td>ITB A111, or dial “88” after 4:30 p.m.</td>
</tr>
<tr>
<td>Fire Alarm Pulls</td>
<td>Near all building exit doors on all floors</td>
</tr>
</tbody>
</table>

## In Case of a Fire (Dial 88)

When calling to report a fire, give name, exact location, and building.

1. Immediately vacate the building via the nearest Exit Route. Do not use elevators!
2. Everyone is responsible for knowing the location of the nearest fire extinguisher, the fire alarm, and the nearest fire escape.
3. The safety of all people in the vicinity of a fire is of foremost importance. But do not endanger yourself!
4. In the event of a fire in your work area shout “Fire!” and pull the nearest fire alarm.
5. Do not attempt to extinguish a fire unless you are confident it can be done in a prompt and safe manner utilizing a hand-held fire extinguisher. Use the appropriate fire extinguisher for the specific type of fire. Most labs are equipped with Class A, B, and C extinguishers. Do not attempt to extinguish Class D fires which involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium, and any other finely divided metals which are oxidizable. Use a fire sand bucket for Class D fires.
6. Do not attempt to fight a major fire on your own.
7. If possible, make sure the room is evacuated; close but do not lock the door and safely exit the building.

**Clothing on Fire**
Do not use a fire extinguisher on people
1. Douse with water from safety shower immediately or
2. Roll on floor and scream for help or
3. Wrap with fire blanket to smother flame (a coat or other nonflammable fiber may be used if blanket is unavailable). Do not wrap a standing person; rather, lay the victim down to extinguish the fire. The blanket should be removed once the fire is out to disperse the heat.

**Equipment Failure or Hazard**
Failure of equipment may be indicative of a safety hazard - You must report all incidents.
Should you observe excessive heat, excessive noise, damage, and/or abnormal behaviour of the lab equipment:
1. Immediately discontinue use of the equipment.
2. In Power Lab, press wall-mounted emergency shut-off button.
3. Inform your TA of the problem.
4. Wait for further instructions from your TA.
5. TA must file an incident report.

**Protocol for Safe Laboratory Practice**
Leave equipment in a safe state for the next person - if you're not sure, ask!
In general, leave equipment in a safe state when you finish with it. When in doubt, consult the course TA.

**Defined Roles**

<table>
<thead>
<tr>
<th>Role</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA</td>
<td>The first point of contact for lab supervision</td>
</tr>
<tr>
<td>ECE Lab Supervisor</td>
<td>Steve Spencer ITB 147 <a href="mailto:steve@mail.ece.mcmaster.ca">steve@mail.ece.mcmaster.ca</a></td>
</tr>
<tr>
<td>ECE Chair</td>
<td>Tim Davidson ITB A111 <a href="mailto:davidson@mcmaster.ca">davidson@mcmaster.ca</a></td>
</tr>
<tr>
<td>ECE Administrator</td>
<td>Kerri Hastings ITB A111 <a href="mailto:hastings@mcmaster.ca">hastings@mcmaster.ca</a></td>
</tr>
<tr>
<td>ECE Course Instructor</td>
<td>Please contact your specific course instructor directly</td>
</tr>
</tbody>
</table>