CSCI – 6055 - Research Methods & Statistics
Course Syllabus
Summer 2014

Instructor Information
Instructor: Dr. Kirstie Hawkey
E-mail: hawkey@cs.dal.ca
Office: 225, Goldberg
Office Hours: To be determined
Class Time: Wednesday: 10:05-12:55
Room #: Computer Sci Lab 5
Tutorial Friday: 10:05-11:55
Room # Computer Sci Lab 5
Course TA: Raghav Sampangi
Course TA: raghav@cs.dal.ca

Homepage: http://web.cs.dal.ca/~raghav/cs6055/
Mail List: all-cs6055@cs.dal.ca
Facebook: https://www.facebook.com/groups/csci6055/

Course Description
This class is designed to provide computer science students with an understanding of the principles of empirical science as they relate to computer science research. The goal is for the student to determine the research methods most appropriate for their research area and to be able to design simple to moderately complicated research studies. The course covers both quantitative and qualitative research issues and will provide a practical introduction to the statistics through hand-on tutorials. In addition, this course will provide the basis for critical reading of research findings in the literature and students will gain experience with scientific writing.

This course will teach students how to assess the validity of other researchers’ articles, and at the same time, enable students to validate their own research. The topics presented to students in lectures will include: the concept of scientific research, variables, validity, control, true experiments (single factor design, factorial design), quasi experiments, non-experimental research (surveys, interviews and observations), ethics, writing, plagiarism, and publishing. The topics presented to students in tutorials include developing a research question, introduction to statistics, descriptive statistics, hypothesis testing, inferential statistics, data preparation, and software packages. Tutorials will include lecture/discussion components and hands-on application of statistical procedures.
Required Texts and Resources

Required text:
  Reading Statistics and Research
  Shuyler W. Huck
  (any edition is fine)

Furthermore, a course archive of additional material available online will be developed by the instructor and students. Additionally, students will be assigned weekly readings of research papers that demonstrate the topics under discussion.

The primary source of communication will be in class. Attendance in class is expected; if you must miss a class, please notify the instructor and arrange with a fellow student to obtain any notes. Additional communications will be posted to the course email list, which comprises the instructor’s and students' CS email accounts, and/or the Facebook page. It is the student’s responsibility to check these channels of communication on a regular basis.

Important Dates

• Final Withdrawal Date without academic penalty: May 30, 2014
• Final Withdrawal Date with academic penalty: June 27, 2014
• Midterm Test: July 4, 2014 (during tutorial)
• Final Exam: TBA in the period of August 5-8, 2014
• Deadlines: Individual assignments:
  o Assignments: May 21, June 4, June 18, July 2, July 16
  o Presentations: July 30-August 1
  o Research paper: Draft July 12; Final version August 6 (12 noon);

Evaluation

Evaluation Scheme:

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Participation (tutorial + class + readings)</td>
<td>15</td>
</tr>
<tr>
<td>Assignments (4)</td>
<td>20</td>
</tr>
<tr>
<td>Research Paper</td>
<td>15</td>
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<tr>
<td>Research Presentation</td>
<td>10</td>
</tr>
<tr>
<td>Mid-Term</td>
<td>15</td>
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<tr>
<td>Final</td>
<td>25</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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Participation: Students are expected to attend the lectures and labs and participate in discussion of the materials and complete in-class exercises. Each week, a research paper will be assigned that demonstrates the topic under discussion. Students are expected to read the research paper and submit two questions/comments for discussion prior to class. They are also expected to find a related research paper on their topic of interest and discuss how the
concept relates to their research questions. There will be periodic quizzes during the tutorials and lectures to evaluate students’ comprehension of assigned reading materials.

Assignments: There will be 4 assignments during which students will develop a research question (assignment 1) and then develop an appropriate research methodology that considers the issues of variables & measurement (assignment 2), experimental validity (assignment 3), hypothesis testing and control (assignment 4).

Research paper/presentation: The research paper will provide students with the opportunity to present the research methodology that they have developed through the assignments at a level more suited for publication. It will include an introduction that motivates the research problem, a related work section, their proposed research methodology, and a discussion of the benefits and limitations of their approach. A draft of the paper will be due mid-semester to provide early feedback and to give students the opportunity to incorporate an editing cycle into their writing process. During the last couple of weeks of class, students will sign up to give a 10 minute in-class presentation of their topic. Any feedback provided should be incorporated in the final version of the paper.

Examinations: The mid-term and final exam will evaluate students understanding of the concepts discussed in class and their ability to apply that understanding to research scenarios.

Midterm and Final Exam Requirements
- Photo ID is required
- Closed book. No dictionaries, notes, calculators, cell phones, PDAs, talking slide rulers, or other electronic aids allowed.

Late Policy
- With the exception of the reading questions, which are due at 5pm on Tuesdays, all submissions are due at the beginning of the class time or lab time on the day they are due.
- Late submissions will not be accepted.
### Tentative Schedule and List of Topics

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture topics (Wed, wkly 3 hour lecture)</th>
<th>Tutorial Topics (Fri, wkly 2 hour tutorial/lab)</th>
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<tbody>
<tr>
<td>May 7</td>
<td>Science &amp; research: Why you need this course</td>
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<tr>
<td>May 14</td>
<td>Developing a research questions; Writing, Publishing, Plagiarism</td>
<td>Iterating on research questions</td>
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<tr>
<td>May 21</td>
<td>Variables</td>
<td>Gentle intro to statistics</td>
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<td>May 28</td>
<td>Validity</td>
<td>Descriptive statistics</td>
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<tr>
<td>June 4</td>
<td>Control</td>
<td>Hypothesis testing</td>
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<td>June 11</td>
<td>True Experiment – Single-Factor Design</td>
<td>Inferential statistics 1</td>
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<tr>
<td>June 18</td>
<td>True Experiment – Factorial Design</td>
<td>Inferential statistics 2</td>
</tr>
<tr>
<td>June 25</td>
<td>Writing seminar (Kirstie away at conference)</td>
<td>Inferential statistics 3 + midterm review</td>
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<tr>
<td>July 2</td>
<td>Quasi Experiment</td>
<td>Midterm</td>
</tr>
<tr>
<td>July 9</td>
<td>Giving presentations seminar (Kirstie away at conference)</td>
<td>Data preparation</td>
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<tr>
<td>July 16</td>
<td>Non-Experimental research: systems</td>
<td>Software packages</td>
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<tr>
<td>July 23</td>
<td>Non-Experimental research: people</td>
<td>Ethics, course summary</td>
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<tr>
<td>July 30</td>
<td>Presentations</td>
<td>Presentations</td>
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Academic Integrity

At Dalhousie University, we respect the values of academic integrity: honesty, trust, fairness, responsibility and respect. As a student, adherence to the values of academic integrity and related policies is a requirement of being part of the academic community at Dalhousie University.

What does academic integrity mean?
Academic integrity means being honest in the fulfillment of your academic responsibilities thus establishing mutual trust. Fairness is essential to the interactions of the academic community and is achieved through respect for the opinions and ideas of others. “Violations of intellectual honesty are offensive to the entire academic community, not just to the individual faculty member and students in whose class an offence occurs.” (see Intellectual Honesty section of University Calendar)

How can you achieve academic integrity?

• Make sure you understand Dalhousie’s policies on academic integrity.
• Give appropriate credit to the sources used in your assignment such as written or oral work, computer codes/programs, artistic or architectural works, scientific projects, performances, web page designs, graphical representations, diagrams, videos, and images.
• Use RefWorks to keep track of your research and edit and format bibliographies in the citation style required by the instructor http://www.library.dal.ca/How/RefWorks
• Do not download the work of another from the Internet and submit it as your own.
• Do not submit work that has been completed through collaboration or previously submitted for another assignment without permission from your instructor.
• Do not write an examination or test for someone else.
• Do not falsify data or lab results.

These examples should be considered only as a guide and not an exhaustive list.

What will happen if an allegation of an academic offence is made against you?

1. I am required to report a suspected offence. The full process is outlined in the Discipline flow chart, which can be found at:
2. http://academicintegrity.dal.ca/Files/AcademicDisciplineProcess.pdf and includes the following:
3. Each Faculty has an Academic Integrity Officer (AIO) who receives allegations from instructors.
4. The AIO decides whether to proceed with the allegation and you will be notified of the process.
5. If the case proceeds, you will receive an INC (incomplete) grade until the matter is resolved.
6. If you are found guilty of an academic offence, a penalty will be assigned ranging from a warning to a suspension or expulsion from the University and can include a notation on your transcript, failure of the assignment or failure of the course. All penalties are academic in nature.

Where can you turn for help?

• If you are ever unsure about ANYTHING, contact myself.
• The Academic Integrity website http://academicintegrity.dal.ca has links to policies, definitions, online tutorials, tips on citing and paraphrasing.
• The Writing Center provides assistance with proofreading, writing styles, citations.
• Dalhousie Libraries have workshops, tutorials, citation guides, Assignment Calculator, RefWorks, etc.
• The Dalhousie Student Advocacy Service assists students with academic appeals and student discipline procedures.
• The Senate Office provides links to a list of Academic Integrity Officers, discipline flow chart, and Senate Discipline Committee.

1 Based on the sample statement provided at http://academicintegrity.dal.ca.