CPSC 699

Research Methodology in Computer Science

Saul Greenberg

CPSC 699 Administrivia

Instructor:
• Saul Greenberg
  - Research area: human computer interaction
    computer supported cooperative work
  - Office hours (Room MS 616):
    before and after class
    or by email any time: saul@cpsc.ucalgary.ca
    or by appointment: email or phone: 220-6087
    or drop in for urgent requests (but no guarantees!)

Text:
• Booklet of readings and handouts
Objectives

The aim is kick-start you as a Computer Science grad student.

You will:

1. Apply a structured process that will help you begin and develop your:
   • selection of a thesis research area
   • thesis proposal
   • background literature review
   • thesis writing
   • actual research

Objectives (continued)

2. Acquire professional skills in computer science research by
   • understanding the research process
   • planning research via research proposals
   • critically evaluating your work and other people’s work
   • writing research documents (papers and theses)
   • finding relevant information through the library and Internet
Objectives (continued)

3. Learn about research done by our faculty, which will help you
   • select a supervisor
   • select graduate courses
   • use them as sources of information
   • know about the breadth of research areas

Course Structure: Orientation days

Goal
   • familiarize you with the department, especially graduate research activities

Contents
   • Introduction to 699
     - goals, structure, expectation, evaluation, your peer group
   • Introduction to graduate studies (faculty and department)
   • Grad courses offered this year
   • Research introductions by faculty
     - meet the faculty and see the range of research
     - see a variety of presentation styles
     - see who is working in an area that interests you
   • Department software and hardware
     - see the resources available and know the department policy
   • Scholarships
   • Library
Course Structure (remainder of term)

Goal:
• launch your thesis work

Regular Classes (All Fridays, 10:00 - 11:15)
• Topics relevant to you becoming a graduate researcher
  - The thesis: Research and critical evaluation
  - Using the Internet to do research
  - Preparation of research proposals
  - How to write a research paper
  - Methodology and argumentation
  - Concept maps...

• Student presentations
  - presentation of your own research proposals
  - discussion / critique of proposal by others

Occasional classes (Wednesday, 9:30-10:45)
• overflow presentations, practice, special seminars, comments on writing...

How you will be evaluated

Plan 1: Starting point (10%)
Plan 2: Short list of topics (10%)
Plan 3: Research proposal (20%)
Literature survey (20%)
Research presentation (20%)
Participation (20%)

Due dates:
• see schedule in handout.
Plan 1: Starting point (total 10%)

Goals:
• start you thinking about topics right away
• get you reading about the basic material in the areas
• begin the process of laying out possible thesis topics.

Deliverables:
1. A statement of your current progress toward:
   - choosing a thesis topic (including a list if you have one),
   - carrying out your research work, and
   - writing the thesis
2. A plan for how you propose to complete the research and thesis
   - includes milestones, activities and deadlines
3. A short list of the fundamental reading material for the research area
4. A short summary of the relevant department research
   - gleaned from presentations during orientation week

Plan Two: Short list of topics (10%)

Goals:
• describe your short-list of topics in enough detail so that you can decide
  which is most appropriate for your final choice.
• should reflect some background reading.

Deliverables:
1. A short summary of each topic
   - including the state of the art and what work you might do in it for a thesis
2. A revised plan for completing the research and thesis
   - based on the most likely topic
3. The relevant resources available for conducting your research
   - equipment, software, expertise, ...
Plan Three: Research proposal (20%)  

Goals  
• produce a real proposal that sets up your research program,  
• after course completion, you should be able to complete the related reading and start the research

Deliverables (4000 word document)  
• Short introduction  
  - stating the proposed research topic and its general importance  
• Concise survey  
  - of the relevant work in the area and how it relates to your proposal  
• Statement and brief analysis  
  - of the problem/s to be investigated  
• Description of the proposed work  
  - including a statement of progress so far  
• References  
• Thesis plan  
  - outlining milestones and schedule for completion

Literature Survey (20%)  

Goals  
• bring you up to speed on the literature study for your thesis work  
• provide an initial draft of a thesis survey chapter.

Deliverables (4000 word document)  
• Survey  
  - of relevant literature in the area of your research  
• Reference/bibliography section  
  - using standard publication format  
• Appendix briefly mentions the information facilities you checked and used  
  - library, profs and supervisor, reference section of key papers, library search facilities, grad students, internet...

Advice:  
• Start now!  
• Text excerpts can be included in Plan 3
**Presentation of Research Ideas (20%)**

**Goals of presentation**
- expose your ideas in public
- help you think about ideas by articulating them
- improve them from audience feedback
- acquire a feeling for what it is like to present your work to a group
  - as you do in the final thesis oral and in conference presentations

**Deliverables**
- half-hour presentation
  - 20 minutes plus 10 minutes discussion of your proposed research ideas
- copies of your overheads

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**Participation (20%)**

**Goals**
- by attending and participating, you will
  - help each other out by giving constructive comments
  - build professional relationships with fellow students so you have colleagues you can discuss your work with
  - trigger ideas in your own area (and writing/presentation skills) from others' research work

**Metrics**
- you will be assigned as discussants for each presentation (after the orientation week), which will contribute to this grade.
- your critical comments, questions, and other forms of participation will also contribute to this grade.
Alternatives to Research Proposals

**Project Proposal**

- a project exercise to help your supervisor discover your skills
  - will not necessarily become your thesis research!
- deliverables similar in structure to research proposal except:
  - plan 2 describes a well-defined project (by supervisor)
  - literature survey replaced by detailed research background of an aspect of your project
  - final concrete deliverable is a technical paper (perhaps with system) of the work done so far

**Area exploration**

- an exercise that lets you gain essential background knowledge in your area
  - will allow you to choose a research area after completion
- appropriate if you lack fundamental knowledge in chosen research area
- deliverables similar to research proposal except:
  - plans 2 and 3 give successive background to what could be interesting (but general) research directions
  - literature review summarizes and synthesises the background knowledge you have acquired

**Supervisor involvement**

consult with your supervisor about:

- your research plan
- resources
- key papers, etc

have them comment your written and oral work

- drafts of written work should be given to supervisor one week before due date

heed their advice unless there is a strong reason not to

- the only thing a supervisor can offer you is advice!

your supervisor can contribute up to 50% of your grade
Opinion vs fact?

there is no “right” way of planning or doing research
• every person has different perspective and opinions

many presentations will reflect opinion tempered by experience

it is your responsibility to find the research style that fits:
• you
• your supervisor
• your examining committee
• your academic peers