CS 491–492–493 – Seminar
Course Syllabus

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Abstract

- **Course Number:** CS 491–492–493
- **Title:** Seminar
- **Course Description:** Reading in the Computer Science literature, writing of a review article, research proposal writing and presentation, conducting research, poster presentation, writing and presentation of the senior thesis. (Prerequisite: permission of instructor.)
- **Required Textbook:** none
- **Recommended Textbook:** Shasha, Dennis and Lazere, Cathy, "Out of their minds : the lives and discoveries of 15 great computer scientists," Springer-Verlag, ISBN 0-387-97992-1.
- **Recommended Textbook:** Turabian, Kate L, "A Manual for Writers of Term Papers, Theses, and Dissertations, Fifth Edition," University of Chicago Press, ISBN 0-226-81625-7.
- **Recommended Textbook:** Lamport, Leslie, "LaTeX, A Document Preparation System, Second Edition," Addison Wesley, ISBN 0-201-52983-1.
- **Class Time:** TBA
- **Classroom:** GCB 104 (my office)

1 Selecting an Advisor

When you (the student) register for a particular section of 491, 492, or 493, you also register for a particular instructor. You should seek the permission of me (the instructor) before you register. All instructors have the same overall goal for this course, but each has a different approach to the details of the course, depending on what works best for them. This syllabus is for 491–493 as currently taught by Don Colton, and it may change over time. Other professors in the department may have different requirements than I do. Pick your professor carefully.

2 Why Take This Course?

Research is the method by which new knowledge is added to a field of study. Computer Science is a very young discipline in comparison to Mathematics, Physics, Chemistry, and the liberal arts. There are many areas where new contributions could be made. Research is primarily done by PhDs and PhD students, but it is useful for each student (e.g., you) to attempt some research and to learn what it is like to perform research. This can open a new life's ambition, or at least give you an appreciation for the work performed by others on a daily basis.

3 What is Research?

You have probably done a review-type research paper. It may have been the result of reading from many sources and summarizing what various authors said about some particular thing. For the purposes of this class, this is just the first part of research in Computer Science. Your goal in this course sequence is to properly conduct research and present a thesis. The review-type research paper is a good start at real research because it helps you see what other people have done. Reading should help you develop questions. Further reading will answer some questions and create other questions. Eventually one of these questions will not be answered by your reading. It will become your area of research. You will seek answers to your questions by conducting one or more experiments. You will present your results in your senior thesis.

4 Course Content

The three-term course is divided into three phases: preparation, experimentation, and presentation. Each phase is assigned to a separate enrollment period. Throughout the enrollment, you will attend periodic research discussion meetings where faculty and other students are present. At these meetings, students will discuss their direction of progress and their achievements.

491: Preparation

> *"Reading in the Computer Science literature, writing of a review article . . . "*

Deliverables

- Twenty reviews of appropriate technical articles.
- One written summary in hardcopy form.
- The same written summary in electronic form.

- One oral presentation of that summary.

During the preparation phase, you should enroll in CS 491. The primary activity of this phase is the reading of twenty papers in areas of interest to you. The objective of this reading is to become familiar with current research, including its methods and special vocabulary, and to identify some part of that research area where you might conduct some experiments.

Most students will have little or no idea of what they want to make the focus of their research experience. My first suggestion is to pick up recent issues of "Communications of the ACM" or a similar general Computer Science publication. Read through the table of contents. See if any of the titles of articles interest you. If so, read that article and report on it. Repeat this process up to ten times, getting a broad perspective on the field or computer science, and selecting those more particular areas that appeal to your fancy.

As each article is read, you will write a review of the article. The review should demonstrate your understanding of the material in the article. To do this you can comment on the procedures used by the authors of the article, and/or tell what you learned by studying the article. The review, together with the paper reviewed, is brought to me for grading. There are two grading options that I typically follow: (a) approved as is, (b) improvements requested, such as the fixing of spelling errors or formatting, or perhaps some missing content that I want you to provide. In the second case the review must be improved and resubmitted.

It is expected that earlier reviews will be more superficial than the later ones. However, later reviews should indicate a stronger and deeper grasp of the material presented by the authors, and a tighter focus on a research area that will interest you.

After twenty papers have been read and reviewed, you will write an overall summary (also submitted for grading) and make an oral presentation giving a good overview of the research area in which you desire to continue. No particular length is specified for the written summary. This summary becomes a technical report of the CS Department, and is added to the CS Department library and posted on the department web server for access by other researchers around the world. The posting will be in PostScript format with an abstract in HTML.

Grading: When you bring me each paper, I will sit with you and read it immediately. I will give you feedback about its content and its form (spelling and grammar). I may request you to rework some aspects of the paper and resubmit it. When I am satisfied, I will put it in a file with your other papers. If you successfully complete the papers (including requested rework) and give an acceptable oral presentation, you will receive an "A" for the course.

Ultimate Goal: Remember that even though you can get an "A" for simply reading and writing and talking, your real goal should be to identify an area of research where you can perform your 492 and 493 work. It would be disappointing to earn an "A" in 491 but be unprepared to continue with 492.

LaTeX: Unless there is some reason to the contrary, I request that all your paper submissions be done in LaTeX, the document preparation system by Leslie Lamport built on TeX, the Computer Typesetting language by Donald Knuth. I request this for several reasons:

- It is very widely used in scientific writing.
- It is freely available on many platforms including Unix and Microsoft Windows.
- BYUH CS department has it installed, at least on the Linux systems.
- I have expertise at LaTeX and can help you with it.

If you have a strong inclination toward some other document preparation system such as Microsoft Word or WordPerfect or FrameMaker, we can talk about making an exception for your case.

Be aware that other professors in the department probably do not have this requirement.

Brief LaTeX HowTo: Use a program editor (like `nedit`, `vi`, or `emacs`) to write your document in ascii text. Give it a filename with `.tex` as the extension. For example, "`doc1.tex`".

To "compile" your document, use the command

```
latex doc1
```

To see on-screen your results, use the command

```
xdvi doc1 &
```

To see on-screen results in a reasonable window

```
xdvi -geometry 580x705-0+0 -s 10 doc1 &
```

Every time you recompile your document, the on-screen results will automatically be updated. There is no need to close the viewer and open it again.

To print your document, use the command

```
dvips doc1
```

Here is a short document you can try out:

```
\documentclass{article}
\begin{document}
\title{Review of ...}
\author{your name goes here}
\maketitle

\section{Introduction}
  Tell why you picked this article. A sentence
  or two should suffice, like ``It looked
  interesting because I like xxx.''

\section{Summary of Article}
  Briefly summarize the article that you read.
```

```
  Cite the article.  Tell briefly what the
  authors did and why they thought it was
  worth writing about.

\section{Response}
  Tell how you feel about this article.  Does
  it excite you?  Does it seem too difficult
  to understand?  Do you want to read more
  articles in this same area of research?

\section{Research Ideas}
  Identify some research that could be done,
  maybe by you, in this area of study.  Name
  some projects that could be done.  For the
  first few articles it is okay if nothing
  comes to mind, but think about it anyway.

\section{Reference}
  Include a bibliographically-correct
  reference to the article.

\end{document}
```

492: Experimentation

> *"research proposal writing and presentation, conducting research . . . "*

Deliverables

- One written research proposal.
- One oral presentation of that research proposal.

During the experimentation phase, you should enroll in CS 492. The goal of this phase is an acceptable research proposal, delivered in both written and oral form. Before making the proposal, you should make sure it is acceptable by discussing the planned proposal with me. After the proposal is accepted, if you want to change it in any substantial way, you will need to submit a new proposal and have it accepted.

It is typical that you have done some research before making the actual proposal. This helps minimize the chances that you will pick a research area that you later find to be boring or too difficult.

With an accepted proposal, you will engage in research, keeping appropriate notes and making informal presentations so that others can observe the progress of the research and can ask questions and offer suggestions and guidance. Experimentation can (but might not) explore many avenues of the original problem, and must lead to at least one interesting avenue that shows promise of some original result.

493: Presentation

> *"conducting research, poster presentation, writing and presentation of the senior thesis."*

Deliverables

- One written thesis in hardcopy form.
- The same written thesis in electronic form.
- One oral presentation of that thesis.
- Submission of that thesis to one or more conference.
- Attendance and presentation at an accepting conference.

During the presentation phase, you should enroll in CS 493. You enter the final phase of research after selecting a particular thesis. Final research is then performed (if not already done) and the result is formally written in a final paper of a quality comparable to that presented at national conferences in that field of study. Ideally a version of the paper will be submitted to one or more such conferences, and if accepted by the conference, both you and I will travel to present the paper at that conference. As with the 491 summary, the 493 final paper becomes a technical report of the CS Department, and is added to the CS Department library and posted on the department web server for access by other researchers around the world.

5 Attendance

Most of the time you and I will meet privately or in a small group in my office. At that time I will receive your write ups and read and respond to them, or I will listen to your oral progress report and respond to it.

Occasionally we will attend a department-wide research meeting at which each student makes informal presentation of the progress achieved in the past and directions to be pursued in the future.

6 Written Work

All written work must be careful and formal. It must be attractively formatted and printed (not handwritten), ideally using LaTeX. It must use proper spelling, punctuation, grammar, and style throughout. It must include properly formatted citations of any articles under discussion. Quotations, if any, must be properly identified.

Written work that is to become a technical report of the CS Department may be subject to additional style requirements, and must be delivered in written form and in an electronic form (e.g., .ps) suitable for posting on the CS Department web server for access by other researchers around the world.

7 Work Load

In the United States, the expectation for accredited university-level course work is that there be an average of three hours of work per week for every hour of credit awarded. In this course that would amount to two hours of work and one hour of attendance per week. This is not nearly adequate to achieve the goals of the course. The work load is generally far heavier than would be expected by the credits awarded.

8 Grading

Grading is subjective, based on my own experience as a researcher, and my expectations for you, understanding that you are working at a senior undergraduate level of performance. Accordingly, "A" is awarded for exceptional achievement, "B" for above average quality, "C" for acceptable work, "D" for work that is not fully satisfactory, and "F" for work that is not acceptable.

9 Office Hours

Office hours are posted outside my office door. Office hours are subject to change. Persons for whom the posted hours are not convenient can contact me by email to make a different appointment.

10 Communication by Email

When I want to say something, or when you want to say something, if we are not in the same room, my first choice is to do it by email. When there is an announcement, I will generally tell you in class or send it to you by email. You are required to maintain (i.e., regularly read) an email account and to provide me with a valid email address that will deliver mail to that account.

11 Subject to Change

I like to avoid mutual unhappiness, so I avoid changes as much as I can. The course number, title, and description will not change, but I do reserve the right to change anything else in this syllabus at any time for any reason. I belive that such changes are unlikely. Any important change will be communicated in class and by email to those affected.