CS 491/492/493 Seminar
Course Syllabus

Computer Science Department
Brigham Young University Hawaii

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Abstract

- **Course Number:** CS 491, CS 492, CS 493
- **Title:** Seminar I, II, III
- **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.)

1 Minimum Standards

This syllabus gives general advice and states the departmental minimum acceptable standards of performance for students seeking credit in CS 491, CS 492, and CS 493. By meeting these requirements, students also earn Advanced Writing general education credit, as required for graduation and typically earned by taking a course such as English 315.

These are departmental minimum standards, developed by department consensus and to comply with advanced writing guidelines from the university general education committee. Your CS professor (advisor) may have additional requirements stated in a syllabus addendum provided by that professor.

Students who desire advanced CS credit without meeting the extensive writing requirements stated in this document may instead consider taking CS 495R (Independent Study in Computer Science) or CS 496R (Student Research in Computer Science).

2 Selecting an Advisor

When you (the student) register for a particular section of 491, 492, or 493, you also register for a particular advisor (instructor). Registration is done by add-drop form only, and requires you to get a signature from the research advisor for which you are registering.

All research advisors have the same overall goal for this course: to train you to perform and report your research. But each has a different approach to the details of the course, depending on what they believe works best for them. Pick your advisor carefully. The same applies to Masters and PhD research. Pick your advisor carefully.

3 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 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.

4 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.

5 Course Content

The three-term course is divided into three phases: preparation, experimentation, and presentation. Each phase is typically performed in a separate enrollment period. Throughout the enrollment, you may attend periodic group research discussion meetings where faculty and other students are present. You will also meet individually with your research advisor, possibly weekly. At these meetings, you will discuss your progress and achievements, and you will be given guidance for future progress.

491: Preparation

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

Minimum Deliverables

- Twelve written reviews of appropriate articles; 500 or more words each, plus bibliography; typically you will present one to your advisor each week.
- A written overall summary in hardcopy form.
- The same written summary in electronic form.
- An oral presentation of that summary; typically one-on-one to your advisor.

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

Getting Started: Many students will start with little or no idea of what they want to make the focus of their research experience. One suggestion to such students is that they pick up some 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 for the first several of your papers, getting a broad perspective on the field or computer science, and selecting those more particular areas that appeal to your fancy.

Reviews: As each article is read, you are assigned to write a review of the article using proper grammar and style. For a sample outline, see below. 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.

Evaluation: Your advisor will evaluate your writing primarily for content and additionally for writing quality. It is common for the first few papers that the advisor will not accept the paper as initially written, but will require a number of improvements. This is typical, especially at first while you are getting a feel for what is actually required and acceptable. Such improvements may relate to spelling, grammar, style, or content.

RWC: If your writing quality seems to warrant, your advisor will mark specific instances in your paper where the quality needs improvement and will request that you visit the campus Reading-Writing Center for assistance by one of their trained tutors. Your advisor may require that you get a "stamp" on the draft of your paper that was reviewed there. The tutor will review the marks made by your advisor and will help you in those skill areas and any others that may seem appropriate.

Grading: To receive a passing grade for an individual paper, it must be 500 words or longer and demonstrate proper spelling, grammar, style, and content as judged by your advisor.

Content: 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.

Summary: After enough 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. A length of several pages is common. The minimum length is 500 words, not counting bibliography. 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 typically be in PostScript or PDF format with an abstract in HTML.

Ultimate Goal: Remember that even though you might 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.

Sample Review Paper Outline

Here is a sample outline for a typical paper. Your advisor may provide additional or different guidance.

Heading: Include a title, your name, and the current date. The title might be something like this: "Paper #3, Review of ..."

Introduction: Tell why you picked this article. A sentence or two may suffice, like "It looked interesting because I like ..."

Summary of Article: Properly cite the article: "Colton (2002) states ..." and tell briefly what the authors did and why they thought it was worth doing and writing about.

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?

Research Ideas: This is a difficult but important section of your paper. You must identify **some research** that **could be done**, maybe by you, in this area of study. Describe some follow-on projects that could be done, based on the ideas and results of the paper you just read. For the first few articles it is okay if nothing comes to mind, but think about it anyway.

Plans: Tell what you actually plan to do next as a result of reading this article. Will you read something? Will you try something?

References: Include a bibliographically-correct reference to the article. If the reference format is not specified by your advisor, follow the examples at the end of each paper you are reading.

492: Experimentation

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

Minimum 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 your advisor. 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."*

Minimum Deliverables

- One written thesis in hardcopy form, 3000 or more words, plus bibliography with twelve or more appropriate references. (Computer programs and program fragments do not count toward the 3000-word requirement.)
- The same written thesis in electronic form.
- One oral presentation of that thesis.
- Must be accepted by your advisor.

Encouraged Deliverables

- Submission of that thesis to a conference/journal.
- Attendance and presentation at a 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, ideally both you and your advisor 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.

Sample Senior Thesis Outline

Here is a sample outline for your thesis. Your advisor may provide additional or different guidance. If you are submitting this to a conference or journal, you may use the format they require.

Heading: Include a title, your name, and the current date.

Abstract: Write a 100- to 250-word summary of the paper, highlighting your findings. Usually this is written last.

Introduction: Describe the problem you planned to solve and why it is important.

Literature Review: Cite and discuss the relevant literature in this field. Tell how it relates to your work, and how it contributed to your direction.

Procedure: Explain in detail what you did and why.

Results: Tell what you learned.

Future Work: Tell what you think should be done next (even though you will probably not do it yourself).

References: Include bibliographically-correct references to the articles cited in your paper.

Biography: Give a brief, third-person biography of yourself, such as: John Doe is a graduating student in Computer Science at BYU Hawaii. He plans to pursue graduate studies in ... at ...