# Table of Contents

## COURSE OVERVIEW ................................................................. 2
- Course Objectives ........................................................................... 2
- Course Expectations ......................................................................... 3
- Frequently Asked Questions (FAQs) .................................................. 4

## AN OVERVIEW OF A STATE-OF-THE-FIELD PROJECT .......... 5
- State-of-the-Field Components .......................................................... 5
- Why a State-of-the-Field Project? ....................................................... 6

## HOW TO SUCCEED IN THIS COURSE .................................... 7
- Select a Good Topic ........................................................................... 7
- Plan Ahead, Work Ahead .................................................................. 8
- Locate Credible and Relevant Resources ............................................. 8

## DO’S AND DON’TS ................................................................... 10
- General .............................................................................................. 10
- Presentations ..................................................................................... 11

## COURSE ASSIGNMENTS ....................................................... 12
- Recurrent Assignment: Regular Reading ............................................. 12
- Assignment 1: Preliminary State-of-the-Field Paper ......................... 13
- Assignment 2: Survey Paper ............................................................... 14
- Assignment 3: Technical Analysis ...................................................... 15
- Assignment 4: Future Trends Paper ................................................... 16
- Assignment 5: State-of-the-Field Paper and Presentation .................. 17
Course Overview

Course description, objectives, expectations and frequently asked
questions (FAQs).

The Computer Science Department Senior Research Seminar (CSCI373) is a
capstone course for Computer Science majors in their senior year. It is the
alternative to an Honors Thesis and can be considered a more highly
structured and regulated thesis development process, with a special emphasis
on topics for students who will become professionals in the computing field.
Computer science is a rapidly changing field. Successful professionals in this field must
keep up with new research and development, even after leaving an academic setting,
and must be able to communicate clearly and convincingly on new topics. Overall, this
course is intended to equip successful students with an appreciation for and desire to
continue their education in computer science and related fields, and to further improve
their research and communication skills in computer science and technology.

Course Objectives

Upon successful completion of this course, students should have made substantial
academic progress in the following ways:

1. Research: Students will have an ability to conduct research in new science and
technology areas using library resources, journals, search engines, new groups,
email lists and more. Thorough research is important to provide context for
new work and to avoid redundancy (and the associated embarrassment).
Through research, students will be aware that new science and technology is
not developed in isolation. In particular, it is important to be aware of the
history that leads to new developments, to be sensitive to any ethical issues
related to new developments, and to be aware of future research and
development trends.

2. Writing: Students will improve their abilities in scientific and technical writing.
The written word carries an influence that is independent of the writer. Well-
written text can have an influence that exceeds the time and breadth of any other form of communication. Technical reports, position papers and even email can have tremendous sustained value for the purposes of retaining and communicating technical information. The ability to write well is essential for the students' long-term success.

3. Speaking: Students will improve their speaking skills, developing a sense of comfort and authority. They will learn to choose the scope of their presentations to best hold audience attention and make points clearly and efficiently. Good speaking skills compliment good writing skills. Both are important to any computer professional who wants to succeed beyond the role of an individual contributor on a project.

4. Continuing Education: Students will increase their appreciation for the value of continued, self-initiated education in computer science and technology, and the role of technology in society. Furthermore, they will experience concrete approaches for building habits that will foster this continuing education. Computer science is a rapidly changing field and its impact on society is always changing. Thus it is very important that professionals develop habits to promote continued education from a variety of information sources.

Course Expectations

Students of this course are expected to do the following:

1. Attendance: Attend all class sessions, or receive prior approval for absence with the instructor.

2. Assignments: Complete all assignments on time, following general class guidelines as well as specific assignment instructions. Late assignments will not be accepted unless the instructor grants prior approval.

3. Resources: Use credible sources for research content. Integrate and synthesize source material into an informed personal perspective on a topic. 
   **Plagiarism will not be tolerated. It is grounds for dismissal from class and further discipline at the college.**

4. Remedial work: Meet with the instructor if there may be potential difficulties in basic writing and presentation skills. It is expected, prior to starting this class, that students have at least average general writing and presentation skills, as would be obtained by successful completion of prior college courses. Students should be able to adequately structure a written document, provide citations to published works and use computer tools for writing reports and giving presentations. Any remedial work required in these areas is the
responsibility of the student, and the instructor should be consulted early in the semester about any potential difficulties in these areas.

Frequently Asked Questions (FAQs)

1. **How do I select a topic for my project?**  
   This is the most important question to answer well. Chapter 3 discusses this issue in detail.

2. **Can I fail this course?**  
   Yes, it is possible to fail this course.

3. **What happens if I fail this course?**  
   You will need to repeat it or write an Honors Thesis in order to graduate as a computer science major.

4. **I cannot find resources for my topic. What should I do?**  
   First, read Chapter 3 to make sure you have considered all of the suggested approaches. If you are still having trouble finding sources, you should consider broadening the topic scope, if possible. As a last resort you should consider switching topic areas.

5. **I have too many resources for my topic. What should I do?**  
   In this case, you should try to reduce the scope of your topic, focusing on a subset of the original scope.
Chapter 2

An Overview of a State-of-the-Field Project

Overview of a state-of-the-field project and discussion of its components.

The overall focus of this course is a state-of-the-field (SOTF) project involving the full development of a topic that is of current interest in the scientific or technological community. Some topic areas in past years have been:

1. Computer Technology in Automotive Applications.
2. Artificial Intelligence.
3. Wireless networking.
4. Iris Recognition.
5. Software Piracy.

State-of-the-Field Components

Understanding the present state and future trends of any given topic requires an understanding of its related history and of the societal issues that may be important to current and future developments. As a result, an SOTF project contains the following four components:

1. **History**: What basic human/societal need is met? How was it met in the past?
2. **Technical Analysis**: What are the technical underpinnings for your topic area?
3. **Future trends**: What are the likely developments in this area in five to ten years?
4. **State-of-the-Field**: What is the current state of the field?
The first major assignment will be a preliminary SOTF paper (approximately five pages). You can think of this as an extended abstract. For the remainder of the semester we will proceed to fill out each of the above components, resulting in the final SOTF paper and presentation. Details for each assignment are found in Chapter 4.

Why a State-of-the-Field Project?

There are many forms of writing that are appropriate for scientific and technical material. Our motivation for focusing on a state-of-the-field project is that it gives students an opportunity to experience several styles of writing, while keeping focus on a single topic area. Also, the SOTF form appears in many professional settings. It is a composite form of communication that allows the writer to both inform and influence the reader. For professionals in computer science and related fields, situations often arise where this type of writing is essential.
How To Succeed in this Course

General policies and advice for succeeding without unnecessary effort.

Here are several issues that, if well-addressed will help a student succeed in this course. Probably the most important is the selection of a good topic.

## Select a Good Topic

We cannot overstate the importance of selecting an appropriate topic for success in this course. Two aspects are important:

1. **Topic Area:** This is the broad description of the topic of interest, e.g. Iris recognition. We often refer to this as your topic.

2. **Topic Scope:** This is specific level of detail and emphasis that you will address within the topic area.

Generally we first focus on selecting the topic area and an approximate topic scope. It is generally easy to adjust the topic scope as needed during the semester but it is very difficult to change topic areas.

The first phase of selecting a topic is best described as brainstorming, listing multiple topics in computer science or computer-related fields that are of potential interest to you. Once you have listed a number of topics, consider the following questions for each topic:

1. Does it have a significant computer science component? (Does it require your computer science background in order to do the research?)
2. Are there sufficient high-quality resources at your disposal?

3. Does it address a perennial societal/human issue?

4. Is it an active field in the computer science community?

5. What is the history behind this topic?

6. What were people in the 19th century doing to address the same societal/human issue?

Plan Ahead, Work Ahead

The nature of this course and how it is scheduled allows the motivated student to complete much of the course work in the early part of the semester. In particular, you should consider the following issues:

1. **Plan ahead:** Once you have selected your topic, it is in your best interest to identify and gather research material early in the semester. Finding credible, relevant resources takes time; both an investment of your time and patience waiting for the arrival of remotely located resources.

2. **Work ahead:** Your final SOTF paper and presentation is a synthesis of your previous papers and presentations. High quality work on early assignments not only improves your grade but also makes your final paper and presentation easier to complete.

Locate Credible and Relevant Resources

The advent of the Internet and the ever-growing availability of online information has been a great asset for gathering research materials. At the same time, it is a challenge to isolate credible resources amidst all of the information we can find. If you do not plan ahead, or do not make an effort to go beyond a first-level web search on your topic, you will not find sufficient high-quality resources for your work. To improve the quality of your resources, consider the following approaches:

1. **ACM Digital Library:** We have access to the ACM digital library which provides a wealth of journal articles and conference proceedings that will provide a foundation for your research.

2. **Web searches engines:** Although web search engines are usually not sufficient for finding credible, relevant resources, they can be a good starting point. Careful selection of key words can help to identify issues related to your topic and, even more importantly, the leaders doing work in your topic area.
Overall, search engines are bad way to directly find topic resources, but an excellent way to identify potential resources.

3. **Library search engines:** Our library websites contain excellent search engines that go beyond what is readily available on the Internet. These tools search a variety of collections of peer-reviewed publications that are the most reliable and high-quality source of material on your topic. These search engines are available from the main library website.

4. **Inter-library loan:** Our libraries have access to almost any printed material (via inter-library loan) in original form as a book, as a photocopy of a journal article, or in electronic form. This is an excellent resource, but it requires planning ahead.

5. **Bibliographies:** One of the best ways to obtain resources is from the citations of articles and books you have already acquired. This is probably the best way to get a complete picture of what is important in your topic area.

6. **Contact experts:** Once you have identified an expert in your topic area, an excellent way to get more information is to contact this person. Experts are accustomed to answering queries and are often excited when a new person shows interest.
Do's and Don'ts

General rules for improving your writings and presentations

This chapter lists a set of general rules-of-thumb for improving your writings and presentations. These are not hard and fast rules to be obeyed blindly, but are suggestions that can be useful to many people.

General

1. **Avoid grandiose language:** Avoid superlatives such as “huge”, “fantastic”, “are endless”. These are essentially meaningless terms that belong in a marketing brochure, not a technical presentation or document.

2. **Justify strong assertions:** When you make a strong assertion such as “X is the best method for…” justify your assertion with:
   a. Objective data.
   b. Extrapolation of existing data.
   c. Quotes from recognized experts in the field.
   d. Correlation to trends in a related field.

3. **Avoid informal and imprecise language:** Phrases such as “X is flaky”, “Y will take over the industry” are not appropriate for professional presentations or documents.

4. **Use spelling and grammar tools:** Use the spelling and grammar checking tools in MS Office tools.

5. **Read for spelling and grammar errors:** Automatic tools are not perfect. You should still read the text for errors. For example, grammar tools will not detect use of “lead” where “led” should have been used.
Presentations

6. **Assume a comfortable, authoritative presentation position:** Look at the wall projection with us, not the computer screen. Avoid using the podium if possible, except for large formal presentations.

7. **Avoid “My topic is...”**: Avoid “My topic is...” as the introduction to your presentation.

8. **Avoid “They say... ”**: Avoid “They say... ”. Who is “they”?

9. **Be prepared to answer questions**: If you mention a term or concept in your presentation, or make an assertion, be prepared to answer questions about it. If you are not familiar with the idea, leave it out of your presentation.

10. **Do not use slides as note cards**: Use figures, pictures, icons and (modest amounts of) motion in your slides. Avoid large amounts of text on slides. With the exception of quotes, do not read from your slides.

11. **Perform sanity test**: Before you give your presentation, walk through the process of setting it up.

12. **Deliver key points in conclusion**: A typical audience member will remember only a handful of key points from a presentation. Because of this, you should design your presentation as follows:

   a. Develop a draft of your presentation.

   b. After reviewing the draft, decide what handful of points you want your audience to remember. These points will be your conclusions.

   c. Remove content from your presentation that is not essential to making your key points.

   d. Add content that will support your key points.

   e. Foreshadow your key points, individually or as a thesis, in the introduction of your presentation.
Course Assignments

Detailed descriptions of key assignments for the entire semester

This chapter describes all major course assignments in detail. In addition to the assignments described here, we will have smaller exercises as part of class discussions.

Recurrent Assignment: Regular Reading

Due: At the start of each class meeting.

Description: One of the primary objectives of this course is to foster habits of continuing education. In support of this objective, each student will complete regular reading assignments.

Requirements:

1. Read two articles between class meetings.

2. At least one of the articles must be from a peer-reviewed computer science journal. Any of the journals published by the Association for Computing Machinery (ACM) would be appropriate.

3. The second article can be from any resource including business and technology newspapers, as long as the article has some connection to computing.

4. At each class meeting, the student will hand in one article review of an article read during the previous week along with the citation for the second article that was read. Format of the article review is described separately.

5. NOTE: After the first two weeks, articles must be selected from outside your SOTF topic area.
Assignment 1: Preliminary State-of-the-Field Paper

Due: 1/26/2005 (detailed outline and references)
     2/11/2005 (paper and presentation)

Description: You will write a paper and give a presentation briefly discussing the state of the field for a topic of your choice.

Requirements:

1. 5 (or more) pages, original content.

2. The content must be of sufficiently narrow and technical scope so as to clearly require your computer science background in order to do the research.

3. Address the following questions:
   a) What is the history of this topic?
   b) What are the technical underpinnings of this area?
   c) What is the state of the field?
   d) What are some trends for the future?

4. Presentation will be 10 minutes.

5. Remember to cite sources in your paper and in your presentation.

Resources for Topics:

1. Communications of the ACM (available in libraries)
2. ACM digital libraries.
3. Current events in technology.
4. Various website.
5. Use of computing in related technical field.
Assignment 2: Survey Paper

Due: 3/3/2005

Description: You will write a paper on history of your topic.

Requirements:

1. No page limit.

2. The purpose of this paper is to provide sufficient background for an intelligent but ignorant reader to understand what you write for your technical, state of the field and future trends segments.

3. For example, consider addressing the following questions as appropriate:
   a. What was status quo prior to new technology?
   b. What was the pressing need addressed by new technology?
   c. What were the catalysts that caused development and introduction of new technology?
   d. What was the introduction phase (of this new technology) like?
   e. What was the new status quo?

4. No presentation required.

5. Remember to cite sources in your paper:
Assignment 3: Technical Analysis

Due: 3/29/2005

Description: You will write a paper with an in-depth description and analysis of one or more technical aspects of your topic.

Requirements:

1. Identify the technical aspect(s) of your topic, explain the relevance to your topic, provide an in-depth description and analysis of the technical component along with issues and open research questions. Think in terms of algorithms, architecture, system design, etc. For example, if your topic is digital rights management, you might compare and contrast different algorithms for digital watermarking.

2. You must have at least five authoritative sources.

3. Your paper should be at least 5 pages long.

4. Presentations will be 15-20 minutes with time for questions.
Assignment 4: Future Trends Paper

Due: 4/14/2005

Description: You will write a paper on future trends for your topic.

Requirements:

1. Based on your informed opinion, predict what the state-of-the-field will be like for your topic area in the next three to five years.

2. Provide evidence to support your claims; avoid exaggerated claims and substantiate your predictions with:
   a. Facts.
   b. Observed trends.
   c. Theoretical limitations.

3. There is no required length for paper.

4. No presentation is required.
Assignment 5: State-of-the-Field Paper and Presentation

Due: 4/22/2002 (First Draft Paper)
week of 4/25/2005 (Presentation)
5/2/2005 (Final Paper)

Description: You will write a paper and give a presentation on the comprehensive state-of-the-field for your topic.

Requirements:

1. You will give a detailed assessment of the state-of-the-field for your topic, including all appropriate material previously developed throughout this semester.

2. You will include a survey, ethical considerations (if appropriate), the present state-of-the-field and future trends.

3. Include charts and diagrams to illustrate trends. Include table of contents, lists of figure/tables, section headings and other navigational aids.

4. There is no set length required for the paper or presentation.

Note: The paper you write for this assignment will be much longer than those for the previous assignments. As a result, structuring your document becomes much more important. In particular, the following elements will be necessary:

1. An abstract or substantial introduction (or both) previewing the thesis and content of your document.

2. Table of Contents (can be generated for you by MS Word) listing section, subsection and possibly sub-subsection headings and associated pages.

3. Lists of Figures, Tables if you have more than one of each (also can be automatically generated).

4. Numbered section, subsection (and possibly sub-subsection) headings. Refer to a section as “In Section 2…”. Refer to a subsection as “In Section 2.1…”. Using the Heading 1, Heading 2, and etc. styles in MS Word.

5. Numbers and captions on all figures and tables, including source of information. In the text of your document, figures and tables should be referred to by their numbers. For example: “In Figure 1 we show… “ Note that figure numbers can be automatically generated and tracked by MS Word.