**Welcome to CSE 499 Senior Project!**

This is an exciting time because it represents that you have arrived at the level of completing a major capstone project. This course is designed to be very much an independent, student-driven process. In a nutshell, you decide what you want to learn and build, and then go do it.

The role of the instructor in this course is simply to help mentor you through the project and ensure that you complete what you planned.

There obviously must be some guidelines in place, but these are designed to be as minimal as possible. This document will outline the steps you need to complete.

In completing your project, you will be expected to do the following:

* Learn something new,
* Create a project that is resume worthy and solves an interesting problem,
* Work with stakeholders,
* Apply software development principles and learnings from your program courses,
* Complete a full semester worth of work on your project, and
* Complete and professionally present your project.

**LEARN SOMETHING NEW**

As a part of your senior project, you are expected to learn one, or more, new computer science topics that you don't currently know.

The ability to be a self-reliant learner, where you can learn new concepts without an instructor teaching it to you, or providing a textbook, etc., is a critical outcome of your degree and of the university's mission.

Expectation and Perception:

This is not a free for all class. In this class, more than any other you have taken, you will be expected to demonstrate your full academic abilities, skills, and capabilities. This is considered the capstone class of your degree. You are expected to apply the majority of your learned skills and knowledge and learn something new and produce a workable product at a professional level.

**A SIGNIFICANT PROJECT**

The expectation is that significant projects:

* Have potential real-world impact. Your project should solve a real-world problem or address a real need. This could range from a service offering to benefit the disabled or underprivileged, or could be a business idea that you would like to further develop.. The idea is that it should provide value.
* Can be broken down into workable tasks. Your project needs to be able to be broken down into smaller units of work that you can schedule and complete in the time you have. Once you have created a plan, that plan should include specific milestones that you will complete.
* Use existing code wherever possible. As in the real world, you should take advantage of any existing libraries or codebases and bring these together to build something more involved than you could if you started from scratch.
* Are able to be completed. This sounds obvious at the beginning, but many students question it at the end. You will set the expectations for what your project requires and be expected to complete it. This means that you figure out a way to push through challenges, whether they be technical or motivational, along the way, and have something you can be proud of in the end.
* Apply software development principles: You need to be able to produce a project using principles that you have learned and demonstrate that you have learned them.
* Require a full semester’s level of effort. Your senior project should require the level of effort of a 3 credit, senior-level, CS course. The university recommends spending 2 hours outside of class for every hour in class, which is 9 hours per week devoted to a 3 credit course. With that in mind, each team member should plan to work roughly 126 hours on the project (9 hours multiplied by 14 weeks). Please keep in mind that, while we will track hours spent, completing a great project is the goal, not spending lots of time.
* Are demonstrable to your instructor, in a job interview and in other professional and academic settings. Your project should be something you can put on your resume that will impress prospective employers.
* Optionally involve more than a single developer. Senior projects can, but are not required to, be completed in teams. If you choose to form a team you will be able to (and be expected to) build something larger and more complete than you could on your own.
* Optionally prepare for a Graduate Degree: Please note that a research-related project/paper can also be significant and is a great option for students considering graduate school.
* Represent the School & Department: The project should be a positive reflection of yourself, the school, and department.

**The Process**

The senior project is designed to be as independent as possible. However, to help the instructor mentor you through the project, there are a certain steps you need to complete along the way. The steps are:

1. [Choose an idea (and potentially teammates)](https://content.byui.edu/file/c05247fa-94c6-4359-b670-a575f25773a7/1/content/499-course-information.html#idea),
2. Obtain approval for the idea from your instructor,
3. [Submit a project proposal](https://content.byui.edu/file/c05247fa-94c6-4359-b670-a575f25773a7/1/content/499-course-information.html#proposal),
4. Submit an initial requirements specification
5. Submit Project Prototype
6. [Submit a final requirements specification](https://content.byui.edu/file/c05247fa-94c6-4359-b670-a575f25773a7/1/content/499-course-information.html#requirements),
7. [Demonstrate project completion](https://content.byui.edu/file/c05247fa-94c6-4359-b670-a575f25773a7/1/content/499-course-information.html#completion), and
8. [Submit a reflection document](https://content.byui.edu/file/c05247fa-94c6-4359-b670-a575f25773a7/1/content/499-course-information.html#reflection).

In addition to the above, weekly status reports need to be submitted throughout the entire semester.

The following sections outline each of these steps in detail.

**Choosing an idea (and potentially teammates)**

The first step in the senior project process is to come up with an idea. The most important qualification for an idea is that the project is something that you are interested in. The best way to doom a project to failure is to choose an idea that you aren't passionate about. Every project will have challenges that arise along the way, but if you're working on something you are intrinsically excited about, it will be much easier to push through the hard times and be successful.

There are few things that you need to consider when choosing your idea.

* You will formally present your project to your instructor for evaluation and grading. You need to select a project that is demonstrable and that you have no restrictions in showing it to your instructor.
* Start with an Idea Web or Brain Storming session. Start with a problem to be solved, idea, or question. Talk to potential stakeholders and brainstorm with them about ways to solve problems they have identified.
* Ask: Can I use this on my resume? When an employer looks at your resume, they are going to ask about your capstone project. Can you talk about it?

Make sure that your project is small enough to fit into the class. You have equivalent of 3-man weeks to complete the class, in other words a full-time person working on it for 3 weeks.

Since it is part of the Degree program, BYU-Idaho retains “shop rights” to your project. Please review the school’s policy, especially Section III: subsection D, “shop rights”. If you plan on selling your project to another company, or are creating your project for a company, you will need to understand BYU-Idaho’s rights.

In addition, most companies have Intellectual Property IP agreements, and you need to be aware and trained on how to handle your ideas and IP (This class does not cover it). Refer to the CSE 499 Syllabus for links to works created at BYU-Idaho and IP ownership.

**Project Proposal**

Your project proposal is your first chance to formally define what you plan to build. It is understood and expected that you do not know everything about your project at this point, but you should have completed some preliminary research. You will continue to research and define more specific requirements as you go along. However, at this stage of the process, you should have a sufficiently clear understanding of the area to know what you want to do.

At this point, you should be able to clearly articulate your focus and your application and give a 30 second elevator pitch to anyone who says, "What are you doing for your senior project?"

THE PROPOSAL DOCUMENT

The project proposal should have the following sections:

***Project Name***

*Give your project a name.*

***Team with Contact information***

*List those who will be building the project and their contact information*

***Stakeholders with Contact information***

*List the Stakeholders of the project and their contact information*

***Project Purpose***

*Describe the problem your project will be solving.*

***Background/Prior Knowledge***

*What do you already know about the topic, technology, or subject you will be working in? Do you consider yourself a Newbie, Beginner, Novice?*

*Provide information essential to understanding your project. If applicable, this should include:*

*Prior work by others - Are you recreating something that has been done before? Are you building on top of others' work?*

*Prior work by you - Have you already done things in this area and you are adding to it?*

*Provide information on what foundational course background, if any, got you interested in this subject and how you are going to use that information in your project.*

***Description***

*Provide the details of your project. In particular, make sure to include:*

*In more detail than your abstract, explain what your will project do. What is the solution/features? Does the solution to your problem already exist? If so how is your solution better or different? What is the real-world impact of your solution?*

*Describe the intended audience, customer, or user of the project. What is your primary audience? Who is going to use your solution/program? Will your solution only be in a certain geographic area, Community, Or age range? etc. Where is it going to be used?*

*When do you know the project is done? What is good enough or a valid product that I can demo?*

***Significance***

*Referring back to the expectations for significant projects above, explain how/why your project will be significant.*

*Is this something that you can put on your resume and feel would impress prospective employers? Describe what you would put on your resume.*

***New Computer Science Concepts***

*Another critical part of your senior project is that you demonstrate that you have become a self-reliant learner. Please describe the new things you will need to learn to complete this project. These items should be computer science / software engineering concepts.*

*Your sole reason should not be to learn a language or learn a language better. Though you may want to learn a new aspect of a language not covered in previous classes found in the major, this should not be the only new concepts you want to learn.*

*You may consider a new tool, technology, 3rd party software, or programming concept. Note: Do not underestimate how long it will take to learn new technologies and concepts. Take some time to do preliminary research so that you have a feeling for how much time may be required to come-up-to-speed on the new technology or concept.*

***Interestingness***

*Describe why this project is interesting and exciting to you. Senior projects get hard, hit road-blocks, and cause people to want to quit. If you are excited about your project, this will help you stay motivated and complete your project.*

***Milestones, Tasks and Schedule***

*Course Expectation is that this is full semester effort of 126 hours/person. That is 9 hours per week.*

*Divide your project into tasks. Try to make these as meaningful as possible and more detailed than "development." For example, for an OCR project, you might have separate tasks for loading an image into the system, identifying the text region, segmenting into characters, etc.*

*For each task, list the deadline and estimated number of hours for the task. Your schedule should include submitting the requirements specification as a milestone. Be sure to consider holidays and other events that may impact your schedule. Be realistic!*

*Provide the total estimated number of hours to completion.*

*Is your schedule too aggressive? Does your project require more hours than you have time/resources? Will you spend more time on this project than is needed? If you are planning on working more than 20 hours a week per person on this class, you might have to reduce the scope. Also, anything over 200 hours/person also might need to be reviewed.*

*Identify critical milestones for your project.*

*Please note that this schedule is for your benefit and not something you will be held to for a grade, but rather something that can be referred to in order to see if you are on schedule or not.*

*Remember that your schedule and plan is likely to change as you learn more. Creating this initial schedule will help you identify the scope of your project and help keep yourself accountable.*

***Resources***

*List resources needed to complete your project. This may include hardware, software licenses, reference material, etc. Specify the estimated cost for each resource. Include hardware, software, compliers, books, websites, mentors, events, and videos associated with languages, tools, and software you need for the project.*

***Dependencies***

*What are your dependencies for the success of your project? What are the languagesyou need to install? What IDE will you use? What platform (Windows, Mac, Web, Servers) are you going to use? Where are you going to develop and test the solution? How are you going to install & deploy the solution? Are you dependent on other people providing anything for you to complete your project? Are there any permissions you need to obtain?*

*This is to help you recognize if there are things you'll need to buy, and if so, if that is feasible for you. In some cases, the department may have limited funds to purchase equipment that can be reused for future projects. But recognize that if the department purchases equipment it will stay with the department.*

***Risks***

*Identify the risks of completing the project. This should include a list of things you don’t know how to do and will need to learn.*

Proofread your proposal. Please make sure that you are not violating copyright, IP, or patent laws.

When complete, submit your proposal to I-Learn for instructor feedback and approval. Then, you will continue in your research, prototyping and development work to submit your requirements specification.

While you are waiting for feedback on your proposal, please continue forward with your project. When changes need to be made, they are almost always clarifications, minor adjustments, or changes to scope, rather than a change to a completely different project.

**Technology Prototype**

See the Technology Prototype document and assignment.

**Project Completion**

Before the end of the semester, you need to demonstrate your project to your instructor via a scheduled online meeting. This means you need to schedule a time to meet with the instructor (e.g., a video call) before the end of the day of the last regular class day of the semester. This leaves the "final exam" days for you to submit your reflection document and for the instructor to finish the paperwork process. In this meeting, you will demonstrate to your instructor how your project met the requirements you defined.

**Peer Evaluation for Team Projects (if applicable)**

If you completed your project in a team, before meeting with the instructor at the end of the semester, please submit a document that discusses each team member's contribution.

First, list the project name and the name of each team member. Then, for yourself and each member of the team include the following:

Describe this person's primary responsibilities

Describe how well they fulfilled their tasks.

Describe how well they communicated with the team.

Describe one thing they could have done better.

Finally, please assign each team member a score that defines their overall contribution to the team. These scores must have an average of 10 and cannot all be the same. So, for example, if you have an11, you will need the equivalent of one 9.

**Frequently Asked Questions**

Can I start on my senior project before I am registered for the course?

Yes! You are encouraged to get started thinking about and even working on your project before you are enrolled in the course.

Please be aware that you must go through the same process of getting instructor approval, submitting proposals, status reports, etc. If you are not yet enrolled in the course, these should be submitted via email. Once you have an approved proposal, you should submit status reports via email whenever you have done about 10 hours of work. You must be enrolled in CSE 499 during the semester that you complete the project.

Can I use software written by others?

Yes! Your goal is to build on existing code to make something significant. This usually means that you are building on top of existing components. Make sure you correctly site all resources used.

Can my senior project be something I'm doing at work?

If a project for work meets the necessary requirements, it can potentially be used for a senior project. However, it is important to go through the process of approval, proposal, requirements document, and status reports before undertaking the project. Also, you must be able to demonstrate your project to your instructor. If your project includes company private data or information, you must gain approval from work that you can show the project to your instructor. This approval must be in legally binding written form.

Can I use something I have previously done for my senior project?

As a matter of policy, previously completed projects, either for work or personal projects, are not eligible for senior project credit. Regardless of what you have done previously, there is still more to learn. The purpose of the senior project is for you to learn something new--so, even if you have done great things in the past, choose something new and interesting to you and see what you can learn.

You are welcome to add onto previous projects, provided the new work will cause you to learn new computer science concepts and is significant.

Can my senior project be something I'm doing for my internship?

Projects done as part of an internship are being counted as part of that course and are not eligible to double count as senior projects. Projects done as part of a second internship wherein college credit is not obtained are eligible senior projects. This would be considered a work project. See the section just above on using work projects.

What are some possibilities topics for my project?

You need to decide what you are interested in so it will be a meaningful project for you.

Are there some topics I should avoid?

Games. It is hard to impress a potential employer with a game.

**Lessons Learned by Past Students**

I didn't submit my requirements document until later in the semester since I didn't want to commit myself to something that seemed a tall order, if not impossible. But I should have just jumped into it and got it done. I feel like, if I had and I could have spent another 50-100 hours on it, I could have had something a little more complex and interesting.

Please recommend the path of Senior Project A & B to all CS/SE students who need to complete a senior project. It is much less stressful to spread it out over 2 semesters.