

Department of Software Engineering

Thesis and Capstone Project Comparison

Thesis and Capstone are similar but they also have fundamental differences.

Similarities

The thesis and project are similar in a few ways. First, they are both supposed to demonstrate that you have learned something, and that you have the ability to learn new things. Second, both the thesis and capstone project should draw on and integrate the knowledge that you gained in the courses that you took for your degree. Third, both the thesis and project culminate in a public presentation.

Focus

Both capstone projects and theses should have a clear *statement of the problem* or issue to be addressed; a *literature review* which covers the important work related to the problem, with content clearly relating to the statement of problem; *analysis of results*; and statement of *conclusions*.

The **thesis** should answer a question, which contributes to new knowledge and is generalizable beyond a single setting. The thesis should be analytic, should systematically analyze data, and should develop and make appropriate inferences based on the analysis.

The **capstone project** may answer a question of practical importance, - to develop, test, and evaluate a solution. A measure of quality of both theses and capstone projects relates to the clarity of thought process, beginning with the statement of the question or problem, to final statement of conclusions or recommendations. An additional measure of the quality of a capstone project may also relate to how effectively it contributes to carrying out the goals and objectives.

From another perspective, a capstone project is different than a thesis is in how you demonstrate your knowledge. With a project you demonstrate this by “building something”. It may involve something new (new methodology, etc.). Basically, a project is "applied" knowledge and learning with the product being the goal. Do not forget that by “building” this includes the entire lifecycle, not just implementation. Even though the capstone is project-focused, you are still trying to answer a question or pursue an objective.

In contrast, the goal of a thesis is to become a "mini-expert" in a given field by researching the answer to a question and/or exploring the impact of an assumption (your hypothesis). This exploration then leads to some statement of fact (thesis). You (and your thesis advisor) come up with a question/assumption that is then tested. You would then develop and conduct experiments to either prove or disprove the hypothesis or otherwise using an appropriate methodology. This would then lead to one or more conclusions regarding validity of your hypothesis.

In a thesis, you demonstrate your knowledge through a full semester of research, investigation, deduction, reason, and experimentation. Note that the "experimentation" part is not the goal. It is just a tool to investigate your thesis. A thesis "feels" more like the scientific method than a project.

Originality

CAPSTONE

Projects are not expected to be earth shattering, or potentially even original. They are used to demonstrate that you can draw together your classroom experiences into an applied project.

THESIS

With a thesis, your work is expected to be original. You are contributing knowledge to the SE field. As such, your work should be publishable (even though you may not pursue actual publication). That means your work should stand up to review by practicing professionals in the field.

Write-up

CAPSTONE

Since you demonstrate your knowledge in a project by building a product, only a brief report is required. This report is not nearly as rigorous as the one done for the thesis, and serves to summarize your project and its background (describe the problem, literature review, present your solution, illustrate its usage). The report is generally between 15-20 pages.

THESIS

The thesis (document) is a detailed document that describes all the work that you've done from the initial narrowing of the thesis topic through the final analysis of results. It demonstrates all of the knowledge that you gained and your ability to integrate it, analyze it, and draw conclusions from it. In essence, the thesis demonstrates that you have become a "mini-expert" in your subject area. Your original research and your thesis document are the goals of the thesis experience. You may also have an associated data set or project that supports your thesis. This document is longer than the capstone report and it is bound into a volume, where one copy is kept in the department and one is kept in the library.

Presentation

CAPSTONE

The final difference is in the presentation. With a project, the focus is on "look what I built". While you do present the overall issue and the background, you mainly focus on the design and implementation of your project, and if relevant a demo of the project. Questions are often of the form "How or why did you do that?" You are also required to create a poster.

THESIS

The thesis presentation is called a defense. The defense shows that you have mastered your subject area. You are also defending your work and your results. During the defense you present your analysis, describe the experiments that you conducted, and defend your conclusions. Questions are more of the form "Why did you do that?" and "Did you think about this...". You are expected to be able to answer the questions, even if you don't know the answer(!).

Both capstone presentations and thesis defenses are open to the public.

Text is modified: <http://www.cis.gvsu.edu/degrees/cis/projectversusthesis> and the University of Washington