

East West University
Department of Computer Science and Engineering
CSE400A Capstone Project

Guideline for Writing Capstone Project Report

CSE400A: Finalizing a capstone project topic and its objectives

Here, consider the following outcomes:

PO1: Engineering Knowledge (Cognitive)

PO4: Investigation (Cognitive, Psychomotor)

Project Report Format:

Project Title

Write the name of your project (indicate accurately the subject and scope of the study; avoid using abbreviations; use words that create a positive impression and stimulate reader interest; use current nomenclature from the field of study).

Background

This section presents the study background and research problem. After reading this section readers should have a broad understanding of the problem: what the problem is, why it is a problem, how does the problem appear to people, and so forth. Background must be backed up by references to research literature.

Related Works

Your project should include a review of the existing research on your topic and a discussion comparing this research to your project focus. A survey of the state-of-the-art may be included in a table. Also, summarize your observations and justify why you are going to propose a method to overcome all limitations found in the literature.

Research Questions/Problem Statements

This section lists the research main question and possible sub-questions. Those questions should be tightly linked with the problem, aims, and objectives.

Objectives

This section outlines how this research study will approach the problem. The section presents the aims of this study, as well as concrete research objectives that the study will aim to achieve.

Planned Methodology

The introductory section may briefly describe strengths and weaknesses or some potential method choices. This section should justify why one method is selected over the others (look back at Research Questions). As you compare different methods and their strengths and weaknesses, make sure that your method of choice is all the time clear for the reader. In the next part, include a proposed model, which you will employ for the design, planning, implementation, and achievement of project objectives. You may include proposed materials, datasets, design/framework, algorithm, etc.

Data Analysis Plans (if any)

This section reports how the data are going to be collected and analyzed. For qualitative studies, it is important to describe the context in detail so that the readers understand the research context and what kinds of things might have influenced the outcomes.

Expected Results

This section reports the expected deliverable product. This is the main section of a project report; the one which is aimed at convincing the reader.

References

The in-text citations and list of references, in IEEE or Harvard, referencing style – but consistently within that style. Use of citation and reference management software/tools/services are highly recommended. Citations of textbooks should be used very rarely and citations to web pages should be avoided. All cited papers should be referenced within the text of the manuscript.

Mark Distribution and Evaluation Criteria (CSE400A):

CO	CO Descriptions	PO Descriptions	Learning Domains	Assessment Weight	Learning Subdomains	Rubrics Design	Points	Obtained Marks
CO1	Integrate new and previously acquired knowledge for identifying a real-life complex computer science and engineering problem as the capstone project.	PO1: Engineering Knowledge	Cognitive	45%	C2	Able to understand the knowledge of mathematics, natural sciences, engineering fundamentals, and computer science and engineering.	20	
					C3	Able to apply new and previously acquired knowledge for identifying problems.	25	
CO2	Examine various problem domains (literature review), define the problems, and formulate the objectives for the capstone project.	PO4: Investigation	Cognitive, Psychomotor	45% 10%	C4	Able to analyse and/or compare and/or categorise investigation (experiment/modelling/survey/etc.) data.	15	
					C5	Able to critically evaluate and/or assess and/or interpret and/or making inferences and/or conclusions data from the investigation (experiment/modeling/survey/etc.).	15	
					C6	Able to design investigation methodology based on literature review and/or standards.	15	
					P2	Able to conduct investigation (experiment/modeling/survey/etc.) under some supervision.	3	

					P3	Able to perform investigation (experiment/modeling/survey/etc.) under minimum supervision.	4	
					P4	Able to adapt investigation (experiment/modelling/survey/etc.) to suit objectives.	3	
Total Points							100	

Appendix

Addressing of COs, Knowledge Profile (K), and Complex Engineering Problem (EP):

CO	CO Descriptions	K	EP
CO1	Integrate new and previously acquired knowledge for identifying a real-life complex engineering problem as the capstone project	(i) Background [K1, K2, K3] <i>Write here how you have addressed K1, K2, K3</i>	(i) Background [EP1] <i>Write here how you have addressed EP1</i> (ii) Research Questions/Problem Statements [EP6] <i>Write here how you have addressed EP6</i>
CO2	Examine various problem domains (literature review), define the problems, and formulate the objectives for the capstone project	(i) Related Works [K8] <i>Write here how you have addressed K8</i>	(i) Related Works [EP1] <i>Write here how you have addressed EP1</i> (ii) Objectives [EP2, EP6, EP7] <i>Write here how you have addressed EP2, EP6, EP7</i> (ii) Planned Methodology [EP2, EP6] <i>Write here how you have addressed EP2, Ep6</i>

Descriptions of Learning Domains, Knowledge Profiles, and Attributes of Complex Engineering Problem

Learning Domains

Cognitive Domain (Anderson and Krathwohl's Taxonomy 2001):

Level	Category	Meaning	Common Keywords
C1	Remembering	Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce or retrieve definitions, facts, or lists, or to recite previously learned information.	Define, describe, draw, find, identify, label, list, match, name, quote, recall, recite, tell, write
C2	Understanding	Constructing meaning from different types of functions be they written or graphic messages or activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining.	Classify, compare, exemplify, conclude, demonstrate, discuss, explain, identify, illustrate, interpret, paraphrase, predict, report
C3	Applying	Carrying out or using a procedure through executing, or implementing. <i>Applying</i> relates to or refers to situations where learned material is used through products like models, presentations, interviews or simulations.	Apply, change, choose, compute, dramatize, implement, interview, prepare, produce, role play, select, show, transfer, use
C4	Analyzing	Breaking materials or concepts into parts, determining how the parts relate to one another or how they interrelate, or how the parts relate to an overall structure or purpose. Mental actions included in this function are <i>differentiating, organizing, and attributing</i> , as well as <i>being able to distinguish between</i> the components or parts. When one is analyzing, he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.	Analyze, characterize, classify, compare, contrast, debate, deconstruct, deduce, differentiate, discriminate, distinguish, examine, organize, outline, relate, research, separate, structure

C5	Evaluating	Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation.	Appraise, argue, assess, choose, conclude, critique, decide, evaluate, judge, justify, predict, prioritize, prove, rank, rate, select, monitor
C6	Creating	Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into something new and different creating a new form or product. This process is the most difficult mental function.	Construct, design, develop, generate, hypothesize, invent, plan, produce, compose, create, make, perform, plan, produce

Psychomotor Domain (Dave's Taxonomy 1975):

Level	Category	Meaning	Common Keywords
P1	Imitation	Copy action of another; observe and replicate.	Relate, Repeat, Choose, Copy, Follow, Show, Identify, Isolate.
P2	Manipulation	Reproduce activity from instruction or memory	Copy, response, trace, Show, Start, Perform, Execute, Recreate.
P3	Precision	Execute skills reliably; independent of help.	Assemble, Implement, Organize, Calibrate, Demonstrate, Build, Perfect, Control, Complete, Measure.
P4	Articulation	Adapt and integrate expertise to satisfy a non-standard objective.	Modify, Master, Develop, Adapt, Formulate, Coordinate, Combine, Solve, Integrate.
P5	Naturalization	Automated, unconscious mastery of activity and related skills at strategic level.	Design, Rank, Manage, Compose, Develop, Specify, Construct, Invent.

Affective Domain (Krathwohl, Bloom, Masia's Taxonomy 1973):

Level	Category	Meaning	Common Keywords
A1	Receiving	Willingness to participate in an activity to attend to a stimulus; getting and holding the attention of students.	Locate, Give, Point to, Follow, Sit erect, Hold, Name, reply, Identify, Choose
A2	Responding	Actively participates; demonstrates interest in an object, activity or phenomena; seeks or pursues this object, activity or phenomena.	Label, Answer, Perform, Write, Conform, Assist, Recite, Report, Read, Greet, Help, Present, Compile.
A3	Valuing	Value or worth attached to an object, activity or phenomena; varies from simple acceptance to commitment.	Work, Form, Follow, Join, Invite, Justify, Study, Explain, Share, Propose, Select, Complete, Describe, read, report, Differentiate, Initiate.
A4	Organizing	Compare and contrast, and resolve conflict to build a consistent value system; emphasis on comparing and synthesizing values.	Relate, Synthesize, Identify, Prepare, Defend, Generalize, Modify, Integrate, Order, Compare, Complete, Organize, Adhere, Arrange, Combine, Explain, Alter.
A5	Internalizing	Adopt a value system for a length of time that contributes to a particular "lifestyle" (i.e. directs behavior).	Influence, Propose, Use, Quality, Revise, Serve, Solve, Modify, Display, Practice, Listen, Question, Perform, Act, Discriminate, Verify

Knowledge Profile

Knowledge Profile	Attribute
K1: Theory-based natural sciences	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2: Conceptually-based mathematics, numerical analysis, statistics, and formal aspects of computer and information science	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline
K3: Theory-based engineering fundamentals	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4: Forefront engineering specialist knowledge for practice	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
K5: Engineering design	Knowledge that supports engineering design in a practice area
K6: Engineering practice (technology)	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
K7: Comprehension of engineering in society	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability
K8: Research literature	Engagement with selected knowledge in the research literature of the discipline

Range of Complex Engineering Problem Solving

Attribute	Characteristics of Complex Engineering Problems
EP1: Depth of knowledge required	Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6, or K8 which allows a fundamental-based, first principles analytical approach
EP2: Range of conflicting requirements	Involve wide-ranging or conflicting technical, engineering and other issues
EP3: Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
EP4: Familiarity of issues	Involve infrequently encountered issues
EP5: Extent of applicable codes	Are outside problems encompassed by standards and codes of practice for professional engineering
EP 6: Extent of stakeholder involvement and conflicting requirements	Involve diverse groups of stakeholders with widely varying needs
EP7: Interdependence	Are high level problems including many component parts or sub-problems