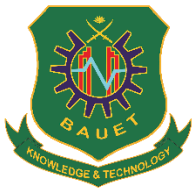
KNOWLEDGE AND TECHNOLOGY



Bangladesh Army University of Engineering and Technology

Qadirabad Cantonment, Natore-6431

Guidelines for Thesis/Final Year Project

Dept. of Information and Communication Engineering

Course Code: ICE 4100 & 4200

Course Title: Thesis/Project

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1. Course Contents

Students may choose to write alone or in groups of up to 3 students.

Types of thesis:

Students can choose topics containing theoretical, empirical and/or practical aspects. But irrespective of the topic chosen, the use of relevant theory and literature is fundamental to the thesis.

An empirical paper: The idea is to gather knowledge on a specific topic and to relate theory to empirical observations, e.g. by using existing data, by using questionnaires or experiments.

A case study: A case study approach involves an analysis of a specific occurrence or process in an actual company or another type of organization. The purpose of a case study is to provide descriptions, analyses and suggested solutions to problems in relation to the case in hand. Case studies will involve the use of quantitative and/or qualitative methods for data collection.

A theoretical paper: This type of thesis builds on a theoretical model or a generic problem. Often a theoretical thesis is based on existing literature studies in which a theoretical problem is analyzed. This type of thesis is the least common.

No type of thesis is superior to others and no topics guarantee a high grade. The grade is based solely on whether the topic is thoroughly analyzed, the results clearly presented and whether you are able to demonstrate your knowledge of current theories and analyses, competent application of methods as well as independent critical judgment.

2. Course Objectives:

- **a.** To learn more in-depth knowledge of the major subject/field of study, including deeper insight into current research and development work.
- **b.** To contribute to research and development work.
- **c.** To use a holistic view to critically, independently, and creatively identify, formulate and deal with complex issues.
- **d.** To plan and use adequate methods to conduct qualified tasks in given frameworks and to evaluate this work.
- **e.** To create, analyze and critically evaluate different technical/architectural solutions.
- **f.** To critically and systematically integrate knowledge.

3. Overview of Final Year Thesis/Project

A Final Year Thesis/Project is a course continues two semesters in final year which can be undertaken individually or in small groups usually of 2/3 students and supervised by a faculty member. The Thesis/Project is offered in seventh semester and continues till the eighth

semester. In this course, students choose a thesis/project title and define the objectives of the thesis/project under the supervision of a faculty member, and prepare the thesis/project proposal including: **defining the statement of the problem, defining system requirements, defining different possible solutions for the problem of study, making feasibility study for different possible solutions, defining the best possible solution, defining time table schedule**. Students present the final thesis/project report at the end of the final semester to an evaluation a committee. The final year thesis/project is assigned to solve a complex engineering problem based on the knowledge and skills achieved while studying the Bachelor of Science in Information and Communication Engineering program. The aim of the Thesis/Project is to give each student the opportunity to experience the engineering design process in the context of a topic related to the Information Technology and Communication Engineering. COs for the final year thesis/project are defined as the part of the Thesis/Project policy. The progress of Thesis/Project is monitored in various steps throughout the thesis/project duration.

4. Final Year Thesis/Project Development Steps

The thesis/project work will be conducted by individual or group of maximum three members under the close supervision of a faculty member. The entire thesis/project will the conducted through the following steps:

Step-1	Topic Submission
Step-2	Literature review, Fixing Objectives, Investigation and Finalizing Methodology
Step-3	Planning for Thesis/Project Management and Finance
Step-4	Design and Partial Implementation (Prototype/Demo)
Step-5	Complete Implementation, Testing and Result Analysis, Report Writing
Step-6	Report Evaluation, Final Observation and Correction

5. Best Practices for Students

The supervisors should guide the students to follow, but not limited to, the following best-practices as shown below**:**

a) Ensure proper research and background knowledge is acquainted

b) Feasibility study is conducted on the proposed thesis/project

c) Scope of the thesis/project is precise and crystal clear

d) Generating and comparing alternative designs to determine best match for the requirements

e) Roles & responsibilities of individual student working within the group is clear and accepted

f) Able to apply thesis/project resources as per the approved thesis/project plan

g) Track and report any issues and risks in completing assigned tasks

h) Both logical and physical design aspects are analyzed

i) Auto or Manual Test Cases are implemented and executed

j) Source control with versioning tools are used for developing as a team

k) Documenting required deliverables using industry standards

l) Participating in Seminars, Events, Publications and Workshops relevant to the thesis/project

6. Statement of the Course Outcome (CO) of Thesis/Project Course

COs	Statements	PO	BL	WK	WP	EA	Delivery Methods and Activities	Assessment Tools
CO1	Research literature and Critically evaluates the limitation of existing solution methods using specialized engineering knowledge.	2	C5	WK4			Demonstration/Tutorial/Self Study	Observation/ Report Writing, Oral Presentation
CO2	Investigate and gather information on a given engineering issue.	12	A1					
CO3	Demonstrate competency in completing individual engineering research or project based on relevant management and economic principles.	11	A5					
CO4	Develop solution for different components of complex engineering problem.	3	C3		1,3,7			
CO 5	Analysis and interpretation of collected data to provide valid conclusion acknowledging the limitations.	4	C4					
CO6	Perform effective oral presentation on complex engineering activities.	10	A2			2,4		
CO7	Practice good professional ethics and commitment to professional responsibilities?	8	A5					

7. Assessment Strategy:

Assessment Method	CO	PO	Bloom's Taxonomy Level	WK	WP	EA	Remarks
Report Writing	1	2	C5	4			Chapter: Literature Review
	2	12	A1				Chapter: Methodology (Explanation and selection of methodology)
	3	11	A5				Chapter: Methodology (Management and budget)
	4	3	C3				Chapter: Methodology (Design of proposed solution)
	5	4	C4		1,3,7		Chapter: Result & Discussion
Presentation	6	10	A2			2,4	Final Defense
Responsibility & Report Writing Ethics	7	8	A5				Continuous Assessment & Turnitin Report

8. Course Assessment Methods & their Weights:

Method	Assessment	COs	Percentage (%)
Report Writing (50%)	Research literature	CO1	10
	Critical analysis of data collected by literature review	CO2	10
	Investigation on methodology	CO3	10
	Project/Research management and finance	CO4	10
	Result and discussion on CEP	CO5	10
Presentation	Final Defense	CO6	30
Responsibility & Report Writing Ethics	Continuous Assessment/Pre Defense	CO7	10
	Turnitin Report		10
		Total:	**100**

9. Formatting of the Thesis/Project Report

The conventional format follows the traditional monograph structure (Table 1.1). This is the most common form of research project/dissertation/thesis used by most candidates.

Table 1.1: The general structure that follows the conventional format

Preliminary
▪ Title Page ▪ Original Literary Work Declaration ▪ Abstract ▪ Acknowledgements ▪ Table of Contents ▪ List of Figures ▪ List of Tables ▪ List of Symbols and Abbreviations ▪ List of Appendices
Main Body
▪ Chapter 1: Introduction ▪ Chapter 2: Literature Review ▪ Chapter 3: Methodology ▪ Chapter 4: Results & Discussion ▪ Chapter 5: Conclusion ▪ References (A consolidated list of references for all chapters)
Supplementary
▪ List of Publications and Papers Presented ▪ Appendix

10. List of Thesis/Project Defense Committee Members (Final Defense)

Si	***Name and Designation***	***Responsibility***
1	Head of the Department	Chairman
2	Concern Thesis/Project Supervisor	Member
3	(Academic and /Industry)	External Expert

11. Statements of Program Outcome (PO) Related to CO of Thesis/Project

Sl.	PO	Category	Description
2	**PO 2**	**Problem Analysis**	**Identify**, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions **using first principles** of mathematics, natural sciences, and engineering sciences.
3	**PO 3**	**Design/Development o f Solutions**	**Design solutions** for complex engineering problems and **design system** components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, social and environmental concerns.
4	**PO 4**	**Investigation**	**Conduct investigations** of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
8	**PO 8**	**Ethics**	Apply ethical principles and commit to professional Ethics and responsibilities and norms of the engineering practice.
10	**PO 10**	**Communication**	Communicate effectively on complex engineering activities with the engineering community and with society at large. Some of them are, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**PO 11**	**Project Management and Finance**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**PO 12**	**Life Long Learning**	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

12. Mapping of Course Outcomes (CO) and Program Outcomes (PO) with Level:

Course Outcomes (CO)	Program Outcome (PO)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1		H										
CO2				H								
CO3												H
CO4											M	
CO5			H									
CO6										H		
CO7								H				

13. Knowledge Profile (WK)

WK1	**Natural Sciences**	A systematic, theory-based understanding of the natural sciences applicable to the discipline
WK2	**Mathematics**	Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline
WK3	**Engineering fundamentals**	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
WK4	**Specialist knowledge**	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.
WK5	**Engineering design**	Knowledge that supports engineering design in a practice area
WK6	**Engineering practice**	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
WK7	**Comprehension**	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability
WK8	**Research literature**	Engagement with selected knowledge in the research literature of the discipline

14. Complex Engineering Problem

WP	Preamble	COMPLEX PROBLEMS have characteristic of WP1 and some or all of WP2 to WP7
WP1	**Depth of Knowledge**	**In-depth engineering knowledge** at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamental based, first principles analytical approach
WP2	**Conflicting requirement**	Wide-ranging or **conflicting** technical, engineering and other issues
WP3	**Depth of analysis**	**no obvious solution** and require abstract thinking, originality in analysis to formulate suitable models
WP4	**Familiarity of issues**	**infrequently** encountered issues
WP5	**Extent of applicable codes**	outside problems encompassed by standards and codes of practice for professional engineering
WP6	**Extent of stakeholder**	**diverse groups** of stakeholders with widely varying needs
WP7	**Interdependence**	high level problems including **many component parts** or sub-problems

15. Complex Engineering Activities (EA)

EA	Preamble	**Complex activities** means (engineering) activities or projects that have **some or all** of the following characteristics listed below
EA1	**Range of resources**	**Diverse resources** (people, money, equipment, materials, information and technologies).
EA2	**Level of interaction**	Require resolution of significant problems arising from interactions between **wide ranging** or **conflicting** technical, engineering or other issues.
EA3	**Innovation**	Involve creative use of engineering principles and **research-based** knowledge in **novel** ways.
EA4	**Consequences to society and the environment**	Have **significant consequences** in a **range of contexts**, characterised by **difficulty** of prediction and mitigation.

EA5	**Familiarity**	Can extend **beyond previous** experiences by applying **principles-based** approaches.

16. Bloom's Taxonomy Domain

CognitiveDomain		**PsychomotorDomain**		**AffectiveDomain**	
C1	Remembering	P1	Perception	A1	Receive
C2	Understanding	P2	Set	A2	Respond
C3	Applying	P3	GuidedResponse	A3	Value
C4	Analyzing	P4	Mechanism	A4	Organize
C5	Evaluating	P5	Complex Overt Response	A5	Internalize
C6	Creating/Designing	P6	Adaption		
		P7	Origination		

17. Marking Rubric

Example marking rubric for each of the assessment toots have been given in Appendix.

Marking Rubric of Thesis/Project Report

G. No:		ID:	Title:			
Category	COs, PO and Section	Outstanding (Up to 100%)	Very Good (Up to 80%)	Good (Up to70%)	Poor (Up to 50%)	Marks
(10) Literature Review & Analysis	**CO1, PO2 Chapter 2** Literature review and Critical analysis	Presents a well-organized review of previous works covering most recent publication with critical analysis and valid conclusion of existing work.	Presents somewhat well-organized review of previous works covering most recent publication with critical analysis and valid conclusion of existing work.	The literature review does not cover sufficient existing literature and/or recent work with insufficient critical analysis and conclusion.	Unable to clarify the understanding of the problem.	
(10) Investigation on Methodology	**CO2, PO12 Chapter 3:** Investigation & Explanation on Methodology	Outstanding investigation on available methods has been conducted and appropriate method has been chosen for the solution of stated problem.	Very good investigation on available methods has been conducted and appropriate method has been chosen for the solution of stated problem.	Good investigation on available methods has been conducted and appropriate method has been chosen for the solution of stated problem.	Poor investigation on available methods has been conducted and appropriate method has been chosen for the solution of stated problem.	
(5) Project Management	**CO3, PO9 Chapter 3:** Project management and Finance	Outstanding project management and financial budged have been demonstrated.	Very good project management and financial budged have been demonstrated.	Good project management and financial budged have been demonstrated.	Poor project management and financial budged have been demonstrated.	
(15) Development of Solution	**CO4, PO3 Chapter3:** Design	Outstanding solution of stated complex engineering problem has been designed.	Very good solution of stated complex engineering problem has been designed.	Good solution of stated complex engineering problem has been designed.	Poor solution of stated complex engineering problem has been designed.	
(15) Investigation on obtained results	**CO5, PO4, Chapter 4:** Result & Discussion	Outstanding analysis and interpretation on obtained results or data has been provided.	Very good analysis and interpretation on obtained results or data has been provided.	Good analysis and interpretation on obtained results or data has been provided.	Poor analysis and interpretation on obtained results or data has been provided.	
					Total Marks (50)	

THESIS/PROJECT'S ORAL DEFENSE
RUBRIC

Gr. No.	ID-I: ID-II: ID-III:	**Title:**

Rubric	**Excellent (5)**	**Very Good (4)**	**Satisfactory (3)**	**Poor (1-2)**	**ID-1**	**ID-2**	**IC-3**
Organization (5)	Very logical, coherent, complete	Generally logical, mostly coherent, generally complete	A bit scattered but acceptable, somewhat coherent, occasionally scrambled	Rather hard to follow, significant omissions and/or substitutions			
Presentation (5)	Clear, convincing, good audience connection	Mostly clear, good grasp of material, only occasional stumbles	Lack of clarity, occasional gaps in theory or important details, somewhat nervous	A lot of confusion, not in control of facts and key details, very nervous and stiff			
Question & Answering (5)	Quickly grasped questions, clear and apt responses, good control of both theory and findings	Occasionally misunderstood a question, responses usually good though occasionally vague	Some misunderstanding of questions, responses may be vague or inaccurate, did not always give a full response	Frequently misunderstood a question, incorrect or inadequate responses, lack of confidence in response, argumentative			
Interaction with material (5)	Clearly understood both research findings and underlying theory	Adequate understanding of research findings, generally understood underlying theory	Weak but acceptable understanding of theory, could present research findings but not always clear on implications	Lacked adequate understanding of theory, research findings not always understood			
				Total Score (out of 20)			

Thesis/Project's Marking Rubric on Continuous Assessment & Similarity Level

Gr. No.	ID-I: ID-II: ID-III:	**Title:**

Rubric	**CO**	**PO**	**Marks: 9-10**	**Marks: 7-8**	**Marks: 4-6**	**Marks: 0-3**	**ID-1**	**ID-2**	**ID-3**
Continuous Assessment	CO7	PO8	Outstanding continuous progress achieved step by step and reported to supervisor	Very good continuous progress achieved step by step and reported to supervisor	Good continuous progress achieved step by step and reported to supervisor	Poor continuous progress achieved and not regularly met to supervisor			
Similarity Level			Similarity level is less than 5%.	Similarity level is in between 6%-10%	Similarity level is in between 11%-20%	Similarity level is more than 20%.			
						Total Score (out of 20)			