Kingdom of Saudi Arabia
Ministry of Higher Education
Umm Al-Qura University

College of Computing at AlQunfudah
Department of Computer Science

Graduation project Handbook

2020-2021

This document outlines the contents of Graduation Project (GP) handbook, which is intended to be used by students and faculty members in the Computing College at AlQunfudah, Umm Al Qura University, Makkah Al Mukarramah, Kingdom of Saudi Arabia. It provides a framework for use in undergraduate computer science projects.

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1. Glossary

GP:	Graduation Project.
CS:	Computer Science
CCG:	College of Computing at AlQunfudah
Supervisor:	A fulltime faculty member in the College responsible for the supervision of a group of **GP**.
Examiner:	An expert of the relevant area chosen from respective department, or other departments of the College.
Coordinator:	A faculty member appointed by the department to coordinate the GP tasks, and prepare GP course folders.
Student:	A student registered for **GP** in Computer Science department at CCG, Umm Al Qura University, KSA.
Group/Team:	A group of students formed as a team to work on the **GP**.

2. Graduation Project Course Objectives

Graduation Project (GP) is an important part of every engineering and computer science discipline at undergraduate level. The main purpose of these projects is to encourage students to apply the knowledge acquired during their studies. Students are also expected to show how proficient they are in solving real world problems with certain constraints for the outcome-based evaluation suggested by ABET and ACM/IEEE Computing Curricula 2001 [1]. State of the art research shows that undergraduate students' projects have the potential to nurture the nascent minds of students toward the advanced knowledge of industry and research domain, in addition to fulfillment their academic needs. In order to emanate the most out of students and their supervisors, a GP need to follow several standards.

Many students deem the GP course very different from normal lecture-based courses because it demands independent objective formulation, activity planning and time management. Hence, a structured template and lifecycle for GP is essential for this course [2]. It can help students to the standards necessary to be followed to obtain a high quality GP course [3]. This handbook is written to serve the same purpose for undergraduate students, enrolled in a GP course at CS department, CCG.

A GP course at Umm Al Qura University consists of a number of activities for producing world class outcomes called "GP Deliverables". This handbook contains a minimal document set (GP Deliverables and assessment rubrics) and the content of each document, based on timeline, look and feel as well as the structure of some standards [4] [5] [6] [7] [8] [9] [10].

3. Overview of GP Process

The GP is by default spread over the last two semesters, called semester 1 and semester 2 (two-semester plan). Semester 1 and Semester 2 will be marked separately based on the work progress shown, final presentation done, and deliverables submitted by the students in each semester. Prior to Semester 1, students are encouraged to communicate with prospective supervisors of their respective department to complete a project proposal. However, the actual registration of the GP course will formally start at the beginning of Semester 1. By the end of Semester 1, the students have to complete the project proposal, project management plan, project requirement specification, and do a presentation, which shall be marked and graded. For the next semester, grade is awarded at the end of the Semester 2 after the demonstration and presentation of the project and submission of the project report. Following are some important facts in the GP process.

Assigning Students to Supervisors and Projects

- A supervisor must be a full-time faculty member in the College and may be assisted by an external supervisor in case of an industrial project.
- In the semester prior to starting the GP, supervisors will be encouraged to submit their project ideas to the GP Coordinator, which will be published to respective departmental website and similar publishing areas. Students can also contact with their earlier chosen supervisor and submit their own ideas.
- At the beginning of Semester 1 of the project, an orientation session will be conducted to educate the prospective final year students, where this GP handbook will be presented and explained.
- The students formally register for the GP course in the 1st week of Semester 1. They can start formally by submitting the Final Year Project Start Form (see Appendix A) to the GP Coordinator, throughout the 2nd weeks.
- Students have to form a group or team consisting of 2 to 6 students, depending on the total number of students and the availability of the faculty staff.
- The GP Coordinator, in coordination with each supervisor, is responsible to prepare a list of the proposed projects and supervisors.

Project Supervision and Deliverables

- After the first startup meeting in the 2nd or 3rd week, the students have to write a formal project proposal (see Appendix A) with the guidance of their supervisor.
- The students are required to submit a finalized project proposal to the GP Coordinator for registration no later than the 4th week of the Semester 1.
- The groups continue submitting project deliverables to the supervisors (see Section 4 for detail on project deliverables). It is expected that by the end of the semester 1 each group should complete project proposal, project management plan, project requirement specification, and prepare either an oral or poster presentation.
- To keep track on weekly student-supervisor meetings and to monitor student progress, the students are requested to fill a Regular Supervision Record Form (see Appendix A) that contains the meeting minutes and submit it to the respective supervisor after the meeting to ensure that it is accurate. Finally, copies of the meeting minutes will be stored in the GP course folder.
- Each group will submit a report (project details, design, modeling, execution plan…) to their supervisor by 15th week of Semester 1.
- Semester 1 project evaluation and marking of final grade of the Semester 1 is held prior to the final examination at the end of the semester. Each group delivers a presentation detailing the work done in Semester 1 and early demonstration of the work, if any, in front of the supervisory committee as per schedule announced by GP Coordinator. The final grade of Semester 1 will be marked by the supervisory committee in consultation with the supervisor.
- The form of presentation in the Semester 1 is either through an oral presentation using Microsoft PowerPoint slides or through a poster. The duration of each oral presentation is total 20 minutes followed by a 10 minute question and answer session.
- According to the evaluation done and suggestions received from the committee, project work should be adapted, in consultation with the supervisor, at the start of Semester 2.
- Each group submits the Final GP Report (project details, design, modeling, execution plan, implementation…) by week 14 of Semester 2.

Project Evaluation

- The department should form an evaluation committee.
- Examiners and supervisory committee are invited to evaluate students' projects. The GP Coordinator is responsible for scheduling final project presentation, which is a public event where students of the last semester before GP should also be encouraged to attend the event.
- Evaluation should be carried out according to the rubrics provided in Appendix A and each project should be marked at least by three members of the evaluation committee.
- Plagiarism should be punished by scaling down students' marks by dissimilarity scores obtained from the online integrity checker www.turnitin.com.

Miscellaneous Notes

- The GP coordinator is responsible for archiving soft copies of the final report (in pdf format). She/he is also responsible for providing any other requested data for the purpose of maintaining a GP data repository or quality assurance.
- Students will be encouraged to fill up a survey at the end of Semester 2 (see Appendix A).
- Figure 1 (see Appendix A) portrays the highlight of the above mentioned GP process.
- If the students need to access resources pertaining to their project such as conducting a survey with human subjects within or outside the Umm Al-Qura University campus, access data from any proprietary database such as University Registration Department, to name a few, they need to fill up a form (see Appendix A) outlining the justification and scope of the project, get it signed by the project supervisor and the Head of the department.

4. GP Deliverables

Overview

The following table contains a minimal set of GP deliverables along with the purpose and the deadline of submission. The set of deliverables (given in Table 1) depends upon the nature of the project. Each deliverable is mandatory and alternate can be defined in consultation with the supervisor and the GP coordinator (at least a week before submission deadline). Each submitted deliverable must be duly signed by the supervisor. The submission without supervisor's approval will not be considered. Late submissions are liable to get penalty decided by GP Committee. The students may get a zero for a particular submission.

TABLE I – GP Deliverables (for two semester plan)

Deliverable	Purpose	Student information	Due
Start of Semester 1			
Project Proposal	To document the problem statement, need for the project, project scope and expected benefits	Submit to supervisor	4th week of Semester 1
Project Report	To submit project deliverables (including the recommended documents of Semester 1 shown in Table III) in the form of a single report	Submit to Supervisor	15th week of Semester 1
Final Presentation	An examiner is invited to evaluate students' projects	Present to Supervisor, Examiners	End of semester 1
Grading of Semester 1 and End of Semester 1			
Start of Semester 2			
Final Report	To bind all project deliverables (including the recommended documents of Semester 2 shown in Table III) in the form of a single report.	Submit to Supervisor	14th week of Semester 2
Final Presentation & Demo	An examiner is invited to evaluate students' projects	Present to Supervisor, Examiners	End of semester 2
Grading of Semester 2 and End of GP			

TABLE II – GP Deliverables (for one semester plan)

Deliverable	Purpose	Student information	Due
Start of Semester			
Project Proposal	To document the problem statement, need for the project, project scope and expected benefits	Submit to supervisor	3rd week
Final Report	To bind all project deliverables (including the recommended documents of Semester 1 and Semester 2 shown in Table III) in the form of a single report.	Submit to Supervisor	15th week
Final Presentation & Demo	An examiner is invited to evaluate students' projects	Present to Supervisor, Examiners	15th week

End of Semester and End of GP

TABLE III – Documents recommended and can be part of the deliverables shown in Table I and Table II

Deliverable	Purpose	Student information	Due
Start of Semester 1			
Project Management Plan (PMP)	To document project development approach, associated milestones, agreed deliverables and dates	Submit to supervisor	10th week of Semester 1
Project Requirement Specification (PRS)	To document the agreed requirements, expected features, constraints, interfaces. This document is also supposed to provide the system design and modeling	Submit to supervisor	13th week of Semester 1
Start of Semester 2			
Project Design Document	To document the design in order to provide the basis for implementation and unit test. Also describes the rationale for design decisions taken.	Submit to Supervisor	3rd week of Semester 2
Test Document	To document how the project will be tested, and record the results.	Submit to Supervisor	14th week of Semester 2
Grading of Semester 2 and End of GP			

End of GP Submission

- Soft copy of the report and any other related files such as:
  - Report (soft copy of the final report, and power point presentation)
  - Code (complete source code of the project)
  - Demo (the executable in working order and a readme file containing the information about the software requirements (tools) and hardware requirements for the GP as well as the instructions or the steps (soft copy of the user manual) for running the GP executable).

5. GP Evaluation

Evaluation Criteria

Following table explains a guideline for the criteria to be used for GP evaluation/assessment along with description and evaluation authority (s).

Table IV: GP Evaluation Criteria

Criteria	Description	Evaluation Authority(s)
Semester 1 and Semester 2 Process	To assess that student(s) have kept continuous contact during the work and have been on time both to meetings and in sending deliverables.	Supervisor
Semester 1 Project Presentation	To assess that student(s) have completed tasks and delivered documents expected in the first half of the course i.e. Semester 1. It includes both demonstration and presentation of the work.	Supervisor, Supervisory Committee
Semester 1 Proposal	To assess that the chosen project is worthy of being acceptable as a GP.	Supervisory Committee
Semester 2 Project Demonstration	To assess the end product developed in terms of interfaces, coding standards, and originality of the work. It requires student(s) to install project and run it for real time presentation.	Supervisor, Supervisory Committee, Examiner
Semester 2 Oral Presentation	To assess problem understanding, adequate analysis, quality of the design and presentation skills. Each group is required to discuss the completeness and accomplishment of the project.	Supervisor, Supervisory Committee, Examiner
Semester 1 and Semester 2 Project Report	To assess the structure of the project report. Student(s) are required to show planning and progress in an organized way with emphasis on the interpretation of the information gathered during the project. Project reports have to be submitted in both Semester 1 and Semester 2.	Supervisor, Examiner

Appendix A

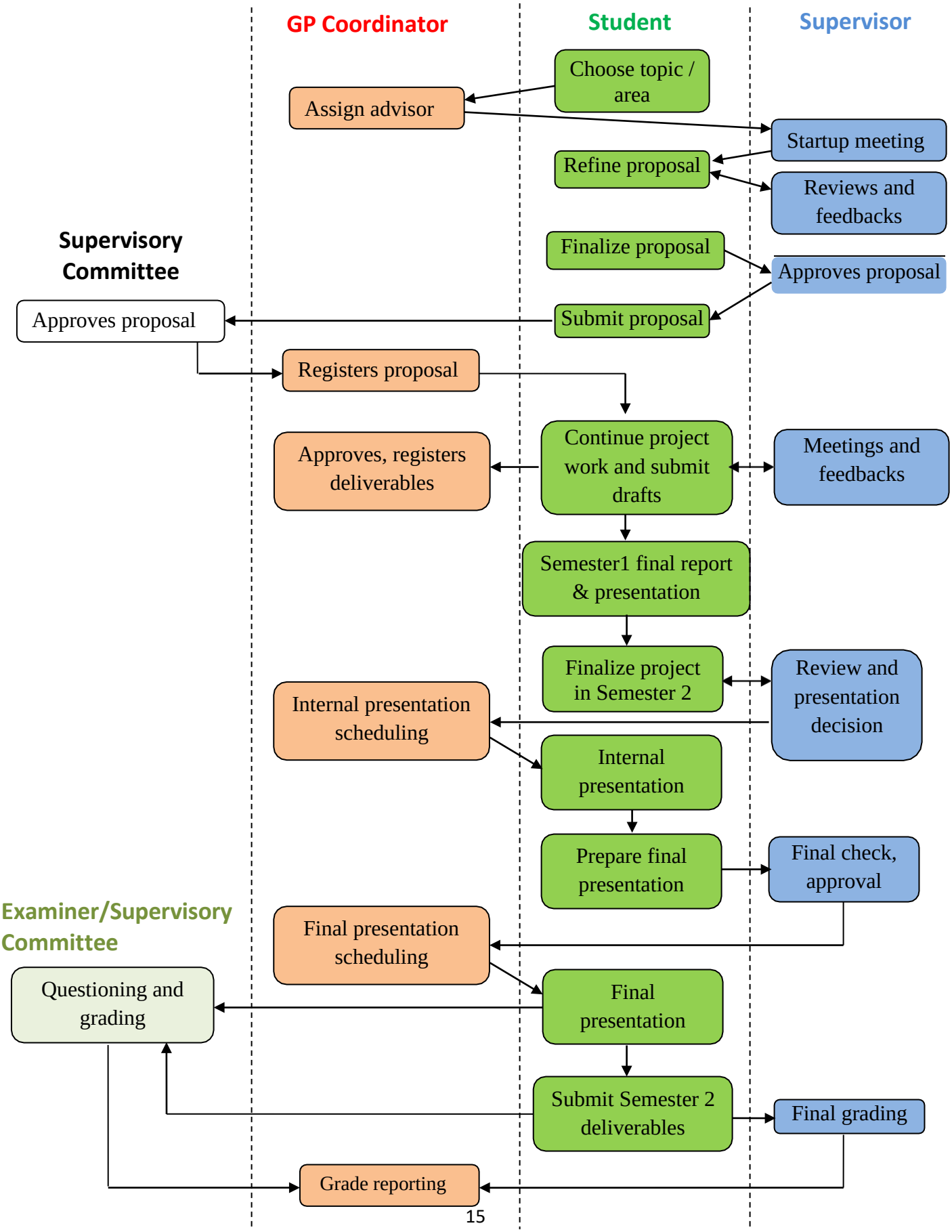
GP Coordinator
Student
Supervisor
Choose topic / area
Assign advisor
Startup meeting
Refine proposal
Reviews and feedbacks
Supervisory Committee
Finalize proposal
Approves proposal
Approves proposal
Submit proposal
Registers proposal
Approves, registers deliverables
Continue project work and submit drafts
Meetings and feedbacks
Semester1 final report & presentation
Finalize project in Semester 2
Review and presentation decision
Internal presentation scheduling
Internal presentation
Prepare final presentation
Final check, approval
Examiner/Supervisory Committee
Final presentation scheduling
Questioning and grading
Final presentation
Submit Semester 2 deliverables
Final grading
Grade reporting

Figure 1: High level overview of GP Process

Project Management Plan

Project Management Plan

Cover Page
Table of Contents

Project Requirements Specifications (PRS)

Project Requirements Specifications (PRS)

Cover Page

Table of Contents

Project Design Description (PDD)

Project Design Description (PDD)

Cover Page

Table of Contents

GP Report and Proposal Style Guideline

Paper

Standard A4 size
Width: 8.27"
Height: 11.69"
Weight: 90 Grams

Fonts, Type Styles

Font Size = 11 (Normal Text)
Font = Times New Roman
Title= 26 bold (Times New Roman)
Sub-title=16 bold (Times New Roman)
Heading 1 (Font Size) = 16 (Bold), Font = Times New Roman, UPPERCASE
Heading 2 (Font Size) = 14(Bold), Font = Times New Roman
Heading 3 (Font Size) = 13 (Bold, Italics), Font = Times New Roman

Margins

Top = 1.5"
Bottom = 1.0"
Left = 2.0"
Right = 1.0"

Spacing

Line Spacing = 1.5
Paragraph Spacing = 6 pts

Indentation

Indent all quotations comprising 4 or more lines by 5 spaces from left.

Page Numbers

Except for the title page, number all pages which come before the first page of the body chapters consecutively with lower case roman numerals (i, ii, iii, iv…).

The first page with Arabic numeral (1, 2, 3, and so on) starts from the page of the introduction but it is mentioned on page 2 onwards. Mention page numbers on the bottom right of the page. The first page of each section or chapter will not carry the page number; however the page number will be counted for the proceeding page.

Headers

The header will comprise the title of the Project report. On every odd page will appear the title of the report while on the even pages the title of the chapter or section will be mentioned. The first page of every section or chapter shall not carry the header.

Binding guidelines

The final report binding should have a dark blue background with Project information

written in silver color.

GP Report Prefatory Pages

Title Page

The title page should include the title of the report along with the name(s) of the department and university for which the report is written, month & year of submission and the project number. Each project will be assigned a Project number for future reference. Also included on the title page should be the name(s) of the author(s) of the report. Title Page is followed by a blank page. A sample title page is shown below.

BSc Project
CS Department
Project ID: CCG-CS -YYYY-xx
Month Year

Centered Title Times Font Size 26 Bold

Centered SubTitle Times Font Size 16 Bold

Centered Author(s) TimesFontSize18Bold

Dept. of _____

College of Computing at AlQunfudha

Umm Al-Qura University, KSA

Contact Information

Below is a sample contact information page. It follows the blank page (after the title page) and contains information about the author(s), external supervisor (if any), internal supervisor and the examiner.

This project report is submitted to the Department of Computer Science at Umm Al-Qura University in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer science department.

Author(s):
Firstname Lastname
Address: If applicable
E-mail: If applicable, a long-term e-mail (not your student e-mail)

University supervisor(s):
Firstname Lastname
Department name

Co-supervisor(if applicable**):**
Firstname Lastname
Company/Organization full name
Address:
Phone: International standard, e.g. use +

Dept. of Computer science
College of Computing at AlQunfudha
Umm Al Qura University
Kingdom of Saudi Arabia

Internet: http://www.uqu.edu.sa
Phone: +966 xxxxxxxxx
Fax : +966 xxxxxxxxx

Intellectual Property Right Declaration

Below is a sample for intellectual property right declaration page. It follows the contact information page.

Intellectual Property Right Declaration

This is to declare that the work under the supervision of_____having title " _____" carried out in partial fulfillment of the requirements of Bachelor of Science in_____, is the sole property of the Umm Al Qura University and the respective supervisor and is protected under the intellectual property right laws and conventions. It can only be considered/ used for purposes like extension for further enhancement, product development, adoption for commercial/organizational usage, etc., with the permission of the University and respective supervisor.

This above statement applies to all students and faculty members.

Date: _____

Author(s):

Name: Firstname Lastname Signature: _____

Name: Firstname Lastname Signature: _____

Name: Firstname Lastname Signature: _____

Supervisor(s):

Name: Firstname Lastname Signature: _____

Anti-Plagiarism Declaration

Below is a sample for Anti-plagiarism declaration, it follows the intellectual property right declaration page.

Anti-Plagiarism Declaration

This is to declare that the above publication produced under the supervision of_____having title "_____" is the sole contribution of the author(s) and no part hereof has been reproduced illegally (cut and paste) which can be considered as Plagiarism. All referenced parts have been used to argue the idea and have been cited properly. I/We will be responsible and liable for any consequence if violation of this declaration is proven.

Date: _____

Author(s):

Name: Firstname Lastname Signature: _____

Name: Firstname Lastname Signature: _____

Name: Firstname Lastname Signature: _____

Acknowledgement

Below is a sample for Acknowledgement page, it follows the Anti-Plagiarism Declaration page.

ACKNOWLEDGMENTS

……..

Abstract

Below is a sample for Abstract page. It follows the Acknowledgement page.

ABSTRACT

[Abstract text]

Keywords: 3-4 keywords, maximum 2 of these from the title, which starts one line below the Abstract.

Table of Contents

Below is a sample for Contents page. It follows the Abstract page.

TABLE OF CONTENTS

[Table of contents]

GP Report Chapters

From here onwards this document should be organized into different chapters specific to each project. Rest of the section outlines chapters to be included and the recommended contents of each chapter.

Chapter 1 – Introduction

Chapter 1 INTRODUCTION

Purpose of the Project
Purpose of this Document
Overview of this Document
Existing System
Existing system description
Problems in the existing system

Chapter 2 – System Analysis

Chapter 2 SYSTEM ANALYSIS

Data Analysis
Data flow diagrams
System requirements
Clients, customer and users
Functional and data requirements
Non-functional requirements
Look and feel requirements
Usability requirements
Security requirements
Performance requirement
Portability requirements
Proposed Solutions
Alternative Solutions

Chapter 3 – Design Considerations

Chapter 3 DESIGN CONSIDERATIONS

Design Constraints
Hardware and software environment
End user characteristics
Architectural Strategies

Algorithm to be used

Reuse of existing software components
Project management strategies
Development method
Future enhancements/plans

Chapter 4 – System Design

Chapter 4 SYSTEM DESIGN

System Architecture and Program Flow
Major modules
Sub modules
Detailed System Design
Detailed component description

Chapter 5 – Implementation and Validation

Chapter 5 IMPLEMENTATION AND VALIDATION

Appendices

Appendix A CODE

Appendix References

Deduction Rules

One of the most important objectives of GP course is to train students for effective time management, which is essential for successful project completion. To keep students on track and to maintain the flow of the project, GP Coordinator is responsible for announcing deadlines for upcoming deliverables. Supervisor continuously assesses students on a process criterion (see Appendix A) during the project. Late submissions and irregular meetings may result in deduction of marks depending upon the supervisor's judgment.

Criteria for late project report submission is as following:

Report Delay	Marks Deduction
1 day	(1/3marks)
2 day	(2/3marks)
3 day	(0 marks)
No Oral Presentation without report submission	

Plagiarism

Plagiarism will result in 0 marks in Project Report, Project Presentation and Project Demonstration. In order to detect plagiarism, we will resort to the following online tools as needed or any other available tools at the university.

- https://www.turnitin.com/static/index.php

Result Compilation

At the end of the Oral Presentation, marks and grades submitted by the project supervisor, supervisory committee and examiners are collected and complied for letter grades.

Bibliography

[1] The Joint Task Force on Computing Curricula, "Computing Curricula 2001," *IEEE Computer Society, Association for Computing Machinery*, December 15 2001.

[2] Declan Delaney and Stephen Brown, "Document Templates For Student Projects in Software Engineering," Department of Computer Science, National University of Ireland, Maynooth, August 2002.

[3] Richard Hall Thayer and Andrew D. McGettrick, "IEEE Software Engineering Standards: A Students' Version," in *20th Conference on Software Engineering Education & Training*, 2007.

[4] IEEE Std. 1008-1997, IEEE Standard for Software Unit Testing.

[5] IEEE Std. 1012-1998, IEEE Standard for Software Verification and Validation.

[6] IEEE Std. 1016-1998, IEEE Recommended Practice for Software Design Descriptions.

[7] IEEE Std 1058-1998, IEEE Standard for Software Project Management Plans.

[8] IEEE Std 1540-2001, IEEE Standard for Software Life Cycle Processes – Risk Management.

[9] IEEE Std. 829-1998, IEEE Standard for Software Test Documentation.

[10] IEEE Std. 830-1998, IEEE Recommended Practice for Software Requirements Specifications.

Miscellaneous Forms

GRADUATION PROJECT PROPOSAL

Supervisor Name :
Email :
Project Title :
Description :
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Plans to achieve the project goal – Timeline:
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For project committee

☐ **Approved** ☐ **Rejected** ☐ **Approved with conditions**

Comments:
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……
……

Committee chair signature

Date: …….

Project Start Form

Fill in the information below as detailed as you can when submitting your project idea.

Team Members			
Student ID	Name	Email	Credit Hrs *

Area of interest (Tick one or more)			
Development Track		**Research Track**	
1. Desktop application		1. Requirement Engineering	
2. Web application		2. Design & Architecture	
3. Client-Server application		3. Verification & Validation	
4. Computer Game		4. Project Management	
5. Mobile application/Game		5. Tools	
6. Others:		6. Others:	

Preferred supervisor (if any): _____

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Supervisor Name : …….

Date : ……

GP Coordinator , Head of CS Department

GP Regular Supervision Record Form

After each weekly project meeting with students, the supervisor will fill this form and will submit it to GP coordinator after the meeting.

SECTION -1 (to be completed by the STUDENT prior to meeting)	
Students' Names:	Supervisor Name:
Date:	Date of previous meeting:
SECTION -2 (to be completed by the SUPERVISOR at the meeting)	
Work undertaken since last meeting:	
SECTION -3	
Work student should undertake between now and next meeting:	

GP Final Project Rubric – Semester 1

Project Title : .....

Supervisor : ..... **Signature…….. Date** .....

Group Members		**Evaluation Criteria**																								**Grade**
Student ID	**Name**	**Literature Search (20)**				**Literature Analysis (20)**				**Problem Formulation (20)**				**Team Work (16)**				**Project Report (12)**				**Oral Presentation (12)**				
		S	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	

(S : Supervisor M: Member P : President)

Project Evaluation Committee	
Committee President	Committee Member
Name : Signature:	Name: Signature:

Head of CS Department

GP Final Project Rubric – Semester 2

Project Title : ……

Supervisor : …… **Signature…….. Date** ……

Group Members		**Evaluation Criteria**																								
Student ID	**Name**	**Design (20)**				**Implementation (20)**				**Testing (15)**				**Team Work (15)**				**Project Report (15)**				**Oral Presentation (15)**				**Grade**
		S	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	**S**	**M**	**P**	AVG	

(S : Supervisor M: Member P : President)

Project Evaluation Committee	
Committee President	Committee Member
Name : Signature:	Name: Signature:

Head of CS Department

GP Resource Request Form

Before asking resources relevant to any project, certain approvals will be needed. If the subject of the request is confined to your own class, office, or department, please obtain approval from your Head, Dean, Coordinator, Director, or other appropriate manager. As well, it is necessary to obtain approval if your request pertains to human subjects.

<table>
<tr><th colspan="2">SECTION -1
(to be completed by the STUDENT prior to request)</th></tr>
<tr><td>Students' Names:</td><td>Supervisor Name:</td></tr>
<tr><td>Date of request:</td><td>Expected date of completion of using the resource(s):</td></tr>
<tr><td colspan="2">Briefly describe the resources you are requesting, address of the resource and its purpose:</td></tr>
<tr><td colspan="2">How will you use the data/information and who will it be shared with?</td></tr>
<tr><th colspan="2">SECTION -2
(to be completed by the SUPERVISOR)</th></tr>
<tr><td colspan="2">Please justify the above request:</td></tr>
<tr><th colspan="2">SECTION -3</th></tr>
<tr><td rowspan="3">Signatures:</td><td>Student (Team Leader):</td></tr>
<tr><td>Supervisor:</td></tr>
<tr><td>Chairman/Dean:</td></tr>
</table>

GP Survey Form

(Survey)	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	5	4	3	2	1
Through this capstone project survey, we are asking you to evaluate your experience as students at Computer Science. All responses will be kept confidential and used as an internal assessment tool to improve our GP programs. We appreciate your help in filling out this survey. **My Capstone Project has given me the ability to:**					
Commit to the plan and monitor the decisions made in the previous course in developing the software system.					
design and implement a computer-based system, process, component or program to meet desired goal.					
Apply testing and validation concepts and techniques to the system.					
Apply core computing knowledge such as programming, database, algorithm analysis, modelling and design, demonstrating the comprehension of trade-offs.					
Demonstrate the ability to work independently and as part of a team with colleagues and advisors utilizing good work dynamics.					