

GUIDELINES FOR GRADUATION PROJECT

**Chemical Engineering Department
College of Engineering
Jazan University**

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1. Introduction

The main objective of this senior graduation project is to provide a multidisciplinary experience, integrating knowledge from the core, intermediate, and advanced courses in chemical engineering. The capstone design project is the culmination of the entire chemical engineering curriculum. The senior graduation project intends to give students experience in finding a satisfactory solution for an open-ended problem of the student's choices, which may have more than one solution. The design project is carried out in engineering by a team of students choosing a topic from the list of different projects. A project involving each team gives valuable experience in planning, division of work, and maintaining individual accountability within a framework of group's success.

The schedule sheds light on the study of how to set up a program for the graduation project in the field of chemical engineering via a design, which depends on the application of fundamental theories to practical chemical engineering operations studied in previous years and what the student gained from the training field factories. The student graduation project implementation has been set up in the ninth level of the chemical engineering program (to fulfill the requirements of the project specifications point of academic accreditation).

2. A Senior Graduation Project should include:

1. Determination of design objectives and functional requirements based on needs statement, identification of constraints on the design problem, and establishing criteria for acceptability and desirability of solutions.
2. Formulation of the design problem based on objectives and constraints.
3. Development of a design strategy, including an overall plan of action, distribution of design problem into subtasks, prioritization of subtasks, establishment of timetables and milestones by which progress may be evaluated. This plan will be used to guide the course of action during design implementation.
4. Considering alternative ideas/solutions systematically.
5. Evaluation/analysis of alternative solutions to obtain the best solution based on their feasibility by considering the realistic constraints.
6. Selection of the most feasible and suitable solution among design alternatives.
7. Realizing the selected/best solution in a working model or prototype.
8. Documenting the design work properly in a standard formal report.

3. Characteristics of a Senior Project

There are several factors that make something suitable for a senior project.

- **Independence** - A senior project should be a discrete unit. There should be a well-defined beginning and end to the project, as well as clearly defined criteria for success or failure.
- **Ownership** - The student needs to be primarily responsible for the project. This means that the student is directly responsible for the success or failure of the project.
- **Background Research** - The project should require some investigation before implementation. Things to consider: How have others approached this problem? What new techniques or technologies the student must learn (or invent) to successfully complete this work?
- **Creativity** - The project should require creativity. This is, the solution should not be obvious.

4. Senior Design Project Objectives

The objectives of the Senior Design Project are:

1. To use the skills acquired from the other courses to solve real engineering and technical problems. The technical results presented in the senior project should reflect the maturity of a senior level student in both the depth to which the subject is developed and in the degree to which a variety of information or viewpoints is brought to bear on the problem.
2. To enhance creativity of the students in analyzing and solving chemical engineering problems. The project should require creativity. This is, the solution should not be obvious.
3. To create an environment to promote cross disciplinary learning and team approach to problem solving. The senior project will be an independent work by the student, developed under his own initiative and on a timetable under the student's control. The instructor who supervises the senior project is expected to supply only general advice and guidance to help the student avoid pitfalls and blunders; the day-to-day activities, which effect the execution of the project, are up to the student.
4. To develop the ability of self-learning. The senior project should represent a well-polished piece of writing, with careful consideration given to presenting the results in such a way as to provide maximum information with minimum efforts required to the

reader. Standard procedures of footnoting, referencing, and symbol usage as used in technical literature should be employed. The final project document should give evidence that the student has acquired the ability to skillfully communicate on a technical subject to an audience less knowledgeable than the author. All media programs utilized in the project are to be completely and fully documented.

5. To prepare students to be successful in their industrial careers.

5. Senior Design Project Duration and Academic Year

Senior students expected to graduate by the end of the academic year must take the senior design project course which spans a two-semester (course code: CHE498 and CHE499; Five-credit units). Credit units are divided between first and second semester.

6. Team Formation:

Team formation must satisfy the following requirements:

- To register senior project student must have passed minimum 118 credit units.
- All senior projects must be performed by group of students.
- Senior project group students should be from chemical engineering department.
- Each group is supervised by one faculty member from the Chemical Engineering.
- The size of the group is three to four students according to their GPA. Each group consists of different GPA (low, medium, and high GPA).

7. Registration of the Senior Design Project:

- 1- Proposals according to ABET format submitted from advisors to senior Project Coordinator in the beginning of each semester (Form 1).
- 2- Senior Project Coordinator put the project titles with respective advisors name in the table (Form 2).
- 3- Senior Project Coordinator announces the list of project titles including respective advisor names via an email to students to choose the topic and advisor of their interest. The email also contains the student's contacts.
- 4- Senior Project Coordinator receives a confirmation from each group.
- 5- Senior Project committee carry out the selection process of students' according to their GPA, as the highest GPA student in the first group, then, the second group, etc.

- 6- Senior Project Coordinator sends an email to students containing the project title and supervisor name.
- 7- Senior Project Coordinator informs the students to meet their respective supervisors.
- 8- Senior Project Coordinator provides documents including the project report format and the write guidelines to the students.
- 9- Senior Project committee proposes the names of examination committee from the faculty having no graduation projects to evaluate and finalize the progress of all senior projects.

8. Senior Project Lectures

Advisors do a seminar for students to inform them the senior project requirements.

The major topics covered in the lectures include:

1. ABET Student Outcomes related to Senior Design Project.
2. Introduction to engineering design; its main components, realistic constraints, engineering standards and impact of engineering solutions.
3. Safety.
4. Engineering ethics.
5. Contemporary issues and life-long learning
6. Report and presentation techniques
7. Senior Design Project Checklist (Form 6).

9. Evaluation of the senior project

In the Department of Chemical Engineering, there are five phases to evaluate the senior graduation project:

CHE-498-1		
Phase	Requirements	Marks
Phase I (First Presentation) (7th week)	<ol style="list-style-type: none">1- Students are supposed to introduce their project progress report via a Seminar containing the following:<ul style="list-style-type: none">- Problem statement.- Problem Justification.- Objective.- Introduction.- The proposed Work.2- Students are required to prepare a 10-to-15-minute oral presentation in English language. The presentation is followed by a 5-minute question-answer session.3- Examination committee evaluates the student based on the seminar, oral presentation, and submitted literature review.	25 Marks (15 Supervisor) (10 Examination committee)
Phase II (Second Presentation) (14th week)	<ol style="list-style-type: none">1. At this stage, students are supposed to introduce their project progress report, which includes work carried out during the period from Phase I to Phase II.2. Students must submit the literature review as needed by examination committee during the seminar.3. Examination committee evaluates the student based on the seminar, oral presentation, and submitted literature review.	75 Marks (35 Supervisor) (40 Examination committee)

	4. Examination committee shows the students their observation in the second presentation and literature review.	
CHE-499-3		
Phase III (Third Presentation) (in the middle of second semester)	<ol style="list-style-type: none"> 1. Students are supposed to introduce their project progress report via a Seminar containing the work completed during the period from Phase II to Phase III. 2. Students need to submit the report thesis initial draft form of the project to the examination committee during the seminar. 3. Examination committee evaluates the seminar, oral presentation, and report thesis initial draft. 4. Examination committee provides the students their decision in the third presentation and project report initial draft. 	<p>25 Marks (15 Supervisor) (10 Examination committee)</p>
Phase IV (Final Presentation) (At the end of the second semester)	<ol style="list-style-type: none"> 1. Students are required to introduce their project progress report via a Seminar containing the work completed during the period from Phase III to Phase IV. 2. Students must have to submit the final graduation project report to the examination committee one week before the final exam. 3. Examination committee evaluates the presentation, oral presentation, and final graduation project report. 4. Examination committee shows the students their observation in the third 	<p>75 Marks (35 Supervisor) (40 Examination committee)</p>

	presentation and final graduation project thesis.	
Phase V	<ol style="list-style-type: none"> 1. After the final editing and corrections recommended by advisors for graduation project thesis and its approval tend to create a final draft. 2. The students are responsible for checking the final draft of the report for any grammatical, spelling or formatting mistakes before submitting to the senior project committee. 3. Students have to submit the following to senior project committee after the final decision of the examination committee: <ul style="list-style-type: none"> • One hard copy of final graduation project report. • Poster (A4) • Three CDs. 	

Form 1: Proposal Form

CHE 498-1 (The project is continuing in CHE-499-3)

Senior Graduation Project

Course #	
Project Title:	
Advisor:	

Description:

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Objectives:

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Special Requirements:

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Form 2: Project Selection Form

This form has to be completed by a group of students (3-4 students) for forming a team for the senior design project. The student's group will be assigned to one project by the program on the basis of the group choices.

Group Number ()

No.	Projects title	Advisor Name	Arrange the projects according to your preferences
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Form 3: Exam

No.	Projects title	Advisor Name	Examiner	Date/Time/Place
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Form 4: Attendance Sheet

Project Advisor:

Project Title:

Student Name:

Student ID:

No.	Date	Advisor Name	Advisor Signature

Form 5: Progress Report

Project Title:

Semester/Year:

Student Name:

Student ID:

Advisor Name:

Procedure	Task given date	Task due date	Date completed	Advisor signature

Form 6: Senior Design Project Checklist Project

Title:

Supervisor:

Student Name(s):

- 1.
- 2.
- 3.
- 4.

Item	Implemented		
	Yes	No	Indicate page(s) in the report for yes, cite reason(s) for no
Cover page			
Table of Contents: List of Figures List of Tables			
Abstract			
Introduction			
Literature Review			
Material Safety Data Sheet (MSDS)			
Process Flow Diagram and Process Description			
Mass and Energy Balance			
Simulation and Process Optimization			
Equipment Design			
Plant Layout			
Safety, Environment and HAZOP			
Economic Design and Analysis			
Conclusion and Recommendation			
References			
Acknowledgements			
Bibliography			
Appendices			

Form 7: Evaluation of Graduation Project

(Total 100 marks)

PROJECT TITLE:

DATE: / / 2021

STUDENT'S ID	(GROUP #1) STUDENT'S NAME	EVALUATION BY SUPERVISOR (50%)			EVALUATION BY EXAMINATION COMMITTEE (50%)			Sub Total (50%)	Total
		Supervisor Assessment		Sub Total (50%)	First Assessment	Second Assessment			
		Attendance & Activities	Participation and outputs		First Presentation	Second Presentation & Oral Exam	Report		
		15%	35 %	50%	10%	25%	15%	50%	100

Examination Committee Members:

- 1- Dr. , Signature:
- 2- Dr. , Signature:
- 3- Dr. , Signature:

Supervisor

Name: DR.
Signature:

Head of Department

Dr. Nasser I. Zouli
Signature:

Appendix 1

- 1. Cover Page**
- 2. Table of Contents**
- 3. Abstract**
- 4. Introduction**
- 5. Process Flow Diagram and Material Balances**
- 6. Process Description**
- 7. Energy Balance and Utility Requirements**
- 8. Equipment List and Unit Descriptions**
- 9. Equipment Specification Sheets**
- 10. Equipment Cost Summary**
- 11. Fixed Capital Investment Summary**
- 12. Safety, Health, and Environmental Considerations**
- 13. Process Safety Considerations**
- 14. Other Important Considerations**
- 15. Manufacturing/Operation Costs (exclusive of Capital Requirements)**
- 16. Economic Analysis**
- 17. Conclusions and Recommendations**
- 18. Acknowledgements**
- 19. Bibliography**
- 20. Appendix**

IMPORTANT NOTES FOR REPORT WRITING

Font size:

Titles: 14 Bold

Subtitles: 12 Bold

Text: 12 normal

Font type: Times New Roman

Page Margins:

Left 2.5 cm

Right 1.5 cm

Header: 2.5

Footer: 2.5

Page number: in the middle - bottom

Line Spacing: (space between lines) 1.5

References

1. <https://www.kau.edu.sa/Files/829/Files/156389 EE file.pdf>
2. <https://aurak.ac.ae/files/aurak/SOE/Senior%20Project%20Report%20Guidelines.pdf>
3. <https://www.kau.edu.sa/Files/0052714/Subjects/CE 499-Guidelines.pdf>