JAZAN UNIVERSITY

COLLEGE OF ENGINEERING

Architectural Engineering Department

SENIOR PROJECT REFERENCE GUIDE

2022

Table of Contents

1. Overview

The senior project (AE 498 and AE 499) for the architectural engineering is constituted in order to develop the research skills of the architectural engineering students related to the real time societal / architectural problems. The project flow is planned in such a way that the students are trained to observe and understand problems of society/architectural and to plan and execute a complete research in the related domains to achieve short term and long term solutions for the problems. Students formulate the research methodology and with available instruments for experimentation and software's for theoretical modelling of the problems. The architectural projects are encouraged in order to ensure the architectural engineering exposure for the students.

First level of the senior projected is allotted for problem identification by a comprehensive literature review and preparing the research proposal. Research proposal presentation I and research proposal presentation II of every group of students in the first level of senior projects will be conducted. Based on the presentations the project proposals will be approved for further research to be carried out. These presentations include the literature review, problem identification, problem definition, problem constraints, research and societal/ architectural objectives, design of research methodology and research execution plan.

The proposed works of the research will be presented in senior project presentation 3 and the examiners team will review the same. Based on the comments and recommendations of the examiners team the further research will be carried out before going for the fourth senior project seminar and final one. The peer review committee of the examiners will review the project report and will execute the senior project during the final seminar. Based on the all these criteria the marks of the students will be awarded by the examiners as well as the project supervisors.

2. Objectives of Senior Design Project:

The objectives of the senior design project are as follows:

1. Illustrate the importance of the design program functionally, environmentally and aesthetically in formation of multi-functional designs, with a focus on study of the types of movement and the basic concepts of the spaces.
2. Identify of the engineering applications in understanding the structural analysis of the building.
3. Measure the student's ability on the configuration. , formulate and solve Architectural problems
4. Measure the student's ability to use modern technology, skills and modern engineering tools necessary for the practice of the job in the architectural projects.
5. Employ what student has learned in computer applications in presentation of the architectural projects.

6. Measuring the student's ability to prepare calculations for lighting, acoustics levels and air conditioning requirements.

3. Outcomes of Senior Project

By the end of the senior project, the student should be able to:

1. Development the project concept.
2. Apply Site Studies outcomes (Environmental studies and site studies).
3. Design and develop of the project & its components.
4. Work professional architectural presentation of project drawings.
5. Provide effective visual and oral presentation of the project.
6. Conduct specialized studies for the project (Structural Systems - lighting - acoustics - HVAC).
7. To be disciplined, professional and collegial and assume his professional responsibilities.
8. Apply safety standards and code for these buildings.

4. Steps to Assign a Senior Project

1. Preparing a list of proposed projects and distributing it to faculty members and students for the purpose of collecting project proposals.
2. Studying the proposed projects and selecting graduation projects that meet the terms and requirements of the Academic Accreditation Commission.
3. Recommending accepted projects and submitting them to the college's project coordinator.
4. Announcing the students to register according to their wishes by filling out the Student Wishes Form.
5. Assigning students to approved projects and submitting it to the project coordinator at the college.
6. Coordinating the work of the initial discussion panels (seminars) for the projects, through which a report is made that includes evaluation and recommendations for each project and submitted to the supervisors.
7. Coordination of the work of the second panel discussion. Where it is open to faculty members and students and announced an earlier date. And evaluated with the development of recommendations sent to the supervisors of the projects for consideration.
8. Coordination with the department council to identify discussion committees and prepare reports after discussion and submit them to the competent authorities.

5. Project Teams

Students are distributed in groups to faculty members according to the following:

- The students' cumulative average so that the groups are balanced in terms of abilities and level of design.
- According to the students' desires and preference, it is according to the student's cumulative average.

6. Senior Design Project Proposal

The student for submission should prepare the senior project proposal. The submitted project proposal will be reviewed by Senior Design Project committee to meet the requirements of ABET. The proposal should contain the following information's:

- Clear problem identification definition
- Constraints and Problems.
- Suggested site alternatives for Project
- Architectural objectives and research objectives of the project
- Complete plan and execution of the research methodology.
- A research statement to meet ABET criteria.

7. Senior Design Project Duration & Academic Level

The senior project is part of final year curriculum of the Architectural engineering discipline. The level of final year is allotted to the literature review problem identification and design of research methodology and a proposal presentation (AE 498). The second level of final year is allotted to the execution of the project work, writing a technical report and final presentation (AE 499). The students and the faculty advisor with appropriate registration will discuss the project progress periodically.

8. Project Supervision

The senior projects are assigned to a faculty member to guide and coordinate the students. The proposal for the project should be submitted at the beginning of the semester to Senior Design Project committee. After the approval, the concerned faculty member will supervise the projects. The status of the project execution will be reviewed periodically and registered.

9. Senior Design Project Coordinator

1. Preparing a list of proposed projects and distributing it to faculty members and students for the purpose of collecting project proposals.

2. The student proposes to choose his graduation project and it is discussed with the supervisor and then a panel discussion is held by the projects committee and supervisors to approve the selection

3. Studying the proposed projects and selecting graduation projects that meet the terms and requirements of the Academic Accreditation Commission.

4. Recommending accepted projects and submitting them to the college's project coordinator.

5. Announcing the students to register according to their wishes by filling out the Student Wishes Form.

6. Assigning students to approved projects and submitting it to the project coordinator at the college.

7. Coordinating the work of the initial discussion panels (seminars) for the projects, through which a report is made that includes evaluation and recommendations for each project and submitted to the supervisors.

8. Coordination of the work of the second panel discussion. Where it is open to faculty members and students and announced an earlier date. And evaluated with the development of recommendations sent to the supervisors of the projects for consideration.

9. Coordination with the department council to identify discussion committees and prepare reports after discussion and submit them to the competent authorities.

10. Senior Design Project I

The following are the requirements of the students enrolled in the senior project I

1. The student acquire a solid foundation in the fundamentals of Architecture engineering science, design and practice..

2. This course, help the senior student to prepare his proposal for the final project. Topics include: Client objectives, Functional relationships, Facility space requirement Development, Site development requirements, Site analysis, Prioritizing functions, Spatial restrictions and budget constraints..etc.

3. The student will have opportunity to develop their communication skills (written and oral) And will be aware about the modern Architecture Engineering education.

4. To implant in our student the value of knowledge and the effective means and confidence of learning new subjects in their specialty or other fields they opt to pursuit.

11. Senior Design Project II

1. Tasks to be carried out by the students enrolled the senior project II are as follows:
2. Illustrate the importance of the design program functionally, environmentally and aesthetically in formation of multi-functional designs, with a focus on study of the types of movement and the basic concepts of the spaces.
3. Identify of the engineering applications in understanding the structural analysis of the building.
4. Measure the student's ability on the configuration. , formulate and solve Architectural problems
5. Measure the student's ability to use modern technology, skills and modern engineering tools necessary for the practice of the job in the architectural projects.
6. Employ what student has learned in computer applications in presentation of the architectural projects.

12. Senior Design Project 1 Delivery (AE 498)

To award the final grade for the senior projects the student should submit the following requirements for the Senior Design Project 1 to the project coordinator:-

- One poster, size 1.0 * 2.1 m, for the studies and ideas that have been completed in the project.
- An electronic copy of the poster on a flash memory.
- A hard copy of the full Graduation Project 1 research paper.
- An electronic copy of the graduation project research 1 integrated on a flash memory.

13. Final Project Delivery (AE 499)

To award the final grade for the senior projects the student should submit the following requirements for the Senior Design Project 2 to the project coordinator:-

- The student submits the following documents for the graduation project:-
- Project posters size 1.0 * 2.1 m (border graphics)
- An electronic copy of the posters on a flash memory.
- 3 A3 paper copies of the posters.
- An electronic copy of the complete project files in PDF or JPG format on a flash memory.
- An electronic copy of the graduation project program on a flash memory.

- A hard copy of the report.
- An electronic copy of the report.

14. References

[1] B. Karagözoğlu, A guide to engineering design methodologies and technical presentation, Scientific Publishing Center, King Abdulaziz University, 2008.

[2] Senior Project and Professional Documents Manual, Collage of Agriculture, California Polytechnic State University, California, 2010.

[3] Society Policy, American Society of Mechanical Engineering, https://www.asme.org/

[4] Code of ethics, Saudi Council of Engineers, http://www.saudieng.sa/English/Pages/default.aspx

[5] Ashraf Saad, Senior Capstone Design Experiences for ABET Accredited Undergraduate Electrical and Computer Engineering Education, IEEE, 2007, P. 294-299.

[6] Senior Design Guidelines, College of Engineering, King Faisal University, 2014. https://www.kfu.edu.sa/en/Colleges/AhsaEngineering/Documents/Senior%20Design/Sen ior%20Design%20Guidelines.pdf

[7] Senior Design Project Handbook, Department of Electrical Engineering, College of Engineering, Qatar University, 2010.

15. Appendixes

14.1 Appendix I (Senior Design Project Forms)

14.2 Appendix II (Code of Ethics for Engineers)

Appendix I

Senior Design Project Forms

1. Senior Project Proposal Format (Form 1)
2. Graduation project registration undertaking form (Form 2)
3. Senior Design Project student Selection Form (Form 3)
4. Announcement of Declared Graduation Projects for Student (Form 4)
5. Senior Design Project 1 Evaluation Form (Form 5)
6. Senior Design Project 2 Evaluation Form (Form 6)
7. Rubrics assessment for Senior Design Project 1 (Form 7)
8. Rubrics assessment for Senior Design Project 2 (Form 8)

FORM 1

COLLEGE OF ENGINEERING

Department OF Architectural Engineering

AE. 498/499 – Senior Project

1- Proposal Format

Example 1

Problem Definition

The presence of a few different elements in the project in terms of functionality and the type of users will be a major challenge for the project designer. Also, the large area required by the project and the high ceiling heights of the building will produce a huge building, which calls for a diversity in blocks, shapes, and materials, as well as will require structural and sustainable solutions and a large collection of studies to plan and operate the project.

Elements of the Space Science and Technology Center

1- The Scientific Museum - a passageway and large halls containing means that provide visual and audio information

2- Planetarium

3- Children's play area and the train track

4- Research Center

5- Scientific lecture halls

6- library specialized in space science and technology

7 - cinema halls

8- General services

Project Objectives and justification

Such a project could be a gateway to enter space science, especially for developing countries, where the existence of such a project will enhance the role of researchers and experts, and it will represent a scientific edifice that brings together the specialized elites, and the scientific entertainment part of this project is an attraction factor to increase awareness and knowledge of space science.

Sustainability and Environmental Impact

By virtue of the size and area of this project and its demand for the presence of high-rise ceilings, the largest forms of sustainability will be the building's consumption of energy due to the need for huge air conditioning units, but solutions have been studied regarding this point where the glass facades were treated in a modern way, where enough natural light entered and significantly reduce heat entering the building. These sustainable solutions will be discussed in Chapter3.

Project Dimensions

The average area of similar projects globally is 30,000 square meters, where this figure is the average area of eight of the most famous international projects of this type, as the average area of the exhibition or Scientific Museum is 10,000 square meters, the average area of the planetarium is 3000 square meters, and the average entertainment halls It is 3500 square meters, the average area of the research center is 500 square meters, lecture halls are 2500 square meters, the public library, and the cinema is 3000 square meters, and public services are from 250 to 500 square meters.

As for the heights of the building, the project contains several elements that require great heights, the museum contains models of planets and models of space ascent equipment, some of which may be identical to their realistic dimensions such as models of satellites and vehicles, and this requires the presence of very high

ceilings, as this applies to the part The project's entertainment, which contains entertainment games of large dimensions.

Example 2

INTRODUCTION

This type of project is considered important in the development of the nation's economy, which requires a special functional solution, as it includes several categories of people.

1.1 Problem Definition

The high rate of population and economic growth in the Kingdom of Saudi Arabia is followed by a rise in the rate of energy consumption, whether in fuel, electricity or water desalination, in order to preserve current resources, achieve balance, meet life requirements for future generations and achieve economic development; The Kingdom has taken serious steps to use renewable energy sources in addition to oil and gas within the national energy mix. This approach requires the existence of a facility concerned with research and regulation in the field of renewable energy.

1.2 Project Objectives and justification

a. Develop innovative sustainable energy technologies in line with national strategic plans.
b. Enrich scientific knowledge and technical skills through education and training to provide qualified human forces in sustainable energy areas to meet national needs.
c. Promoting public awareness to promote a clean and sustainable energy culture.
d. Conducting research and studies in the field of renewable energy and its applications.
e. Building a knowledge database in renewable energy.
f. Support, development, and use of renewable energy technology at the local, regional and international levels.
g. Conducting national research and projects to diagnose the reality of renewable energy.
h. Providing technical and scientific advice in the field of renewable energy.
i. Specialized courses and workshops in the field of renewable energy.
j. Conducting studies and research for the purpose of rationalizing consumption.

k. Coordination and cooperation with research centers and universities locally and regionally in the field of renewable energy.

1.3 Sustainability and Environmental Impact

Since this project is concerned with energy sustainability, it was important for the building to be sustainable to express the essence of the project, as it was important to rely on natural lighting and this causes a great need for air conditioning, but solutions were studied in order to protect the building from solar radiation, and from these treatments, Kars rat Shams worked around the building And the use of triple glazing with special treatments.

1.4 Project Dimensions

A- Environmental functional dimension:

1. Provide proper planning of energy areas and take into account the appropriate distances between wind fans as well as solar panels and bioenergy areas.
2. Consider the flexibility of the design and the compatibility of the shape with the function and avoid intersections in motion.
3. Considering future expansion.

B- Design dimension:

1- Providing an integrated and distinctive construction system that reflects the project in a distinctive and wonderful way.
2- Use the energy generated by wind turbines and solar cells to provide the building with the necessary energy.
3. Provide natural ventilation of the building and use indoor gardens.

C- Environmental dimension :

1- Provide a facility adapted to the region's environment and hot and humid climate while taking advantage of self-generation of energy (wind- solar radiation).
Harvesting and exploiting rainwater.

D- Economic dimension:

Research centers contribute to raising the state economy, raising the level of technological capabilities, and raising the level of investment as a result of studies and research conducted in these centers, recycling and utilizing the resulting biological waste.

Jazan University

College of Engineering

Educational affairs

جامعة جازان

الهندسة كلية

التعليمية الشئون وكالة

FORM 2

Academic advisor	
Student Name	
ID	
Department	
Number of hours completed from the plan	
GPA	
Mobile number:	
E-mail:	
Date of application submission (day and date)	

I pledge, I am the student whose data is shown above, in the event that my registration for the graduation project course for the first semester of the academic year 144../144 is accepted, I pledge to contact the project supervisor / or the head of the department no later than a week from the date of adding the course and I pledge to abide by attendance at the dates that Determined by the department and the research supervisor, and if 25% of the total number of project lectures failed to attend or were vacated by one of the project's conditions, the department has the right to take whatever it deems appropriate and committed to fully cooperate with the research team of students in the graduation project and implement what is required of me to complete the graduation project in an honorable manner. Project report and presentation will be delivered at specified times :Student Name

: signature

FORM 3

Senior Design Project Selection Form

(Return the form to the Senior Design Project Coordinator by deadline)

No	Project Title	Professor Supervisor	Student choose
1			
2			
3			
4			
5			
6			
7			

Student Name	
ID	
Number of Hours	
GPA	
Mobile No.	
Email Address	
Signature	

Announcement of Declared Graduation Projects for Student Architectural Engineering Semester 2022_2 (FORM 4)

S.N	Project Title	Professor Supervisor
1		
2		
3		
4		
5		
6		
7		
8		
9		

Head of Architectural Engineering Department Senior Design Project Committee

Dr. ……..

FORM 5

Kingdom of Saudi Arabia
Ministry of Education
Jazan University
Engineering College
Architectural Engineering Department

المملكة العربية السعودية
وزارة التعليم
جامعة جازان
كلية الهندسة
قسم الهندسة المعمارية

Evaluation Senior Project 1 Total 50 marks

1	ID	Name	Objectives & Reasons	Architectural, environmental, site & specialized studies	Local & international legislation and codes	Analyze of similar projects	Propose a functional program	Presentation & Poster	Discussion	English fluent	Total 50
			10	10	5	5	10	5	3	2	50
1											
2											
3											
4											
5											

Examination Committee

DR. Name: ……

Signature :……..

FORM 6

Kingdom of Saudi Arabia
Ministry of Education
Jazan University
Engineering College
Architectural Engineering Department

المملكة العربية السعودية
وزارة التعليم
جامعة جازان
كلية الهندسة
قسم الهندسة المعمارية

Evaluation Senior Project 2 Total 75 marks

	ID	Name	Examination Committee													
			Project concept & Development	Achievement of project Functions	Innovation in Design	Sustainability	Acoustics	Lighting	HVAC	Structure	Presentation [1]	Poster	Discussion	English fluent	Report [2]	Total
			9	14	9	5	4	4	5	5	5	4	3	3	5	75
1																
2																
3																
4																
5																
6																
7																

Examination Committee

DR. Name: ……

Signature :……..

[1] Oral presentation delivery (2 Marks) + Presentation details (Slides) (3 Marks)
[2] Organization of the written materials.

FORM 7

Graduation Project Evaluation Using Rubric Assessment (AE499..First semester)

Title of the Project:..... **Name of the Supervisor:**.....

Course Code	*Course Title*	*Course Learning Outcomes (CLOs)*	*Assessment Activities And Weights (%)*		*Student Outcomes addressed by the course SOs*	*Performance indicators addressed by the course PIs*
			Assessment	*Weight %*		
AE4598-1	**Senior Design Project (1)**	CLO1: Prepare site and environmental studies (orientation - entrances - contour - surrounding elements and landmarks) (climatic - natural - cultural – acoustical- heritage…..etc.). CLO5: Create preliminary concept for project.	Research Research Research & Final discussion (function)	5 5 10	**SO 2**	**PI 2-1** **PI 2-2** **PI 2-4**
		CLO2: Analyze data using calculations.	Research & Final discussion (function) Research	10 5	**SO 1**	**PI 1-3** **PI 1-4**
		CLO3: Analyze similar projects and understand the functional requirements of the selected project.. CLO4: Propose a functional program for the project that includes components and spaces Area.	Research & Final discussion (function) Research Research & Final discussion (function)	10 5 10	**SO 7**	**PI 7-1** **PI 7-2** **PI 7-3**
		CLO6: Show Effectively the contents of studies.	Final Presentation Final Presentation Final oral	5 5 10	**SO 3**	**PI 3-1** **PI 3-2** **PI 3-5**

CLO7: Work effectively in multidisciplinary teams.	Final discussion (function)	5	**SO 5**	**PI 5-1** **PI 5-3**
	Final discussion (function)	5		
CLO8: Study local and international legislation and codes.	Research	5	**SO 4**	**PI 4-1** **PI 4-2**
	Research	5		

	Committee Members	**Name**	**Signature**
1	**Chairman**		
2	**Member**		
3	**Member**		
4	**Project Supervisor/s**		

FORM 8

Graduation Project Evaluation Using Rubric Assessment (AE498..Second semester)

Title of the Project:..... **Name of the Supervisor:**.....

Course Code	*Course Title*	*Course Learning Outcomes (CLOs)*	*Assessment Activities And Weights (%)*		*Student Outcomes addressed by the course SOs*	*Performance indicators addressed by the course PIs*
			Assessment	*Weight %*		
AE498-1	**Senior Design project (2)**	CLO1: Development the project concept. CLO3: Design and develop of the project & its components.	***sketches***	15	**SO 2**	**PI 2-3** **PI 2-5**
			Final project (development)	15		
		CLO2: Apply Site Studies outcomes (Environmental studies and site studies).	***sketches***	*5*	**SO 1**	**PI 1-1** **PI 1-2**
			sketches	*5*		
		CLO4: Work professional architectural presentation of project drawings. CLO5: Provide effective visual and oral presentation of the project.	***Presentation, Final project (innovation)***	*7*	**SO 3**	**PI 3-3** **PI 3-4** **PI 3-5**
			Presentation, Final project (innovation)	*6*		
			Final oral Presentation	*7*		
		CLO6: Conduct specialized studies for the project (lighting - acoustics - cost).	***Final project (construction)***	*7*	**SO 6**	**PI 6-2** **PI 6-3**
			Final project (function)	*5*		
		CLO7: To be disciplined, professional and collegial and	***Final project (function)***	*5*	**SO 4**	**PI 4-1**

	(assume his professional responsibilities.	***Final project (function)***	*6*		**PI 4-2**
		Final project (function)	*6*		**PI 4-4**
	CLO8: Apply safety standards and code for these buildings.	***Final project (development)***	*5*	**SO 7**	**PI 7-1**
		Final project (innovation)	*6*		**PI 7-4**

Committee Members Name Signature

1	**Chairman**		
2	**Members**		
4	**Project Supervisor/s**		

College of Engineering
Architectural Engineering Department

(Project Title)

by Student

_____

Student ID

_____

PROJECT ADVISOR: _____

A Senior Project report submitted in partial fulfillment
of the requirement for the degree of BACHELOR OF Science (B.Sc.),

in
Architectural Engineering

(Completion Date June/2022)

College of Engineering
Jazan University

(Project Title)

APPROVAL RECOMMENDED:

Examination Committee _____
_____
_____

_____
PROJECT ADVISOR

_____
DATE

_____
DEPARTMENT HEAD

_____
DATE

_____
COURSE INSTRUCTOR

_____
DATE

APPROVED:

_____
DEAN, COLLEGE OF ENGINEERING

_____

DATE

ABSTRACT

(Project Title)

Senior project submitted to the Department of Architectural Engineering

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DEDICATION

I dedicate this project to my parents, ……., who, through their financial and moral support, were the source of inspiration and the mainstay in my attaining an education.

ACKNOWLEDGEMENT

This project was developed under the direction and supervision of Dr. ……

I would like to express my sincere appreciation for his interest and assistance.

TABLE OF CONTENTS

PAGE

CHAPTER I

INTRODUCTION

……

……

……

……

……

1.1 Problem Definition ……..……

1.2 Project Objectives and justification ……..……

1.3 Sustainability and Environmental Impact……

1.4 Project Dimensions……..……

CHAPTER 2

PROBLEM CONSTRAINTS

……

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CHAPTER 3

PROJECT STUDIES

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CHAPTER 4

DESIGN PROCEDURE AND IMPLEMENTATION

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CHAPTER 5

CONCEPT DEVELOPMENT

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CHAPTER 6

PROJECT OUTCOMES

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Senior Design Project Checklist

Project Title: ……..…….....

Supervisor: ……..…….....

Student Name: ……..…….....

	Item	Implemented		
		Yes	No	***Indicate page(s)* in the report for yes, *cite reason(s)* for no**
1	Problem definition & Objectives			
2	Problem constraints			
3	Legislation and Codes			
4	Project studies			
5	Design procedure and implementation			
6	Alternative solutions			
7	Impact of engineering solutions			
8	Final product			

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

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A- Conclusion ……..……

B- Recommendations……..……

REFERENCES

[1]

[2]

[4]

[5]

APPENDIXES