King Fahd University of Petroleum & Minerals
Department of Civil Engineering

Senior Design Project Handbook

Department of Civil Engineering

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1.0 Course Description

Senior design is offered in two semesters for civil engineering science where the senior design project preparation is offered in the second semester of the junior year and followed by senior design project in the first semester of the senior year.

Senior design project is officered in one course for civil engineering applied major. The student is expected to choose the project in the field in which he is most familiar through his co-op work experience.

1.1 Civil engineering - Science

CE 410 Senior Design Project Preparation (0-3-1)

Each student starts the planning and undertaking of a suitable senior design project in consultation with the course coordinator. The student makes a presentation of his proposal for senior project work before a committee. The proposal outlines the objectives, scope and details of the work.

Prerequisite: ENGL 214, CE 312, CE 318 and senior standing or approval of the advisor

CE 412 Senior Design Project (0-6-2)

Students undertake a civil engineering design project under the supervision of a faculty member with the aim of achieving a comprehensive design experience through a coherent study of all applicable principles, strategies and methodologies of design, including construction operation, and maintenance as and when applicable. The project should also take into consideration other appropriate factors such as alternative designs, economic feasibility and social and environmental impacts. The student is required to make an oral and written presentation of the design project to an examining committee.

Prerequisite: CE 410

1.2 Civil engineering - Applied

CE 413 Applied Design Project (0-9-3)

ACE students undertake a civil engineering design project under the supervision of a faculty member with the aim of achieving a comprehensive design experience through a coherent study of engineering and design principles. The student chooses the project in the field in which he is most familiar through his co-op work experience. The student is required to make an oral and written presentation of the design project to an examining committee.

Prerequisite: CE 351

2.0 Course objectives:

1. To experience the comprehensive design requirements and apply the engineering knowledge
2. To select and apply the applicable method of design and analysis, software and tools
3. To account for other design consideration such as cost, construction environment, aesthetic and social impacts.

3.0. Learning outcomes

After successfully completing the course, the students will be able to

Outcome 1: Apply the knowledge from different courses into the comprehensive design process.

Outcome 2: Apply the appropriate design methods, systems, tools and software and codes

Outcome 3: To account for other design issues related to the design process such as economy, safety, health and environmental impacts

Outcome 4: To be able to communicate in writing and oral presentation and discuss engineering issues.

Outcome 5: To be able to work on a team spirit for project with more than one student.

4.0. Topics Covered

- Design and analysis methods
- Use of design skills, tools and codes
- Technical writing and engineering drawings
- Communication and presentations

5.0 Class Schedule

Each course will have a weekly class scheduled hour where all students must attend. Each student is expected to devote 3-9 hours by individual arrangements with the advisor working on the project.

6.0 Course Organization

Success completion of the senior design course is largely dependent on the coordination and communication between the student, course coordinator, student supervisor and examiners. The roles and responsibility of each are

6.1 Roles and responsibilities of students

The student needs to plan for this course one semester in advance. He needs to do a number of tasks prior to registering the course. Below are the main tasks to be performed distributed over two semesters?

Items to be performed in the semester prior to registration of Senior design course

1. Contact the CE Department Senior Project Coordinator during preregistration
2. Select a topic from the department list (proposed by a faculty member for senior project if convenient)
3. Propose your own topic (including brief description and objectives) and obtain approval from the senior project coordinator
4. Coordinate with the course coordinator to select your project advisor

Items to be performed in the senior design course

1. Meet with course coordinator and project advisor once a week during the semester
2. Submit a project proposal two weeks from the start of the semester
3. Submit a draft report and a draft presentation in the 9^{th} week
4. Submit a semi final report in the 13^{th} week
5. Conduct a trial presentation in the 14^{th} week
6. Conduct the final presentation in the 15^{th} week
7. Submit the final report in the 15^{th} week
8. Course advisor, coordinator, and an examiner will give you your course grade

6.2 Roles and responsibilities of advisors

The role of senior project advisors is very crucial. Advisors are requested to work closely with their designated students, while students should allocate time in their schedule to meet regularly with their advisors. Project advisors should be full-time faculty at the Department of Civil Engineering. The main responsibilities of each senior project advisors are:

1. Suggests topic(s) that is (are) within his area of expertise. It is highly recommended that senior projects cover more than one area of Civil Engineering (Multidisciplinary)
2. Gives general description of the suggested topic
3. Defines the maximum number of students to be involved in the proposed research topic(s)
4. Sends copy of the proposed research topic(s) to the course coordinator one semester prior to the planned semester
5. Posts proposed topic(s) on his web-page or web-page of the senior project course, if available
6. Meets with student(s) regularly for efficient guidance and communication
7. Guide students for the purpose of efficient work in order to:
    - insure that student(s) meet(s) time schedule
    - maintain record of regular meetings with students

8. Evaluates work produced by student(s) based on the evaluation policies set by the Department of Civil Engineering for the senior project course
9. Assigns grade to the work progress in accordance with the grading policies set by the Department of Civil Engineering for the senior project course.

6.3 Roles and responsibilities of coordinator

Senior project coordinator is responsible for the smooth and successful execution of senior design project. His basic role is to develop, oversee and maintain a project management function associated with the coordinated activities of communications, scheduling, meetings and events coordination. These activities include:

1. Develop and maintain systems and processes necessary for the initiating, tracking, planning and execution of projects.

2. Coordinate and supervise presentation meetings for ongoing projects.

3. Oversee and maintain liaison between parties concerned with the project to facilitate any changes or modifications and to facilitate resolution of project problems.

4. Oversee the development of relevant project proposals and recommend approval of them before offering to students in the first week of the semester.

5. Ensure completion of projects and adherence to timelines;

6. Track milestones and/or percent completion across projects and institute/modify necessary work flow, making alterations when necessary to meet expectations in coordination with project advisor.

7. Analyze and resolve issues that have the potential to jeopardize performance and/or ability to meet mile stones.

8. Arrange for the final presentation by inviting department faculty and some external examiners in the project area and maintains required ABET file documentation.

6.4 Roles and responsibilities of examiners

Upon the selection of the senior design project topic and advisor, the course coordinator will assign, in coordinator with course advisor, two examiners in the specific topic area. The examiners are expected to

1. **Attend** all presentations and provide comments to improve the quality of the project.

2. **Review** semi final reports and provide required corrections

3. **Evaluate** the final presentation and report using Outcomes rubric forms.

7.0 Reports and presentations

The following are the reports and presentations expect from the student to be performed in the time frame indicated. The date of the final presentation is fixed for all students in any given semester.

In addition to special reports that the individual supervisors may require, the following reports are mandatory. See attached sheets for report formats. It is particularly important that the final project document conforms to the prescribed form.

7.1. Reports

1. **Topic Selection Form**: must be prepared by advisors at the beginning of the semester. See **Form 1** for guidance.

2. **Advisor Selection Form**: must be signed by the student, his advisor and the course coordinator. The form must be submitted during pre-registration period. See **Form 2** for guidance.

3. **Project Proposal**: must be submitted during the first two weeks of the semester. See **Form 3** for guidance.

4. **Project Outline**: must be submitted together with the project proposal during first 2 weeks of the semester. See **Form 4** for guidance.

5. **Progress Reports:** must be submitted to the advisor on weekly basis. See **Form 5** for guidance.

6. **Draft Report** (9th week of the semester)

7. **Final Draft**: must be submitted towards the end of the semester (13th week of the semester). See **Form 6** for guidance.

8. **Final Report**: must be submitted at the end of the semester. See **Form 6** for guidance.

7.2. Presentations

In addition to the above-mentioned reports, students are requested to deliver two presentations as follows:

1. **Proposal Presentation**: must be delivered at the time of proposal submittal. The presentation should have a format that is similar to the Proposal (Form 3)

2. Progress Presentation: must be delivered at Mid-term (9^{th} week). The presentation should have a format that is similar to the Final Report (Form 6)

3. Final Presentation: must be delivered towards the end of the semester. The presentation should have a format that is similar to the Final Report (Form 6)

8.0 Registration Procedure

At the beginning of each semester, the department faculty will offer topics for the course and provide the information about the topic as per **Form 1**. Topics will be listed by the Early Registration period in the website of the course and posted in the department notice board by the course coordinator.

1- Student should register the course during the Early Registration period.

2- Thereafter, student should see the course coordinator to select a topic, advisor for the project **Form 2** (projects will be posted on the department website or department board).

3- Student who fails to select a topic and submit the commitment form will have his registration for the course canceled.

4- In the first week of the following semester, student must meet course coordinator for the discussion of course guidelines.

5- Student must attend weekly meeting with his advisor/coordinator for guidance and follow-up. Weekly progress report **Form 5** must be submitted every week to the advisor and copy to the coordinator.

6- Student must devote a minimum of 3-9 hours weekly for project work.

7- Student must submit his project report and present his project to the examining committee not later than the 14th week of the semester.

9.0 Report Writing

The report should consist of the following:

1- Title page, table of contents and summary
2- Description of the problem including background literature
3- Objectives
4- Problem design and analysis
5- Discussion and conclusion

6- Appendices (References, Drawings, etc.)

10.0 Presentation and Assessment procedures

All students are required to complete and present their work to the examining committee no later than 14th week of the semester. Each student will be graded individually by the project coordinator and his advisor. The grade assigned by both should reflect student effort during the semester to meet deadlines, participation in meetings, presentations, leadership, creativity, participation with other project team member, literature search, report preparation and development, planning…etc

Project coordinator will assign 10 % of the score, while the advisor will assign 20 % of the Grade based on the submitted Weekly progress report **Form 5**. The remaining 70 % will be assigned by the examining committee which will include 2-3 members besides the advisor and coordinator. The examining committee may include one external examiner in the same project field.

Each examiner should fill Rubric Matrix (**Form 7**) based on the final project presentation and report. The grading form (**Form 8**) must be filled and signed by all examining committee team members.

11.0 Forms and reports Format.

9. ***Form 1. Senior Design Project Topic***
10. ***Form 2. Senior project advisor consent form***
11. ***Form 3. Project proposal format***
12. ***Form 4. Project outline format***
13. ***Form 5. Progress report format***
14. ***Form 6. Final report format***
15. ***Form 7. Scoring Rubric***
16. ***Form 8. Final grade form***

(Form 1)

Senior Design Project Topic

Project Title: _____

Description of the Project: _____

_____

_____

_____

_____

_____

Number of Students: ☐ one student ☐ two students

Prerequisite: _____

Faculty Name:_____

Signature: _____

Date: _____

Project Code: _____
(to be assigned by the Coordinator)

(Form 1 - Sample)

Senior Design Project Topic

Project Title: Stabilization/Solidification of Contaminated Soil

Description of the Project: Contaminated soil will be acquired or synthesized in the CE labs. In the case of using synthetic contaminated soil, the type and concentration of contaminants should resemble a real contaminated soil. Cement and other additives to replace portions of the added cement (such as fuel fly ash) will be used to solidify the contaminated soil. The Solidified samples will be subjected to mechanical testing such as unconfined compressive strength and permeability tests. Moreover, the solidified samples will be subjected to the Toxicity Characteristic Leaching Procedure (TCLP) for environmental purposes.

Number of Students: 2

Prerequisite: CE xxx and CE yyy

Faculty Name: XYZ

Signature: xyz

Date: 14/6/2009

Project Code: _____

(To be assigned by the Coordinator)

(Form 2)

SENIOR PROJECT ADVISOR CONSENT FORM

Project Title: ----------

The Advisor Selection Process

A. It is the student's responsibility to a CE faculty who will agree to be his project advisor. Normally a CE faculty member will have a maximum of 3 project advisees per semester. Once the faculty member has signed the Advisor Consent form, the student must register for that faculty member's Senior Project section during the pre-registration for the semester the project will be completed

B. The student will be required to meet with the faculty advisor at least once a week. The student will come to the meeting prepared to explain and/or demonstrate the progress he has made on the project. After each meeting, the faculty member will sign the student's weekly progress report.

C. The faculty member's responsibility is to view and comment on the progress being made on the project. Since one of the senior project requirements is an "ability to do independent work," the faculty member will not work on the student's project in any way. (This means that it is the role of the faculty member to give advice and monitor progress, not to write code.)

D. ***The Civil Engineering Department reserves the right to veto a final project of a student who fails to meet with his project advisor on a regular, weekly basis.***

I agree to the above policy.

_____	_____	_____
Student Signature	Date	Student Name (Printed)
_____	_____	_____
Student Signature	Date	Student Name (Printed)
_____	_____	_____
Faculty Signature	Date	Faculty Name (Printed)
_____	_____	_____
Faculty Signature	Date	Faculty Name (Printed)
_____	_____	_____
Coordinator Signature	Date	Coordinator Name (Printed)

(Form 3)

PROJECT PROPOSAL FORMAT

Project Proposal must be prepared in both report format and presentation format. The report format of the proposal must include the following items.

General Guidelines on Report Format

1. Cover Page

The cover page should include Department Name, Project Title, Student's Name and ID, Advisor's Name, and Proposal's Date.

2. Arabic and English Abstracts

3. Table of Contents

4. Introduction

In this section, the significance of the project must be presented in a clear and systematic manner. Background on the project and related topics must also be presented.

5. Objectives and Expected Outcomes

In this section, objectives of the selected project must be clearly stated. Moreover, expected outcomes of the project must be declared.

6. Scope of Work

In this section, different tasks that should be conducted to achieve the stated objectives must be systematically defined.

7. Constraints (Materials and Methods)

In this section, all materials and equipment that will be used in order to conduct the research must be presented. Moreover, softwares, any other computer-based activities, and standard methods that will be utilized during the project must be stated.

8. Work Schedule

A bar chart showing all tasks that will be performed as part of the selected project must be presented. Responsible team member for the particular tasks must be specified on the chart. Moreover, time for reports and presentations must be indicated on the chart

General Guideline on Presentation

A PowerPoint presentation must be prepared in parallel with the proposal for delivery. The general format of the presentation is similar to the proposal format. Hard and soft copies of the proposal and presentation must be submitted to the advisor.

(Form 4)

PROJECT OUTLINE FORMAT

Project: ……..

Objective: ……..

Equipment: ……

Materials: List all materials need to conduct the project

Material	Cost
A	
B	
C	
Total	

OUTLINE OF PROJECT

List all tasks that will be conducted to achieve the project goals together with number of hours needed to perform each task.

Task Expected execution time, hrs

1-

2-

3-

4-

5-

6-

7-

8-

9-

Date: _____

Student: _____

Advisor: _____

(Note: Copies of this project outline go to the advisor and student.)

(Form 5)

PROGRESS REPORT FORMAT

Date: …….
To: Dr. ……..….(Advisor)
From: ……... (Student)
Subject: Progress Report No. ……..

List

- Accomplished tasks
- Tasks that will be started next
- Problems encountered, if any
- No of hours spent
- Vision on progress

_____
Student Signature

cc: Coordinator

(Form 5 - Sample)

PROGRESS REPORT FORMAT

Date: January. 1, 200x
To: Dr. XYZ (Advisor)
From: ABC (Student)
Subject: Progress Report No. 3

As of this date, the following progress has been made on my project entitled "Stabilization/Solidification of Contaminated Soil"

- Experimental design – The experimental design of the project was finalized (or is well under way)
- Data collection – data collection in accordance with the experimental design is on going.
- Data analysis – Spread sheet for data analysis has been prepared and tested.

Total time spent: xx hours

It is believed that progress is on or ahead of schedule towards completion of this project on time.

_____
Student Signature

cc: Coordinator

(Form 6)

FINAL REPORT FORMAT

The main objective of this report is to present final, complete documentation describing the development, implementation, testing and operation of the product/prototype which has been designed or developed. Only one report need be submitted per team; however, all team members must contribute to the report. On the cover page, list (1) the team members and (2) the report authors.

1. Title Page
The cover page should include Department Name, Project Title, Student's Name and ID, Advisor's Name, and Proposal's Date.

2. Arabic and English Abstracts
Both abstracts should be in the form of concise one or two paragraph summary of the essential points in the report such as objectives, approach, results, conclusions, and recommendations.

3. Table of Contents

4. Lists of Tables, Figures and Photographs

5. Introduction
In this section, the significance of the project must be presented in a clear and systematic manner. Background on the project and related topics must also be presented. Recent publications pertinent to the project must be presented

6. Project Objectives
In this section, objectives of the selected project must be clearly stated. The objectives should be a copy of those stated in proposal.

7. Material s and Methods
In this section, all materials and equipment that will be used in order to conduct the research must be presented. Moreover, softwares, any other computer-based activities, and standard methods that will be utilized during the project must be stated.

8. Results and Discussion
In this section, clear and complete discussion of test procedures which were used to evaluate the product performance must be presented using actual test results.

9. Conclusions and Recommendations
In this section, give a general interpretation of the obtained results and suggest further research to improve the product.

10. References
List all documents and resources related to the project using University standard formats.

11. Acknowledgments
Acknowledge any company and/or individuals who provided technical and financial assistance.

Appendixes (as appropriate)

- Raw Data
- User's Manual

- Installation procedure
- Operating instructions
- Bar chart of the tasks performed and the time spent on each task

The reports must be prepared in accordance with the standard formats for preparation of MSc and PhD theses (Deanship of graduate studies).

When the project is presented on "Senior Project Day", the presentation must have the same format as the final report and be shared by all team members, each describing a component or feature of the project to which he contributed.

Department of Civil Engineering

Form 7: Scoring Rubric for Senior Design Project

Group no.
Student: .....

Outcomes	Excellent (exceeds expectation) 4	Very Good (meets expectation) 3	Good (barely meets expectation) 2	Poor (fails to meet expectation) 1	Score
(a) Ability to apply knowledge of mathematics, science and engineering					
• Applies correct mathematics principles to obtain solutions	Work demonstrates ample use of math in correct manner. ☐	Work demonstrates adequate use of math with a few mistakes.☐	Work demonstrates some use of math with some mistakes. ☐	Work demonstrates some use of math with many mistakes. ☐	**/2**
• Uses principles of sciences and engineering in solving engineering problems	Work demonstrates ample use of science and engineering principles in correct manner. ☐	Work demonstrates adequate use of science and engineering principles, with a few mistakes ☐	Work demonstrates some use of science and engineering principles with some mistakes☐.	Work demonstrates some use of science and engineering with many mistakes. ☐	**/2**
(b) Students shall have an ability to design and conduct experiments, as well as analyze and interpret data.					

• Identification of objectives, requirements and constraints	All important project objectives, requirements and design constraints are identified. ☐	Important project objectives, requirements and constraints are identified, missing few minor ones. ☐	Most important objectives, requirements and constraints are identified, missing few major ones. ☐	Important objectives, requirements and constraints are not identified. ☐	**/2**
• Uses appropriate measurement techniques to collect data	All important measurement techniques to collect data are identified and used correctly. ☐	Important measurement techniques to collect data are identified and used, missing few minor ones. ☐	Most important measurement techniques to collect data are identified and used, missing few major ones. ☐	Important measurement techniques to collect data are not identified or used. ☐	**/2**
• Gathering and using relevant data and information	All relevant data and information, including literature review, is obtained and used to find solution. ☐	Sufficient data and information is obtained and used to find solution. ☐	Some information and data collected but more needed to find solution. ☐	No significant information and data collected. ☐	**/2**
• Uses appropriate tools to analyze data	All important data analysis tools are identified and used correctly. ☐	Important data analysis tools are identified and used, missing few minor ones. ☐	Most important data analysis tools are identified and used, missing few major ones. ☐	Important data analysis tools are not identified or used or correctly. ☐	**/2**
(c) Students shall have an ability to design a system, component, or process to meet desired needs within constraints.					

• Can identify and understand the important constraints	All project design components, requirements and design constraints are identified. ☐	most project design components, requirements and design constraints are identified, missing few minor ones. ☐	Most important project design components, requirements and design constraints are identified, missing few major ones. ☐	Important project design components, requirements and design constraints are not identified. ☐	**/2**
• Evaluates alternative design in choosing best solution	More than two alternative solutions are considered; each is correctly analyzed For technical feasibility. ☐	At least 2 alternative solutions are considered; analysis is complete. ☐	At least 2 alternative solutions are considered; analysis contains minor conceptual and/or procedural errors. ☐	Only one solution considered; no optimization included; better solutions were available. ☐	**/2**
• Perform design or solve problems using civil engineering knowledge, using alternatives, if applicable	Design or solution is clearly and coherently presented with alternatives, where warranted. ☐	Design or solution presented with minor errors or omissions. ☐	Design or solution presented with major errors or omissions☐	Design or solution presented haphazardly with incoherence and errors. ☐	**/2**
• Economic study conducted for the chosen solution	Comprehensive cost-study is conducted for the chosen solution. ☐	Substantial cost study, but not all carried out for the chosen solution. ☐	Limited cost study is carried out for the chosen solution. ☐	No meaningful cost study is done for the chosen solution. ☐	**/2**
(d) Ability to function in a team					
• Contributes by conducting search and gathering data	Collects a great deal of information – all relates to the topic☐	Collects some basic information – most relates to the topic☐	Collects very little information – some relates to the topic. ☐	Does not collect any information that relates to the topic. ☐	**/2**
• Takes responsibility by fulfilling roles	Perform all duties of	Perform nearly all duties. ☐	Perform very little duties. ☐	Does not perform any duties of assigned team	**/2**

	assigned team role. ☐			role. ☐	
• Share work equally and Cooperate with teammates	Always does the assigned work – without having to be reminded. ☐	Usually does the assigned work – rarely needs reminding. ☐	Rarely does the assigned work – often needs reminding. ☐	Always relies on others to do the work. ☐	**/2**
(e) Students shall have an ability to identify, formulate, and solve engineering problems.					
• Identifies and develops a problem statement	Problem statement is clearly defined; background is extremely well researched. ☐	Problem is defined clearly; some background given. ☐	Problem is discussed, but not well defined. Very little background is given. ☐	Little or no sense of the problem is described.☐	**/2**
• Uses basic knowledge of engineering to formulate the problem	Can relate theoretical concepts to practical problem solving☐	Connects theoretical concepts to practical problem-solving missing some minor ones☐	Connects theoretical concepts to practical problem-solving missing some major ones☐	Does not see the connection between theory and practical problem solving☐	**/2**
• Solves engineering problems by applying appropriate scientific methods	Demonstrates creative synthesis of solution by combining engineering knowledge and information☐	Demonstrates synthesis of solution by combining engineering knowledge and information missing minor ones☐	Demonstrates synthesis of solution by combining engineering knowledge and information missing some major ones☐	Demonstrates synthesis of solution by combining engineering knowledge and information missing most important ones☐	**/2**

(f) Understand professional and ethical responsibility					
• Demonstrates an ability to make informed ethical choices	Ethical issues including safety, economy, ethics and environmental impact are all considered. ☐	Primary issues considered; one or two secondary issues may have been ignored. ☐	Most but not all important issues considered. ☐	Most if not all important issues ignored. ☐	**/2**
• Understands the professional responsibilities of engineered solutions	Demonstrates an understanding of professional preparation and responsibility. ☐	Demonstrates an awareness of professional preparation and responsibility. ☐	Little or no understanding of professional preparation and responsibility. ☐	No understanding of professional preparation and responsibility. ☐	**/2**
• Evaluates the ethical dimensions of professional engineering	Can determine multiple appropriate actions and prioritize them. ☐	Able to identify more than one ethical issue related to their design or work. ☐	With assistance able to identify at least one appropriate part of an ethical code or framework to address the issue☐	Unable to identify any ethical or potentially ethical issues related to the design. ☐	**/2**
(g) Students shall have an ability to communicate effectively.					
• Writes well-written reports that are factually correct, supported with evidence	Report is complete, well organized and error-free. ☐	Report is mostly complete and well organized with some errors. ☐	Report is reasonably complete and organized, with some missing elements and some errors in grammar and spelling. ☐	Report is incomplete and not well organized with missing elements and numerous errors in grammar and spelling. ☐	**/5**

• Speaks clearly and uses appropriate terminology during presentation	Student presents information in logical, interesting sequence which audience can follow. ☐	Student presents information in logical sequence which audience can follow. ☐	Audience has difficulty following presentation because student jumps around. ☐	Audience cannot understand presentation because there is no sequence of information. ☐	**/5**
• Use clear and well prepared visuals aids	Uses effectively the presentation tools to tell the story. ☐	Uses well the presentation tools to tell the story with minor mistakes. ☐	Uses well the presentation tools to tell the story with some major mistakes. ☐	Does not use effectively the presentation tools to tell the story. ☐	**/4**
• Responds well to questions	Student demonstrates full knowledge by answering all questions with explanations and elaboration. ☐	Student is at ease with expected answers to all questions, but fails to elaborate. ☐	Student is uncomfortable with information and is able to answer only rudimentary questions. ☐	Student does not have grasp of information; student cannot answer questions about subject. ☐	**/4**
(i) Students shall have recognition of the need for, and an ability to engage in lifelong learning.					
• Shows willingness to learn new materials on his own	Takes initiative to acquire new skills. or Develop competency in at least one new skill or knowledge applicable to the design work. ☐	Has taken advantage of at least one resource to acquire a basic understanding of one new skill or knowledge area. ☐	Made minimal efforts to use available resources to acquire new skills to advance the work of the design. ☐	Has not taken any action beyond going to class to acquire skills that would advance the work of the design. ☐	**/2**
• Can identify what needs to be learnt for a given situation	Can identify multiple methods or resources to improve own	Can identify more than one method or resource to	Can identify at least one method or resource to	Cannot identify any methods or resource or opportunities to improve	**/2**

	learning. ☐	improve own learning. ☐	improve learning. ☐	their own learning. ☐	
(j) Knowledge of contemporary issues					
• Can discuss major socio-economic issues facing the country and the world.	Problem placed in appropriate social / political context; all issues considered. ☐	Primary issues considered; some secondary issues may have been neglected. ☐	Most but not all primary issues considered. ☐	Most if not all primary issues ignored. ☐	**/2**
• Can identify contemporary issues related to energy, health and environment	The project and literature review clearly shows student's knowledge of contemporary issues through the use of current development and concepts. ☐	The project and literature review shows some evidence of student's knowledge of contemporary issues through the use of current developments and concepts. ☐	The project and literature review shows limited evidence of student's knowledge of contemporary issues through the use of current developments and concepts. ☐	The project does not show any evidence of student's knowledge of contemporary issues. ☐	**/2**
(k) Use techniques, skills, and modern engineering tools necessary for engineering practice					
• Demonstrates skills in using computers and software tools	Correct use of computer based tools is well documented and discussed ☐	Use of computer-based tools is documented and some discussion is present. ☐	Some documentation of use of computer-based tools ☐	Little or no documentation of use of computer-based tools. ☐	**/2**

• Demonstrates the capability in using modern laboratory tools for instrumentation and testing	Correct use of laboratory-based tools is well documented and discussed ☐	Use of laboratory-based tools is documented and some discussion is present. ☐	Some documentation of use of laboratory-based tools ☐	Little or no documentation of use of laboratory-based tools. ☐	**/2**
• Can solve engineering problems using software	Correct use of computer-based tools to solve engineering problems is well documented and discussed ☐	Use of computer-based tools to solve engineering problems is documented and some discussion is present. ☐	Some documentation of use of computer-based tools to solve engineering problems ☐	Little or no documentation of use of computer-based tools to solve engineering problems ☐	**/2**

Score /70

Senior Design Project

FORM 8 . FINAL GRADE FORM

Name of the Student | Student I.D. #

Examining Committee:

- Advisor: _____

- Member: _____ - Member: _____

- External Examiner-1:_____ _____ External examiner -2: _____

Grade Distribution:

#	Grade Distribution		Max.	Score
1	Progress grade	by Coordinator	10%	
		by Advisor	20%	
2	Report and Presentation grade From Rubric matrix Form 8, by Committee (Attach Suummary of Form -8)		70%	
Total …			100%	
Recommended Grade Letter				

Signature:

_____ _____ _____

Advisor Member Member

_____ _____

Member Member

Course Coordinator: _____ Date: _____