COLLEGE OF ENGINEERING
Department OF Electrical Engineering

EngE 590 – Senior Project (I)
(Capstone Design)
Proposal Procedure

Proposals can be submitted by students, faculty or industry. The deadline for submission is First of September, and First of April. Each project will be completed under the supervision of one or more department or college staff members with expertise in the project area. Each student team will normally consist of Three to Four Department or college engineering seniors.

Each project must meet the following criteria:

1. Project can be completed during TWO semesters (ONE academic year.)
2. Project must meet ABET design criteria:
   a) Open ended
   b) Non-unique solutions
   c) Student decisions required
   d) Involve advanced engineering analysis
   e) Design configuration decisions required
   f) Visibility studies and market needs

The main emphasis of the project is design. If construction is involved it must not override the engineering design aspects of the project.

Each proposal should be outlined as listed below:

A. Proposer's name, address, phone number and affiliation.
B. Choice of faculty advisor if known.
C. Number of students desired and student design team choice if known.
D. Type of analysis that project may involve such as (Department specialties)…….
   ……..
E. State tentative project name followed by a description of the project not more than one page in length.
F. If the project is from industry please state what your company is willing to donate to the project to offset student travel, duplication expenses, etc. Estimated Budget around 5000 SR or budget accepted by the university

The proposals will be reviewed by the department and confirmed by the Advisory Board. Students will be assigned to selected projects early at 10th September and April

Please submit proposals with formal attached Form by Email to:

College Coordinator of Capstone Design
Dr. Refaat Khater
ref_khater@yahoo.co.uk,
Department Coordinator of Capstone Design
Name:……
Email: …….

COLLEGE OF ENGINEERING
Department OF Electrical Engineering

EngE 590 – Senior Project (I)
(Capstone Design)

Proposal Format

Academic year	**1441 – 1442 - 2019 – 2020**
Semesters	**Fall / Spring**
Academic Level	**Nine / Ten**
Project Title	**Modeling and simulation of hybrid power system (photovoltaic-wind) connected to the grid**
Supervisors	**Dr. Bilel DHOUIB** **Dr. Houssem BEN ARIBIA**
Number of Student Team	**5**

1- Introduction & Background

Renewable energy technologies offer the promise of clean, abundant energy gathered from self-renewing resources such as the sun, wind, water, earth, and plants. Virtually all regions of the world have renewable resources of one type or another. Renewable energy technologies offer important benefits compared to those of conventional energy sources. Worldwide, 1000 times more energy reaches the surface of the earth from the sun than is released today by all fossil fuels consumed. Photovoltaic and wind generation are also an attractive source of energy because of their benign effect on the environment. Increased population growth and economic development are accelerating the rate at which energy, and in particular electrical energy is being demanded. All methods of electricity generation have consequences for the environment, so meeting this growth in demand, while safeguarding the environment poses a growing challenge. Each of the renewable energy technologies is in a different stage of research, development, and commercialization and all have differences in current and future expected costs, current industrial base, resource availability, and potential impact on greenhouse gas emissions. Hybrid power systems consist of a combination of renewable energy sources such as: photovoltaic (PV), wind generators, hydro, etc., to charge batteries and provide power to meet the energy demand, considering the local geography and other details of the place of

installation. These types of systems, which are not connected to the main utility grid, arc also used in stand-alone applications and operate independently and reliably. The best applications for these systems are in remote places, such as rural villages, in eletrocommunications, etc. The importance of hybrid systems has grown as they appeared to be the right solution for a clean and distributed energy production. It has to be mentioned that new implementations of hybrid systems require special attention on analysis and modeling. One issue is determined by the variable and unpredictable character of energy supply from renewable sources. A major importance for the theoretical study of hybrid systems, based on renewable energy (photovoltaic, wind, hydroelectric systems), is the availability of models, which can be used to study the behavior of hybrid systems, and most important, software simulation environments.

2- Problem Statement and Objective (ABET – 3e)

Problem statement:

The continuous instability of fossil fuel prices, the amount of oil and natural gas reserves is getting lesser and the serious environmental degradation due to overexploitation of existing energy reserves are among the reasons to develop an alternative energy generation system that based on renewable energy sources, such as a hybrid system that combined solar and wind energy.

Objective:

The main objective of the project is;

To carry out a research based project on the integration of solar and wind by interlinking them to act as a single source of power. This project on a large scale aspect can be considered a national system in feed-in tariff rates for these forms of energy thus providing a source of efficient, stable and sustainable power.

Through this project we intend to have comprehensive results that encourage provision of incentives in the implementation of similar projects. The design and simulation of results gives an output that displays a standing ovation project.

3- Problem justification and Outcomes (ABET - 3e)

In order to develop a functional model for hybrid system, the characteristic equations of each standalone system need to be determined. Moreover, identifying the parameters that affects the results of the simulation and the possible types of power converter used helps to develop a comprehensive hybrid model.

4- Literature Review (ABET – 3j)

Hybrid power system (Publications and Standards).

Matlab Simulink software (Publications and Manual guide).

5- Problem Constraints (ABET - 3c)

In design studies for renewable energy systems, reliability indices such as power supply probability, loss of power supply probability, and loss of load probability are repeatedly presented as reliability constraints (technical design index), because a technical evaluation should be performed for the PV/WT system to meet the load demand.

6- Design Approach and Methodology (ABET - 3a, 3b, 3e, 3k)

i) Knowledge of mathematic and engineering principles.
ii) Methods used to formulate and solve engineering problems.
iii) We develop an optimal design for a hybrid solar-wind energy plant
iv) Knowledge of hybrid solar-wind energy principles
v) Knowledge of power system stability and electronics principles
vi) Using Matlab Simulink to simulate the hybrid system.

7- Tasks and Time Schedule

(Level: 9, First Term, 1441)

Task No.	Task Name	Duration (Weeks)
1	Study the solar and wind model	6
2	Study the converters and regulators	4
3	Develop an optimal design for a hybrid solar-wind energy plant	2
4	Report & seminar	2

(Level: 10, Second Term,1442)

Task No.	Task Name	Duration (Weeks)
1	Revision of the tasks on first semester	1
2	Simulate the hybrid system	6
3	Analysis the results	4
4	Discussion, conclusion and final report	3

8- Budget & Expenditures Sheet

- Matlab Simulink

9- Visibility of the product and market needs (ABET)

Supervisors	
Name	Signatures
Dr. Bilel DHOUIB	
Dr. H. Ben ARIBIA	

Senior Project (Capstone Design) Presentation

EngE 590 Case Study Presentations

I have invited Guest lecturers and students to provide you with actual projects or situations for your review.

- Review your notes and presentation slides
- Study the information
- Use what you have learned in project class to identify various issues/topics of interest

- Working in your teams, select one of the Guest Lecturer projects for review.
- Please identify why you have selected the guest lecture or video for case study review.
- Please identify the Engineering Challenges for the Case Study.
- Review and discuss the project within the framework of the course topics including:

  - Need Identification and Problem Definition
  - Project Planning
  - Technological Innovation
  - Concept Generation and Evaluation
  - Legal and Ethical Issues

Your Case Study review should be between 8 to 10 minutes. Because of time constraints, I may cut off teams in excess of 10 minutes. Therefore please plan your time wisely.

You should prepare your presentation with PowerPoint and have a copy on a USB memory stick. Please do not show up with a floppy disk and expect to load onto the computer. Please be prepared to present at your selected time. If you have a significant delay in setting up that effect the timing of other presentation, your score will be deducted.

A good rule of thumb is one slide per minute. Therefore, I recommend that you limit to more than 12 slides.

Recommended Presentation Outline

- Title Slide: Case Study Project,
- Team Members,
- Date
- Agenda – organization of the presentation materials
- Case Study Selection – Why you have chosen or selected this project for review
- Background – Provide summary or overview of the case study project
- Engineering or Technical Challenges – Identify the challenges as presented
- Case Study Review – Identify and discuss various course topics as they relate to the case study. You should be able to describe the Design Process or Methodology for your case.
- Summary/Conclusions, what is your outcomes, visibility, marketing
- References/Acknowledgements

Your presentation will be assessed by the following criteria:

- Organization and Style of Presentation
- Case Study Review – identification of topics, significance of review

EngE 590 – Senior Project
(Capstone Design)

Catalog Data: *EngE 590* – Senior Project. (4:6,0)
Continuous Assessment two semesters (Duration – 32 weeks)

Fall/Spring 143.

Department of: Electrical engineering

Senior Project Sign-Up Sheet

Project Title: **Modeling and simulation of hybrid power system (photovoltaic-wind) connected to the grid**

Project Advisor: Dr. Bilel DHOUIB

Dr. H. Ben ARIBIA

Team Leader	نواف ابراهيم أبكر شراحيلي
Team Members	خالد يحي بن علي عبيري
	محمد عواجي علي حكمي
	سعود محمد مرضي الغامدي
	نواف محمد محمد محنشي

Please identify the everyday item that will be addressed by the design project.

Your team will also address the Case Study assignment.
Please identify a Team Leader to address communication responsibilities.
Team must have a minimum of 3 members and no more than 5 members.

Signature

(1) …… (2) …… (3) …… (4) ……
(5) ……..……..

[This page must be signed and returned no later than the start of the 2rd Session. Students who are not comfortable signing this document should meet with the course coordinator before the third week of the semester to review the requirements as necessary.]