COLLEGE OF ENGINEERING
Department OF Electrical Engineering

Eng. E… 590 – Senior Project (I)
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)
Proposal Format

Academic year	**1440– 1441 - 2019 –2020**
Semesters	**First / 2020**
Academic Level	**Nine / Ten**
Project Title	**Design of an Automatic Power Factor Compensation System**
Supervisors	**Dr. Sami Alotaibi – Dr. Shahir Hussein**
Number of Student Team	**5 students**

1- Introduction & Background

The electrical energy is almost exclusively generated, Transmitted and distributed in the form of alternating current. Therefore, the question of power factor immediately comes into picture. Most of the loads (e.g. induction motors , arc lamps) are inductive in nature and hence have low lagging power factor. The low power factor is highly undesirable as it causes an increase in current, resulting in additional losses of active power in all the elements of power system from power station generator down the utilization devices.

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

In an electric power system, a load with a low power factor draws more current than a load with a high power factor for the same amount of useful power transferred. The higher currents increase the energy lost in the distribution system, and require larger wires and other equipment. Because of the costs of larger equipment and wasted energy, electrical utilities will usually charge a higher cost to industrial or commercial customers where there is a low power factor.

Linear loads with low power factor (such as induction motors) can be corrected with a passive network of capacitors or inductors. Non-linear loads, such as rectifiers, distort the current drawn from the system. In such cases, active or passive power factor correction may be used to counteract the distortion and raise the power factor. The devices for correction of the power factor may be at a central substation, spread out over a distribution system, or built into power-consuming equipment

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

The main objective of this project is to design a small automatic compensation unit, summarized as follow:

- Improve the power factor automatically.
- Reducing the voltage drops on installation.
- Increasing overall power.
- Savings on the electricity bill.
- Increase overall efficiency.

4- Literature Review (ABET – 3j)

All AC electrical networks consume two types of power, active power and reactive power. The active power (kW) is the real power transmitted to loads such as motors, lamps, heaters, computers … The electrical active power is transformed into mechanical power, heat or light.

$$P=VI\cos(\Theta)$$

The reactive power (kvar) is used only to supply the magnetic circuits of machines, motors and transformers .The apparent power (kVA) is the vector combination of active and reactive power. In this representation, the Power Factor (P/S) is equal to cosφ.

$$Q=VI \sin(\Theta)$$

The power factor is defined as the ratio of the active power (P) and volt-amperes (S),

$$\text{Power Factor} = P/S = P/VI$$

For sinusoidal waveforms the power factor is the cosine of the phase angle Θ between voltage and current.

$$\text{Power factor} = \cos(\Theta)$$

5- Problem Constraints (ABET - 3c)

1) Sources of Reactive Power
2) Synchronous Generators
3) Synchronous Compensators
4) Capacitive and Inductive Compensators
5) Selection of Compensation Type
6) Effects of Harmonics

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

i) Knowledge of mathematic and engineering principles
ii) Components to conduct design and compare with theoretical
iii) Methods used to formulate and solve engineering problem
iv) Design a panel with components to simulate the process
v) Taking experiment result to build a proper control parameters

7- Tasks and Time Schedule

(Level: 9, First Term, 1435)

Task No.	Task Name	Duration (Weeks)
1	Data collections	2
2	Literature overview of actual solutions	3
3	Comparing deferent methodologies used in practice	2
4	Choosing of circuit equipment's and materials	2
5	Report & seminar	2

(Level: 10, Second Term,1436)

Task No.	Task Name	Duration (Weeks)
1	Revision of the tasks on first semester	1
2	Executing a lab experiment with similar equipment's in dep. labs	1
3	Calculation of circuit parameters	3
4	Building the circuit and controls	2
5	Taking measurements and simulation results	2
6	Discussion, conclusion and final report	2

8- Budget & Expenditures Sheet

Items	Description	Estimated Price
1	Microcontroller (AT89S52)	500
2	Transformer, rectifier, voltage regulator and filters	200
3	Relays and relays drivers	400
4	Quad Voltage Comparator (LM339)	200
5	Inductive Load	200

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

Connection with Ministry of electricity and industry of KSA

Supervisors	
Name	Signatures
Dr. Sami Alotaibi	
Dr. Shahir Hussein	

Senior Project Presentation

Eng. M 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

Eng. M 590 – Senior Project
(Capstone Design)

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

1440/1441 first semester

Department of: __Electrical Engineering_____

Senior Project Sign-Up Sheet

Project Title: **Design of a Solar Energy Station for Collage Administration Building Using Hybrid Silicon Solar Panels.**

Advisors :

Name	E-mail Address
Dr. Sami Alotaibi	dr_samiraji@hotmail.com
Dr. Shahir Husien	shahir.jmi@gmail.com

Team Leader

- Bader Ibraheem Mohammad Bakmani 201401966

Team Members

- Yahya Mohammad Ali Atoudi 201405677
- Abdelrahman Sediq Sadaqah Aljhani 201600685
- Sagheer Hadi Ali Al Abas 201601165
- Khaled Mohammad Hasan Aqeel Al Ibraheem 201601504

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) ….…….

[This page must be signed and returned no later than the start of the 2nd 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.]