A SUSTAINABLE STUDENT OUTCOMES ASSESSMENT PROCESS IN ELECTRICAL ENGINEERING PROGRAM AT UMM AL-QURA UNIVERSITY

Part-I
By
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UMM AL-QURA UNIVERSITY
College of Engineering and Islamic Architecture
Makkah Al-Mukarramah, Saudi Arabia

Dr. Muhammad Arshad Malik
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Dean, College of Engineering, Al-Lith, UQU

Dr. Abdel Monim Abdurrahman Abbas
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AGENDA

♦ Goals
♦ Introduction
♦ Program Educational Objectives
♦ Student Outcomes
♦ Constituents Involved in the Student Outcomes Assessment Process
♦ Student Outcomes Assessment Process
♦ Faculty Development toward Implementation of Assessment Process
♦ Faculty Engagement in the Development and Implementation of Sustainable Assessment and Evaluation Processes
EXCELLENCE

“Allah loves, when one of you is doing something, that he [or she] does it in the most excellent manner.”

———Muhammad (Peace be upon him)

“With regard to excellence, it is not enough to know, but we must try to have and use it.”

--Aristotle
GOALS OF THIS WORKSHOP

♦ Mission, Program Educational Objectives, Student Outcomes, and their relationship.

♦ Student Outcomes Assessment and Evaluation Processes and who should be involved in their Development & implementation.

♦ Development and Review Process of Student Outcomes and closing the Feedback Loop.

♦ Direct and Indirect Measures.

♦ Curriculum Mapping of Student Outcomes.

♦ Formative and Summative Assessments.

♦ Summative and Comprehensive Student Outcomes Assessment in Capstone Design Project
INTRODUCTION

UMMAL-QURA University
MISSION

PROGRAM EDUCATIONAL OBJECTIVES
(Students' achievements after graduation)

STUDENT OUTCOMES
(Students' competencies at the time of graduation)

COURSE OUTCOMES
(Students' competencies acquired in specific courses)
Higher education in Saudi Arabia has undergone a tremendous growth over the past five decades in the form of diversified expansion.

Kingdom of Saudi Arabia is at the forefront of achieving EXCELLENCE in higher education.

Being the first university in the Kingdom of Saudi Arabia located at the most sacred site of Islam, Umm Al-Qura University’s top priorities are the Quality Assurance and the Higher Academic Standards.
MISSION OF UMM AL-QURA UNIVERSITY (UQU)

• Realize the purposes and goals of higher education and provide higher education and higher studies to all the nationals.
• Develop strategies that establish quality assurance and meet the local and international standards and requirements of academic accreditation.
• Focus on studying the problems and difficulties of the community and strive to be an expert resource in solving these problems and maintaining the environment of Makkah Al-Mukarramah and Mashaer Al-Muqadassah (Sacred Sites).
Department of Electrical and Computer Engineering at UQU was established in 1986.

Department of Computer Engineering was separated in 2001.

Ministry of Higher Education (MOHE), Saudi Arabia launched a competition in 2008 to sponsor Departmental Academic Development Projects in all Universities in the Kingdom.

Electrical Engineering Department at UQU was awarded a project on “Student Outcomes and Quality Assurance”.

Many Departmental Academic Development activities started in 2008.
MISSION OF EE PROGRAM

To provide quality education that enables graduates to lead and excel in their profession and to serve society and humanity through productive ideas and meaningful collaboration locally and internationally.
The Electrical Engineering Program offers excellent education and its Program Educational Objectives, in support of its mission and the mission of the university, are to prepare graduates to:

- **To play a leading role in engineering careers and perform innovative research. (Engineering Knowledge & Professional Practice)**
- **To utilize appropriate knowledge, experience and skills to function effectively in multidisciplinary teams and adapt to the changes in engineering practices and environments throughout their careers. (Active Team Participation & Life-long Learning)**
- **To apply current electrical engineering design principles within the societal, ethical, environmental, safety, & economical constraints, and progress in their professional responsibilities in accordance with the Islamic values. (Engineering Citizenship)**
STUDENT OUTCOMES

A set of specific student outcomes that relate to Electrical Engineering Program Educational Objectives are listed below. EE Program makes sure that its curricula cover all these items. EE Program also assesses and evaluates whether graduates are successfully attaining the following Outcomes:

a. An ability to apply knowledge of mathematics, science, and engineering
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d. An ability to function on multidisciplinary teams
e. An ability to identify, formulate, and solve engineering problems
f. An understanding of professional and ethical responsibility
g. An ability to communicate effectively
h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. A recognition of the need of and ability to engage in lifelong learning
j. A knowledge of contemporary issues
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
CONSTITUENTS INVOLVED IN THE STUDENT OUTCOMES ASSESSMENT PROCESS

♦ FACULTY (Development, Assessment, & Achievement)

♦ EXTERNAL ADVISORY BOARD (EAB) (Development & Review)

♦ STUDENTS (Assessment & Achievement)

♦ EMPLOYERS (Assessment & Achievement)

♦ ALUMNI (Assessment & Achievement)

♦ INSTITUTION (Support toward achievement)
DEVELOPMENT AND REVIEW PROCESS FOR
STUDENT OUTCOMES

EE Curriculum Committee Suggests/Reviews Student Outcomes

Entire EE Faculty Discuss, Develop, and Approve Student Outcomes

External Advisory Board (EAB) Reviews and Approves Student Outcomes

Employers

Alumni

Students

INSTITUTION

Student Outcomes are Published on the EE Department Web Page
STUDENT OUTCOMES ASSESSMENT PROCESSES

Processes that identify, collect, and prepare data to evaluate the attainment of student outcomes.

Assessment Processes to Evaluate the Attainment of Student Outcomes

**Direct Measures**
- Student Surveys
- Peer Evaluations
- Faculty Evaluations
- Formative Assessment (Sophomore Year Courses)
- Formative Assessment (Junior Year Courses)
- Summative Assessment (Senior Level Courses)
- Summative Assessment Capstone Design (Graduating) Project Assessment

**Indirect Measures**
- Exit Interview Surveys
- Employers Survey
- Alumni Survey
- External Advisory Board (EAB) Meetings

FEEDBACK TO ALL CONSTITUENTS
Specific Outcomes of Instructions: *(Example for Seminars in EE Course)*

1. Students will be able to collect and understand the relevant technical information regarding a research topic on current issues in Electrical Engineering.
2. Students will demonstrate how to perform library research (achieving information literacy skills) and understand the importance of life-long self-learning.
3. The student will be able to think critically to solve an engineering problem in a team environment.
4. Students will be able to communicate effectively with others in figuring out solutions to basic engineering problems.
5. Students will learn how to come to well-reasoned conclusions and solutions through discussions in a team environment.
6. Students will be able to use technology for presentation and enhance their presentation skills.
7. Students will learn the art of addressing the audience and Public Speaking.
8. Student will understand and apply the Ethical and Professional code of Conduct.
9. Students will be able to write a Professional report.
SPECIFIC OUTCOMES OF INSTRUCTIONS MAPPED TO STUDENT OUTCOMES

ABET FORMATS SYLLABUS

Student Outcomes Criterion 3 (a,…,k) addressed by the Course:

Specific Outcome of Instruction 1 listed above address the criterion 3 student outcome j.

Specific Outcome of Instruction 2 listed above attends to the criterion 3 student outcome i.

Specific Outcome of Instructions 3 and 5 listed above focuses on the criterion 3 student outcome a, d, and e.

Specific Outcome of Instructions 4, 7, and 9 listed above deals with the criterion 3 student outcome g.

Specific Outcome of Instruction 6 listed above concentrates on the criterion 3 student outcome k.

Specific Outcome of Instruction 8 listed above addresses the criterion 3 student outcome f.
STUDENT OUTCOMES ASSESSMENT PROCESS

Faculty Evaluations

- Sophomore Year (s) Courses
  Formative Assessment

- Junior Year Courses
  Formative Assessment

- Senior Year Courses
  Summative Assessment

- Capstone Design Project
  Summative Assessment

- Student Outcomes Assessment

- Feedback to Faculty for Actions
Results (Direct Measures: Final Exam Question) Fall 2010 (Term-1, 1431/1432 AH): A sample of 25-44 students (100% Intro to Comm. & Control, 46% EM Conversion I, and 50% Intro to Power Eng.). These courses are in a sequence of 6th, 7th, and 8th semester (Junior level). The assessment is done for Criterion 3: Students Outcomes: \( a, e, d, j, \) and \( k \). Application of Fourier Series, Complex Numbers, and Advanced Math was also assessed in the Intro to Comm., Intro to Power Eng. And Control respectively.

The percentage of the sample indicated for each course is:

**Actions 2011:**

<table>
<thead>
<tr>
<th>S. #</th>
<th>Course Name (Course #)- Section</th>
<th># of Students /Section</th>
<th>Final Exam Q. #</th>
<th>Outcomes of Instruction</th>
<th>Criterion 3 Student Outcome</th>
<th>IEEE program Criteria/ABET Criterion 5</th>
<th>Target (Percentage Grade in the Final Exam Question)</th>
<th>Percentage of Students who met the target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Communication (802322)</td>
<td>44</td>
<td>5a</td>
<td>6</td>
<td>( a )</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Introduction to Communication (802322)</td>
<td>44</td>
<td>6a</td>
<td>6</td>
<td></td>
<td>Fourier Analysis</td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Electromechanical Energy Conversion I (802341)-2</td>
<td>30</td>
<td>4</td>
<td>1, 4</td>
<td>( a, e )</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Electromechanical Energy Conversion I (802341)-1</td>
<td>34</td>
<td>4</td>
<td>1, 4</td>
<td>( a, e )</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Introduction to Power Engineering (802351)-4</td>
<td>25</td>
<td>2</td>
<td></td>
<td>( a, j, k )</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Introduction to Power Engineering (802351)-4</td>
<td>25</td>
<td>1</td>
<td></td>
<td>Complex Numbers</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Control (802331)</td>
<td>27</td>
<td>5</td>
<td></td>
<td>( a, d, e )</td>
<td>Advanced Math</td>
<td>70% or above</td>
<td></td>
</tr>
</tbody>
</table>
STUDENT OUTCOMES ASSESSMENT PROCESS
SUMMATIVE ASSESSMENT (SENIOR YEAR)

Results (Direct Measures: Final Exam Question) Fall 2010 (Term-1, 1431/1432 AH): A sample of 23-44 students (100% in each course.). These courses are in a sequence of 9th, and 10th semester (Senior level). The assessment is done for Criterion 3: Students Outcomes; a, ..., k. Assessment on Application of Probability Theory and Advanced Math was also done.

The percentage of the sample indicated for each course is:

Communication Systems: Student Outcome a =

Communication Theory: Student Outcome a, c, & e = Application of Probability in Communication Systems =

Application of Probability and Advanced Math in Communication Theory. =

Actions 2011:

<table>
<thead>
<tr>
<th>S. #</th>
<th>Course Name (Course #)-Section</th>
<th># of Students /Section</th>
<th>Final Exa m Q. #</th>
<th>Outcome s of Instructi on</th>
<th>Criteri on 3 Student Outco me</th>
<th>IEEE program Criteria/ ABET Criterion 5</th>
<th>Target (Percentage Grade in the Final Exam Question)</th>
<th>Percenta ge of Students who met the target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Communication Systems (802421)</td>
<td>23</td>
<td>6</td>
<td>9</td>
<td>a</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Communication Systems (802421)</td>
<td>23</td>
<td>4</td>
<td></td>
<td>Applicati on of probabili ty</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Communication Theory (802475)</td>
<td>30</td>
<td>1</td>
<td>1, 2</td>
<td>a, c, e</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Communication Theory (802475)</td>
<td>30</td>
<td>4</td>
<td>2, 3</td>
<td>Probabili ty And Advanced Math</td>
<td></td>
<td>70% or above</td>
<td></td>
</tr>
</tbody>
</table>
### Student Outcomes Assessment Process

#### Student Surveys

**Student Survey, Assessment Committee, EE Dept., UQU**

<table>
<thead>
<tr>
<th>Term</th>
<th>312</th>
<th>Course: Electronic Circuits</th>
<th>Instructor</th>
<th>Group</th>
<th>2</th>
</tr>
</thead>
</table>

**Target/Performance Criteria**

- 70% or more Students Agree and Strongly Agree

<table>
<thead>
<tr>
<th>CLO</th>
<th>Course Learning Outcomes</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.9  0.3  100  20  0  0  ET</td>
<td>ET: Exceed target &gt; 85% agree and strongly agree, MT: Meet target (70% &lt; target &lt; 85%), NI: Need improvement: &lt; 70% agree and strongly agree.</td>
</tr>
<tr>
<td>2</td>
<td>3.55  0.497  100  20  0  0  ET</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3.7  0.458  100  20  0  0  ET</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3.4  0.663  90  20  0  0  ET</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3.35  0.792  80  20  0  0  ET</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3.45  0.804  90  20  0  0  ET</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>3.55  0.668  90  20  0  0  ET</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3.4  0.734  85  20  0  0  ET</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3.31  0.633  89.47  19  0  1  ET</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>3.3  0.781  80  20  0  0  MT</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3.75  0.536  95  20  0  0  ET</td>
<td></td>
</tr>
</tbody>
</table>

**Action within two (2) weeks of receiving this report**

1. Discuss all NIs with Assessment Committee
2. Discuss comments of students, IE and ISE with Head of Department
<table>
<thead>
<tr>
<th>#</th>
<th>STATEMENT</th>
<th>Assessment</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>You are able to describe the basics of Operational amplifier and its</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>characteristics.</td>
<td></td>
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<tr>
<td>2</td>
<td>You are able to analyze and design Inverting, Non-inverting amplifier,</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Voltage follower.</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>You are able to analyze and design Comparator, Summing amplifier,</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difference amplifier, Instrumentation amplifier, Integrator and</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Differentiator.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>You are able to describe and analyze AC equivalent models of BJT and</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FET amplifiers.</td>
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<tr>
<td>5</td>
<td>You are able to derive and explain the frequency response of BJT and</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>FET amplifiers.</td>
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<tr>
<td>6</td>
<td>You are able to describe and analyze Darlington pair, Cascade amplifier,</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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</tr>
<tr>
<td></td>
<td>and Multistage amplifiers.</td>
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<tr>
<td>7</td>
<td>You are able to describe the basic operation of differential amplifier.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>You are able to explain different types of feedback.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>You are able to analyze and design Wein-bridge oscillator and RC-</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td></td>
<td>phase shift oscillator.</td>
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<tr>
<td>10</td>
<td>You are able to design and conduct experiments on the topics of the</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>course.</td>
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<tr>
<td>11</td>
<td>You are able to design small mini-project applying the concepts given in</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>this course.</td>
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</tr>
</tbody>
</table>
STUDENT SURVEY RESULTS AND EVALUATIONS (TERM-2, 1431/1432 AH, SPRING 2011)
The specific Outcomes of Instructions address ABET criterion 3 Student Outcomes a, b, c, d, e, g, and k

10. ELECTRONIC CIRCUITS, GROUP-2
SURVEYS:
Most of the students entered valid entries for this survey

OUTCOMES OF INSTRUCTIONS RESULTS:
All the Outcomes of Instructions exceeded the performance target: 70% of Students Strongly Agree or Agree for the achievement of Outcomes of Instruction except two.

The following outcomes of instructions met the target: 70% -85% of Students Strongly Agree or Agree for the achievement of Outcomes of Instruction.

<table>
<thead>
<tr>
<th>80% of Students Strongly Agree or Agree to the following Outcome of Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. The students are able to derive and explain the frequency response of BJT and FET Amplifiers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>80% of Students Strongly Agree or Agree to the following Outcome of Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. The students are able to design and conduct experiments on the topics the course.</td>
</tr>
</tbody>
</table>

OUTCOMES OF INSTRUCTIONS EVALUATIONS:

The students in this course (group) are confident with all the outcomes of instructions. This indicates that most of them achieved the outcomes of instructions of this course and they have achieved EE program Student Outcomes a, b, c, d, e, g, and k.
There were 29 students in this group. Only 20 took part in this survey.

RESPONSE: Faculty may be requested to provide feedback to the survey results and evaluations.
If don’t agree with the evaluation, please give reasons.
If agree with the evaluation, what actions would be taken to improve?
Dear Alumnus,
Assalamualikum! We appreciate your assistance in evaluating our academic program by answering this short survey. Your input is very valuable in order to continually improve our program. The purpose of this survey is to evaluate how our electrical engineering program has prepared you for professional life after graduation. Your responses will be kept confidential and will not be released to anyone outside the electrical engineering (EE) department without your written permission. Many thanks in advance for your time and effort.

**Part I: General Information:**
Your job title: ____________________________  Company Name: ____________________________

Date of Graduation from Umm Al-Qura University (UQU): __________________________

Your name, email address, and phone number:
________________________________________, ____________________________, ____________

Do you regularly participate in workshops or conferences?  _____Yes   _____No

Are you currently pursuing or you have enrolled in, Graduate Studies?  _____Yes   _____No

If YES, Name of the Institution where you are currently pursuing, or have enrolled in, Graduate Studies: __________________________

Are you a member of any professional organization or society (such as the IEEE)?  _____Yes   _____No

If YES, which organization or Society: __________________________
**Part II: Your profession**: Please indicate the level of importance (relevance) for the following statements by placing a check (✓) in the appropriate column. The levels of importance are defined as follows:

- **Excellent**: Highest Level of Importance,
- **Very Good**: High Level of Importance,
- **Fair**: Low Level of Importance,
- **Poor**: Lowest Level of Importance

<table>
<thead>
<tr>
<th>How important it is that in your first few years on the job, you are able to</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
<th>No Judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. assume leading roles in solving engineering problems.</td>
<td></td>
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<tr>
<td>2. engage in research related activities.</td>
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<tr>
<td>3. work effectively in diverse and multidisciplinary teams.</td>
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<tr>
<td>4. continually develop yourself personally and professionally to be able to respond to changes in engineering practices and environments.</td>
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<tr>
<td>5. apply current electrical engineering design principles with multiple realistic constraints.</td>
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</tr>
<tr>
<td>6. behave with integrity while adhering to Islamic values at workplace, and you are aware of the professional and ethical consequences of your work on society, environment and the world.</td>
<td></td>
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</tr>
</tbody>
</table>

**If you have any recommendations regarding the above objectives (modifications or additions), please specify:**

__________________________________________________________

__________________________________________________________
Part III: EE Department’s Program Educational Objectives
The table below represents our department’s Program Educational Objectives (PEOs). Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation.
For each item, please check (✓) in the appropriate column to indicate your Level of attainment of the following abilities related to PEOs of EE program. The levels of attainment are defined as follows:
Excellent: Highest Level of Attainment, Very Good: High Level of Attainment, Fair: Low Level of Attainment, Poor: Lowest Level of Satisfaction

<table>
<thead>
<tr>
<th>In your first few years on the job, you have attained the following abilities</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
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**STUDENT OUTCOMES ASSESSMENT PROCESS**  
**ALUMNI SURVEY**

**Part IV: EE Department’s Curriculum Review and Renewal:**
EE program is committed to continual improvement of its curriculum. EE program periodically review, evaluate, and renew the curriculum every 5 years based on feedback from all its constituents, newer trends in Engineering, and considering International Academic Accreditation Standards (e.g., ABET). Please place a check (√) in the appropriate column to indicate the Level of significance for the following curricular changes recommendations. The levels of significance are defined as follows:  
Excellent: Highest Level of Significance,  Very Good: High Level of Significance,  
Fair : Low Level of Significance, Poor: Lowest Level of Significance

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If you have any comments on EE program’s curricular changes or you have any other suggestions, please specify:
Department of Electrical Engineering
Employer Survey

We are requesting your kind feedback regarding our alumni whom you may have supervised directly or indirectly. By completing this short survey, you are supporting us improve our program to achieve international academic accreditation standards. The purpose of the survey is also to assist us assess the effectiveness of the EE program and is not intended to gather specific comments on a single graduate. Your input is very valuable and thanks in advance for your time and effort.

Part I: General Information:

Name (Optional) __________________________________________ Title _____________, Name of Company: ____________

How many UQU electrical engineering (EE) graduates have you supervised? ______

Overall, how did UQU EE graduates compare to EE graduates from other Saudi Arabian institutions:

___Better prepared           ___About the same           ___Less prepared

Your email address and phone number (optional):
________________________________________________________________________
Part II: EE Department’s Program Educational Objectives: The table below represents our department’s Program Educational Objectives (PEOs) (professional accomplishments that our graduates are expected to achieve during the first few years of employment).

Please indicate your level of Importance (relevance) for the following statements by placing a check (√) in the appropriate box. The levels of importance are defined as follows:

Excellent: *Highest Level of Importance*,

Very Good: *High Level of Importance*,

Fair: *Low Level of Importance*,

Poor: *Lowest Level of Importance*

<table>
<thead>
<tr>
<th>According to your opinion, how important it is that in their first few years on the job, UQU EE graduates may be able to</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
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<td>6. behave with integrity while adhering to Islamic values at workplace, and are aware of the professional and ethical consequences of their work on the society, environment and the world.</td>
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If you have any recommendations regarding the above Program Educational Objectives (*modifications or additions*), please indicate it in writing.
**STUDENT OUTCOMES ASSESSMENT PROCESS**

**EMPLOYER SURVEY**

Part III: Our graduates: For each item in the following table, please check (✓) in the appropriate box to indicate the **Level of attainment** of the following abilities by UQU EE graduates related to PEOs of EE program. The levels of attainment are defined as follows:

**Excellent:** Highest Level of Attainment, **Very Good:** High Level of Attainment, **Fair:** Low Level of Attainment, **Poor:** Lowest Level of Attainment

<table>
<thead>
<tr>
<th>Based on your experience, in their first few years on the job, UQU EE graduates have attained the following abilities</th>
<th>Excellent</th>
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**STUDENT OUTCOMES ASSESSMENT PROCESS**

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If you have any comments on EE program’s curricular changes or you have any other suggestions, please specify:

---
WORKSHOP ON ASSESSMENT & EVALUATION PROCESSES

DECEMBER 4-8, 2010
DHUL-HIJjah 28, 1431AH
- MUHARAM 2, 1432 AH

Under the auspices of His Excellency,
the Rector of Umm Al-Qura University,
Dr. Bakri Assas

This interactive workshop will help engineering faculty and administrators implement sustainable Assessment Processes for continuous improvement of teaching and learning. Participants will work in small groups in developing a functional assessment and evaluation plan and would be ready to implement a continuous improvement plan thereby satisfying EAC of ABET’s Criteria 2, 3, and 4. Participants will receive a workshop booklet containing slide presentations and templates for various forms, reports, and a continuous improvement plan.

Workshop Leader:

Amin Karim, a former director of the college of engineering and information science at one of the largest private universities in the USA will serve as the workshop leader. He has over eighteen years experience in managing ABET accreditation. He has served as an ABET Evaluator for over ten years. He has published and presented many papers on assessment at major engineering conferences including two at the ABET Annual Conferences.
STATEMENTS

1. I have a basic understanding of the EAC of ABET accreditation process.
2. I understand the assessment terminologies.
3. I can develop Program Educational Objectives for my department.
4. I have an understanding of the Program Educational Objectives review process.
5. I can develop PEO-Student Outcome (SO) Mapping.
6. Given an SO, I can develop performances required to achieve the SO.
7. I feel more confident about contributing towards the development of a Map for my program to show where SOs are being achieved in the curriculum (SO-Course Map).
8. I can develop Assessment Methods for an SO.
9. I understand the importance of Validity and Reliability in selecting Assessment Methods.
10. I understand the differences between direct and indirect measures in Assessment methods.
11. I feel more confident about developing Assessment Methods for SOs.
12. I understand what "Closing the Loop" means.
13. I can write an Assessment Report.
The Faculty feedback indicates that most of the faculty members benefited from this workshop.
FACULTY ENGAGEMENT IN THE DEVELOPMENT AND IMPLEMENTATION OF SUSTAINABLE ASSESSMENT AND EVALUATION PROCESSES

EE Head of Department

EE Faculty Council

EE Curriculum Committee

EE Assessment Committee

EE Heads of Sequences Committee

Design Project Assessment Committee

Communication Sequence Committee

Power Sequence Committee

Electronics Sequence Committee

Control Sequence Committee
RESPONSIBILITIES OF EE DEPARTMENT COUNCIL

• All Academic matters (related to Students, Faculty, Curriculum and Instructional support) are discussed and approved by Faculty Council.

• Recommendations of Curriculum Committee, Assessment Committee, and Project Assessment Committee are discussed by entire faculty and approved unanimously.
RESPONSIBILITIES OF EE COMMITTEES

EE Heads of Sequences Committee

- Discuss recommendations of Sequence Committees for application throughout the curriculum.
- Make sure that all the proposed academic materials are completed on time.
- Coordination for the preparation of material for Basic courses taught in all sequences.
- Coordination for Consistency of all academic matters, e.g., Course Syllabi, Lab Manuals, grading policies, assessment and evaluation, etc.

SEQUENCE COMMITTEES

- Prepare Courses Descriptions
- Prepare Courses Syllabi
- Prepare Lab Manuals
- Recommend Laboratories Development
- Prepare Course Folders
- Participate in Assessment Activities
- Recommend Curriculum Development
- Academic Advising
RESPONSIBILITIES OF EE COMMITTEES

EE Curriculum Committee

- Curriculum Review
- Curriculum Renewal
- Program Educational Objectives Development (PEOs)
- Student Outcomes Development (SOs)
- Mapping of SOs to PEOs
- Curriculum Mapping to SOs
- Curriculum Coordination regarding scheduling classes and faculty schedules.

EE Assessment Committee

- Prepare Student Feedback Surveys
- Assess, Evaluate, and Analyze Student Feedback Surveys data
- Evaluate and analyze Formative and Summative Assessment data
- Assess, Evaluate, and Analyze ALUMNI Survey data
- Assess, Evaluate, and Analyze Employers Survey data
RESPONSIBILITIES OF EE COMMITTEES

- Teams (Formed by Students) Registration Coordination
- Project Titles submitted by faculty from each sequence (e.g., Communication, Electronics, Control, Power)
- Student Teams choose four titles (maximum of two from one area) and write them in order of preference.
- Project Assessment Committee assign projects based on average team CGPA and order of preference.
- Student teams meet their supervisors and submit Abstract, Associated Engineering Standards, and Team Roles.
- Student Orientation in regards to Design Project Requirements and expectations
- Formation of Assessment Committees for each Project Team
- Scheduling of Project Presentations and Demonstrations
- Collection of Assessment documents/reports/materials e.g. phase reports, graded final report, log books.
- Assessment, Evaluation, and Analysis of Project Data
Again knowing Excellence is not enough. You need to practice excellence and you can motivate others with an excellent example.
THANK YOU!

ANY QUESTIONS?
A SUSTAINABLE STUDENT OUTCOMES ASSESSMENT PROCESS IN ELECTRICAL ENGINEERING PROGRAM AT UMM AL-QURA UNIVERSITY

Part-II

By

Dr. Muhammad Arshad Malik
ABET International Symposium
April 20-21, 2012, ST Louis, Missouri, USA

UMM AL-QURA UNIVERSITY
College of Engineering and Islamic Architecture
Makkah Al-Mukarramah, Saudi Arabia

Dr. Muhammad Arshad Malik
Professor, Electrical Engineering Department

Dr. Mohammed Talal Simsim
Ex-Chair, Electrical Engineering Department
Dean, College of Engineering, Al-Lith, UQU

Dr. Abdel Monim Abdurrahman Abbas
Program Coordinator, Electrical Engineering Department
AGENDA

♦ A Sustainable Assessment Process and its Importance in Higher Education
♦ Self Evaluation via Student Outcomes- Based Assessment Processes
♦ UQU Electrical Engineering Assessment Process
♦ Evolution of Capstone Design Project
♦ Enhancement and Phase-I of Assessment Process
♦ Enhancement of Phase-I & Phase-II of Assessment Process
♦ Further Improvements and Phase-III of Assessment Process
♦ Results and Future Recommendations
A SUSTAINABLE ASSESSMENT PROCESS AND QUALITY ASSURANCE IN HIGHER EDUCATION

Quality Assurance of a Program
- Looked at by Employers
- Recruitment of Well Rounded and better prepared Professional

Quality Standards
- Student Choose these programs for being prepared as professionals
- Parents prefer these programs

PROGRAM

CONSTITUENTS

CONTINUAL IMPROVEMENT

QUALITY ASSURANCE

QUALITY ASSURANCE

ACHIEVEMENT OF QUALITY

• Processes followed to achieve quality

• Continual Improvement and Enhancement
• Sustainability for long term goals

• Constituents are assured
SELF-EVALUATION VIA STUDENT OUTCOMES-BASED ASSESSMENT PROCESSES

• Programs develop Assessment Processes based on Student Outcomes performance for self-evaluation.

• Programs utilize the Results of Evaluation for the Continuous Improvement of their Quality.

• The Assessment Processes must be Sustainable and not designed for short-term goals achievement.

• A Student Outcomes based Assessment Process requires the engagement of the Entire Program Faculty for Sustainability.

• The faculty awareness regarding the Assessment Process and its Importance plays an important role in engaging the faculty to Participate Actively in all the processes leading to Quality Assurance and Continuous Improvement.
A Sustainable Assessment Process to assess and evaluate the International Academic Standards set by Engineering Profession based on Student Outcomes performance.

The proposed process uses the Capstone-Design Project course for Comprehensive Assessment of Student Outcomes with minimal administrative load for the faculty.

The Assessment Process and the Tools to implement it have been continually improved in Phases to make the process Sustainable.
ELECTRICAL ENGINEERING CAPSTONE DESIGN PROJECT

Nomenclature: “Graduating Design Project”
or “Graduating Project”

Course Name: Project
Course #: 802499
Credit Hours: 4

Duration of Design and Implementation: One Semester
EVOLUTION OF THE CAPSTONE-DESIGN PROJECT ASSESSMENT AS A CONTINUOUS IMPROVEMENT PROCESS

Graduating Project Teams Formation by Project Coordinator (A Faculty Member)

2nd Week of each Semester

Supervisor Faculty Assigned to Each Team by The Departmental Council (In a Meeting)

3rd Week of each Semester

Teams Start working on Their Projects and Consult their Supervisors as Needed

4th Week of each Semester

Assessment Committees Assess Students Performance

During the 15th Week of each Semester

Students Present and Demonstrate Their Projects and Submit the Final Report

During the Weeks 10th to 12th of each Semester

Project Committee Decides about Assessment Panels for Each Team

GRAPHICAL DISPLAY OF STEPS FOR THE FORMER ASSESSMENT PROCESS (Before 2008)

22/22/2012 ABET INTERNATIONAL SYMPOSIUM, ST. LOUIS, MISSOURI, USA, APRIL 20-21, 2012
## Graduating Project Grading Form

**Student Name:**  
**Student I.D. #:**  
**Project Title:**  

<table>
<thead>
<tr>
<th>Supervisors Names</th>
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<tr>
<td>1.</td>
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<tr>
<td>2.</td>
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</table>

**Term in which registered 1st time:**  
**Departmental Council Meeting #:**  
**Date:**

### I. Grades for Semester Work (40 Points):

<table>
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<tr>
<th>#</th>
<th>Term</th>
<th>Grades (40 Points)</th>
<th>Supervisor’s Signature</th>
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<td>2.</td>
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</table>

**Average Grades out of 40**

### II. Grades for Final Report Assessment (20 Points):

<table>
<thead>
<tr>
<th>#</th>
<th>Names of Assessment Committee Members</th>
<th>Grades (20 Points)</th>
<th>Signature</th>
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<tr>
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<td></td>
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<td>3.</td>
<td>Dr.</td>
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**Average Grades out of 20**

**Date of Assessment & Presentation:**

### III. Assessment & Presentation Grades (40 Points):

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**Average Grades out of 40**

**Recommendations and Comments:**

**Total Grades (100 Points):**  
**In words:**

Approved by Head of EE Department: ______________________,

---

FORMER GRADUATING PROJECT ASSESSMENT FORM
Lacked *High Quality* of *Assessment*.

Was also very *Subjective*.

Grades did not reflect the *Actual Performance* of the *Students*.

*Assessment Process* did not portray *Student Outcomes*.

It was inadequate in regards to measuring *Students’ Knowledge, Skills and Behaviors*.

Therefore, a major overhaul was needed for a *High-Quality Assessment*. 
The understanding of the ABET Accreditation Criteria by the Electrical Engineering (EE) faculty was the key factor in using the minimum set of 11 (a..k) Student Outcomes, that are a major part of EC-2000, for the Capstone-Design Project Assessment.

These outcomes’ are defined in the IDEAL (Institute for the Development of Excellence in Assessment Leadership), 2010 as follows:

“Student Outcomes describe what students are expected to know and able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program.”
The **11 student outcomes** specified by **EAC (Engineering Accreditation Commission)** *(criterion 3. a-k)* are as follows:

a. An ability to apply knowledge of mathematics, science, and engineering  
b. An ability to design and conduct experiments, as well as to analyze and interpret data  
c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.  
d. An ability to function on multidisciplinary teams  
e. An ability to identify, formulate, and solve engineering problems  
f. An understanding of professional and ethical responsibility  
g. An ability to communicate effectively  
h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context  
i. A recognition of the need of and ability to engage in lifelong learning  
j. A knowledge of contemporary issues  
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
EE faculty at UQU agreed to use **10 Student Outcomes** and made them the **basis** of capstone-design project assessment during the **Spring 2009 semester**. These **10 student Outcomes** for the capstone-design project are listed as follows:

<table>
<thead>
<tr>
<th>The student is:</th>
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<tbody>
<tr>
<td>1. able to apply knowledge of Mathematics, Science, &amp; Engineering.</td>
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<td>4. able to Analyze and Interpret Data.</td>
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<td>5. able to communicate effectively</td>
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<td>6. able to function as an effective member of a team.</td>
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<tr>
<td>7. aware of the current issues and the needs of community.</td>
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<tr>
<td>8. to use modern engineering tools, techniques, and skills necessary for engineering practice.</td>
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<tr>
<td>9. aware of professional and ethical responsibility and understands it.</td>
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<td>10. able to engage in life-long learning and understands its need.</td>
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PHASE-I ENHANCEMENT OF ASSESSMENT PROCESS

- The new *Assessment Process (Phase-I)* uses the aforementioned *Student Outcomes* for *summative assessment* in the *capstone-design project*.

- This assessment process was organized in the sense that students as well as faculty were explicitly aware of the expectations of the capstone-design project.

- Other than the administrative work, the assessment process was systematized as follows:

  1. PROJECT IDEA
     1A. PROJECT LOG BOOK *(Engineering Notebook)*
     1B. PHASE REPORTS *(Presented by students’ Team)*
     1C. PROJECT DESIGN & IMPLEMENTATION

  2. FINAL REPORT

  3. PRESENTATION & ASSESSMENT *(BASED ON STUDENT OUTCOMES)*

  4. EVALUATION FOR FEEDBACK AND CLOSING THE LOOP
PHASE-I ASSESSMENT PROCESS

1. **PROJECT IDEA (OBJECTIVES)**
   - 1A. PROJECT LOG BOOK
   - 1B. PROJECT PHASE REPORT
   - 1C. PROJECT DESIGN & IMPLEMENTATION

2. **FINAL REPORT**

3. **PRESENTATION & ASSESSMENT**

4. **EVALUATION FOR FEEDBACK AND CLOSING THE LOOP**

(Student Outcomes)

GRAPHICAL DISPLAY OF STEPS FOR CAPSTONE-DESIGN PROJECT ASSESSMENT PROCESS BASED ON STUDENT OUTCOMES
1. PROJECT IDEA (OBJECTIVES)

1A. PROJECT LOG BOOK

1A.1 PROJECT DESCRIPTION

1A.2 DAILY LOG

1A.3 CITATION INFORMATION

2. FINAL REPORT

1C. PROJECT DESIGN & IMPLEMENTATION

1B. PROJECT PHASE REPORT

GRAPHICAL DISPLAY OF DELIVERABLES FOR CAPSTONE-DESIGN PROJECT
The high quality assessment cannot be performed if the students and faculty have no prior knowledge of the expectations of the assessment.

Accordingly, all the faculty members are provided with the hard as well as soft copies of the expectations.

The students are made aware of these expectations during the Orientation Session regarding the project.

The documented expectations of the assessment are as follows:

1A: PROJECT LOG BOOK:  
1A.1: Project Description, 1A.2: Daily Log Book, 1A.3: Citation Information

1B. PHASE REPORT

1C. PROJECT DESIGN & IMPLEMENTATION

3. FINAL REPORT
1A. Project Log Book: A project log book can be considered a scientific record. You will need documentation for everything when you will write your Final Report. So go ahead and write it.

Each student in the group must maintain a log book that contains the following:

1A.1: General Project Information:

- Title of Project
- Names of the team members responsible for design and implementation of the project
- Date of Project content
- Geographic Area of Project (Department, College, University)
- Description of Project
- Purpose of Project
- Data format if any
- Projection of your data set(s) if any
- List of Attributes, their codes, and acceptable values
- Methods used for each step of the project
- What data sources or ancillary sources did you use? Write down their full citation (bibliography, URL address, etc.). You will need it for your final report.
1.A. 2: Daily Log:

- **Date.** Write it down every day
- **What did you perform on your project today?** Be very specific
- **How did you collect your data if any?** Did you design part of your project on paper or did you implement it on a bread-board? Did you write a flow chart on paper or did you write a simulation algorithm on computer?
- **How did you manipulate your data if any?** How did you test your circuit? How did you test your algorithm? Did you try something that didn’t work? Do you know why it didn’t work? What did work? What programs were you using?
- **What safety and quality control steps did you perform?** Did you check your work? What kind of equipment/program did you use to do that?
- **What ancillary data/information sources did you use for each step today?**
- **What troubleshooting techniques did you use to detect and correct any fault in the part of the project you worked on today?** What measuring instruments did you use?
1A. 3: How to Document Source Citation Information (Source Data and Ancillary Information):

Data Source (report, map, image, circuit diagram, block diagram, flow chart, Program etc.)
Media Type (Digital File, HTML file, journal, book, paper map)
Author/Originator(s):
Title:
Edition:
Publisher:
Publisher Location:
Publication Date:
Series Name:
Volume/Issue Number:
Online Linkage: URL Address:
Source Dates: DD / MM / YYYY:
Source Abbreviation (ISO, IEEE, etc.)
How or Why was the source used?
PROJECT REQUIREMENTS AND EXPECTATIONS

CITATION FORMAT

Electronic References

Books
Available: site/path/file [date accessed].
Example:
[May 21, 2003].

Journal
Example:

World Wide Web
Author(s)*. “Title.” Internet: complete URL, date updated* [date accessed].
M. Duncan. “Engineering Concepts on Ice. Internet:
1B: PROJECT PHASE REPORTS:
These are reports regarding the completion of a part (phase) of the project. This must include the following:

1. **Bill of Material:** Name of Parts (Components) used, Quantity, and the Price of the components / Cost in Terms of Design Time / Cost in Terms of Algorithm development time
2. **Description of the part of the project**
3. **Block Diagram, Flow Chart, Source Code**
4. **Citation Information**
5. **Testing and troubleshooting/ debugging / service methods used**
6. **What worked and what did not work?**
7. **Future actions to be taken to restore working condition of the part of the project**
8. **Engineering Standard and safety considerations**
3. FINAL REPORT: Submit a final report at the end of the term containing:

1. Cover Page
2. Table of Contents
3. Acknowledgment or Foreword
4. List of Figures
5. List of Tables
6. List of Abbreviations
7. Introduction: Objectives and Purpose of Project
8. General Description of the Project with Block Diagrams / Flow Charts
9. Technical Description of each part of the project including block diagrams, flow charts, Data tables, Graphs, Design Procedures, Source Codes, etc.
11. Engineering Standard and Safety Considerations
13. Citation Information
14. Appendix containing Data Sheets of components, Mathematical Analysis, etc.
ENHANCEMENT ACTIONS

1. Revised Grade Distribution Based on Faculty Recommendations
2. Faculty course folder including log books, phase reports, and grades for these reports to be submitted before the presentation and demonstration sessions.
3. Hard copies of the three assessment forms one for the supervisor faculty and two for the assessment-committee faculty members were required to be filled at the time of presentations and demonstrations.
4. Hard copy of the final grade form was required to be filled by the supervisor faculty and the two assessment committee faculty members and signed after the assessment is completed with the final report graded.
5. Table of Grade distribution was developed and faculty and students were informed.
## GRADUATING PROJECT GRADE DISTRIBUTION

<table>
<thead>
<tr>
<th>s. #</th>
<th>Description</th>
<th>Graded By</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>*Project Log Book</td>
<td>Supervisor Faculty</td>
<td>10%</td>
</tr>
<tr>
<td>2.</td>
<td>*Bi-Weekly/Monthly Project Phase Reports</td>
<td>Supervisor Faculty</td>
<td>10%</td>
</tr>
<tr>
<td>3.</td>
<td>Graduating Project Assessment</td>
<td>*Supervisor Faculty and Assessment Committee Members (Average of the grades given by 3-4 members including supervisor)</td>
<td>40%</td>
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<tr>
<td>4.</td>
<td>*Final Report Assessment</td>
<td>Supervisor Faculty</td>
<td>30%</td>
</tr>
<tr>
<td>5.</td>
<td>Final Report Assessment</td>
<td>Assessment Committee Members (Average)</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>
Notes!
1. *Supervisor faculty will assess his students for 60-63% of the grades
2. A complete folder for each project is to be submitted to the department by each supervisor faculty.

This folder contains:
- a. Project Log Book of each student with assessment,
- b. Project Bi-Weekly/Monthly Phase reports of each group (team) with individual student's assessment,

The three options for (a) and (b) aforementioned are as follows:
- i. Project Log Book Only (20% Grade)
- ii. Biweekly Project Phase Reports Only (20%)
- iii. Both Project Log Book and Project Phase Reports (10% + 10%)
- c. Final Report of each Group (Team) with individual student's assessment.
- d. 3 or 4 Graduating Project Assessment Form for each student with grades,
  (1 for supervisor faculty and 2 or 3 for assessment committee members)
- e. Graduating Project Grades Form for each student

3. The assessment committee will be formed and the presentation / demonstration will be scheduled only after the supervisor faculty has submitted (a), (b), and (c) of Note 2 to the department.
# Graduating Project Grades Form

Student’s Name: _____________________________, I.D. #: __________________

Project Title: ______________________________________________________________

Supervisor’s Name:  _______________________________________________, Date: _________

Assessment Committee Members:
1. Member #1: ___________________________________________________________
   Signature
   Date
2. Member # 2: ___________________________________________________________
   Signature
   Date
3. Member # 3 (optional): ________________________________________________
   Signature
   Date

<table>
<thead>
<tr>
<th>s. #</th>
<th>Description</th>
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<th>Student's Grades</th>
</tr>
</thead>
<tbody>
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<td>Supervisor Faculty</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Monthly Project Phase Reports</td>
<td>Supervisor Faculty</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Graduating Project Assessment</td>
<td>Supervisor Faculty</td>
<td>10-13%</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Graduating Project Assessment</td>
<td>Assessment Committee</td>
<td>27-30%</td>
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</tr>
<tr>
<td></td>
<td>(2 or 3 members)</td>
<td>Member #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Final Report Assessment</td>
<td>Supervisor Faculty</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Final Report Assessment</td>
<td>Assessment Committee</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Member #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Final Report Assessment</td>
<td>Assessment Committee</td>
<td>5%</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Member #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Final Report Assessment</td>
<td>Assessment Committee</td>
<td>5%</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Member #3 (optional)</td>
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<tr>
<td></td>
<td>Total</td>
<td></td>
<td>100%</td>
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</table>
Graduating Project Assessment Form, Page-1

**Student’s Name:** _____________________________, **I.D. #:** __________________

**Project Title:** _______________________________________________________

**Supervisor’s Name:** _______________________________________________

**Term (in which the Project was 1st Time Registered):** ___________________

**Supervisor's Signature:** _____________________________, **Date:** ___________

<table>
<thead>
<tr>
<th>#</th>
<th>Criteria</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
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<tbody>
<tr>
<td>1.</td>
<td>The student is able to apply knowledge of Mathematics, Science, &amp; Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>The student is able to Analyze and Interpret Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>The student is able to design a system within the economical, environmental, social, ethical, and safety constraints</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>The student is able to identify, formulate the engineering problem and is able to solve it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>The student is able to communicate effectively orally and in writing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>The student is able to function as an effective member of a team.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>The student is aware of the current issues and the needs of community.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>The student is able to use modern engineering tools, techniques, and skills necessary for engineering practice.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>The student understands professional and ethical responsibility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>The student understands the need of life-long learning and is able to engage in it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Please write your comments on the next page if you give the student a grade of ‘4’, or ‘1’.*

---

Graduating Project Assessment Form, Page-2

**Student’s Name:** _____________________________, **I.D. #:** __________________

**Project Title:** _______________________________________________________

**Supervisor’s Name:** _______________________________________________

**Term (in which the Project was 1st Time Registered):** ___________________

**SUPERVISOR'S COMMENTS:**

---

**Supervisor's Signature** _____________________________, **Date:** ___________
EVALUATION FOR FEEDBACK AND CLOSING THE LOOP

RECOMMENDED ACTIONS BY FACULTY AFTER EVALUATION AND ANALYSIS

1. The *assessment forms* may be *revised* and *changed* because they are complex and a lot of faculty time is used in calculating the grades.

2. The *orientation session* for the students may be conducted during the 3rd week.

3. The *log-books* and the *phase reports* must be submitted with the grades before the presentation and project demonstration sessions for the assessment. This procedure was not followed by the faculty although the faculty and students were aware of the documented procedure.

4. The *log-books* were not *maintained* by the students *appropriately*. The *log-books* must be checked by the supervisor faculty members on regular basis.

5. Approximately 70% of the students performed above the *target* for almost all the student outcomes. The *assessment* was still *biased* because average grades granted by the *supervisors* for *final report* and *presentations assessment* were *higher* than those granted by the *assessment committee faculty*.

6. There may be some *guide-lines* for grading the Final *Reports*. 
1. EXCELL SHEET ASSESSMENT FORMS: Excel sheets for Presentation Assessment, Final Report Assessment, and Log-Book & Phase Report assessment for final grades were developed. A fail column with 0 weight was added to discern students who did not contribute to the project work.

2. GUIDELINE FOR FACULTY: A guideline for using the electronic excel sheets was developed for faculty. Hard copy as well as electronic copy of the guideline was provided to faculty members. The excel sheets were explained to faculty members during a departmental council meeting.

3. FINAL REPORT RUBRIC: A Rubric for Final Report grading was developed after a brainstorming session during the departmental Council meeting.

4. ORIENTATION SESSION: An orientation session for student was conducted during the 3rd week to explain the requirements of project and expectations of assessment.
Graduating Project (802499) Assessment Form-1

**Supervisor's Name:**

<table>
<thead>
<tr>
<th>S.</th>
<th>CRITERIA</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The student is able to apply knowledge of Mathematics, Science, &amp; Engineering</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>2</td>
<td>The student is able to identify, formulate the engineering problem and is able to solve it.</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3</td>
<td>The student is able to design a system within the economical, environmental, social, ethical, and safety constraints</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>4</td>
<td>The student is able to Analyze and Interpret Data</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>5</td>
<td>The student is able to communicate effectively</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>6</td>
<td>The student is able to function as an effective member of a team.</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>7</td>
<td>The student is aware of the current issues and the needs of community.</td>
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<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>8</td>
<td>The student is able to use modern engineering tools, techniques, and skills necessary for engineering practice.</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>9</td>
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<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>10</td>
<td>The student understands the need of life-long learning and is able to engage in it.</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>TOTAL (OUT OF 40)</td>
<td>32</td>
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<td>26</td>
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<td>TOTAL (OUT OF 14) Graded by Supervisor</td>
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<td>9.5</td>
<td>9.1</td>
<td>14</td>
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**Project Title:** __________________________________________________

**Group#** 1

**Term:** Spring 2011 (Term-2, 1431/1432 AH), Date: ______________
## PHASE-II ENHANCEMENT OF ASSESSMENT PROCESS

### ENHANCEMENT ACTIONS

---

### CRITERIA

<table>
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<tr>
<th>S. #</th>
<th>Maximum Grades</th>
<th>Graded by Supervisor</th>
<th>Graded By Assessment Committee Member # 1</th>
<th>Graded By Assessment Committee Member # 2</th>
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<td>Acknowledgment or Foreword</td>
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<td>Introduction: Objectives and Purpose of Project</td>
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<td>5 5 5 4 4 5 5</td>
<td>5 5 5 4 4 5 5</td>
</tr>
<tr>
<td>b</td>
<td>General Description of the Project with Block Diagrams / Flow Charts</td>
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<td>5 5 5 4 4 3 3</td>
<td>5 5 5 4 4 3 3</td>
</tr>
<tr>
<td>i</td>
<td>Technical Description of each part of the project including block diagrams, flow charts, Data tables, Graphs, Design Procedures, Source Codes, Schematic Diagram etc.</td>
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<td>5 5 5 4 4 3 3</td>
<td>5 5 5 4 4 3 3</td>
</tr>
<tr>
<td>j</td>
<td>Bill of Material / Cost of the (Design / Plan / Simulation) in Terms of Hours of Work</td>
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<td>5 5 5 5 5 5 5</td>
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<td>k</td>
<td>Engineering Standards and Safety</td>
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</tr>
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<td>l</td>
<td>Operation / Troubleshooting / Debugging / Manual</td>
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<td>m</td>
<td>Conclusion or Summary</td>
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<td>5 5 5 4 4 5 5</td>
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<td>o</td>
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<td>2 2 2 2 2 2 2</td>
<td>2 2 2 2 2 2 2</td>
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<tr>
<td><strong>Total</strong></td>
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<td>100 96 89 89 89 89 89</td>
<td>100 96 89 89 89 89 89</td>
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</table>

---

### GRADING FORM

**Graduating Project (802499) Final Report/LB/PR Assessment Form**

**PROJECT TITLE:**

**Graded by Supervisor:** ______________

**Graded by Member # 1:** ______________

**Graded by Member # 2:** ______________

**Supervisor's Name:** Easy Electrical Engineering Department

**Umm AL-Qura University (UQU)**

**Term:** Spring 2011 (Term-2, 1431/1432 AH), **Date:** ______________

**Students' Name:**

**ID. #:** __________

**Logbook:** 10

**Phase Rep.:** 10

**Total:** 20

---

**Group # 1**

---

**Supervisor:** ______________, **Member#1:** ______________, **Member#2:** ______________

---

**Signature**

---

**Graduating Project (802499) Final Report/LB/PR Assessment Form**

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**PHASE II GRADUATING PROJECT FINAL REPORT ASSESSMENT FORM**

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2/22/2012

ABET INTERNATIONAL SYMPOSIUM, ST. LOUIS, MISSOURI, USA, APRIL 20-21, 2012

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Slide 31 of 47
### PHASE II GRADUATING PROJECT FINAL GRADUES ASSESSMENT FORM

**Supervisor’s Name:**

**Member#1’s Name:**

**Member#2’s Name:**

---

### PHASE II ENHANCEMENT OF ASSESSMENT PROCESS

**ENHANCEMENT ACTIONS**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PROJECT</th>
<th>BIWEEKLY/MONTHLY</th>
<th>GRADUATING</th>
<th>FINAL</th>
<th>TOTAL</th>
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</thead>
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<td></td>
<td>LOG BOOK</td>
<td>REPORT</td>
<td>REPORT</td>
<td>REPORT</td>
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</tr>
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<td>MAXIMUM GRADE</td>
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<td>5</td>
<td>18</td>
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<td>11.05</td>
<td>4.45</td>
<td>15.5</td>
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<td>18</td>
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<td>15.55</td>
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**Student’s Name:**

**I.D. # :** __________

**TOTAL:** 95.8

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<th>GRADUATING</th>
<th>FINAL</th>
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**Student’s Name:**

**I.D. # :** __________

**TOTAL:** 96.9

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**Student’s Name:**

**I.D. # :** __________

**TOTAL:** 95.8

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**Student’s Name:**

**I.D. # :** __________

**TOTAL:** 95.8

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**Supervisor’s Name:**

**Signature:** ____________________
EVALUATION FOR FEEDBACK AND CLOSING THE LOOP

RECOMMENDED ACTIONS BY FACULTY AFTER EVALUATION AND ANALYSIS AT THE END OF FALL 2009

1. Time may be saved by automating the validation of data in the final grades form.
2. The log-books and the phase reports must be submitted with the grades before the presentation and project demonstration sessions for the assessment. This procedure was still not followed strictly by the faculty although the faculty and students were aware of the documented procedure.
3. The log-books were not maintained by the students appropriately. The log-books must be checked by the supervisor faculty members on regular basis.
4. Approximately 78% of the students performed above the Program target (2.75/4.0) for almost all the student outcomes. The assessment was still biased because average grades granted by the supervisors for final report and presentations assessment were more than 10% higher than those granted by the assessment committee faculty members.
5. Information regarding the project requirements and expectations of assessment may be published on the EE department web-page for easy access for students. This will help students keep track of their work.
6. There is a development need for faculty members to understand the Student Outcomes as specified by ABET EC200 criteria. A 5 days workshop may be conducted by an international expert on Assessment and Evaluation Processes to give faculty confidence on performing student outcomes assessment and engage them in the assessment process with passions and
PHASE-III FOR FURTHER IMPROVEMENT OF ASSESSMENT PROCESS

• The Student Outcomes Assessment Process in the Capstone-Design Project developed by EE program started to take the shape of high quality assessment.

• But we need to take actions to improve the Assessment Process for sustainability, validity, and reliability.

• The sustainability of a process depends on the environment factors like family time for faculty, health, and economic.

• The Assessment Process needs to be sustainable for long-term goals and changes in the environments

• EE department at UQU considers these factors by providing incentives to faculty in terms of time-release to engage them in the assessment process.

• The validity of the assessment process may be increased by appropriate understanding of the student outcomes.

• The rater reliability of the outcomes assessment may be enhanced by eliminating the subjective judgment of the rater.
PHASE-III ENHANCEMENT ACTIONS FOR IMPROVEMENT OF ASSESSMENT PROCESS

Based on faculty and Program Assessment Committee’s recommendations & For Sustainability, Validity, and Reliability of the Assessment Process

1. **Data validation** of the **Assessment excel sheets** was **automated** and faculty did not need to spend time on data validation. The faculty members were reminded regarding strictly following the log-book and phase report procedures and regularly checking the log-books and phase reports.

2. The **inconsistencies** in the **grades of presentation assessment** and **final report assessment** between **supervisor faculty** and **assessment committee members** were noticed and discussed with faculty during the departmental council meeting.

3. In order to increase **validity** and **reliability** of **Student Outcomes Assessment** a **5-day workshop** on **assessment and evaluation** for engineering faculty by an **International Expert** was held in **December 2010** to engage them in the **development of an assessment and evaluation process**.

4. To help students keep track of their work **information** regarding the **project requirements and expectations of assessment** has been **published on the EE department web-page** for easy access.
### RESULTS AND FUTURE RECOMMENDATIONS

**EVALUATION AND ANALYSIS RESULTS FOR FIVE TERMS OF GRADUATING PROJECT ASSESSMENT DATA**

**DESIGN PROJECT (802499) ASSESSMENT REPORT**

Term-2, 1429-1430 AH (Spring 2009 TO Term-2, 1431/1432AH (Spring 2011)

<table>
<thead>
<tr>
<th>S. #</th>
<th>STUDENT OUTCOME</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>The student is able to apply knowledge of Mathematics, Science, &amp; Engineering. <em>(ABET Criterion 3: a)</em></td>
</tr>
<tr>
<td>2.</td>
<td>The student is able to identify, formulate the engineering problem and is able to solve it. <em>(ABET Criterion 3: e)</em></td>
</tr>
<tr>
<td>3.</td>
<td>The student is able to design a system within the economical, environmental, social, ethical, and safety constraints. <em>(ABET Criterion 3: c)</em></td>
</tr>
<tr>
<td>4.</td>
<td>The student is able to Analyze and Interpret Data. <em>(ABET Criterion 3: b)</em></td>
</tr>
<tr>
<td>5.</td>
<td>The student is able to communicate effectively. <em>(ABET Criterion 3: g)</em></td>
</tr>
<tr>
<td>6.</td>
<td>The student is able to function as an effective member of a team. <em>(ABET Criterion 3: d)</em></td>
</tr>
<tr>
<td>7.</td>
<td>The student is aware of the current issues and the needs of community. <em>(ABET Criterion 3: h, j)</em></td>
</tr>
<tr>
<td>8.</td>
<td>The student is able to use modern engineering tools, techniques, and skills necessary for engineering practice. <em>(ABET Criterion 3: k)</em></td>
</tr>
<tr>
<td>9.</td>
<td>The student understands professional and ethical responsibility. <em>(ABET Criterion 3: f)</em></td>
</tr>
<tr>
<td>10.</td>
<td>The student understands the need of life-long learning and is able to engage in it. <em>(ABET Criterion 3: i)</em></td>
</tr>
</tbody>
</table>
RESULTS AND FUTURE RECOMMENDATIONS
EVALUATION AND ANALYSIS RESULTS FOR FIVE TERMS OF GRADUATING PROJECT ASSESSMENT DATA

DESIGN PROJECT (802499) ASSESSMENT REPORT
Term-2, 1429-1430 AH (Spring 2009 TO Term-2, 1431/1432 AH (Spring 2011)
STUDENT OUTCOMES ASSESSMENT

STUDENT OUTCOMES ASSESSMENT

BAR Graph Comparison of Five Consecutive Terms

LINE Graph Comparison of Five Consecutive Terms
RESULTS AND FUTURE RECOMMENDATIONS

EVALUATION AND ANALYSIS RESULTS FOR THREE SPRING TERMS OF GRADUATING PROJECT ASSESSMENT DATA

DESIGN PROJECT (802499) ASSESSMENT REPORT

Term-2, 1429-1430 AH (Spring 2009), Term-2, 1430/1431AH (Spring 2010), Term-2, `1431/1432AH (Spring 2011)

STUDENT OUTCOMES ASSESSMENT

EE PROGRAM STUDENT OUTCOMES ASSESSMENT

BAR Graph Comparison of Three Spring Terms

EE PROGRAM STUDENT OUTCOMES (DESIGN PROJECT) ASSESSMENT

LINE Graph Comparison of Three Spring Terms
RESULTS AND FUTURE RECOMMENDATIONS

EVALUATION AND ANALYSIS RESULTS FOR TWO FALL TERMS OF GRADUATING PROJECT ASSESSMENT DATA

DESIGN PROJECT (802499) ASSESSMENT REPORT
Term-1, 1430-1431 AH (FALL 2009) ANF Term-1, 1431/1431AH (FALL 2010), STUDENT OUTCOMES ASSESSMENT

EE PROGRAM STUDENT OUTCOMES ASSESSMENT

BAR Graph Comparison of Two Fall Terms

EE PROGRAM STUDENT OUTCOMES (DESIGN PROJECT) ASSESSMENT

LINE Graph Comparison of Two Fall Terms
RESULTS AND FUTURE RECOMMENDATIONS

EVALUATION AND ANALYSIS RESULTS FOR FIVE TERMS OF GRADUATING PROJECT ASSESSMENT DATA

DESIGN PROJECT(802499) ASSESSMENT REPORT
Term-2, 1429-1430 AH (Spring 2009) TO Term-2, 1431/1432AH (Spring 2011)

DESIGN PROJECT ASSESSMENT COMPONENTS (CRITERIA)

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<th>ASSESSMENT CRITERION</th>
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<tr>
<td>1</td>
<td>Project Design (Log) Book/ Project Phase Report: Graded by Supervisor (20%)</td>
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<tr>
<td></td>
<td>(ABET Criterion 3: b, c, d, g)</td>
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<td>2</td>
<td>Presentation Assessment: Graded By Supervisor (14%)</td>
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<td>4</td>
<td>Final Report: Graded By Supervisor (30%)</td>
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<td>5</td>
<td>Final Report: Graded By Committee (10%)</td>
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<tr>
<td>6</td>
<td>Total (100%)</td>
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EVALUATION AND ANALYSIS RESULTS FOR FIVE TERMS OF GRADUATING PROJECT ASSESSMENT DATA

DESIGN PROJECT (802499) ASSESSMENT REPORT

Term-2, 1429-1430 AH (Spring 2009) TO Term-2, 1431/1432AH (Spring 2011)

PROJECT CRITERIA ASSESSMENT

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<td>PERCENTAGE of Students who got 80% or above</td>
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BAR Graph Comparison of Five Consecutive Terms

LINE Graph Comparison of Five Consecutive Terms
### RESULTS AND FUTURE RECOMMENDATIONS

**EVALUATION AND ANALYSIS RESULTS FOR FIVE TERMS OF GRADUATING PROJECT ASSESSMENT DATA**

**DESIGN PROJECT (802499) ASSESSMENT REPORT**

Term-2, 1429-1430 AH (Spring 2009) TO Term-2, 1431/1432AH (Spring 2011)

#### STUDENTS’ TEAMS SOFT SKILLS ASSESSMENT

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<td>1</td>
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<td>2</td>
<td>Written Communication Skills</td>
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<td>3</td>
<td>Life-Long Learning Skills</td>
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<td>(<em>ABET Criterion 3: i</em>)</td>
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RESULTS AND FUTURE RECOMMENDATIONS

EVALUATION AND ANALYSIS RESULTS OF GRADUATING PROJECT ASSESSMENT DATA

DESIGN PROJECT (802499) ASSESSMENT REPORT

Term-2, 1431/1432AH (Spring 2011)

STUDENTS’ TEAMS SOFT SKILLS ASSESSMENT

BAR Graph Comparison of Fourteen Teams and Average of all the Teams (15)

LINE Graph Comparison of Fourteen Teams and Average of all the Teams (15)
FUTURE RECOMMENDATIONS

- It is helpful to break down each outcome into finer detail that can be more easily matched to specific course content. The finer detail component assessment may reduce bias.

- Once the faculty members have initial understanding of the meaning of the outcomes, they can along with external advisory board prioritize the entire set of eleven outcomes. The faculty either use a few of the outcomes that are very important for the program and use only those outcomes for assessment or use all the eleven outcomes and give more weight to the important outcomes than that given to the less important outcomes.

- A grading mechanism in terms of the level of attainment of student learning outcomes may be developed to grade log-books and phase reports to diminish the bias in the assessment of these two components of the capstone-design project assessment.

- External Advisory board members may be engaged in the assessment of the capstone-design project to assess, especially, the students’ professional skills like communication, ethical responsibility, and team work. This will also increase the reliability and validity of assessment.
FUTURE RECOMMENDATIONS FOR DEALING WITH CHALLENGES

• The projects must be completed within one semester for fair assessment. There is always an argument that implementing a presentable project in one semester is not possible and therefore, some student teams ask for extension for one more semester.

• Different criteria may be developed for the projects extended over two semesters. Extended projects must be assessed during each semester for fair assessment.

• The comprehensive project proposal including realistic constraints and associated engineering standards may be written in one semester in an Engineering Design Course. The project may then be implemented in the next semester based on the proposal submitted.
Again knowing Excellence is not enough. You need to practice excellence and you can motivate others with an excellent example.
THANK YOU!

ANY QUESTIONS?