Doctor of Engineering
Assessment Report for Spring 2003 – Spring 2004

Program Goals/Outcomes

The goals and outcomes for this program were developed by the Graduate Affairs Committee (GAC) of the Engineering College, which is the governing body responsible for academic matters of the doctor of engineering program. These goals/outcomes have been modified since they were originally determined in 1995, based on experience in trying to articulate them and to assess them. Upon graduation, our students should have:

1. A deeper, more general, and more fundamental understanding of the principles underlying a particular field of study, as well as those underlying related fields.
    a. Depth of knowledge
    b. Breadth of knowledge
2. A familiarity with advanced methods of analysis and synthesis that are more powerful and more generally applicable than those taught at the undergraduate level.
3. The ability to independently read and understand the significance and limitations of the relevant literature.
4. The ability to formulate, initiate, and complete new and innovative research projects that contribute to the advancement of the field.
    a. Impact on advancement of the field
    b. Adequacy of the scope of the research
    c. Adequacy of the depth of the research
    d. Novelty of the research
5. To communicate effectively in written and oral form
    a. Quality of the writing style
    b. Organization of the written dissertation
    c. Organization of the presentation
    d. Clarity of the language usage
    e. Ability to answer questions
    f. Quality of slides
6. Do application-oriented research of an inter-disciplinary nature
    a. Application-oriented research
    b. Interdisciplinary nature

Research

A rubric was developed by the GAC that specifies the specific criteria need to meet each of the goals/outcomes described above. This rubric is completed by each member of student's dissertation committee at the conclusion of the student's defense. The evaluation forms are collected and kept anonymous as to both faculty member and student being evaluated. This instrument has been modified and expanded since the first version was developed. This is shown in the appendix.

Findings

Each goal/outcome is evaluated on a 1 – 3 scale, with 1 as unacceptable, 2 as satisfactory, and 3 exemplary. The expected level of achievement is that more than 90% of the students should be rated as satisfactory on each criteria, and that the average score should be 2.3 or above. The results from about 14 graduates from the past 1.5 years are shown in the table below.

Objectives/Criteria for Evaluation	**No. responses meeting or exceeding criteria/total no. responses**	**Average score**
1. A deeper more general and more fundamental understanding of the principles underlying a particular field of study as well as those underlying related fields.		
a. Depth of knowledge	45/45	2.5
b. Breadth of knowledge	41/45	2.4
2. A familiarity with advanced methods of analysis and synthesis that are more powerful and more generally applicable than those taught at the undergraduate level.	45/45	2.7
3. The ability to independently read and understand the significance and limitations of the relevant literature.	42/45	2.5
4. The ability to formulate, initiate, and complete new and innovative research projects that contribute to the advancement of the field.		
a. Impact on advancement of the field	54/54	2.6
b. Adequacy of the scope of the research	54/54	2.6
c. Adequacy of the depth of the research	51/54	2.4
d. Novelty of the research	48/54	2.3
5. To communicate effectively in written and oral form.2.5		
a. Quality of the writing style	52/54	2.5
b. Organization of the written dissertation	52/54	2.7
c. Organization of the presentation	54/54	2.6
d. Clarity of language usage	53/54	2.7
e. Ability to answer questions	51/54	2.3
f. Quality of slides	54/54	2.8
6. Do application-oriented research on an inter-disciplinary nature		
a. Application-oriented research	52/54	2.6
b. Interdisciplinary nature of research	53/54	2.6

Furthermore, 13 out of 14 graduates had papers accepted for publication in peer-reviewed journals as a result of their dissertation work, at the time of the defense.

These results indicate that our program is meeting the stated goals/outcomes, with the exception of the novelty of the work (outcome 4d), in which 6 of 54 respondants indicated that the novelty was not at an acceptable level. This indicates that the faculty advisors will need to more closely monitor the students' research, especially at the candidacy exam stage, to ensure that candidate is proposing an innovative project.

It is interesting to note that the ability to communicate effectively was rated highly, despite the fact that the vast majority of the students are international.

Review

This report was reviewed by the members of the GAC.

Actions

No changes will be made to the assessment activities, to the statements of the goals/outcomes, nor to the curriculum itself. The results will be shared with all faculty, who will be advised to work more closely with their students to ensure innovative projects.

Appendix- Doctor of Engineering Program
Assessment of Student Academic Achievement Objectives

This evaluation is to be completed by each member of the student's doctoral dissertation committee, upon completion of the defense. Return form to the department secretary. Please check the appropriate box in each row.

The objectives are to develop in the student:	**Level of Achievement**		
Objectives/Criteria for Evaluation	**Exemplary**	**Satisfactory**	**Unsatisfactory**
1. A deeper, more general, and more fundamental understanding of the principles underlying a particular field of study, as well as those underlying related fields.			
a. Depth of knowledge	☐ Student shows excellent understanding of fundamental principles directly related to the project.	☐ Student displays good understanding of fundamentals directly related to project.	☐ Understanding of fundamental principles directly related to the project is weak.
b. Breadth of knowledge	☐ Student shows good understanding of related principles.	☐ Knowledge of related subjects is adequate.	☐ Knowledge of related subjects is weak.
3. A familiarity with advanced methods of analysis and synthesis that are more powerful and more generally applicable than those taught at the undergraduate level.	☐ Student is competent in the most advanced techniques needed for research in the field. Student can synthesize and integrate results and relate them to the hypothesis.	☐ Student is competent in experimental/analytical techniques needed for research in the field. Student can accept or reject hypotheses.	☐ Student is competent in analytical techniques, with little understanding of the principles underlying the techniques. Student has difficulty in addressing the hypothesis.
4. The ability to independently read and understand the significance and limitations of the relevant literature.	☐ Student actively searches all works directly and indirectly related to the project. Student can identify the strengths and limitations of various methods.	☐ Student has read the literature related to project, and understands how project fits into the literature.	☐ Student has read only some of the articles related to the project.
5. The ability to formulate, initiate, and complete new and innovative research projects that contribute to the advancement of the field.			

a. Impact on advancement of the field	ڤ Work has strong impact on the field.	ڤ Work has incremental impact on field.	ڤ Work has no impact on the field.
b. Adequacy of the scope of the research	ڤ Work has examined many facets of the problem.	ڤ Amount of work is adequate.	ڤ Amount of work done is inadequate.
c. Adequacy of the depth of the research	ڤWork has probed deeply the principles behind the problem.	ڤ Work answers the basic questions of the problem.	ڤ Work only touched the surface of the problem.
d. Novelty of the research	ڤ Dissertation is an innovative idea from the student; student shows creativity in designing experiments and solving problems.	ڤ Student contributed originality to designing experiments and solving problems.	ڤ The student followed directions from his/her advisor.
5. To communicate effectively in written and oral form.			
a. Quality of the writing style	ڤ Written sentences are complete and grammatical, and they flow together easily. Words are chose for their precise meaning.	ڤ Writing is grammatically correct. Paragraphs and sentences may not flow together perfectly.	ڤ Writing contains grammatical errors.
b. Organization of the written dissertation	ڤ Dissertation is logically organized and easy to follow.	ڤ Dissertation organization is clear.	ڤ Dissertation is poorly organized.
c. Organization of the presentation	ڤ Presentation is clear, logical and organized. Listener can follow line of reasoning. Pacing is correct for the audience.	ڤ Listener can follow and understand the presentation.	ڤ Talk is poorly organized. Speaker jumps around from topic to topic.
d. Clarity of language usage	ڤ Speaker is comfortable in front of the group and can be heard by all.	ڤ Grammatical errors and use of slang are evident. Some sentences may be incomplete.	ڤ Speaker is difficult to understand or hear.
e. Ability to answer questions	ڤ Answered questions directly and clearly.	ڤ Student can answer questions, but with some difficulty.	ڤ Students had difficulty understanding questions and answering clearly.
f. Quality of slides	ڤ Slides enhance the		ڤ Slides are inadequate (writing

	presentation and are prepared in a professional manner.	ڤ Slides are adequate for the presentation.	too small, too much or too little information per slide).
6. Do application-oriented research of an inter-disciplinary nature			
a. Application-oriented research	ڤ Research has practical applications that are clear.	ڤ Research may have practical applications.	ڤ The practical application of this work is completely unclear.
b. Interdisciplinary nature of research	ڤ Research required significant level of knowledge of and interaction with people from more than one discipline	ڤ Research involved some level of work or interaction with more than one discipline.	ڤ Research was completely within one discipline.

To be answered by the research advisor only:

Have any papers resulting from the dissertation work been accepted for publication in peer-reviewed journals? _____Yes _____No