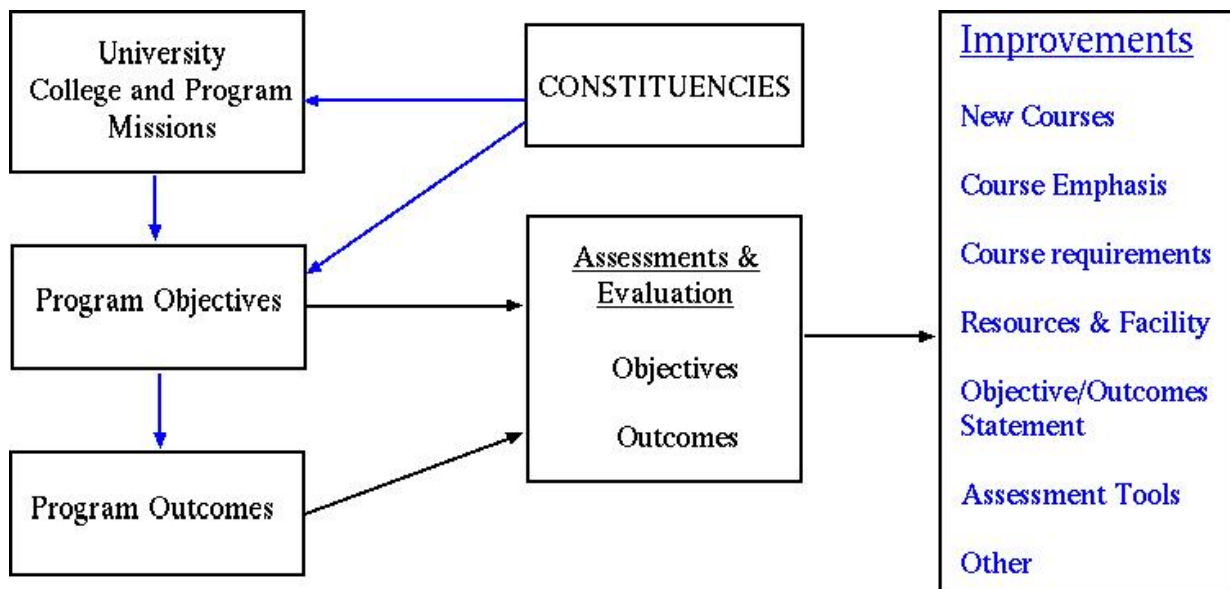


#### **CRITERION 4. CONTINUOUS IMPROVEMENT**

In this section we discuss the program improvements that have been made and are being made since the general ABET review of 2002 to the program and to the processes used for assessment and evaluation of achievement of objectives and the assessment and evaluation of desired outcome on a continuous basis. The process involves all the constituencies with the faculty, assisted by the Department's undergraduate committee, playing the central role in developing, coordinating and delivering all aspects of the program. The overall process of development, assessment and improvement on a continuous basis is illustrated in Figure 4.1 and discussed below.



**Figure 4.1** Development, Assessment and Improvement of the BSOE Program

The constituencies' needs determine the missions of the University, the College and the Department. The needs of the constituencies also play a vital role in setting the program objectives. The desired program outcomes that have to be attained in order to achieve the objectives are then identified. Criteria for satisfactory achievement of objectives and attainment of desired outcomes, as well as instruments for assessment, are then developed. The program thus undergoes periodical assessment and evaluation as discussed in earlier sections on program objectives (Criterion 2) and outcomes (Criterion 3).

Based on the assessment and evaluation, various program improvement measures have been implemented as discussed below.

##### **1.1. Information Used for Program Improvement**

The principal data used for program improvements are assessment and evaluation results from the Criterion 2 (Objectives) and Criterion 3 (Outcomes) processes. The assessment data gathered, as discussed in the earlier sections, include

A. From Criterion 2:Objectives

- a. Alumni survey on objective statements, achievement of objectives and attainment of desired outcomes
- b. Employer survey on objective statements, achievement of objectives and attainment of desired outcomes
- c. Graduating class survey on objective statements, achievement of certain objectives
- d. Alumni progress and career accomplishments, including pursuit of life-long learning and leadership positions
- e. Contributions to the field

B. From Criteria 3: Outcomes

- a. Alumni survey on attainment of outcomes
- b. Employer survey on attainment of outcomes
- c. Graduating senior survey on attainment of outcomes
- d. EBI survey of graduating seniors
- e. Appraisal of senior design by a committee of faculty and industry members
- f. Students performance in the FE examination
- g. Assessment of students' performance in coursework

Other information and data that are commonly used for improvements of various facets of the program are

C. Other

- a. Peer faculty review of portfolios and evaluation of course contents (discussed further in a later section on Criterion 6: Faculty)
- b. Student evaluation of teaching (discussed further in a later section on Criterion 6: Faculty)
- c. Miscellaneous recommendations of the Advisory Board
- d. Miscellaneous input from students through discussions with faculty
- e. Exit interviews with graduating seniors
- f. Miscellaneous input from staff and others based on day-to-day experience and report of any problems or concerns.

Information related to objectives (item A above) and outcomes (item B above) have been discussed in the earlier two sections. Those on C (a) and C (b) above are discussed in the later section on Criterion 6: Faculty. In the following paragraph, we describe information that come from C(c), C (d), C (e) and C (f)

C(c) Miscellaneous recommendations of the Advisory Board

The department has an Advisory Board consisting of leaders from a broad range of the commercial and naval ocean engineering industry and an undergraduate student representative. Currently the following six members from industry and the Navy are on the Board:

- 1 Mr Richard Asher, former Deputy Superintendent of Salvage
- 1 Dr. Andrew Clark, President, Maritime Communications, Harris Corp.

- 2 Dr Paul Rushfeldt, Technical Director at Lockheed Martin
- 3 Mr. Kevin McEvoy, Executive VP of Oceaneering International (joined the Board in August, 2007)
- 4 Dr William Venezia, Chief Engineer at SFTF, NSWCD
- 5 Mr. Keith McAllister, Asst. Program Manager, PMS 420.
- 6 The student member of the Board for 2007-08 was Ms Victoria Ringle.

The Board meets at least once a year to review the program and make recommendations for improvements on various aspects of the program, in addition to providing assessments and inputs to program objectives and outcomes as discussed in the earlier sections. Items discussed and prioritized in the two 2007 meetings is given in Attachment 4-1 at the end of this section. The top 5 priorities identified were increase in student enrollment, strategies for recruitment of new students, professional internet-based recruitment package, and improvement of senior design sequence courses. The actions taken to address the recommendations are listed in Table 4.2.

#### C (d) Miscellaneous informal input from students through discussions with faculty and Department Chair

Students, through formal and informal discussions, provide valuable suggestions for improvement of various aspects of the program. Students hold regular student professional society (SNAME and MTS) meetings in which they discuss student activities and Departmental support for the activities. The students' views are communicated to the faculty through the faculty advisor for the societies. Informally, they also meet with faculty members, including the Department Chair, to convey any concerns they may have, for example, on courses, course scheduling, lab facility and access to the facility. The Department faculty members discuss the concerns and take steps to resolve them promptly.

#### C (e) Exit interviews with graduating seniors

Each year, the Department Chair meets with the graduating seniors to learn of their experience in the program and hear about their concerns and suggestions for program improvement. The discussion includes their experience with the science and mathematics classes in the College of Science, their experience with the junior and senior year courses, capstone design projects, their 'best' class, and their overall satisfaction with the program among other issues. The students offer their candid views on these topics. The chair shares the suggestions with the faculty or takes appropriate action in improvement of the program and the student experience.

#### C (f) Miscellaneous input from staff and others

The Department has sizable staff strength to assist the Department in teaching, research and service activities. The Department Advisor, Ms Teresa Perez, interacts with the students on regular basis for advice on enrollment and other matters affecting students' performance. Most other staff members also deal with students, for example, by providing assistance in laboratory experiments, during sea trials of design projects and in various machine and electronics shops. The staff members report any concerns that students may have, and have not yet communicated to faculty, immediately to the Department Chair for action and resolution.

### **1.2. Actions to Improve the Program**

A number of actions have been taken in support of program improvement since the general ABET review of 2002. In particular, the methods of assessing program objectives and outcomes have been significantly improved. Major improvements to the curriculum include introduction of

electives in the program, introduction of new core and elective engineering courses, change in minimum grade requirement of all engineering courses, changes in scheduling of courses and provision of better support for student participation in internships. The ABET reports for 2002 and Department's responses are discussed in 4.2.1. Changes related to assessment of program objectives are discussed in 4.2.2, those related to assessment of program outcomes are discussed in 4.2.3, and those related to recommendations of the Advisory Board are described in 4.2.4. A full list of changes and associated basis for action are described in section 4.2.5.

It is believed that as a result of this implementation, the program is strengthened and the students are better served.

#### 1.2.1. Outcome of Previous ABET Visit

This information is reproduced here from the section on Background Information for completeness.

ABET visit and evaluation of the program for accreditation last took place in October 2002. The program audit form cited basis of program educational objectives as a weakness, program outcome and assessment as a concern and institutional commitment as a weakness. These weaknesses and concern were subsequently deemed as resolved in the final ABET statement of August 2005 following 'substantial and appropriate' implementation of program changes by the Department to address the ABET concerns as described below, and the program was accredited to September 2009.

The reasons for citing the basis for program objectives as a weakness were (1) limited involvement of all constituencies in the development of objectives reflecting needs of all constituencies and (2) lack of direct assessment of and performance criteria for objectives. The reason for citing program outcome and assessment process a concern was that the recommendations of the undergraduate committee for program improvement following assessment of outcomes were not fully implemented. Loss of faculty was the primary reason for citing institutional commitment as a weakness.

In the 14 day response, post ABET visit of October 2002, the department (1) explained the indirect role of employers in the development of program objectives, (2) listed the changes made to the curriculum subsequent to assessment of outcomes and (3) described offers that had been made to new faculty hires. ABET, in its March 2003 Draft Statement, noted that additional information provided by the Department will be considered during due process and that the concerns and weaknesses remained unresolved.

In response to ABET's March 2003 Draft Statement, the Department (1) highlighted the changes made to the objectives with input from constituencies, (2) listed all curricular changes implemented since October 2002 for continuous improvement and (3) noted two new faculty members were joining the program.

In the August 2003 Statement, ABET found that (1) basis of objectives remained a weakness, (2) concern on program outcomes and assessment was cited as resolved and (3) institutional support reduced from weakness to a concern. The program was accredited to September 2005. ABET noted that the items that remained as weakness and concern would be the focus of the following review and ABET required an interim report on actions taken to correct all shortcomings by 1 July 2004.

In the July 2004 interim report submitted by the Department, we listed all the actions taken and implemented to correct the shortcomings that remained unresolved. Some of the actions taken to address the shortcomings were

- Input of Advisory Board in the review and assessment of objectives and in setting metrics for evaluating the assessment data
- Identifying methods of assessment of program objectives which include job placement and career progress of alumni
- Employer and alumni surveys conducted in 2004 on the appropriateness of the objectives and the outcomes
- Changes implemented based on assessments of objectives and outcomes
- Salary increase for three junior faculty members
- Monetary awards for teaching and research performance and
- Performance based salary equity increases for faculty

The ABET's draft statement, dated 01 March 2005, noted that (1) concern regarding institutional support was resolved and (2) weakness regarding the basis of program objectives was reduced to a concern. ABET was encouraged by the steps taken by the Department with regard to evaluation of objectives but noted that little implementation of changes [based on objectives evaluation] had occurred. ABET also suggested alumni and employer surveys be modified so that they explicitly asked not only about the appropriateness of program objectives but also whether the objectives were being achieved.

Several steps were taken to implement program improvements as a follow up to the 2004 assessment of objectives.

In particular, alumni and employer surveys showed that there were two areas of concerns – one related to societal awareness and the other related to leadership skills. In order to correct these shortcomings, instructions and experience pertaining to these two objectives were incorporated or strengthened in the two-semester capstone Senior Design sequence. Guest lectures by industry leaders on diverse range of societal engineering issues as well as pertaining to fostering leadership skills were made significant features of the course as described under Criterion 4. Topics on project management, presentation skills, and financial accounting were also added to the course content. A course, Fundamentals of Engineering, was made a requirement for the program in 2004 and included more material on societal awareness as described in Criterion 4. All the improvements made in the process of assessment of objectives and to the program curriculum based on the evaluation were provided in detail to ABET in the Department's response to the ABET final draft statement.

The alumni and employer survey forms were modified as suggested by the ABET reviewer to specifically include a question addressing achievement of objectives.

ABET, in the FINAL statement made in August 2005, found that changes implemented for improvement with regard to achievement of objectives were “substantial and appropriate” and was also encouraged by the development of alumni and survey forms which included evaluation of appropriateness *and* achievement of objectives. All weaknesses and concerns were deemed resolved. The program was accredited to 30 September 2009. The present report is a self-study report for subsequent reaccreditation.

### 1.2.2. Improvements relating to Achievement of Program Objectives

This is reproduced here from section on Criterion 2 for completeness.

The assessment data on objectives were evaluated by the undergraduate committee and discussed by the faculty to determine follow-up actions for improvement and achievement of objectives that were not met.

The assessment of objectives (Table 2-2) made in 2007-08 show that all program objectives are satisfactorily achieved except that related to “leadership skills” (Objective 4) and “societal awareness” (Program Objective 5). The surveys show that employers, alumni and graduating seniors all find the technical content of the program to be quite strong. In response to the shortcomings on “leadership skills” and “societal awareness” identified in the 2004 surveys, a number of steps were taken. Instructions and experience pertaining to these objectives have been incorporated/ strengthened in two of our classes, (i) Fundamentals of Engineering, (ii) Capstone Senior Design sequence. The seniors are also encouraged to attend weekly seminars on a range of topics by workers from industry, government and academia. Since June 2004, Fundamentals of Engineering has been offered in summer and fall 2004, and spring 2005, and the two-semester Capstone design sequence annually. Details of material taught in the class that are relevant to these objectives are given below:

#### *EGN1002 Fundamentals of Engineering:*

This freshman level 3-credit course was made a requirement for the degree since 2004. The appointed instructor, Doug Briggs, holds a PE license, and has significant previous industry experience. An alternate instructor, Dr Edgar An, taught the class in Fall 2007. The class has a two-week session on ethics, one week session on leadership skills, and introductory lectures on implications of engineering for society. The instructions relate, among other issues, engineering marvels and disasters of the past to the students. Students work in teams and their performance in interacting with team members is assessed. The class also invites lectures from workers in industry. For example, in fall 2007 the following speakers provided lectures to the class:

- 1 Richard Asher, Deputy Superintendent of Salvage, U.S. Navy
- 2 Timothy von Epps, previously a Senior Staff Process Control Engineer at AK Steel Company, Kentucky, now with FAU College of Engineering and Computer Science
- 3 Cynthia Currie from EdgeTech who manufacture sonar systems.
- 4 Dr William Venezia, from South Florida Test Facility, NSWC-CD
- 5 Louise Larkin, from Lockheed Martin
- 6 Dr Rick Driscoll, faculty member and Technical Director of Center of Excellence in Ocean Energy Technology at FAU
- 7 Kelly Copper, Program Manager at the Office of Naval Research
- 8 Dr Ray McAllister, Emeritus Professor, FAU-OE.

These guest lectures contribute measurably to bringing awareness of the complexities of contemporary society to the students as well as awareness of engineering ethics.

#### *Capstone Senior Design Two-semester Sequence:*

To help students become aware of external engineering issues and current trends in ocean engineering, we are inviting people who hold or have held high level positions in ocean

engineering to offer formal lectures to senior design students and informally meet with them. The range and experience of the people selected for 2004-05, and 2007-08, for example, have been broad and representative of a wide range of disciplines and backgrounds, governmental and industry related, military and environmental, and national and international. The lecturers for 2004 – 05 sequence were:

- 1 Dr. Paul Rushfeldt – Technical Directory, Lockheed Martin, Perry Technologies
- 2 LtCdr Russell Peters – Canadian Exchange Officer, Center for Innovation in Ship Design - Naval Surface Warfare Center Carderock Division
- 3 Mark Selfridge UK MoD Exchange Officer, Center for Innovation in Ship Design (CISD), Naval Surface Warfare Center Carderock Division
- 4 James Dehlsen – Chairman and CEO, Clipper Wind Power Inc
- 5 Richard Metrey – Former Director, Naval Surface Warfare Center Carderock Division
- 6 David Vendittis – Former Head of the Ship Acoustics Department of the Naval Surface Warfare Center Carderock Division.

For the 2007-08 sequence the lectures provided were:

- 1 Systems Engineering, by M. Naiman, Oceaneering Inc.
- 2 Laboratory safety, presented by FAU Environmental Health & Safety
- 3 Hazardous waste awareness and handling, presented by FAU Environmental Health & Safety
- 4 The Basics of Intellectual Property, by FAU Division of Research, Dr. M. Fleisher
- 5 Respiratory protection training, by FAU Environmental Health & Safety, H.B. Hutchinson
- 6 Sustainable Development in Ocean Engineering, Dr. J. Vos, FAU Dept. of Urban & Regional Planning
- 7 Social responsibility of engineers, by Dr. B. Chen, P.E., of Chen and Associates
- 8 Program management principles, by Dr. P. Rushfeldt, Lockheed-Martin (Riviera Beach)

Leadership Skills: To foster leadership qualities and understanding of management, and provide a taste of knowledge needed in management positions, several paths are taken in the senior design sequence. First, the following lectures were given in the fall senior design class:

- Project Management, Planning and Team Work
- Engineering Management
- Motivation, Behavior and Communication
- Presentation Skills
- Businesses
- Managerial Accounting
- Financial Accounting

Second, the class is divided into teams that work on components of a larger design. As such, the students must develop and demonstrate a high level of inter and intra team coordination and communication. Finally, each team has a designated rotating team leader position. The team leader must not only motivate the other students, but plan activities, and prepare weekly reports. The position rotates so that all students have an opportunity to participate in the position. The success of this approach will be assessed through an exit interview with graduating students and refined as necessary for implementation in future years. In the 2008 exit interview, students had reservations about the effectiveness of a rotating team leader and made some suggested changes which will be reviewed with the instructors for the 2008-09 class for improvement.

Societal Awareness: The guest lectures for the senior design class described above, and the weekly guest speaker seminars which the seniors are encouraged to attend bring awareness of a host of issues in contemporary society. In addition, the design projects the students have undertaken for the 2004-05 and 2005-06 sequences were selected to reflect current and relevant issues in society. Two of the projects dealt with a major initiative within the military – Sea-Basing. One specific project involves designing, building and testing a deep water stable crane-ship for a Sea-Base. As part of the project, the students were required to research the broad concept of Sea-Basing and the logistics and the at-sea operational complexities it entails. Thus the project not only exposes the students to the challenge of engineering a major offshore mobile facility, but also familiarizes them with the overall Sea-Basing program and the general military engineering complexities associated with at-sea operations. Another project in 2004-05 was the design of an ocean current turbine that is to be part of a future renewable energy production system. This familiarizes the students with the ocean environment, with the role of renewable source of energy in contemporary society, and wise utilization of the ocean for the benefit of society.

Ethics: One of the aims of the Senior Design sequence is to instill an understanding of ethics. To this end, several lectures on ethics are given that teach the four fundamental principles and seven fundamental canons in the ethics code endorsed by ABET. The series of lectures consist of an entry exam, presentations, and cases studies. The exam is used to assess and to demonstrate to the students their level of understanding and need to study ethics - motivation. Some of the major focus areas are 1) ethics and the engineering profession, 2) legal and ethical domains, and 3) solving ethical conflicts. These lectures have been provided to the class since 2005.

The effects of these efforts have been assessed and continue to be assessed through exit interviews with the graduating students and through future surveys of alumni and employers.

Further efforts in overcoming the shortcomings on the objectives related to “leadership skills” and “societal awareness” were discussed by the faculty in spring 2008 and the undergraduate committee was tasked to come up with recommendations for additional measures to address the shortcomings. The following undergraduate committee recommendations for improvement and achievement of objectives related to “societal awareness” have been adopted for implementation from fall 2008.

- 1 The survey forms will be revised for the next cycle of assessments to precisely define what constitutes “societal awareness” and “leadership skills” and “contribution to field” as some respondents had found the questions to be somewhat vague and left them unanswered.
- 2 From Spring 2009, a one credit course Professional Development for Ocean Engineers will be offered again on a regular basis. The course is not required for graduation. The course addresses many topics useful for practicing engineers such as company organization, management of resources and professional ethics.
- 3 A one-credit elective course, “Senior Seminar” has been introduced into the program, starting spring 2008, that requires students to attend the Department’s weekly seminars and write about selected topics covered in the seminar for assessment of their comprehension. The seminars cover research topics based on a diverse range of contemporary societal issues and should provide the students with additional awareness of the complexities of contemporary society.



### 1.2.3. Improvements Based on Assessment of Program Outcomes

This is reproduced here from Criterion 3: Program Outcomes for completeness.

The faculty discussed the assessment data and evaluation of results (corresponding to program outcomes) and decided to take steps for program improvement by further boosting efforts in overcoming the shortcomings on the outcomes related to “leadership skills” and “societal awareness” (which still feature as requiring attention in 2007-08 assessment). The undergraduate committee was tasked to come up with recommendations for additional measures to address the shortcomings. The following undergraduate committee recommendations for improvement and achievement of objectives related to “societal awareness” have been adopted for implementation.

#### *Societal Awareness and Contemporary Issues*

1. Starting Fall 2008, all ocean engineering courses will have contents on societal and contemporary issues in the context of the subject matter. 5% of the grade will be assigned for assessing students’ knowledge of these topics.
2. Guest lectures by outside experts on topics related to leadership skills and societal awareness, such as on project and team management, communication, alternative sources of energy, sustainability, environmental protection and law, pollution etc will continue to be part of in the courses EGN1002 Fundamentals of Engineering and EOC4804 OE Systems Design. Students will be quizzed on the contents of the lectures provided as part of the overall grade in each class.

#### *Fundamentals of Engineering (FE) Examination*

The importance of taking the FE examination will be emphasized to students through a special seminar in EGN 1002. A seminar will be arranged in the junior year explaining the topics covered in the examination and various preparatory reviews administered by student sections of the professional societies. The examination data and application procedure will be reminded in the senior year in a lecture in the design (EOC4804) class.

### 1.2.4. Actions Initiated For Improvements in Response to Advisory Board Recommendations

Changes taken in response to Advisory Board ranking of issues (2007) are given in the table in Attachment 4-2.

### 1.2.5. Complete List of Program Improvements since 2002

1. Revision of Objectives Statements: As discussed in Section 2.6, the program objective statements were revised by the faculty in 2003 adding emphasis on ocean engineering in the statements.

Basis of Action: In response to ABET reviewer’s observation that program objective statements were very closely related to the objective statements of the College of Engineering and Computer Science.

2. Introduction of Electives in the senior year in 2004: The credits of senior year level II courses (Acoustics II, Fluid Mechanics II, Structures II, and Materials II) were increased from 3 to 4 credits to include more applied topics in ocean engineering and naval architecture. The students are required to take two of these four courses, as electives, which will depend on their career interests. Subsequently, since 2007, Acoustic II, Fluids II, Structures II and Environmental Data Analysis have been taught in conjunction with corresponding graduate classes.

Basis of Action: ABET reviewer, Advisory Board recommendation and student requests,

3. Senior Design: More resources have been made available each year, starting 2004, for senior design projects so that the students can take the project to completion including sea trials of the systems designed and fabricated.

Basis for Action: Exit interviews with graduating seniors, faculty requests

4. Introduction of Marine Materials – Marine Topics course: A one credit course on materials topics related to ocean structures and vehicles is introduced in the core curriculum, which came into effect from 2004-05.

Basis for Action: Introduction of Materials II as an elective warranted this action

5. Fabrication of OE Systems course: To enhance hands-on experience, the one credit course on machine shop experience is required for graduation as of 2004.

Basis for Action: Exit interview of seniors and faculty input revealed machine-shop experience would improve quality of performance on senior design projects

6. Offering of Structures II course: The course was moved in 2004 from Summer to Spring semester so that the students have the summer semester prior to their senior year to undertake internship training.

Basis for Action: ABET review and Advisory Board recommendations to make better opportunities for internships in the program schedule

7. Professional Development course: Even though not required for graduation, students are encouraged to take this one credit course to improve leadership skills and societal awareness. This course was offered in 2004. Subsequent enrollment and scheduling issues led to the Department dropping this offering. The class will once again be offered from spring 2008.

Basis for Action: 2004 and 2007-08 assessment surveys reveal need for more instructions on societal awareness and leadership skills.

8. Fundamentals of Engineering course: In order to provide students an exposure to engineering right from the beginning of their program, this three credit freshmen/sophomore year course offered in the college is required for the degree as of 2004. Offered each semester since 2004.

Basis for Action: 2004 surveys (Alumni, Employer, EBI) assessment pointing to need for increase of societal awareness. Faculty expressed need for action to enable retention of interest in engineering during freshmen year when students mostly take classes in other colleges.

9. Analog and Electrical Machines course: A new course on analog electronics and machines has been designed specifically apt for core OE program. The course was planned to be offered every spring semester beginning 2005. It was offered in 2005 and 2006. However, changes in the pre-requisites for Electronics I offered by EE has made it possible for students to take that course instead, allowing the Department to share a College resource.

Basis for Action: EE stopped offering Electronics I for non-majors so that OE students required both Circuits I and Circuits II as pre-requisites for the regular Electronics I course. OE students only need Circuits I. As from 2007, EE now requires only Circuits I for Electronics I

10. Internship support: Making use of the support from US Navy through programs such as National Naval Responsibility Initiative for Naval Engineering (NNRI-NE), established in 2002, more students are now supported for summer internships at Navy laboratories and marine industry. Efforts are underway to establish summer internship programs with marine industry and laboratories in the region.

Basis for Action: ABET review team and Advisory Board recommendations for providing better internship opportunities to students.

10. Programming course in the curriculum: A new computer programming course to contain more *scientific and real-time programming* was considered in 2004. Limitations in available required credits have not made this feasible. Instead, based on on-going faculty deliberations of 2005-06, embedded programming has been introduced in OE Lab course. The matter still needs further consideration.

Basis for Action: Exit interviews of graduating seniors revealed a need for better computing instructions involving more practice. Exit interview of 2008 suggest need for further action.

11. Career Advisor: In 2005, Mr. Doug Briggs was appointed by the Chair as career advisor with the responsibility of helping with student placement in industry. Mr. Briggs is an alumnus of the program with significant industry experience. He works in coordination with the university and college career offices. Mr. Briggs also represents the Department at SNAME.

Basis for Action: Exit interviews with students suggested this was an issue.

12. Requirement of minimum grade: In 2006, the faculty adopted the undergraduate committee recommendation: "Graduation requirements changed to require a C grade in every ocean engineering course required for graduation". This new policy came into effect from Fall 2007

Basis for Action: Many faculty members expressed a concern that students' performance appeared to reflect grade expectation. An minimum average GPA of 2.0 was not

sufficient to ensure students put in adequate effort into each of their engineering classes. Also, the need for consistency with other engineering departments was identified. .

13. Program Scheduling: The Department moved EOC3631 Ocean and Environmental Data Analysis course to a senior level (4000 level) course starting in 2006-07.

Basis for Action: Exit interviews suggested students were not sufficiently prepared at the junior level for the rigor the course demanded.

14. Program Scheduling: The course Ocean Thermal Systems (a 3000 level course) has been moved to the junior year starting in 2006-07. EOC3123 Fluid Mechanics I is made required as co-requisite for the course. Teaching of Acoustics I was moved to the Fall semester.

Basis of Action: Action 13 necessitated this scheduling action to distribute the load and ensure timely graduation of all students.

15. Course Prerequisites: Changes were made to the prerequisites of several OE courses in 2006 to ensure

- Students have sufficient background for the coursework
- Courses that are stand alone in the curriculum (i.e. not pre-requisites for any other courses) are also taken in a timely fashion.

Basis for Action: Normal course review process by the Undergraduate Committee.

16. Faculty and Staff changes: Since 2002, Drs Frisk, Mahfuz, Presuel-Moreno, Song and Xiros joined the Department. Dr Song left after a year due to personal issues in 2006, Dr Cuschieri left to take up a position in industry in 2003, and Dr Hartt retired in 2007. Ms Julie Noelke served as Academic Programs Coordinator and Department Advisor during 2003-2005. Ms Teresa Perez has served in that capacity since 2006.

Basis for Action: Normal faculty and staff hiring process to fill vacant positions.

17. Outcome measure: Starting Fall 2008, all ocean engineering courses will have contents on societal and contemporary issues in the context of the subject matter. 5% of the grade will be assigned for assessing students' knowledge of these topics.

Basis of Action: 2007-08 direct assessment of outcomes relating to course work suggests that coverage of societal awareness and leadership skill topics in the courses needs to be better measured.

18. Outcome measure: Guest lectures by outside experts on topics related to leadership skills and societal awareness, such as on project and team management, communication, alternative sources of energy, sustainability, environmental protection and law, pollution etc will continue to be part of in the courses EGN1002 Fundamentals of Engineering and EOC4804 OE Systems Design. Starting fall 2008, students will be quizzed on the contents of the lectures provided as part of the overall grade in each class.

Basis of Action: 2007-08 direct and indirect assessment of outcomes.

19. Senior Seminar Elective: A one-credit elective entitled Senior Seminar has been introduced whereby students taking the class are required to attend the Department's weekly seminar series on a range of diverse research topics involving contemporary societal issues so as to foster societal awareness as well as to get students interested in graduate school and lifelong learning. The students are required to write about selected topics covered in the seminar for assessment of their comprehension. The course was offered as a trial measure in spring 2008 and proved to be a reasonable success with an enrolment of 7 students. It will be offered each spring.

Basis of Action: 2007-08 direct and indirect assessment of outcomes.

20. FE Examination: As of Fall, 2008, the importance of taking the FE examination will be emphasized to students through a special seminar in EGN 1002. A seminar will be arranged in the junior year explaining the topics covered in the examination and various preparatory reviews administered by student sections of the professional societies. The examination data and application procedure will be reminded in the senior year in a lecture in the design (EOC4804) class.

Basis of Action: Direct assessment using performance in FE examination point to the fact that not enough students are taking the examination.

21. Senior Design: The scope of the 2007-08 senior design projects was reduced and much of the fabrication work was shipped out as recommended. This practice will be repeated for future projects.

Basis for Action: The 2007 recommendations of the Advisory Board.

22. Recruitment Efforts: Significant recruitment efforts, outlined in Attachment 4.2 have been put in place since 2007. Others are continuing, including Departmental website development...

Basis for Action: The 2007 recommendations of the Advisory Board.

23. Changes to prerequisites for Engineering Mathematics I (makes MAC2254 or MAC 2312 prerequisites), Circuits I (make MAC 2313 co-requisite) , Thermodynamics (remove CHM 2045 +LAB as prerequisite; make MAC 2313 co-requisite), Materials I – Marine Topics (make EOC 3200 co-requisite) and OE Lab (make MAP 3305 co-requisite) have been accepted by the faculty and will be implemented for the 2008-09 cycle.

Basis for Action: (i) Changes implemented by other Departments, (ii) Need for consistency in prerequisite requirements for Thermodynamics across the College to facilitate multiple offerings and instructor input, (iii) Review of course contents by instructors for Materials I – Marine Topics and OE Lab suggested co-requisite requirement were appropriate.

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