



FLORIDA ATLANTIC UNIVERSITY

Department of Ocean and
Mechanical Engineering

College of Engineering &
Computer Science

Continuous Improvement Plan

Ocean Engineering
Undergraduate Curriculum

Plan for the Assessment and Continuous Improvement of the
Ocean Engineering Undergraduate Curriculum Department
of Ocean and Mechanical Engineering
Florida Atlantic University
June 8, 2026

The Ocean Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET, 111 Market Place, Ste. 1050, Baltimore, MD 21202-4012 (www.abet.org). Florida Atlantic University is accredited by the Southern Association of Colleges and Schools (SACS) Commission on Colleges to award associate, bachelor, masters, specialist and doctoral degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097. Both of these organizations have moved towards the requirement of a Continuous Improvement Program (CIP) for the curriculum and the progress of the students. The department has responded to these requirements in the following manner:

1. The establishment of a mission statement for the Ocean Engineering Program.
2. The establishment of educational objectives for the Ocean Engineering Program.
3. The development of student educational outcomes for student performance.
4. A mapping of the student educational outcomes to the educational objectives.
5. A mapping of the contents of each required course in the curriculum to the student educational outcomes.
6. The responsibility of the OE Undergraduate Committee for reviewing course sequences in the program.
7. The development of assessment tools for each of the intended courses and student educational outcomes.
8. The forwarding of the recommendations of the OE Undergraduate Committee to the faculty at large, for decisions regarding adjustments or changes that are necessary to insure continuous improvement of the Ocean Engineering program.

Each of these steps will be presented or discussed in detail. A flowchart has been developed to show the linking of the different segments of the Continuous Improvement Program, which is presented in Appendix 1. The Educational Objectives established for the Ocean Engineering Program will be reviewed every three years.

1. Mission Statement of the Ocean Engineering Program

The Ocean Engineering Program's mission is to provide an outstanding ocean engineering program for learning and research and to prepare individuals to meet national and international engineering challenges in the ocean environment. The goal of the Ocean Engineering Program is to develop and offer a comprehensive and broad curriculum in science and engineering that prepares a student, upon graduation, to effectively perform engineering tasks in the ocean environment or to successfully pursue higher studies and research in engineering.

2. Educational Objectives for the Ocean Engineering Program

Graduates of the ocean engineering baccalaureate program at the Florida Atlantic University, within a few years after graduation, will:

- Demonstrate an ability for critical thinking to carry out engineering tasks in the multi- disciplinary field of ocean engineering.
- Make meaningful contributions in terms of design, development and integration of engineering systems, particularly for applications in the ocean environment.
- Pursue graduate study and/or participate in professional societies.
- Develop and exhibit leadership qualities, teamwork, and communication skills in their engineering work.
- Understand various complexities and issues of contemporary society and make professional contributions in the larger and long-term interest of the society.
- Understand, consider, and apply engineering standards and codes.

3. Student Educational Outcomes

The program will meet the above objectives by establishing the following educational outcomes for student performance. At the time of graduation, the students will attain the following:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
8. An ability to understand, consider, apply, and test engineering standards and codes.

4. The mapping of the Ocean Engineering student educational outcomes to the educational objectives is presented in Appendix 2.
5. The mapping of each required course in the Ocean Engineering program to the student educational outcomes is presented in Appendix 3.
6. The OE Undergraduate Committee develops and maintains the course syllabus for each course. These are posted on the internet on the Ocean Engineering webpage at www.ome.fau.edu. It establishes the prerequisites and co-requisites for each course, the topics to be included and the expected course outcomes. The committee is responsible for addressing the feedback received from the surveys and assessment results and forwarding recommendations for changes to the courses in their sequence of the curriculum to the faculty.
7. The following indirect and direct assessment tools have been developed and are in use for the Ocean Engineering Program. Invitation for Evaluation of Senior Design Projects (EOC 4804 and EOC 4804L) by external evaluators is shown in Appendix 4-6. The corresponding frequency of assessment and the expected level of attainment are listed in Appendix 4-7 and 4-8.

Indirect Assessment

Indirect assessment represents a qualitative measure of attainment of the student outcomes. The indirect assessment is carried out using the following instruments:

- Survey of alumni (conducted once in 3 years)
- Survey of employers (conducted once in 3 years)
- Survey of graduating seniors (conducted at FAU every year)
- Survey of students on course outcomes (conducted every semester in all OE core courses).

The sample forms used to survey alumni and employers for assessment of program outcomes are given in Appendix 4-1 and 4-2. These surveys ask the alumni and employers to assess attainment of program outcomes using a scale ranging from 1 to 10, with 1 meaning unsatisfactory, 5 satisfactory and 10 excellent.

The sample form used to survey graduating seniors for assessment of program outcomes is given in Appendix 4-3. This survey asks the graduating seniors to assess attainment of program outcomes using a scale ranging from 1 to 10, with 1 meaning unsatisfactory, 5 satisfactory and 10 excellent. In addition, the Department Chair conducts an exit interview with graduating seniors in an informal setting. Questions on courses, facilities, teaching and the support received from faculty and departmental staff are discussed. Any concerns raised by the students and suggestions for

improvements are shared with the program faculty, and steps are taken for program improvement. The exit interview is conducted every year.

A sample form used to survey students in one of the OE courses, such as EOC 4422 (Ocean Wave Mechanics) is provided as Appendix 4-4. Similar forms are used to survey students on all other OE core courses. This survey asks students to assess their self-reported attainment of specific course outcomes using a scale ranging from 1 to 5, with 1 meaning poor, 3.5 satisfactory and 5 excellent. Since Fall 2024, we have introduced a QR code system to collect students' response. Students scan the QR code, gets access to the survey Form, fill it out and submits it to a Google drive. Later, data is collected from Google Drive. These scores are then re-scaled to 1:10 so these survey results can be easily compared to other results. It should be noted that the specific outcomes for each of the OE courses are mapped to 1-8 outcomes so that the evaluation of assessment data can be directly compared to other instruments used in this report.

Direct Assessments:

Direct Assessment is based on quantitative measures of the student outcomes. Direct assessment is carried out using the following instruments:

- 1) Capstone senior design project performance appraisal by faculty and external industry and government representatives (carried out every semester).
- 2) Performance in coursework directly related/mapped to student outcomes (the curriculum maps are listed in Table 3-3 and 3-4)

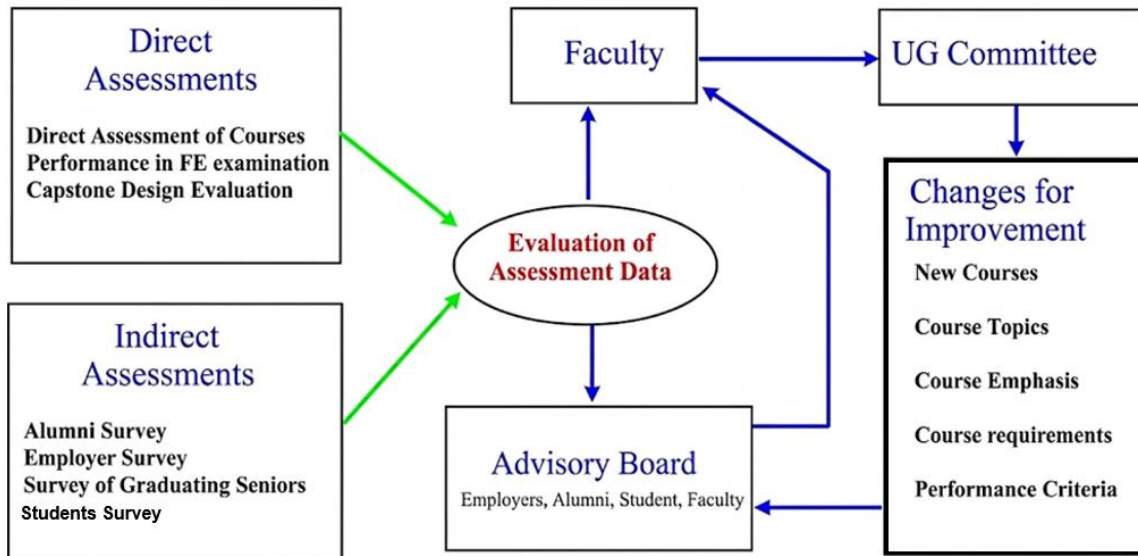
The appraisal of each of the capstone senior design projects is based on assessment of Critical Design Review (CDR) and Final Design Review (FDR) presentations by the students of their projects and their responses in the Q&A session following the presentations. Feedback from instructors, faculty, and external members from industry and navy laboratories in attendance is sought using the Form shown in Attachment 4-4.

Students' performance in class assignments provides an excellent measure of student outcomes. A sample Form used for the assessment of student outcome SO1 in EOC 4422 (Ocean Wave Mechanics) is shown in Appendix 4-5. Similar Forms (SO1 through SO8) are used to assess student's outcome in all other OE core courses. These assessments are evaluated for the BSOE program every semester. It should be noted that the assessment of student outcomes is based not on the overall course grade, but on individual assignments such as lab reports, project reports, teamwork in conducting experiments, project presentation, specific exam and quiz.

8. The Ocean Engineering (OE) Undergraduate Committee reviews all assessment data and develops recommendations for program improvement. As appropriate, these recommendations are presented to the faculty for discussion and consideration. Following faculty deliberation and approval, any resulting course or curriculum modifications are referred back to the OE Undergraduate Committee for implementation.

Appendix 1 – Assessment and Continuous Improvement Plan

The process of continuous assessment, evaluation, and improvement in support of attainment of student outcomes is illustrated in the following flow chart. OE undergraduate committee members are assigned the responsibility of coordinating this process. The assessment of the degree of attainment of student outcomes is through direct and indirect assessments. Direct assessments are based on student performances in courses and appraisal of capstone senior design projects. Indirect assessments include alumni and employer surveys, survey of graduating seniors, the Industry Advisory Board, and students' self-assessment on course outcomes. The OE undergraduate committee evaluates the results of the assessments to determine the level of attainment of the student outcomes, and to identify improvement needs and opportunities. If the level of attainment of a student outcome falls below 70%, the committee reviews the outcome and makes recommendations for appropriate action to the program faculty. Upon review and approval by the entire faculty, the indicated improvements are implemented. The changes could include the introduction of new courses, new facilities and instructional equipment or space, change or emphasis on topics, course requirements etc. The BSOE constituents including the program faculty, students, alumni, employers, and the Industrial Advisory Board may also offer feedback through the assessment process for improvement. A schematic of the assessment and improvement process is shown in the flow chart below.



Continuous assessment and improvement process for student outcomes

Appendix 2 – Correlation between student outcomes and program educational objectives

Student Outcomes	Objective 1 Engineering Practice in Ocean Environment	Objective 2 Contributions to the field	Objective 3 Pursue further study/Participate Professional Societies	Objective 4 Leadership	Objective 5 Societal Awareness	Objective 6 Standards and Codes
Outcome (1) Application of Math, Science	X	X				
Outcome (2) Design	X	X			X	X
Outcome (3) Communication				X		
Outcome (4) Impact of Engineering Solutions	X	X			X	X
Outcome (5) Team work				X		
Outcome (6) Experimentation	X	X				X
Outcome (7) Life-long learning			X		X	
Outcome (8) Standard and Codes	X	X				X

Appendix 3 - Mapping of OE Core Courses to Students Outcomes

	Courses	Student Outcomes							
		1	2	3	4	5	6	7	8
Fall	EOC 3123 OE Fluid Mechanics	x							
	EOC 4631C OE Data Analysis	x					x		
	EOC 4422 Ocean Wave Mechanics	x				x			
	EOC 4804 OE Senior Design		x	x	x	x		x	x
	EOC 4193 Ocean Thermal Systems		x						
	EOC 3213 Materials 1 – Marine Topics	x	x		x				
Spring	EOC 3130L OE Lab			x		x	x	x	
	EOC 3410C Structural Analysis	x					x		x
	EOC 3306 Acoustics for Ocean Engineers	x			x				
	EOC 4804L OE Systems Control & Design		x	x	x	x		x	x
	EOC OCE 3008 Oceanography				x				

Each of the student outcomes is evaluated based on the “X” mark shown above.

Appendix 4-1 Alumni Survey Form for Student Outcomes

Using a numerical scale ranging from 1 to 10, with 1 meaning poor, 7 satisfactory and 10 excellent, please assess how well the BSOE program at FAU achieves the student outcomes through its curriculum. If unable to rank any of the outcomes, you may leave that blank. Please return the completed form to hmahfuz@fau.edu. Thanks.

<p align="center">BSOE Program Student Outcomes</p> <p>The student outcomes of the BSOE program at FAU are the following:</p>	<p align="center">Assessment</p> <p>1.....7.....10 Poor Satisfactory Excellent</p>
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
(3) an ability to communicate effectively with a range of audiences	
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
(5) an ability to function effectively in a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	
(8) An ability to understand, consider, apply and test engineering standards and codes	

Name: _____ **Year of Graduation with BSOE at FAU:**

Present Affiliation and Address:

Appendix 4-2 Employer Survey Form for Student Outcomes

Based on the performance of FAU-BSOE graduates, please assess how the BSOE program at FAU fares in achieving the learning outcomes through its curriculum (using a scale ranging from 1 to 10, with 1 meaning unsatisfactory, 5 satisfactory and 10 excellent). If unable to evaluate any of the outcomes, you may leave that blank. Please return the completed form to Dr. Mahfuz (hmahfuz@fau.edu). Thanks.

BSOE Program Student Outcomes	Assessment Scale
The student outcomes of the BSOE program at FAU are the following:	17.....10 Poor Satisfactory Excellent
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
(3) an ability to communicate effectively with a range of audiences	
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	
(8) An ability to understand, consider, apply and test engineering standards and codes	

Your Name: _____ **Date:** _____

Affiliation and Address:

Current Email Address:

Appendix 4-3 Graduating Seniors Survey Form for Student Outcomes

Using a scale ranging from 1 to 10, with 1 meaning unsatisfactory, 5 satisfactory and 10 excellent, please assess how the BSOE program at FAU fares in achieving the learning outcomes through its curriculum. If unable to evaluate any of the outcome(s), you may leave that blank. Please return the completed form to Teresa Perez or Dr. An. Thanks.

PS: You may also send any additional comments about the program on p.2 of this form.

<p style="text-align: center;">BSOE Student Outcomes</p> <p>The learning outcomes of the BSOE program at FAU are the following:</p>	<p style="text-align: center;">Assessment Scale</p> <p>1.....5.....10 Unsatisfactory Satisfactory Excellent</p>
(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 for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Name:

Email where you can be reached in the future:

Appendix 4-4

Department of Ocean & Mechanical Engineering

Student Survey of Course Outcomes

Course Number and Title: EOC 4422 Ocean Wave Mechanics

Semester Taught: _____

Instructor: _____

Please use this form to rate your personal feelings of achievement of the published outcomes for the course as listed below. The following 0 to 5 rating scale should be used in assessing your achievement of the outcomes. This information will be presented for review to the Department ABET/SACS committee at the end of each semester. The committee will evaluate performance of the specified outcomes by the students and make recommendations for changes as appropriate.

5 - Complete understanding of the technical content of the outcome or the specified skills and confidence in applying the techniques to engineering problems.

4 - Good understanding of the technical content of the outcome or the specified skills and an ability to apply the techniques to engineering problems.

3 - Adequate understanding of the technical content of the outcome or the specified skills and some ability to apply the techniques to engineering problems.

2 - Marginal understanding of the technical content of the outcome or the specified skills and some difficulty in applying the techniques to engineering problems.

1 - No understanding of the technical content of the outcome or the specified skills.

0 - Did not cover the information specified in the outcome in the class.

Outcome 1: An ability to apply the knowledge of mathematics for formulation and analysis of ocean wave and boundary-value fluids problems. (1) _

Outcome 2: A thorough knowledge of the basic properties of ocean waves in deep and coastal waters, and mechanisms of wave generation. (1) _____

Outcome 3: An ability to determine wave forces on fixed and floating structures. (1,6) _____

Outcome 4: A basic knowledge of the relation between atmosphere and sea states, and wave modeling and spectra. (1) _____

Outcome 5: An ability to make measurements of surface waves and analyze experimental data (6) _____

Outcome 6: An ability to work on team projects (5) _____

Additional Comments:

Appendix 4-5 - Direct Course Assessment Form (Blank)

Course Information:

Semester / Year:

Instructor:

ABET Outcome: SO1

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Indicator for Assessing of SO1

Indicator	Inadequate (1)	Adequate (2)	Proficient (3)
Identify, formulate and solve an engineering problem	Achieve only 1 of the following: <ul style="list-style-type: none"> Sufficiently identify the problem Sufficiently formulate the problem Sufficiently solve the problem 	Achieve 2 of the following: <ul style="list-style-type: none"> Sufficiently identify the problem Sufficiently formulate the problem Sufficiently solve the problem 	Achieve all of the following: <ul style="list-style-type: none"> Sufficiently identify the problem Sufficiently formulate the problem Sufficiently solve the problem

Assignment Related to the Indicator:

Mapping from the Assignment to the Indicator's Performance

Inadequate (1)	Adequate (2)	Proficient (3)
Student achieves < XX% in the assignment	Student achieves >= XX% but ≤ XX% in the assignment	Student achieves >= XX% in the assignment

ABET SO1 Assessment Table

ABET Student Outcome	Assignment	Indicator	Level of Achievement (1-3)		
			# of students achieving Inadequate (1)	# of students achieving Adequate (2)	# of students achieving Proficient (3)
1		Identify, formulate and solve Engineering Problems			

Rubric for Assessing Student Outcome Criteria:

- At least 80% of students achieve Level 3 → **Achieved outcome**
- At least 80% of students achieve level 2 or above → **Achieved outcome with concerns**
- More than 20% of students achieve level 1 → **Outcome not achieved**

SO1 Student Outcome Evaluation

ABET outcome (1):

- Outcome not achieved
- Achieved outcome with concerns
- Achieved outcome

Improvement Plan

Appendix 4-6

EVALUATION OF EOC 4804 OCEAN ENGINEERING SYSTEMS CONTROL & DESIGN

Instructor:

Semester:

Project Title:

Evaluator's Name and Affiliation (Please Print): _____

Dear Evaluator: Based on the design accomplishments, team effort and project presentation, please rate the team's overall attainment of the following outcomes. **If any of the outcome(s) cannot be evaluated based on the available information, you may leave those unevaluated.** Any additional comments are welcomed. Please return the completed forms to Dr. Pierre-Philippe Beaujean. Thanks.

ABET Outcomes	Evaluation		
	Poor	Satisfactory	Excellent
Outcome 1: An ability to design a system that satisfies an ocean engineering related need (outcome 2)			
Outcome 2: An ability to function in multidisciplinary design teams (outcome 5)			
Outcome 3: An ability to communicate effectively during the progress review meetings and Final Design Review (outcome 3)			
Outcome 4: An understanding the potential economic, environmental, and societal impacts of ocean engineering designs (outcome 4)			
Outcome 5: Recognition of the need for self-study and life-long learning in engineering design (outcome 7)			
Outcome 6: An understanding of how contemporary issues affect engineering design (outcome 4)			
Outcome 7: An ability to understand, consider, apply and test engineering standards and codes (outcome 8)			

Additional Comments: (Continue on the other side, if more space is needed.)

Appendix 4-7 (Frequency of Assessment)

The frequency of outcomes assessment is provided below

Assessment Method	Outcomes Assessed	Frequency	Rationale and Discussion
Indirect Assessments			
Alumni Survey	1-7	Once every 3 years	Once every 3 years the alumni that graduated over the previous five years are surveyed. Thus, all graduates are surveyed at least once on attainment of student outcomes
Employer Survey	1-7	Once every 3 years	This survey is conducted along with the alumni survey to get the viewpoints of both the graduates and their employers. The frequency is found to be just about right to get a reasonable response and returns.
Senior Exit Interview	Overall Program and Objectives	Each Year	The exit interview covers the overall program, its strengths and weaknesses, and seeks input and opinions for improvement.
Student's Assessment of Outcomes	1-8 (since Fall 2024)	Each semester	This provides the students' own assessment of the attainment of each of the student outcomes linked with each of the courses listed in Table 3-2.
Direct Assessments			
Senior Design	1-8 (since Fall 2024)	Each semester	Survey of faculty and industry and Navy representatives attending CDR and final student presentations of their projects on their assessment of the level of attainment of each of the student outcomes linked to the senior design course sequence.
Direct Assessment of Student Outcomes	1-8 (since Fall 2024)	Each semester	Specific class assignments (and not the overall course grade) in the courses listed in Table 3-2 are used for this assessment.

Appendix 4-8 (Expected Level of Attainment for Student Outcomes)

The criteria set by the ocean engineering faculty for the expected level of attainment of outcomes and the evaluation of the assessments are summarized in Tables below. The benchmark we used for the alumni, employers and graduating senior surveys is that at least 70% of program constituents find the students to have attained desired outcomes to a satisfactory or better level (7 on a scale of 10 was considered satisfactory).

Metrics for Expected Level of Attainment for the Indirect Assessment

Indirect Assessment	Satisfactory Attainment Criteria set by faculty
Alumni Survey	At least 70% of the alumni assess all student outcomes to be satisfactorily attained.
Employer Survey	At least 70% of the employers assess all student outcomes to be satisfactorily attained
Graduating Senior Survey	At least 70% of the graduating seniors assess all student outcomes to be satisfactorily attained
Student Survey on Course Outcomes	Average score of 7 or above (out of 10) as indicator of attainment of each of the student outcomes.

Metrics for Expected Level of Attainment for the Direct Assessment.

Direct Assessment	Satisfactory Attainment Criteria set by faculty
Senior design project performance appraisal	Constituents assess all student outcomes to be at least satisfactorily attained
Direct assessment of performance in Coursework	Average score of 7 or above (out of 10) in class assignments as indicator of satisfactory level of attainment of each of the assessed student outcomes.