

# Bachelor of Science in Electrical Engineering Undergraduate

## *Expanded Statement of Institutional Purpose*

### **Institutional Mission Reference**

The B.S. degree program in Electrical Engineering offers a high quality degree program that meets national standards of excellence. It is a significant component of the University's commitment to science, engineering, and technology, particularly in fields of major importance to the region. The program provides the skills and knowledge unique to Electrical Engineering that support the engineering profession in meeting the growing needs of the region and the nation. Simultaneously, the program comprises the general education components that yield a well-rounded graduate who is aware of societal needs and issues. The program faculty are committed to the highest quality of teaching and discovery of new knowledge.

### **Institutional Goal(s) Supported**

The B.S. degree program in Electrical Engineering supports the University goals of (a) quality undergraduate programs, (b) quality teaching, (c) application of engineering principles to serve the local community through applied research and development, and (d) life-long learning. The major strategic initiatives supported by the department are Strategic Initiative 1 (High-Quality, Distinctive Undergraduate Programs), Strategic Initiative 8 (Enhanced Quality of University Life), Strategic Initiative 9 (Inclusive and Supportive University Environment), and Strategic Initiative 10 (Strengthen and extend the existing relationships with community colleges, the U. S. Navy, and industry).

## *Intended Educational (Student) Outcomes, Methods for Assessment, Criteria for Success, Assessment Results, and Use of Results*

### **Intended Outcome 1**

Our graduates must demonstrate the ability to apply knowledge of mathematics, science, and engineering.

**Method for Assessing Outcome 1 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

Employee Survey of Co-Op students (This long standing survey addresses aspects of this outcome)

These instruments are evaluated holistically to determine whether the outcome was successfully met.

### **Summary of Assessment Data Collected for Outcome 1:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

CoOp Survey: Failed

Alumni Survey: Passed

**Use of Assessment Results from Intended Outcome 1 to Improve Academic Program:** No changes to program with respect to this outcome anticipated in near future

**Intended Outcome 2**

Our graduates must demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.

**Method for Assessing Outcome 2 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 2:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

Alumni Survey: Passed

**Use of Assessment Results from Intended Outcome 2 to Improve Academic Program:** No changes to program with respect to this outcome anticipated in near future

**Intended Outcome 3**

Our graduates must demonstrate the ability to design a system, component, or process to meet desired needs.

**Method for Assessing Outcome 3 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

These instruments are evaluated holistically to determine whether the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 3:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

Alumni Survey: Passed

**Use of Assessment Results from Intended Outcome 3 to Improve Academic Program:** No changes to program with respect to this outcome anticipated in near future

**Intended Outcome 4**

Our graduates must demonstrate the ability to function on multi-disciplinary teams.

**Method for Assessing Outcome 4 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

Employee Survey of Co-Op students (This long standing survey addresses aspects of this outcome)

These instruments are evaluated holistically to determine whether the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 4:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Failed

CoOp Survey: Passed

Alumni Survey: Failed

**Use of Assessment Results from Intended Outcome 4 to Improve Academic Program:** No changes to program with respect to this outcome anticipated in near future

**Intended Outcome 5**

Our graduates must demonstrate the ability to identify, formulate, and solve engineering problems.

**Method for Assessing Outcome 5 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

Employee Survey of Co-Op students (This long standing survey addresses aspects of this outcome)

These instruments are evaluated holistically to determine whether the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 5:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

CoOp Survey: Failed

Alumni Survey: Passed

**Alternate Method for Assessing Outcome 5 and Criterion for Success (NOTE: Alternate methods are optional):**

This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

Employee Survey of Co-Op students (This long standing survey addresses aspects of this outcome)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

**Summary of Assessment Data Collected, Alternate Method for Outcome 5:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

CoOp Survey: Failed

Alumni Survey: Passed

**Use of Assessment Results from Intended Outcome 5 to Improve Academic Program:** No changes to program with respect to this outcome anticipated in near future

**Intended Outcome 6**

Our graduates must demonstrate the ability to understand professional and ethical responsibilities

**Method for Assessing Outcome 6 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 6:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

Alumni Survey: Failed

**Summary of Assessment Data Collected, Alternate Method for Outcome 6:** No changes to program with respect to this outcome anticipated in near future

**Intended Outcome 7**

Our graduates must demonstrate the ability to communicate effectively.

**Method for Assessing Outcome 7 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

Employee Survey of Co-Op students (This long standing survey addresses aspects of this outcome)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 7:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Failed

CoOp Survey: Failed

Alumni Survey: Failed

**Use of Assessment Results from Intended Outcome 7 to Improve Academic Program:** The major issue here is the lack of proficiency in writing. Although all ODU students must pass a writing proficiency as one of the requirements for graduation, as noted previously, there still appears to be a deficiency in writing skills. This point was discussed in some detail at the ECE faculty retreat held in January of 2003. Two specific steps have been taken. In ECE 284, the required sophomore level digital lab, beginning in spring of 2003, all lab reports are graded both for technical content, and writing (evaluated by a graduate student majoring in English, who had formerly worked in a technical field). Comments on writing errors are noted on each report, and the English graduate student is also given a few minutes in each lab recitation period to discuss writing issues. Secondly, in ECE 382, a required electronics laboratory, a portion of each lab recitation is devoted to a brief (roughly 15 minute) writing exercise. A graduate student majoring in English evaluates this exercise. Each exercise is a topic of some technical interest, such as a memorandum, email or business letter, or asks the students to explain some aspect of the current lab assignment or other related topic. Again feedback is given each week, and credit for the writing is factored into the lab grade. Note that these sophomore and junior level courses with writing exercises augment the two required English courses, and the writing needed for the senior design projects courses.

For about the past three years, we have also had Writing Seminars in ECE 486, EE Design II. They consist of two one-hour sessions, administered by one of technical writers in the engineering dean's office, aimed at helping students specifically with the written portion of their senior design project. These seminars again emphasize the importance of writing to our students.

#### **Intended Outcome 8**

Our graduates must demonstrate the ability through the broad education necessary, to understand the impact of engineering solutions in a global and societal context.

**Method for Assessing Outcome 8 and Criterion for Success:** This outcome is assessed using the following instruments:

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

#### **Summary of Assessment Data Collected for Outcome 8:**

Senior Exit Survey: Failed

Alumni Survey: Failed

**Use of Assessment Results from Intended Outcome 8 to Improve Academic Program:** concern over this outcome was coupled with frequent student comments made during senior exit interviews that students did not think course material was well related to "real-world" applications. In an attempt to address these related issues, the faculty decided at the ECE retreat in January of 2003 to develop a materials for a technical application, which would then be used in several courses as an example of technology related to many concepts in electrical engineering. Additionally, the impact of this technology in society would be discussed. Two technologies were suggested: wireless communications (cell phones), and digital cameras. During the spring semester, two ECE faculty members developed this idea more fully and chose digital cameras as the "theme" technology. Their decision was based primarily on the resources that could be easily located and the major technical interest areas of the ECE faculty. At the time of this writing, a Web page is being developed for the digital camera materials, and the plan to make use of these materials in several courses, beginning in fall of 2003

**Intended Outcome 9**

Our graduates must demonstrate the ability to engage in life-long learning, and understand the need for, and have the desire to engage in it.

**Method for Assessing Outcome 9 and Criterion for Success:** This outcome is assessed using the following instruments:

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

Employee Survey of Co-Op students (This long standing survey addresses aspects of this outcome)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 9:**

Senior Exit Survey: Passed

CoOp Survey: Failed

Alumni Survey: Passed

**Use of Assessment Results from Intended Outcome 9 to Improve Academic Program:** No changes to program with respect to this outcome anticipated in near future

**Intended Outcome 10**

Our graduates must demonstrate the ability to understand contemporary issues.

**Method for Assessing Outcome 10 and Criterion for Success:** This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

**Summary of Assessment Data Collected for Outcome 10:**

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

**Use of Assessment Results from Intended Outcome 10 to Improve Academic Program:** No changes to program with respect to this outcome anticipated in near future

1. **Outcome 11:** Our graduates will demonstrate the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

#### Methods of Assessment and Criterion for results

This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

Alumni surveys (a nationally normed survey prepared by Educational Benchmarks Inc.)

Employee Survey of Co-Op students (This long standing survey addresses aspects of this outcome)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

#### Assessed Results:

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

CoOp Survey: Failed

Alumni Survey: Failed

#### Actions:

No specific actions are contemplated in the near future.

**Outcome 12:** Our graduates will demonstrate the ability to apply the knowledge of advanced mathematics of differential equations, linear algebra, complex variables, and discrete mathematics.

#### Methods of Assessment and Criterion for results

This outcome is assessed using the following instruments:

Student course assessments (students are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Instructor Course Assessments (Instructors are asked their level of agreement on a scale of 1-6 to various prompts related to this outcome)

Student Program Assessments (consist of three parts, a nationally normed survey prepared by Educational Benchmark Inc, a departmentally prepared instrument which addresses aspects of this outcome, and a group interview with the department chair where students are encouraged to have a frank open discussion about any aspect of program)

These instruments are evaluated holistically to determine whether or not the outcome was successfully met.

#### Assessed Results:

Student/Faculty Course Assessment: Passed

Senior Exit Survey: Passed

#### Actions:

No specific actions are contemplated in the near future.