

Bachelor of Arts in Engineering Science (BA-ES) Assessment Plan

Background

The Bachelor of Arts degree in Engineering Science (BA-ES) is a multidisciplinary program that emphasizes understanding and application of engineering, scientific and mathematical principles. The program provides a broad foundation in the sciences and associated mathematics that underlie engineering, and provides students the opportunity to obtain an in-depth knowledge in an area of their choosing through technical electives. This program offers considerable flexibility, and permits students to develop an individual plan of study to meet educational goals that require working at the interface between engineering and other disciplines.

Program Learning Objectives

Students successfully completing the program should possess the following attributes:

1. Plan and articulate in a *Statement of Focus*¹ an individual program of study that describes an area of concentration and the learning objectives the student intends to achieve.
2. Ability to apply foundations of physics and math to basic engineering problems.
3. Ability to communicate ideas, scientific findings and engineering outcomes effectively in written reports and oral presentations.
4. Be able to articulate and succeed in achieving a post-graduation career path as reflected in student's *Statement of Focus*.

Proposed Program Assessment Methods

Direct

- Student and Engineering advisor review student's course assessments that are related to achievement of program learning objectives 1-2. (annual)
- Writing requirement course assessments. (annual)
- Post-graduation placement in Engineering or Science related fields. (annual)

Indirect

- Senior survey questions asking senior to self-assess learning.

¹ *Statement of Focus*: Each student intending to major in Engineering Science must prepare a short statement of academic focus that identifies his or her educational objectives. This statement must accompany the declaration of major form submitted at the end of the student's sophomore year. This statement will detail the student's rationale for their six engineering and natural science electives that provide a coherent context for the major in Engineering Science, both in terms of the understanding of engineering and of the student's educational objectives. The student's selection of clusters as they relate to the major should also be addressed. Examples of potential educational objectives include architecture studies, education, public policy, energy policy, global development, and music/art technology.

- Alumni survey questions asking alumni to self-assess learning.

Appendix A:

Program of Study Requirements for BA-ES degree

Prerequisites

(6 courses)

- **Mathematics (3 courses including differential equations)**
- MTH 141, MTH 142, MTH 143, and MTH 163 or MTH 165
- MTH 161, MTH 162, and MTH 163 or MTH 165
- MTH 171, MTH 172, and MTH 173

Note: the sequence MTH 141, MTH 142 and 143 counts as only two courses for the degree.

- **Physics (2 courses)**
- PHY 121, 122; or PHY 141, 142
- **Chemistry (1 course)**
- CHM 131

Required Hajim School Courses

(Choose 3, one from each group)

- Computer Programming: CSC 160, 161, 170 or 171; BME 221
- Introduction to Engineering: EAS 10X
- Engineering Mechanics: BME 201 or ME 120

Core Hajim School Courses

(Choose 1 course from any two categories below)

- Circuits: BME 210, ECE 111, or ECE 210
- Mechanics of Fluids/Solids: CHE 243, ME 225, or ME 226
- Thermodynamics: CHE 225 or ME 123
- Optics: OPT 241

Hajim School Electives

(Choose 4)

Any 4 four-credit Hajim School courses except those listed above as Required or Core Courses. These courses should be chosen in consultation with a faculty adviser, and may include upper-level writing courses. At least one of the courses should be 200-level.

Natural Science Electives

(Choose 2)

Any two courses in astronomy, biology, chemistry, earth and environmental sciences, mathematics, physics, or statistics except those listed above as Prerequisite courses.

Two Clusters

ES Degree candidates must possess a thorough understanding of social and economic forces, and have an appreciation of cultural and humanistic traditions. Therefore, all Engineering Science students are required to complete minimally two clusters, one in the humanities and one in the social sciences. The possibilities of coupling the Engineering Science major with humanities and social science disciplines are boundless, and prepare students to address the complexities of the world in which we live.

Writing
(3 courses)

The ability to communicate clearly and effectively is extremely important in engineering. All students are advised to complete the College's Primary Writing Requirement (WRT 105) by the end of their first year. The Engineering Science upper-level writing requirement will be met by satisfactorily completing either two of the following Hajim School courses, or at least one from the list below and one that satisfies the upper-level writing requirement in a natural science department:

- BME 221, 230, 260
- CHE 246, 255
- CSC: See department
- ECE 111
- ME 204, 205, 241, 242, 251
- OPT 197, 198, 199