Biological Systems Engineering (BSE) Communications Program

Program Overview
The Biological Systems Engineering (BSE) Communications Program has been in place since the mid-1990s to provide substantial instruction in written, oral, and visual communications. The curriculum includes both engineering courses and a dedicated professional development course, and encompasses the sophomore, junior, and senior levels. Faculty members teach courses, conduct workshops, tutor students, grade writing and speaking assignments, and conduct regular programmatic assessment. The program covers topics such as professional communication, laboratory and research report writing, poster sessions, public speaking, engineering ethics, interpersonal and professional development skills, teamwork skills, and critical and creative thinking skills.

Employers and graduates of BSE routinely compliment the Communications Program and stress its value in professional employment. The BSE Advisory Board also strongly supports the program.

Because the program is already in place, this report describes the existing program and the assessment plan; implementation and phasing are not at issue.

Student Outcomes
By graduation, BSE students should be able to:

- Write prose that conforms to Standard Written American English.
- Write clearly, concisely, and coherently.
- Speak clearly and articulately in front of both large and small groups (e.g. appropriate tone, volume, speed).
- Demonstrate proficiency in the common forms of engineering communication: business correspondence, poster sessions, laboratory reports, proposals (written and oral), progress reports (written and oral), at least one type of professional report (journal articles, recommendation reports, design reports, feasibility reports), and electronic mail.
- Identify the explicit and implicit goals, needs and expectations of their audience in any communication situation.
- Identify their explicit and implicit goals in any communication situation.
- Identify additional factors that bear on the communication situation.
- Identify the genre (e.g. recommendation report, feasibility study, proposal) and the medium (e.g. paper, electronic, oral) best suited to helping the audience and the author achieve their goals.
- Adapt the content, organization, language, tone, and medium of the appropriate genre to meet the demands of the specific communication situation at hand.
Select the most effective means of visually representing engineering data/information based on the specific situation (audience, purposes, and context).

- Design information to make it easily accessible for audiences (e.g., using meaningful headings, subheadings, lists, and related visual cues to make documents easy to skim; designing slides to help audiences easily follow presentations; providing tables of contents, lists of figures/tables, indexes).
- Locate and use resources to learn the communication practices/conventions of any culture, and adapt communication accordingly.
- Conduct effective meetings.
- Maintain effective project documentation.
- Develop documents and presentations collaboratively in a team environment.
- Provide effective feedback to colleagues based on oral or written presentations.
- Communicate ethically.

Curriculum

The Communications Program spans the sophomore, junior, and senior years; five semesters include a communications component.

BSE Courses:

- BSE 2105-2106 Introduction to Biological Systems Engineering, sophomore year (2 semesters). Taught by BSE faculty member.
- BSE 3134 Undergraduate Seminar, junior year (1 semester). Taught by BSE faculty member.
- BSE 4125-4126 Comprehensive Design Project, senior year (2 semesters). Taught by BSE faculty member and other BSE faculty direct and advise design projects.

Table 1 provides a detailed list of the current course objectives and corresponding assignments. All communications assignments are introduced, taught, and graded by a BSE faculty member.

Assessment

We assess the BSE Communications Program in three primary ways:

- Student work in each course is graded to assess individual performance.
- Alumni are surveyed periodically to assess the extent to which the program provided effective professional preparation.
- Employers of alumni are surveyed periodically to assess the communication skills of alumni.

We then design and implement programmatic changes (including revisions to individual assignments, teaching strategies, and curricular structure) annually in response to these three levels of feedback.

In addition, the BSE faculty remains current on issues related to technical communication and engineering education through research, publications, conferences, and professional journals, and
regularly reviews the program (including assignments, teaching practices, evaluation rubrics, and related material) to insure that it remains current with the needs of the engineering profession.
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<th>COURSE</th>
<th>Outcomes</th>
<th>Assignments</th>
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| **BSE 2105**  
*Introduction to Biological Systems Engineering* | Demonstrate improved writing skills gained through writing experiences  
Write technical laboratory reports  
Demonstrate improved abilities to solve engineering problems using Excel and MATLAB  
Develop practical solutions to design problems, and interpretation of data and graphs  
Present oral and written reports of completed engineering design project. Report writing (Intro, procedure, tables, data, graphs) | Presentation of BSE Faculty/Staff (oral)  
2 In-class Writing Assignment on current events (written)  
4 Out-of-class Lab Reports (written)*  
Develop Graphs & Tables (5-MATLAB reports) (written)  
In-class Sketch Illustrations (freehand drawing)  
Team Design Presentation (written & oral) |
| **BSE 2106**  
*Introduction to Biological Systems Engineering* | Demonstrate improved writing skills gained through writing experiences  
Write technical laboratory reports  
Demonstrate improved abilities to solve engineering problems using Excel and MATLAB,  
Develop practical solutions to design problems, and interpretation of data and graphs  
Present oral and written reports of completed engineering design project. Report writing (Intro, procedure, tables, data, graphs) | 2 In-class Writing Assignment on current events (written)  
5 Out-of-class Reports (written)*  
Develop Graphs & Tables (4-MATLAB reports) (written)  
Team Design Presentation (written & oral) |
| **BSE 3134**  
*Undergraduate Seminar* | Explain the components of an effective oral technical presentation  
Give an effective oral technical presentation  
Conduct and present the results of a literature review on a technical topic  
Explain and demonstrate the concept of peer review  
Identify and utilize resources, prepare materials, and develop strategies to aid in career development and job searching  
Demonstrate improved oral and written communication skills | Literature Review on Technical Topic (written)*  
Oral Presentation of Technical Topic (oral)  
Mock interview (oral, written report)  
Resume (written)  
Cover Letter (written)  
Engineering Expo/Company Profile (written) |
| **BSE 4125**  
*Comprehensive Design Project* | Managing Engineering Projects and Project Communication  
Successfully design, propose, and conduct an extended design project  
Understand the role of communication in engineering design & project management  
Design communication that meets audience/client/project needs at all stages of a project | Problem Statement & Proposal (written)  
Non-technical letter describing problem (written)  
Team Design Notebooks (written)  
2 Team Progress Reports (written)*  
Team Progress Presentations (oral)  
Team Design Proposal (written) |
| **BSE 4126**  
*Comprehensive Design Project* | Managing Engineering Projects and Project Communication  
Successfully design, propose, and conduct an extended design project  
Understand the role of communication in engineering design & project management  
Design communication that meets audience/client/project needs at all stages of a project | Presentation of engineering topics/current events (oral)  
Team Design Notebooks (written)  
Team Progress Report (written)*  
Team Progress Presentations (oral)  
Team Poster Presentation of final design (oral)  
Team Final Design Report (written) |

*This table deals only with the communications component of each course; it does not address the corresponding technical content.*
* Items marked with asterisks always include drafts and revisions. Other assignments may include revision opportunities as well.