Program Overview

The Materials Science and Engineering (MSE) Engineering Communications Program has been in place since 1993 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 level. The director, together with the program staff, teach courses, conduct workshops, tutor students, grade writing and speaking assignments, and conduct regular programmatic assessment. The program covers topics such as business and 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 MSE routinely compliment the Communications Program and stress its value in professional employment. The departmental 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, MSE 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 (“genres”) 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).
- Identify the explicit and implicit goals, needs and expectations of their audience in any communication situation.
- Identify their own 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, 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.

**Staffing**

**Program Director:** The Program Director is a member of the professoriate, whose qualifications will always include a doctoral degree in technical communications, English, communications, or related field and an active research program in engineering communications. This director position is shared between MSE and Engineering Science and Mechanics (ESM); 80% of this faculty member’s time is allocated to the MSE/ESM program and 20% is allocated to the Engineering Education Department, which is the faculty member’s home department.

**Program Staff:** Like the Director, the Program Staff provides instructional support to both MSE and ESM. The staff includes 1) an Assistant Director at the Instructor level with at least a Master’s Degree in technical communication, English, communications, or related field and experience teaching technical communication, and 2) a Graduate Teaching Assistant pursuing a degree in English, Communications, Engineering Education, or related field.

**Curriculum**

The Communications Program spans the sophomore, junior, and senior years in each department. In MSE, at least one course per year includes a communications component; in MSE, at least one course per semester includes a communications component.

**MSE Courses:**
- 2884 Professional Development I – Fall, Sophomore. Taught by Program Director.
- 2044 Fundamentals of Materials – Fall, Sophomore. 3 workshops and grading by Program Staff.
- 3314 Physical Metallurgy Lab – Spring, Sophomore. 3 workshops and grading by Program Staff.
- 3064 Mechanical Behavior – Fall, Junior. 3 workshops and grading by Program Staff.
- 4424 Physical Ceramics Lab – Fall, Junior. 3 workshops and grading by Program Staff.
- 3884 Professional Development II – Spring – Junior. Taught by Program Director.
- 4085-4086 Senior Design Project – Senior year (2 semesters). Co-taught by MSE faculty and Program Director.
- 4095-4096 Honors Senior Design – Senior year (2 semesters). Co-taught by MSE faculty and Program Director.
- 4894 Writing Portfolio – Spring, Senior. Taught by Program Director.

Table 1 provides a detailed list of the current course objectives and corresponding assignments. All communications assignments are introduced, taught, and graded by a member of the Engineering Communications Program.
### Table 1: MSE Communications Program Curriculum*

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<th>Course</th>
<th>Outcomes</th>
<th>Assignments</th>
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| MSE 2884 — ProDev Fall / Soph. (1 credit) | *Communication Basics: The Design Process and the Fundamental Tools*  
- Understand the role of communication in the workplace  
- Develop communication based on analysis of audience/purpose/context  
- Write clear, concise, concrete prose  
- Design documents and presentations to make information visually accessible  
- Present information orally  
- Collaborate on speaking assignments  | - Job Application Package w/ audience analysis*  
- Workplace Report  
- Workplace Presentation (group) w/ audience analysis  
- Poster session with audience analysis  
- Ethical analysis |
| MSE 2044 — Intro to Mat Fall/Soph | *Researching Technical Information; Communicating with Non-specialists*  
- Research technical information  
- Communicate technical information to non-technical audiences  | - Article for Engineer's Forum* |
| MSE 3314 — Metals Spring/Soph | *Recording and Presenting the Results of Laboratory Work*  
- Understand the role of documenting experimental work  
- Record experimental information to meet professional, legal, & related standards  
- Write academic laboratory reports that record relevant information, analyze/interpret data, and develop conclusions and recommendations  
- Represent engineering data visually (tables, charts, graphs)  | - Laboratory Notebooks  
- 3 Laboratory Reports* |
| MSE 4424 — Ceramics Fall/Junior | *Reporting Results in an Industry/Workplace Context*  
- Understand the role of documenting work within workplace contexts  
- Understand the use of professional journals as the means to disseminate knowledge  
- Synthesize and summarize experimental/design work in professional reports  
- Develop reports based on work completed collaboratively  
- Select the most effective means of representing engineering data visually  | - 3 Industry-quality progress reports*  
- 1 Article for the *Journal of the American Ceramic Society* |
| MSE 3884 — ProDev II Spring/Junior (1 credit) | *Communicating Across Cultures; Developing Engineering Projects*  
- Communicate technical information to non-technical audiences  
- Locate and use resources for addressing cross-cultural communication  
- Understand the role of documentation in project development  | - Group Service-Learning Project w/ audience analysis  
- Cultural Communication Presentation (group)  
- Preliminary Literature Review * |
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| MSE 4085/6 – Sr. Des Senior | **Managing Engineering Projects & Project Communication**  
- Successfully design, propose, and conduct an extended research project  
- Understand the role of communication in engineering design & project management  
- Design communication that meets audience/project needs at all stages of a project | - Collaborative Proposal (Written and Oral)*  
- At least 4 Collaborative Progress Reports (Written and Oral)  
- At least 2 Collaborative Technical Reports (Written and Oral)*  
- Laboratory Notebooks |
| MSE 4894 – Portfolio | **Effectively demonstrating communication skills**  
- Create a portfolio of key writing and speaking assignments  
- Document design and decision-making with respect to communication | - Relevant assignments from prior courses  
- Memo explaining assignments and development of communication skills |

*This table deals only with the communications component of each course; it does not address the corresponding technical content.*

* Items marked with an asterisks always include drafts and revisions. Other assignments may include revision opportunities as well. For every assignment, students are always encouraged to meet with the Program Staff for one-on-one tutoring.*
**Assessment**

We assess the MSE Communications Program in three primary ways:

- Student work in each course is graded to assess individual performance.
- Beginning with the 2004-05 academic year, student portfolios MSE 4894 will be assessed annually against the “Student Outcomes” by faculty in both engineering and technical communications to evaluate programmatic effectiveness and identify areas that require improvement.*
- Alumni are surveyed periodically to assess the extent to which the program provided effective professional preparation.

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 Program Director, along with the staff, remain current on issues related to technical communication and engineering education through research, publications, conferences, and professional journals, and regularly review the program (including assignments, teaching practices, evaluation rubrics, and related material) to insure that it remains current with the needs of the engineering profession.