

# **MATERIALS SCIENCE AND ENGINEERING 4894**

## **WRITING IN MATERIALS SCIENCE AND ENGINEERING**

**(ADP: TITLE WRITING IN MSE)**

### **I. CATALOG DESCRIPTION**

4894 WRITING IN MATERIALS SCIENCE AND ENGINEERING (2WI)

Each student develops a portfolio of writing in various styles from work performed in eight required courses. The completed portfolio meets the writing-intensive requirements of the University Core. Students register for this course in the semester during which their portfolio will be completed. (OH,OC) Pre: 2044; 2094; 3034; 3314; 4085 or 4095 Co: 4215; 4564; 4086 or 4096.

### **II. LEARNING OBJECTIVES**

Upon satisfactory completion of the writing portfolio, the student will have demonstrated effective communication skills in:

- preparing papers for publication in the open literature of the multi-disciplinary materials field;
- writing technical reports in a variety of formats required by industry, government, and academia and
- preparing research, engineering, or grant proposals;
- writing memoranda and/or short communications typical of the modern business and engineering community;
- writing letters of application for employment, graduate school, and/or fellowships;
- designing graphic and visual representations and interpretations of scientific and engineering data; and
- developing oral presentations of engineering and scientific reports (both in the lecture and poster presentation format).

These objectives will significantly exceed the Core Curriculum requirements for entering freshman in the fall of 1999.

### **III. JUSTIFICATION**

The University Core Curriculum Committee, with approval of the Commission on Undergraduate Studies and University Council, requires all students entering the University in 1994 to take one in-department writing-intensive course, and all students entering in 1999 and thereafter to take two such courses (University Core Curriculum: A Guide for Students 1993-1994, page 40). The MSE Department endorses these requirements; however, in a small department such as ours, there are several difficulties with the implementation of the requirements in either 3-hour lecture or coupled 1-hour laboratory courses. Notable among these are: the need to rotate faculty among our courses, several of whom are not comfortable with teaching WI courses and, perhaps most importantly, the problems associated with our co-op students who often must be in industry during the time WI courses are offered. Because of our size, we cannot teach multiple sections nor can we offer the course in more than a single semester during a calendar year.

We therefore propose an alternative model based upon the development of portfolios of student writing. We believe that it is pedagogically sound to teach writing and communications more slowly over an extended period of time, rather than all at once in a single course. With unanimous support of our faculty, we have modified eight required courses in our curriculum to include instruction in all aspects of writing

and communications in our field (see approved syllabi of prerequisite courses). None of these courses meets the requirements of a WI course as currently defined in the Guide. However, collectively, the quantity of writing required in these courses far exceeds the Core Curriculum requirements. It is proposed that a student portfolio of writing taken from these courses serve as an alternative to the two WI course requirement (see Sections V and VIII).

The following required MSE Core Courses have been designated by the faculty to be included in the writing-intensive program.

Academic Level	Course Number	Description
Fall Semester, sophomore	2044	Intro to Materials
Spring Semester, sophomore	2094	Analytical Methods
Fall Semester, junior	3314	Structure Properties
Spring Semester, junior	3034	Processing Lab
Spring Semester, junior/senior	4215	Electronic Materials
Spring Semester, junior/senior	4564	Polymer Engr. Lab
Fall & Spring Semester, senior or	4085-86 4095-96	Senior Design Project Honors Senior Project

Apart from these designated courses, several additional elective courses have significant writing components. The MSE Writing Director assists with these courses and will offer a minimum of twelve evening workshops per semester which address professional writing and communication tasks such as resumes, letters of application, developing a "professional persona," ethics in science and engineering, report and poster preparation and presentation.

The quality of work in the proposed portfolio will be monitored by the MSE Department Writing Director and certified by an external committee appointed from qualified VPI faculty by the Heads of the MSE and English Departments, and the Director of the University Writing Program. Mechanisms for maintaining the portfolios and for assisting students in difficulty have been devised and will be implemented.

Upon completing a satisfactory portfolio, students will register for this course on a zero-contact, zero-credit, pass-fail basis. Successful completion of the program will be required to meet the University Core requirement for graduation, and will be controlled by a passing grade on the student's checksheet.

#### **IV. PREREQUISITES & COREQUISITES**

The eight prerequisite and/or corequisite courses have all been modified to provide significant writing and communications instruction in the five distinct areas of materials science and engineering. This sequence of courses, all of which are required for the BSc in Materials Science and Engineering degree (see checksheet for graduating class of 1996 and thereafter), develop writing and communications skills in a logical and progressively more sophisticated sequence beginning the fall semester sophomore year through graduation. Samples of writing and graded communications work (poster session, oral presentations, letters, papers, senior design projects, reports, etc.) will be selected by the student from these courses for inclusion in the student's writing portfolio.

## **V. TEXTS AND SPECIAL TEACHING AIDS**

The required texts and teaching aids, including style manuals, handbooks, and computer software are described and purchased by students in the first two courses in the program. Please see requirements for 2044 and 2094.

## **VI. SYLLABUS**

Although the volume of writing assigned to students will be greater, the writing and communications portfolio will contain the following items which will have been revised, edited, and graded as C or above in the prerequisite courses:

- one senior project or honors senior project final report (minimum 15 pages) or one manuscript on a scientific topic suitable for publication in the materials science and engineering open literature (minimum 15 pages), Originating courses: 4085-4086/4095-4096.
- one formal researched technical report (minimum 10 pages), Originating courses: 3034, 4564;
- three laboratory reports or technical memos (minimum 5 pages each), Originating courses: 3034 and 4215;
- one report on research in progress (3 pages), Originating courses: 2094 AND 3034.
- one resume, Originating course: workshops;
- one letter of application, Originating course: workshops;
- one graded oral presentation (minimum 8 minutes speaking time), Originating courses: 2044, 4085-4086, and 4095-4096; and
- one graded poster presentation of professional meeting quality, Originating course: 2044.

All work which does not meet the grading standards of the portfolio may be revised and re-graded under the direction of the writing director and the originating course supervisor. However, such revision will in no way affect the grade already assigned in the originating course.

It is the responsibility of the MSE Department Writing Director to review annually the portfolio with each student during the spring semester, and to prepare a checksheet of completed and missing work. A copy of the checksheet will be given to the student and also will be placed in the student's academic file. The portfolio will be maintained in the department office, but the student may have access to the file at any time upon request to the department.

## **VII. OLD (CURRENT) SYLLABUS**

## **VIII. CORE CURRICULUM CONSIDERATIONS**

### CLASS SIZE AND INTERACTION

MSE is a small department and all courses in the department involve no more than 25 students per class. As the department grows to an estimated maximum of 40 students per class, we anticipate no difficulties in maintaining the quality of the program because of the significant amount of one-on-one personal instruction between the student, the instructor, and the writing director.

### USE OF WRITING ASSIGNMENTS

The attached descriptions of the MSE required core courses which each student must take have been modified to include specific communication learning objectives in addition to their technical learning objectives. Examinations of these objectives will show that:

- The student is lead through a carefully planned sequence of technical writing and engineering communications assignments. These assignments are designed to build on various skills as they are developed in each succeeding course.
- The communication assignments mimic almost every kind of writing and oral presentation typically found in a professional setting.
- The instructor in each course, in collaboration with the writing director, will teach the student to critically evaluate and revise his work in a carefully graded series of exercises. Our objective is that, on completion of the portfolio, the student will be able to self-edit all of his/her own work.
- We gradually shift the role of the writing director from that of friend and colleague in the early courses to that of a more traditional instructor in the later courses, thus creating a friendlier atmosphere more conducive to the learning environment we wish to establish.

### STAFFING

The MSE portfolio concept involves many more faculty than does a “classical” WI course. In our department, five faculty are directly responsible for the courses involved in the program (Kander: 2044 and 2094; Aning 3306; Kampe 3034; Hendricks 4215; Brown 4085-86 and 4095-96)

As indicated in the attached memorandum, each faculty member has participated in the design and sequencing of the material presented in the program, and each is committed to developing communication skills of the students in the true spirit of the Core Curriculum. In addition, the MSE department has extended its commitment to teaching communication skills by adding a full-time writing director to its staff. In this position, the writing director plays several roles:

- he is instructor to the students, assisting them with one-on-one counseling and guidance concerning communication issues;
- he is counsel to the regular faculty, providing input and guidance with regard to grammatical and structural issues;
- he will develop faculty training programs in conjunction with the University Writing Program to teach such topics as holistic scoring, efficient grading and evaluation of written work, etc.;
- he will offer workshops to the students regarding topics of importance in creating a “professional” persona, but which are not appropriate for inclusion in “in-course” material; examples include preparation of resumes, letters of application for employment, graduate school and scholarships;
- he will identify common communication weaknesses among our students and offer focused workshops aimed at correcting these deficiencies; and
- he will coordinate, maintain, and evaluate a portfolio for each student.

### LEVEL OF COURSE

The courses involved in the MSE Integrated Writing and Communications Program begin in the fall semester of the sophomore year (2044) and culminate in the spring semester of the senior year (4086, 4096, and 4215 or 4564). The course is offered at the 4000 level because it carefully builds on the entire sequence of 2000, 3000, and 4000-level courses.

### RESOURCES

The principal resources for the development of the student portfolio are:

- an IBM-compatible PC running Windows,
- a high-end word processor (MS Word for Windows or equivalent), and
- a data analysis package (MS Excel and Minitab For Windows).

The PC and word processor are part of the College of Engineering package required of all students. The spread sheet and statistics package are required in MSE 2094 and are used throughout the program. Both are available at reasonable cost due to excellent University site license agreements with the vendors.

The human resources include the course instructors and the writing director. It is critical to understand the synergism between these individuals. In every case, the course instructor is responsible for the writing-intensive instruction offered in our program. It is the role of the writing director to aid the course instructor by providing additional one-on-one counseling to the students, by providing guidance, counsel, and continuing education to the instructors in various aspects of technical writing, learning research, and "writing-to-learn," and by maintaining the formal portfolio required of each student and assessing the quality of the work maintained therein. Thus, our program is one based on a professional team, all of whom contribute to the writing experience of our students.

### SELF-REGULATION

The quality of the proposed program will be monitored by an advisory board which is completely external to the department. For the AY 1994-95, the Advisory Board is comprised of the following individuals:

Dr. Nancy Metz, Coordinator, University Writing Program (VPI&SU)  
Dr. Eileen Schell, English Department(VPI&SU)  
Dr. Charles Blankenship, General Electric Corporate Research

The advisory board will audit the completed portfolios of selected students, and will report to the MSE department head and to the Commission on Undergraduate Studies and the Core Curriculum Committee the results of their findings. They are charged with determining the adequacy of the work accepted for the portfolios; it is not their responsibility or prerogative to change the grade of any student's portfolio.

### DEPARTMENTAL PROCESS

The MSE program was designed by mutual collaboration of the instructors responsible for each of the courses involved (Drs. Aning, Brown, Hendricks, Kander, Kampe), the department undergraduate curriculum committee (chaired by Dr. Hendricks), the English Department (Drs. Squire, Pappas), the University Writing Program (Dr. Metz) and the Office of Assessment (Dr. Muffo). On completion of the program design, the entire package as presented here, was unanimously approved by the MSE faculty by a vote of 19 to 0, taken at the annual retreat in September, 1995.

## **IX. ABET CONSIDERATIONS**

### APPLICATION OF WRITTEN AND ORAL COMMUNICATION SKILLS

See Sections II, III, VI, and VIII.

### ABET CATEGORY CONTENT

Engineering Science 0 Credit

Engineering Design 0 Credit

Total 0 Credit

## **X. DEPARTMENTAL APPROVALS**

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Course Supervisor, R.W. Hendricks

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MSE Curriculum Committee/ABET Coordinator, R.W. Hendricks

Date Prepared: 4-18-94

## **XI. UNIVERSITY APPROVALS**

COMM UNDGRAD	05-02-94
UNIV COUNCIL UNDRGR	05-09-94
UNIV CORE CURRICULUM COMMITTEE	05-11-96