

**HANDBOOK FOR CREATING  
COURSE PORTFOLIOS**

**University of Wisconsin-Madison  
College of Engineering**

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Originally Prepared by Teaching Assistant Fellows, Fall 1998

<http://www.cae.wisc.edu/~tafellow/>

# The College of Engineering TA Fellows Projects

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## Preface

**1996-97 College of Engineering TA Fellows** who created the original Handbook included Ahmed Hala, *Engineering Physics*; Robert Heussner, *Materials Science and Engineering*; Kevin Hugo, *Electrical and Computer Engineering*; Jodi Reeves, *Materials Science and Engineering*; Bulent Sarlioglu, *Electrical and Computer Engineering*; Sandy Courter, *Engineering Learning Center*, who was the advisor; Steve Bialek, *Office of Quality Improvement*, who was the facilitator.

The mission of the Teaching Assistant Fellows is to identify, prioritize, and carry out a quality improvement project that will improve undergraduate education in the College of Engineering. The past projects were the following:

- *Teaching Assistant Evaluation and Improvement Handbook* (1994)
- *Best Teaching Practices Handbook* (1995)
- Creation of a graduate student chapter of the American Society of Engineering Education (1996)

Our goal was to create a formal mechanism within the College of Engineering for the exchange of course-specific information from TA to TA. The *Handbook for Creating Course Portfolios* and the associated example course portfolios are the result. We hope this effort will not only make your current teaching experience better, but also help your future academic career.

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## **Introduction to the Course Portfolio**

### **What is the purpose of a course portfolio?**

Many creative and effective teaching strategies are forgotten or misplaced between semesters, only to be re-learned in subsequent semesters or lost forever. In the College of Engineering, no formal mechanism is in place to pass course-specific teaching information from instructor to instructor. A solution to this problem is the course portfolio, a resource exchange of course-specific teaching information.

### **Why should instructors make a course portfolio?**

Course portfolios prevent the loss of effective teaching techniques, thus providing the means for all instructors to continually improve existing curriculum. Course portfolios will enable most instructors get a head start, specifically those who are new to campus, those who are teaching for the first time, or those who receive late assignments and have little time to prepare. By performing all of these functions, course portfolios will complement existing workshops and resources. Finally, course portfolios are useful for instructors who plan to continue teaching. Course portfolios can be revised into teaching portfolios, which may be useful documentation to present at job interviews and list on a vitae.

Of course, none of these benefits are possible if no one bothers to put anything in the course portfolio! Some instructors may be hesitant to put together their own course portfolio because they are concerned about the time involved. However, many of the items that could be in your course portfolio are things that you already have. You just need to collect and organize them. The portfolios may not be complete, but every bit will help the next instructor or help you the next time you teach the course. Additionally, by having course portfolios from previous semesters, instructors can spend more time developing new material for their course to supplement and enhance the previously collected material.

### **How will course portfolios benefit faculty?**

Faculty, administrators, and departments can benefit from course portfolios in several ways. The course portfolio can help faculty bring new TAs up to speed, can serve as a repository which professors and TAs can draw from, and can provide a source of information to improve courses. Also, the information contained in the course portfolios is organized to provide useful accreditation and assessment documents. Information about the Accreditation Board for Engineering and Technology (ABET) is included in Appendix A.

We hope that professors will encourage their TAs to put together a course portfolio and provide current course materials for the portfolio. Any handouts that professors give to the students such as a syllabus (section 2), teaching materials (section 3), support materials (section 4), and assignments (section 5) should be included. Sensitive materials (for example, exams which should not be available to students), may or may not be appropriate for the course portfolio.

Our vision is that each department will encourage faculty, staff, and TAs to create and maintain their course portfolios and will provide physical space for storing and securing all materials. A contact person in each department will serve as an information resource.

Please contact your department chair or department administrator to determine the best contact person for course portfolios in your department. The Engineering Learning Center also has a current list of department contacts. So feel free to contact them at 263-3248 or email at [elc@engr.wisc.edu](mailto:elc@engr.wisc.edu).

### **How will course portfolios help undergraduates?**

Undergraduates will benefit by more effective teachers earlier in the semester. By using course portfolios from previous semesters, new instructors can provide students with some immediate materials that worked well in the past, thus enabling students to learn more easily while the instructor can take more time to prepare effective materials for future sessions. Instructors will have more time to focus on teaching techniques, curriculum revisions, or learning styles of the students. Also, the cumulative nature of the course portfolio will help the instructor avoid previous mistakes and identify common difficulties that students experience.

### **What does a course portfolio contain?**

The first element of a course portfolio is course components, which include all the information necessary to teach your course. Course components include the syllabus, teaching materials, support materials, and assignments. A detailed description of each of these items follows in sections 2-5. The second element of the course portfolio involves critical analyses of teaching and learning. The assignments and tests used to evaluate student learning in your course also make ideal opportunities for you to assess your teaching. This section of the course portfolio includes analyses of key assignments and tests. A complete critical analysis of a key assignment may include the following items:

- Samples/statistics of student performance (section 6)

- Reflections on your teaching (section 7)

- Reflections on the learning activity (section 7)

- Feedback from the students (section 7)

Personal reflections will be very useful to you as an educator because you can critically assess your teaching and make improvements throughout the semester. This documentation is also essential for building your own teaching portfolio. Additionally, future instructors will be able to use this information to guide their teaching.

## **How should you organize the items in your portfolio?**

We have arranged this handbook to make it is easy for you to find information. However, you may find that one item could be filed in two different places, or that two items out of sequence may have been placed in the same handout. Therefore, you might want to add these materials to the end of your portfolio. If you are including handouts, you should insert either originals or photocopies. Try to include the course number, your name, and the date on each handout. We recommend writing this information on the back side if a handout is one-sided. If you find errors or items to improve, note the corrections directly on the handout.

## **How will course portfolios be accessed and shared?**

The TA Fellows have asked each department to provide a place to keep the portfolios and to identify a contact person who will help you access the portfolios. If a course is cross-listed in several departments, we recommend that the “home” department of the course keep the portfolio.

Your portfolio might contain materials that are acceptable for the instructor of that course to access, but that should not be available to students or the general public. These items might include exams, solutions to problems, examples of student work, and copyrighted material. The intent of the course portfolio is to provide an information exchange of course-specific teaching materials among instructors. For that reason, we expect that access will be limited to those who have a legitimate use for the information contained in the course portfolio.

Finally, you should be aware that the course portfolios are intended to include constructive criticism of the course only. Course portfolios should not include faculty or TA evaluations, or any item that may embarrass or offend any person related to the course. If you are a TA and unsure about what to include, check with the professor in charge of your course or the department contact person.

## **Do you have to include everything that we have listed in this handbook?**

Absolutely not! We expect there to be differences among courses and instructors. For example, some items apply only to laboratory courses and others only to lectures. Use your discretion when deciding what needs to be in your portfolio. If multiple people teach a course, they could keep separate portfolios or share one common portfolio. However, each person should provide his or her own reflections (section 7).

We have tried to minimize the time that it takes you to put together the portfolio. Start your portfolio with existing materials. Throughout the semester, we encourage you to make improvements whenever possible.

# Course Portfolio Contents

## 1. Checklist

The portfolio begins with checklists, which are intended to help remind you to place material into the portfolio as well as to let others know what information you have placed in the course portfolio. Because you will probably be adding to your portfolio several times during the semester, we have separate checklists for various times: before the first day, after your first day, during the semester, and after the last day. These checklists are in Appendix B.

Before your first day, you should read what others have placed into the course portfolio and gather other appropriate handouts. If changes to the handouts are necessary for the new semester, make them before including them in the portfolio.

During the semester, you may have additional handouts and assignments for the students. You also may have corrections, observations, homework solutions, and grading criteria to document. To save time, add materials to the portfolio as they become available to you, rather than hunting them all down at the end of the semester.

The end of the semester is a time for instructors and students to reflect upon what worked, what didn't work, and what needs to be improved for next time. Be sure to note any corrections or changes.

## 2. Syllabus

In general, a syllabus covers topics such as course design, teaching/learning goals and objectives, learning activities, teaching methods, and assessment strategies. Specifically, a syllabus contains an outline and schedule of topics taught in the course. Also, the syllabus communicates to students what the course is about, why it is taught, where it is going, and what will be required of the students to pass the course. Last semester's syllabus is a good place to start when creating a new syllabus. While teaching the course, keep track of topics that took more or less time to cover than you predicted. Include suggestions about reorganizing or combining topics, or whatever ideas you have that would make the class run more smoothly. For more detailed information about syllabi, we refer you to Appendix D and references by Altman, Birdsall, and Millis in (Appendix G).

### **3. Teaching materials**

This section should contain all the materials considered essential to teaching your course. Please keep the materials updated, especially if a new instructor will be teaching the course next semester, and place them in the portfolio. Of course, you may want to make a copy to keep for yourself!

#### **3.1 Course manual or notes**

Include the most recent copy of the course or lab manual if one exists. If this is your last semester teaching the course, please deposit your own copy, including any revisions, corrections and additions that you may have jotted down throughout the semester. These notes will be useful to whoever is responsible for producing the next course manual.

#### **3.2 Lecture notes**

Include paper or transparency copies of the lecture notes. Staple or paper-clip the pages for each lecture together and keep them organized chronologically.

#### **3.3 Additions and revisions**

Include any other core teaching materials such as a bibliography of supplemental textbooks if one is not included within the course manual. If you used supplemental texts, please make sure that the chapters used from each text are noted.

### **4. Support materials**

In order for students to complete their assignments and fulfill the learning objectives, we often must supply them with additional material. We don't expect you to provide your students with all of the following because every course is different. However, a few examples of things to consider follow:

#### **4.1 Construction techniques**

If your students actually build something in your course, provide them with tips on how to perform the construction, especially if it is their first time using the technique.

#### **4.2 Equipment documentation**

Many lab courses require students to use equipment to make measurements, perform experiments, or troubleshoot a problem. You may have information or tips on how to use the equipment; please include them in the course portfolio. If you have documentation from the manufacturer (e.g., a user's manual) that is too large to include, specify where you keep it.

### **4.3 Computer files, programs, and documentation**

Whether or not you have assignments that are to be done on a computer, you may have computer files related to the course. This section might include programs, data files, source code, sample files, on-line documentation, and the electronic version of your handouts. Include a floppy disk (labeled with the operating system type) or state where you keep the files. Please also state where any written documentation for the software can be found.

### **4.4 Troubleshooting and debugging tips**

It often seems like students keep making the same mistakes. If you have any tips on how to troubleshoot an experiment, debug a computer assignment, or solve a problem set, be sure to include them in the course portfolio.

### **4.5 Departmental resources and shops**

Some departments have special shops where parts can be obtained, items can be machined or constructed, or equipment can be fixed. Document what is available to you or your students.

### **4.6 Additions and revisions**

If you have added any of the above items yourself or have found errors that need correction, please include them in the course portfolio.

## **5. Assignments**

This section of the course portfolio covers the expected format for assignments, problems, laboratory experiments, handouts, problems, quizzes, and exams. Homework problem sources and page numbers should be provided if they are from a textbook. This section will give the next instructor an idea about the questions asked in exams and your old homework assignment problems can be used in future discussions.

Corrections, suggestions for improvement, and specific grading criteria such as what factors will be included, how they will be weighted, and how they will be translated into grades should be included with the assignments. You may also include your grading criteria and partial credit policy. If you grade several assignments the same way, just indicate your grading scheme once. You may write corrections and suggestions directly on the old copy of the assignment.

### **5.1. Expected format for assignments**

Some instructors expect students to turn in their assignments in a particular format. For example, reports should be typed, lab write-ups should include an abstract, or computer printouts should be in a monospaced font. If you have any guidelines for the preparation of homework assignments, lab reports, or

take-home exams, include those guidelines in this section. If you would like to pass along the reason why you preferred your formatting style (easiness to grade, better presentation, etc.), please do so. This information is often in a course syllabus.

### **5.2. Homework problems**

Note the details about where assignment problems originated. Sometimes the problems are assigned by number from a textbook. In this case, the assigned problems might already have been listed in the course schedule; if they are coming from different books, indicate their page, author, and if necessary the edition number of the book. Other assignments that you should include are computer exercises and problem sets that include the full description of the problem; these may already have been given to students in other handouts.

### **5.3. Laboratory experiments and in-class exercises**

Include these handouts in the course portfolio and tell whether you had any problems with the current version of the handout. If you make any changes, please be sure to write what they are. You might also recommend other changes and include a note as to why you would make them.

### **5.4. Quizzes and exams**

Whether to include quizzes and exams in the course portfolio is an instructor decision. Many instructors consider these items to be sensitive material to which students should not be allowed access. Include quizzes, bench exams, lab quizzes, midterms, and final exams and provide their solution sets, only if appropriate.

## **6. Student work**

Examples of student work are an important part of the course portfolio. Include good, average, and poor examples of assignments, exams, or lab reports. If applicable, include a list of previous student projects. Also include the grading guidelines. Putting student samples into your course portfolio will give the next instructor an idea of the variety of student work in the class. Additionally, your professor or department chair might ask for student work examples for ABET review. **Student privacy is important.** Any student work samples you choose to include in the portfolio must be anonymous—remove the student's name and other identifying information. In the beginning of the semester, you should distribute a permission form similar to the sample in Appendix E.

## **7. Personal reflections and student feedback**

The most valuable component of the course portfolio is the section that contains the constructive criticism of the instructors and students. Here is the place where you can give your personal reflections and evaluation of the class. Any educational or motivational suggestions are encouraged. If you have any “I wish I had done that ...” or “If I teach this course again, I would do this and that differently” comments, this section is the right place to add your ideas. Passing on information such as the difficulty of problems in assignment sets and exams, motivation of students, strengths and weaknesses of students, and problems with lab equipment will be helpful to the next instructor.

### **7.1 Reflections before the first day**

This section might be best thought of as “big picture” in which you provide the overall context for the course. A helpful way to think about what to include is to imagine that you are talking to the next instructor about planning the course. Background information about the types of students enrolled in the course is helpful. For instance, are they electrical engineers taking a mechanics course, or are they first year students with no major declared? Is your course introductory or maybe an elective with students who bring a wide range of skills and experiences to the course? Include comments about unique aspects of the course that might prove challenging to students. For example, do students use computers in lab for the first time? You may also include details about where the course fits into the major program of study. If you are a TA, and are teaching the course for the first time, it is important that you talk with the professor to help you understand the course context.

A key component of your reflections is your personal teaching philosophy. Thinking about and writing down your approach to teaching and explaining the rationale of why you do what you do can be challenging even for the most experienced faculty member. Some faculty share their teaching philosophy with their students. Whether or not you share your philosophy with students, the act of writing it will help you articulate your approach to teaching and learning. A written teaching philosophy is, therefore, an important part of the course portfolio. Some faculty, especially those who teach team courses, also write a course philosophy. We have provided examples of personal teaching philosophies and a course philosophy (in Appendix F) as models.

Your teaching philosophy and reflections before the first day may not be complete, but write down as much as you can about your planning. You can always go back and add detail to your reflections later in the semester. Form C1 can help you in organizing your thoughts.

### **7.2 Reflections after the first day**

We have provided you with Form C2 that asks several questions about how you prepared for the

first day of class. Your insight can help instructors who teach the course next time and remind you of what needs to be done in order to improve the course for future semesters. We recommend that you answer these questions soon after your first class day, while the answers are still fresh in your mind.

### **7.3 Reflections during the semester**

Most ideas for improvement occur as the semester progresses. You may document your observations on Form C3. Ideally you should reflect upon every assignment or chapter in your course; use your own judgment on how often you will need to do this. For example, you may write down your personal reflections once a week or for every major section of the class. Also, incorporate student feedback into your reflections.

### **7.4 Reflections after the semester**

The most important part of this portfolio may be your reflections at the end of the semester. You will have your best impression of the course soon after your last day of teaching. Please take the time to note on Form C4 what worked, what didn't work, and most importantly, what needs to be improved for the future.

### **7.5 Evaluations**

Departments usually require students to complete a course, professor and TA evaluation form at the end of the semester. Some example forms you may use are found in the *Teaching Assistant Evaluation and Improvement Handbook*. These forms are available on the web at <http://www.engr.wisc.edu/elc>.

Students are an excellent source of feedback regarding improvements to the course. If you have access to their comments or a summary of their ratings, consider including them in the course portfolio. If you made your own custom evaluations about your class, you may also include them. Remember that you should NOT include any evaluations of the people teaching the course. Only course evaluations should be included in the portfolio.

### **7.6 Summary of relevant e-mails**

Electronic mail has become a practical and efficient means of instant feedback from students. If you receive a message that you think would help in future semesters, you may print it or summarize it.

## **8. Future Issues**

In preparing this manual, the TA Fellows found several issues that could not be resolved at this time due to our inability to predict how the portfolios would develop. We have documented these issues here with our tentative solutions. We recommend that the course portfolios be accumulated in this manner

for a period of at least two years. After this trial period, we recommend having a new committee (possibly of TA Fellows) evaluate the project and revise the course portfolio manual with recommended improvements.

### **8.1 Guidelines for amending and deleting information**

Until the project is evaluated, we recommend that information should only be added to the portfolios, not deleted or modified. This policy will ensure that no information is lost, and will provide a history by which the project can be evaluated.

Of course, this policy cannot occur indefinitely. By observing the pattern of what information is added each semester, a future committee can determine how items can be amended or deleted. In particular, the committee should determine how long information should be kept, who should decide what to keep, and how changes will be made.

### **8.2 Centralized vs. distributed access**

Each department will maintain their own portfolios. Many electronic portfolios are available on the web. However, passwords may be necessary to review comments in the instructors' corner. Check with individual instructors and department contacts.

### **8.3 Computerized vs. printed formats**

Both electronic and traditional paper portfolios are possible. Consider which version is most appropriate for your course or department.

### **8.4 Voluntary vs. mandatory participation**

We presently recommend that creating a course portfolio should be voluntary as long as the program is in a pilot phase. In the future, each department can decide whether participation should be part of the instructors' workload. However, we hope that most instructors, including TAs, would find course portfolios so beneficial that the majority would voluntarily participate in creating course portfolios.

### **8.5 Appropriate availability of information**

We have asked each department to provide a contact person to ensure that the portfolio is both accessible and secure. However, a future committee should assess this matter as well. Is the information there when you need it? Are users putting materials into the portfolio? Are users hoarding the files? Can users access things that they shouldn't be able to?

### **8.6 Courses with multiple instructors**

Our recommendation is to have each instructor contribute to their course's portfolio. One instructor or TA may be designated to create or revise a portfolio, but all instructors should collaborate in the process.

### **8.7 Cross-listed courses**

We recommend that the "home" department of cross-listed courses be responsible for those course portfolios. This is an item for future analysis.

### **8.8 Evaluation of the success of the project**

Finally, we would like to survey TAs, faculty, contact persons, the COE operating committee, and students to evaluate the success of the project. Our ultimate question is, "Have course portfolios improved teaching and learning?"

## **Acknowledgments**

The TA Fellows would like to thank the following people for their valuable comments and suggestions in preparing this manual:

- Michael Corradini, Associate Dean of Academic Affairs, College of Engineering
- Marsha Landretti, Civil and Environmental Engineering, department administrator
- Donna Lewis, Electrical and Computer Engineering, department administrator

## Appendix A. ABET Guidelines and Example Course Homepage

The Accreditation Board for Engineering and Technology (ABET) is “responsible for establishing standards, procedures, and an environment that will encourage the highest quality for engineering, engineering technology, and engineering-related education through accreditation so that each graduate possesses the skills necessary for lifelong learning and productive contribution to society, the economy, and the profession.” The University of Wisconsin, College of Engineering is an ABET-accredited college. (<http://www.abet.org>)

A degree from an accredited program is necessary for graduates to become a licensed Professional Engineer, which is different than just being an engineer. Professional Engineers are committed to maintaining high technical and ethical standards in their work. Greater salary potential and more job opportunities and prestige are some benefits of being a licensed engineer. Contact the National Council of Examiners for Engineering and Surveying (NCEES) for more information (<http://www.ncees.org>).

Practicing engineers and university faculty have crafted the ABET guidelines. ABET Engineering Criteria 2000 emphasize what students learn and continuous improvement. Engineering programs have to demonstrate that their graduates meet the criteria. The UW-Madison, College of Engineering, has a process in place. It demonstrates achievement of objectives and uses the results to improve the effectiveness of its programs.

Each course in the College of Engineering has a homepage which documents the course objectives and topics. You may need to update the homepage for the course you teach to keep information up-to-date for students, faculty, and ABET reviewers both on and off campus. To check documentation for your course, go to the college homepage (<http://www.engr.wisc.edu>), check course homepage, select department and course. For your review we've included the Engineering Criteria 2000 (<http://www.abet.org/downloads.htm>) and a course homepage for one course – NEEP 411-Nuclear Reactor Engineering.













## Appendix B. Course Portfolio Checklist

Department and Course:

Semester/Year:

### BEFORE THE FIRST DAY

- Skim the portfolio from past semesters. \_\_\_\_\_
- 2. Syllabus and related information \_\_\_\_\_
- 2.1 Catalog information \_\_\_\_\_
- 2.2 Instructor information \_\_\_\_\_
- 2.3 Required information \_\_\_\_\_
- 2.4 Course description and objectives \_\_\_\_\_
- 2.5 Course calendar \_\_\_\_\_
- 2.6 Course policy \_\_\_\_\_
- 2.7 Available support services \_\_\_\_\_
- 3. Teaching materials \_\_\_\_\_
- 3.1 Course manual or notes \_\_\_\_\_
- 3.2 Lecture notes \_\_\_\_\_
- 3.3 Additions and revisions \_\_\_\_\_
- 4. Support materials \_\_\_\_\_
- 4.1 Construction techniques \_\_\_\_\_
- 4.2 Equipment documentation \_\_\_\_\_
- 4.3 Computer files, programs, documentation \_\_\_\_\_
- 4.4 Troubleshooting and debugging tips \_\_\_\_\_
- 4.5 Departmental resources and shops \_\_\_\_\_
- 5.1 Expected format for assignments \_\_\_\_\_
- 7.1 Reflections before the first day \_\_\_\_\_

### AFTER THE FIRST DAY

- 7.2 Reflections after the first day \_\_\_\_\_

### DURING THE SEMESTER

- 3. Teaching materials additions and revisions \_\_\_\_\_
- 4. Support materials additions and revisions \_\_\_\_\_
- 5.2 Homework problems \_\_\_\_\_
- 5.3 Laboratory experiments and in-class exercises \_\_\_\_\_
- 5.4 Quizzes and exams \_\_\_\_\_
- 6. Samples of student work \_\_\_\_\_
- 7.3 Reflections during the semester \_\_\_\_\_
- 7.6 Summary of relevant e-mails \_\_\_\_\_

### AFTER THE SEMESTER

- Appendix F. Teaching or course philosophy \_\_\_\_\_
- 3. Teaching materials additions and revisions \_\_\_\_\_
- 4. Support materials additions and revisions \_\_\_\_\_
- 5.1 Assignments \_\_\_\_\_
- 6. List of student projects \_\_\_\_\_
- 7.4 Reflections after the semester \_\_\_\_\_
- 7.5 Evaluations \_\_\_\_\_







5. What educational improvements would you recommend for this activity?
  
6. What student motivational suggestions would you share with the next instructor?
  
7. At what point in the semester was this activity completed (i.e., second week, midterm, etc.)?
  
8. For labs, How long did it take to set up the experiment? Any difficulties?
  
9. For labs, is there a more efficient way to perform the experiment?
  
10. For labs, if the experiment did not work, how should it be fixed? What could be done instead?
  
11. What needs to be repaired, replaced, or ordered before next time?

Please attach extra sheets for other information as necessary.



6. How effective were the teaching methods you used? What recommendations for improvement would you make?
  
7. List any people that helped you and how you contacted them.
  
8. If you have computer files related to the course, where can they be found?
  
9. Did you find any additional texts or references useful? Please provide details.
  
10. For labs, is there a TA setup? Where is it located? How did you use it?
  
11. For labs, what needs to be repaired, replaced, or ordered for next time?
  
12. How can you be contacted the next time this course is taught?
  
13. When were your office hours? How well were they attended? What suggestions would you have for further improvement?

Please attach extra sheets for other information as necessary.

## **Appendix D. Syllabus Components**

### **Catalog information**

Catalog information includes course title, course number, credit hours, any prerequisites and if the permission of the instructor is required. It also indicates the location of the classroom and days and hours the class meets.

### **Instructor information**

Instructor information includes instructor's and TA's name, office location, where to leave assignments, office phone number, e-mail address, and office hours. It might be important to give an emergency contact number to the students.

### **Required and recommended materials**

These materials include all printed materials used for the course. List textbook(s) including title, author, date, edition, publisher, cost and where the textbook can be purchased. In addition, a detailed bibliography with additional readings should distinguish between required and recommended readings. Include details about the availability of the readings; for example, indicate whether readings are from books that must be purchased or if the books are on reserve in the library. Remember that some courses require other materials such as lab safety equipment, art supplies, special calculators, or computers.

### **Course description and educational objectives**

A minimum course description repeats the department's course catalog description. Also, instructional and assessment methods, the course's main goal, and specific learning objectives are useful.

### **Course calendar**

The calendar should include daily or weekly topics to be covered as well as the dates for exams, quizzes, assignments, and any upcoming special events that relates to the course. If necessary, indicate that the schedule is tentative and subject to change.

### **Course policies**

Course policies cover a variety of topics and could include some or all of the following items: grading, extra or partial credit, attendance, lateness, class participation, late or missed exams/assignments, lab safety, academic dishonesty and plagiarism (to address questions related to plagiarism and cheating refer to the UW-Madison Academic Misconduct Guide for Instructors).

### **Available Support Services**

Students appreciate a syllabus that includes support services available on campus such as the examples listed below:

- Wendt library, 262-3493, 215 N Randall
- CAE computer labs, 262-5349, 1410 Engineering Dr.
- Engineering Learning Center, 263-3248, 333 N. Randall Ave.

*<http://www.engr.wisc.edu/services/elc>*

- Campus Assistance Center, 263-2400, 716 Langdon St., *<http://www.wisc.edu/cac>*
- Academic advising information, available from each of the school and college deans' offices
- University Health Services: clinical services, 265-5600, 1552 University Ave., or counseling and consultation services, 262-1744, 905 University Ave.
- Dean of Students' office, 263-5700, 75 Bascom Hall

## Appendix E. Permission Form to Use Student Work Samples

I agree that you may excerpt some of my work to share with other teaching assistants and faculty. The purpose is to assess student learning and to improve teaching. I recognize that every effort will be made to keep this information confidential and that my name will not be associated with my comments.

Signed

Date

I agree that you may excerpt some of my work to share with other teaching assistants and faculty. The purpose is to assess student learning and to improve teaching. I recognize that every effort will be made to keep this information confidential and that my name will not be associated with my comments.

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Signed

Date

## **Appendix F. Teaching Philosophy and Course Philosophy Examples**

What is your approach to teaching and learning? A teaching philosophy is a written description of that approach: your interests, aims and approach, and the results including evidence you rely on to evaluate the success of your teaching. In addition, you might include the level of preparation you require from your students prior to a class and the degree to which you expect students to be engaged in class discussion. Other components of a teaching philosophy can include how you believe discussion contributes to learning and the extent to which students need to be self-directed. The amount of previous teaching experience you have and information about what you've learned when you've taught before can also be included.

Of what value is a teaching philosophy? Perhaps most important is the value you receive from articulating your own approach to teaching and learning. Others, however, who may benefit by reading your philosophy include students, peers, potential employers, and award selection committees.

The two teaching philosophies presented here were written for the Teaching Academy at the University of Wisconsin-Madison as part of an award selection process. Faculty have since shared these teaching philosophies with their students. The course philosophy was written collaboratively by a team of faculty who designed the first year design course at UW-Madison.

### **Teaching Philosophy**

#### **Sandra Courter, Co-Director of the Engineering Learning Center**

To describe my teaching philosophy, I will first describe my interests, my aims and approach, and the results including evidence I rely on to evaluate the success of my teaching.

#### **Interests**

My interests include teaching undergraduate and outreach courses to improve technical communication skills, helping others discover new ways of teaching to improve learning, and building connections among people to improve the teaching and learning environment in higher education. These interests parallel the mission of the College of Engineering. Within this framework, I am privileged to address issues of importance including curricular innovations for improved student learning, assessment of student learning and engineering curricula, effective teaching strategies, and increased retention of students in science and engineering especially women and minorities. I am interested in developing students' creativity and kindling their sparks within so that they can contribute in meaningful ways to society. Like Anatole France, I believe that we can "Awaken people's curiosity...put there just a spark...so that it will catch fire." As an educator, I can make a difference so that my students can make a difference and contribute to society.

#### **Aims**

My aims are to design effective curricula and to create a learning environment in which students can develop their technical communication, critical thinking, and problem-solving skills; experience all levels of learning from knowledge through analysis, synthesis, and evaluation; bridge theory and practice with practical, real-world application of theories and skills; and build collaborative relationships among their peers and with faculty. By working within my own classroom as well as providing opportunities for

faculty and students throughout the college, I will continue to work with others to build this type of learning environment. Since by definition a curriculum includes both content and method, I work to improve both content and teaching methodologies within my own classrooms and among my colleagues.

### **Approach**

My approach is student-centered, team-based, and interactive. I always strive to focus on my students in terms of explaining strategies to help them become more effective communicators. Strategies include providing them with clear learning objectives, organized content, real-world examples, and practical applications for them to build their skills, attitudes, and knowledge. Recognizing that students don't all learn in the same way, I strive to provide a variety of learning activities. For example, my EPD 275 Technical Presentations class provides opportunities for students to analyze their strengths and weaknesses as speakers; design, present, and evaluate their own presentations; use technology effectively to present and create visuals; observe their peers and real-world speakers; and, assess continually their presentations and set goals for improvement.

Teamwork is an important component of my philosophy not only for my students, but also for my colleagues and me. My students often work in teams to accomplish goals and provide support for each other. My techniques are didactic which means that I primarily use cooperative learning strategies to complement the traditional lecture strategy. I recognize the value of working in teams with my own peers to improve curricula. Recently, I am working with my colleagues to pilot a new freshmen basic communication course, develop a new teamwork course, recognize diversity in our classrooms in effective ways, and organize an industry advisory board meeting for our technical communication program. I believe that "It takes a whole village to educate a child" as the African Proverb states. Furthermore, I believe that "diversity leads to synergy and creativity."

### **Contributions and Results**

Contributions I have made include an expanded curricula and certificate program for technical communication, a series of technical communication outreach programs for practicing engineers and scientists, two video-taped credit courses, a teaching assistant (TA) policy and program for teaching improvement, an evaluation process for continuous improvement of TAs within the Teaching Assistant Fellow Program, a third-party evaluation of the new freshman design course, the development of the basic communication course for freshmen, an NSF-funded Engineering Education Scholars Program for graduate students throughout the United States, and the beginnings of an Engineering Learning Center (ELC).

Contributions I would like, and intend, to make include coordination of activities within the ELC to connect undergraduate and graduate students with faculty, improvements in the technical communication outreach program including both credit and non-credit courses using a variety of distance technologies, development of new courses for teamwork and facilitation skills, and stronger links among all courses and faculty across the engineering curricula.

Evidence I rely on to evaluate the success of my teaching includes student feedback throughout specific courses and at the end of each course as well as peer feedback through informal team meetings and formal annual reviews. Students' feedback takes the forms of short written comments at the ends of classes, mid-semester surveys, and end-of-semester evaluations. Most recently, I have used focus groups of students to identify strengths and weaknesses of courses and help develop new courses.

Continual feedback from students has been an important indicator for me throughout my teaching career. Perhaps this philosophy has helped me value the continuous improvement principles that gained acceptance in the total quality management philosophy. Following this philosophy are data that demonstrate the kinds of evidence that I've gathered throughout my experience in the College of Engineering.

## Statement on Teaching and Learning Philosophy

### Mike Corradini, COE Associate Dean of Academic Affairs

As individuals we engage in a life-long learning process, which evolves from one state to the next. I think all of us change our emphasis on what we want to learn, what we learn, and how we best learn. As a young person, I think I was most influenced by my father, who kept on emphasizing how much there was to learn about the world, and my mother, who pointed out one should not waste any time in the process. In a sense I was imbued with their interest in learning new information and relationships about the world, and I was not lacking in my motivation. As I progressed through various schools, I did not think how I best learned, because I tended to learn relatively easily compared to others. This is a trait to which all faculty can probably relate. Thus, my natural focus was learning facts and their interrelationships. Given this background, during my fifteen years at the University of Wisconsin my teaching philosophy has evolved from one that is based solely in the transmission of scientific facts to one that dwells more on trying to give the student the motivation to learn and to let them become actively involved in the learning process.

The amount of emphasis in teaching on helping the student in wanting to learn, what to learn and how the student best learns is a delicate balance which depends to some extent on their position in their college career and their maturity. Although the teacher cannot completely ‘customize’ the learning process it is important to appreciate and plan how one might change the emphasis on these three aspects of learning. This is a main reason I helped initiate the Teaching Improvement Program in the College over the last two years, and was fortunate to have it funded by the Department of Education as a FIPSE grant for all the Physical Sciences over the next three. Consider the college career of any student to be made up of three stages; i.e., initially as freshman, mid-career as sophomores and juniors, and finally as more mature seniors and masters candidates.

Early in the career of the student at the university, I feel that it is incumbent upon the teacher to not only challenge the student with a presentation of the facts and their interrelationships, but also to motivate the student to **want to learn**. This is especially true in engineering or the physical sciences where students are required to take an array of courses in mathematics, physics and chemistry where students must learn the fundamentals and the “language” of the physical sciences; i.e., applied mathematics and computer science. The students not only need to learn the fundamentals and the language, but also need to see why these are important to their future career. This is one reason why I helped organize and develop an Introduction to Engineering course for the engineering college. As we present these pre-engineers with the facts and the ‘language’ of the physical sciences through calculus, physics and chemistry, we need to give them the opportunity to ‘discover’ what engineering is all about. This course is specifically designed to do this, by presenting them with real-world customers and their problems, and asking them to solve the problem through the design process in a cooperative student team project. Teams of faculty and senior undergraduates act as ‘consultants’ to the team as they brainstorm, evaluate, build, test and present their solutions to the customer. In addition, the course involves real engineers from industry, as they talk about their own careers. This course concept is now being expanded for freshmen pre-engineering class and we are writing an Instructors Manual and Student Notes for other UW system campuses who supply us with transfer students as well as target high schools in the state; e.g., Eau Claire and Madison.

As mid-career students at the university, the “fundamentals and the language” of the physical sciences gives way to learning of the engineering sciences for any specific discipline. Once again, the fundamentals of these applied sciences are the core knowledge that the students must learn, but it is my view that the teacher must “share” the classroom with the students as they engage in team-learning and help teach each other. One specific way this can be done is to integrate the fundamentals into problem-oriented courses where again teams of students grapple with applying the fundamentals to a specific problem through engineering design and problem solving. This has the added benefit that students at various years can work together on problems that have applied as well as research applications. We have no formalized integrated set of courses in all degree curricula, but experiments are underway; e.g., the MEDUSA project in Nuclear Engineering.

At the senior and masters level, the students now have acquired enough fundamental science and engineering science facts and relationships that the concept of team-based problem solving can become more sophisticated. Once again the key to students **wanting to learn** is to allow the students to become active partners in **how they learn**. For example, in nuclear engineering the senior design project is the

culmination of a team-based learning environment were the students work on a sophisticated system design and the teacher takes on the role of the pseudo-customer, the consultant and resource person. The 'open-ended' nature of this type of learning experience can also be imbedded within a senior or masters course with case studies. In this situation a team of students is presented with an open-ended analysis problem and must work together to clarify uncertainties, make assumptions for the analysis to proceed and come up with a recommendation. The difference between the capstone design and the case study is the time allowed and the focus of the engineering problem. In the senior design project only the broad need is expressed and the student team must brainstorm solutions to the customer need as well as perform the analysis for the proposed solution. In the case study, the problem is more narrowly focused and team analysis must expeditiously provide a solution.

Individual courses must also reflect a balance between motivation, factual information and variable methods of learning. In a typical 'lecture' course, I find myself using the time in class to convey three key aspects of any engineering science topic: [1] why we want to know it, [2] the basic facts that need to be known, and [3] a demonstration of the physical process, the analysis or the design procedure. In my view students do not learn in the classroom by me doing it for them, but by them doing for themselves or with their peers. Thus, a major fraction of the classroom time would allow students [1] to ask questions about any of these activities or [2] to verbalize the physical process themselves to their peers or to do the analysis with their peers. Learning also comes with time for reflection on these principles or practicing the analysis outside of the classroom, and this is the purpose of assignments or homework either individually or as a group. The teacher in the classroom must motivate the student to want to continue the study of the subject beyond the brief fifty-minute interval in any day. Active student engagement during the hour is a key to this process.

The final aspect of learning is the teacher as a 'coach' and role model for learning. Human nature is such that we tend to follow by example, and the teacher has enormous influence by the way she/he behaves with the students in and out of the classroom. This aspect of education actually becomes more important in the doctoral programs where the doctoral thesis advisor teaches as much by example as by transmission of certain facts. The 'teacher-coach' at all levels instructs by demonstration of his/her own abilities, as well as by discussion, prompting and questioning of the methods, thinking and results of the students' work. This 'body language' of the teacher is an extremely potent teaching tool and we all must be aware that students learn as much from 'how' we deliver our message and 'behave' in our career as to 'what' we say.

## Course Philosophy of EPD 160

The goal of this course is to provide an experience in the freshman year that allows incoming students to discover engineering by practicing engineering. Students work in small teams to understand engineering in terms of the design process, to show connections between science, math, and engineering courses, to see how they might "fit" into an engineering career, and to develop confidence in their ability to be successful engineers. Some of the skills that students are expected to learn are to ask questions; to clarify ambiguous situations; to collect and interpret data; to solve problems as a team; to rely on their own and others' abilities; to question premises; to apply some basic engineering techniques where appropriate; and to work constructively toward a true team solution.

The specific goals of the course are to:

- allow students to learn how to form and work in teams (team dynamics)
- provide the opportunity for a sequence of successful experiences for the student
- have students acquire a feeling (hands-on) of what engineering entails and might encompass
- develop design process skills on a "real" design project with "real" customers
- develop skills for hardware and software usage in the projects in an as-needed basis
- develop context for engineering curriculum, so students see connections among math, science, and technology classes
- develop confidence in engineering as a career, particularly for students with little prior knowledge or experience in engineering-type activities.

To accomplish these goals, there are specific concepts that we wish to see developed. These are divided into "process" and "product" categories.

### **Process: (focus)**

*Design methodology* - Students learn to work through the design process, including identifying customer needs, translating those needs into engineering specifications, developing multiple alternative solutions, evaluating proposed solutions against existing products, and creating workable and cost-effective designs. Students and customers develop realistic constraints.

*Why Design?* Because the design process seems to be one process common to all disciplines of engineering; the design process encompasses most of the important elements we wanted in the class; the design process is real engineering (not an artificial academic exercise), regardless of technical level. *Team Interaction* - Students learn to work in teams with peers, to plan tasks, to organize activity to accomplish tasks on time, and to interact constructively and effectively with team members.

*Why team-based?* Because team interaction presents students with the opportunity to meet and know other engineers and appreciate the wide range of students interested in engineering; it offers opportunities for peer teaching and learning; it represents a realistic view of what most industrial engineering activity is like.

*Communication* - Students learn to communicate effectively with peers, with instructors, and with customers.

*Why emphasize communication?* Because . . . clear communication of ideas and understanding of others' ideas is critical in the design process, particularly in team; many engineers need to begin developing communication skills at an early stage of their careers.

*Confidence Building* - Students develop confidence in their value as members of a team and their potential for success in engineering.

*Why worry about student confidence?* Because we want to develop a level of confidence in first-year students that they belong in the engineering field and can be successful engineers, should they chose to do so; for some groups currently under-represented in engineering, this lack of confidence in belonging or seeing connections to personal values may be a significant deterrent to remaining in an engineering career.

### **Product: (enabling)**

*Engineering Science Principles* - Students learn some basic concepts in engineering science relevant to the specific project; for example, basic electrical circuit relations or relations for strength of structural members.

*Why include engineering science topics?* Because students need these fundamentals to attack their design problems; knowledge of some engineering science principles builds a context for subsequent math, physics, and chemistry classes; understanding and successfully using these ideas in a design can contribute to a student's confidence.

*Engineering Tools* - Students learn basic calculation and communication skills, including email, spreadsheets, word processors, and graphics programs.

*Why learn about engineering tools?* Because the tools make much of the class work and communications easier (spreadsheets, email); they present a realistic picture of some common engineering tools; they are likely to be of use in many following classes.

## Teaching/Learning Methods

To accomplish the goals of the course, we tried to embed several characteristics in the way we organize and teach the course. We tried to

- emphasize collaborative or team activity because
  - engage most or all of the students
  - emphasize range of possible contributions
  - develop listening and communication skills
  - develop team skills (consensus building, surrendering ownership of ideas, and utilizing all team members' skills...)
  - allow students to meet a group of engineers also beginning their careers (friends, support group,...)
  - make engineering a "home" in which a wide variety of students can feel they belong and fit in
  - fun

Implementation note: Faculty select teams using checklists about comfort with specific skills; teams are provided significant external direction, internal direction only when needed.

- employ hands-on testing experiences whenever possible because
  - develop an experience base, particularly for those with limited prior hands-on experience
- encourage multiple perspectives on problems because
  - reinforce creative thinking skills
  - develop students' ability to think about multiple facets of problems and brainstorm multiple solution approached
  - reinforce the idea that engineering practice is often ambiguous, and there is frequently no one, correct answer
- deliver "just-in-time" engineering science (e.s.) because
  - to supply the minimum level of e.s. needed to move forward with designs
  - to avoid focus on e.s. or technology (product over process)
  - allow students to see how and where e.s., math, physics...would allow more latitude and opportunity in design solutions

Implications note: This concept requires rapid, specific feedback so that if students' needs for e.s. aren't being met, lectures/labs can be adjusted so that they are.

- promote (demand?) feedback from students on course and activities within the course because
  - we want to be able to make rapid modifications, if needed
  - we need information flow from students for just-in-time information supply
  - for example, students wanted inclusion of information on engineering departments
- establish and let students know evaluation criteria, including how teams and team members will be evaluated because
  - evaluation criteria show our values
  - understanding evaluation criteria may reduce student anxiety about the product
  - if we don't test or measure it, it may not happen
  - lab notebooks and homework (40%), participation and peer evaluation (20%), product (40%)
- ensure student teams have an opportunity to build all or a portion of their design because
  - test and evaluation are important parts of design process
  - reinforces or corrects "paper" ideas
  - puts a little competition into the class and gives teams something to show others at the end of the class
  - gives us something to show the customer (proof of concept)
  - it's fun
- try to use effective team skills as faculty and SA team because
  - we need the practice
  - students notice

## Appendix G. References

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