The Enterprise Program at Michigan Technological University: A Professional Development Curriculum in Action

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Abstract

In 2000, Michigan Tech introduced The Enterprise Program (www.enterprise.mtu.edu), an innovative and integrated learning experience that offers all students on campus, but especially engineering majors, an opportunity to learn through the process of starting and operating their own businesses. Students participate in this program by pursuing either a twelve-credit Enterprise Concentration, or a twenty-credit Enterprise Minor.

The Enterprise curriculum requires students complete a series of project courses that represent their roles/assignments as members of their enterprise. In addition, students take a number of professional development courses that were created specifically for the Enterprise Program and cover topics such as Teaming, Communications, Leadership, Project Management, Ethics, Economics, Entrepreneurship and Finance. Each professional development course is equivalent to one-semester credit or 14 contact hours of instruction, hence, these courses are very concentrated in their subject matter, providing students with the most critical information and instruction in order to enable them to employ their new-found knowledge directly in the operation of the enterprise.

The philosophy behind this approach is that students will better master the subject matter through its immediate application in their enterprise project work and that further development and understanding of the material will come through both student interest and enterprise needs. This paper will discuss teaching methodologies, course curricula, and techniques used in the delivery of these professional development courses, as well as assessment and student feedback. Successes and challenges associated with this unique component of the Enterprise Program will also be discussed.

I. Enterprise Program Background

In the fall of 2000, Michigan Tech University introduced a new and innovative undergraduate educational experience that provides students of all disciplines on campus, but especially engineering majors, an opportunity to start and operate their own "virtual" business. Within engineering programs the philosophy behind the Enterprise Program is to provide a flexible curricular structure that leads to a traditional engineering degree while at the same time enabling students to participate in the operation of a real enterprise over multiple years.

The Enterprise Program includes an extensive multi-year, multi-disciplinary design experience. Within this option the college/university establishes a number of engineering/business entities, called enterprises, and students choose to join an enterprise and work with other students and faculty to make it a successful venture. Each Enterprise, for the most part, operates much like a real company in the private sector. The employees (students) solve real-world problems, perform testing and analyses, make recommendations, build prototypes, manufacture parts, stay within budgets (real and imaginary), and manage multiple projects. The objectives of the Enterprise Program are to:

- provide opportunities for students and faculty to develop entrepreneurial and innovative engineering skills,
- provide students with a multi-disciplinary design experience that involves other baccalaureate programs, such as Business and the Basic Sciences,
- provide a framework for faculty to mentor students in a learning setting that closely resembles an industrial or professional environment,
- include learning activities that arise from the approaches used to solve real-world problems provided by industrial and/or professional sponsors,
- utilize the students' fundamental background in science and engineering in problems where non-technical issues (i.e. cost or societal impacts) are of equal importance,
- enable students to participate in leadership activities that coincide with the stages of their professional development.

The genesis of the Enterprise Program at MTU was a direct result of industrial assessment of engineering degree programs across the nation which indicates that technical competence is seldom an issue with industry as it is typically considered a 'given' for ABET accredited engineering programs. However, several other personal and professional attributes are consistently identified as critical to the success of an engineer, but generally lacking in new engineering graduates, including:

- strong skills in communication and persuasion
- ability to lead and work effectively as a member of a team
- sound understanding of non-technical forces that affect engineering decisions
- awareness of global markets and competition
- demonstrated management skills and a strong business sense

Many of these skills and expertise are not easily taught within a traditional classroom setting. In fact most, if not all, of these abilities are best developed in practice. With the Enterprise Program, MTU has created a new and different experience designed to educate and prepare graduating engineers for more productive and successful careers. The Enterprise Curriculum is offered as a 20-credit minor or a 12-credit concentration, typically completed over two to three-years. The curriculum is two-pronged and consists of 1) participation in the operation of a business (project work) and 2) completion of concentrated course material (professional development workshops) designed to provide key information, processes and skills required for effective management of a viable business.

Of the required semester credits, 6-7 credits result from working on real-world projects, i.e. operating the company. Each enterprise is required to address and complete at least one major project/product per year, although multiple projects are encouraged when appropriate and available. Consequently, each student participates in a minimum of three different projects during their tenure in the enterprise. Their tasks and responsibilities on each of the projects are many and varied, since over the three year period they contribute to the projects in different ways due to changing levels of technical expertise, maturity and seniority.

II. Professional Development Workshops

The remaining credits in both the Enterprise minor and concentration paths result from the student involvement in structured mini-courses or professional development workshops, some of which are required and others elective. Each workshop is equivalent to one semester credit or 14 contact hours of instruction and is therefore very concentrated in subject matter, providing students with only the most critical information and instruction to enable them to employ their new-found knowledge directly in the operation of the enterprise. The philosophy behind this approach is that students will better master the subject matter through its immediate application and that further development and understanding of the material will come through both student interest and company needs. Table I provides a listing of professional development workshops currently available to enterprise students.

Table I – Enterprise Professional Development Courses

Requirements	Course #	Course Name	Credits
Minimum 2 Credits	ENG2961	Teaming in the Enterprise	2
Minimum 2 Credits	ENG2962	Communication Contexts	1
	ENG3962	Communication Strategies	1
	ENG4952	Complex Communication Strategies	1
Minimum 5 Credits	EC3401/2/3	Economic Decision Analysis	1-3
	ENG3954	Enterprise Market Principles	1
	ENG3961	Enterprise Strategic Leadership	1
	ENG3963	Enterprise Entrepreneurship	1
	ENG3964	Enterprise Project Management	1
	ENG3971	Seven Habits of Highly Effective People	1
	ENG4951	Budgeting and Finance for the Engineer	1
	ENG4954	Global Competition	1
Remaining credits needed to fulfill minor from any of the above or this list	ENG3955	Conceptual Design/Problem Solving	1
	ENG3956	Industrial Health and Safety	1
	ENG3957	Product and Process Development I	1
	ENG3958	Engineering Ethics	1
	ENG3966	Design for Manufacturing	1
	ENG3967	Product and Process Development II	1
	ENG3969	Project Phases of Design and Implementation	1
	ENG3972	Electronic Circuit Design and Fabrication	1
	ENG3973	Geohydrological Techniques	1
	ENG3974	Fuel Cell Fundamentals	1

The initial set of workshops offered through the Enterprise Program were developed with support from the originating NSF Action Agenda grant. During the development phase of the overall Enterprise Program, proposals for workshops of topics related to the program goals were solicited from faculty across campus. A subset of workshop topics were selected by committee and funds were then provided to the submitting faculty member to develop the course materials and deliver the first offered session. Workshops are typically designated as either a fall or a spring offering, to allow for a balanced list of options to the students. They are typically taught on an overload basis, and therefore, faculty are provided compensation in the form of incentive funds for each workshop taught.

Workshops are generally delivered by a faculty member from the related department or college who has a teaching/research interest in the associated topic. Instructors choose the delivery format for their respective courses as best fits the nature of the topic. The underlying intent is to deliver the course in a format similar to that experienced by professionals attending a continuing education or professional development seminar in industry. For example, some modules are taught in a very intensive weekend session followed by team project work completed over subsequent weeks. Other instructors find the traditional one lecture hour per week best suits the subject material. This flexibility in format allows the student to experience first-hand the typical continuing education format encouraged and expected of employees in the workplace. In the following sections, we will describe in more detail the teaching methodologies, curricula and delivery techniques used in two of the workshop courses.

III. Sample Workshop Curricula - Teaming

The first professional development workshop we'll look at in more detail is the two-unit workshop titled "Multi-Disciplinary and Cross-Functional Teaming". Students are enrolled in a section corresponding to their enterprise team affiliation. Although teams come from several disciplines across campus, we find that the stated course objectives are applicable to each of them:

- Cross-functional and multidisciplinary team dynamics and management
- Stages of team development
- Team based problem-solving skills
- Interpersonal skills
- Conflict management
- Communication in engineering-design contexts

A sample syllabus for the course can be found in Appendix I. Not all teams and team members need the same level of attention to each of these objectives however, as some arrive knowing each other already from previous courses, projects, and team interactions, while some are meeting new Enterprise team members for the first time in this workshop. This configuration of new or experienced members has immediate implications for the stages of team development aspect, since we begin the workshop with discussion and activities based on the dynamics of newly formed teams.

Team members that know each other already consistently perform better together at the initial stages of team development, but, interestingly, they do not necessarily perform better as a team in the long-term activities and projects. For this reason, we emphasize the documentation of the team's emerging and ongoing dynamics through a series of short in-class and out-of-class written reflections: we may ask for initial impressions of the team's dynamics and goals, which we can then read side-by-side with their meeting agendas (another form of required documentation) and team progress reports.

At the same time that we are guiding teams through their initial forming stages, we ask them to identify an unresolved problem or challenge on their Enterprise teams that they can work toward solving during the course of the professional-development workshop. This process asks team members to communicate with both their team's faculty advisor and the workshop instructor -- thus having to articulate, discuss, and document a problem for more than one audience (see Appendix II: "Initial Problem Identification, Discussion, and Analysis"). In terms of scaffolding the workshop around communication, problem solving, and team development, then, we focus on those inter-related concepts simultaneously:

By the fourth week of the workshop, teams are expected to have defined a problem, composed it in problem-statement form, had it approved by both their Enterprise Team's faculty advisor, generated a team charter and rules (i.e., moving through the "norming" stage), and documented a series of interactions via a videotaped meeting. We integrate at this point an iterative project-management and documentation strategy, such that teams take their problem statements and move through a series of brainstorming, generating alternatives, decision matrices, and other problem-solving approaches with the goal of documenting the possible, potential, and creative solutions to the problem. (One productive aspect of documenting these activities and outcomes is that we also capture the not-possible and uncreative ideas generated by the team.)

During this phase, each team researches unfamiliar aspects of their problems, and in the past couple of years, these have been wide-ranging initiatives such as hybrid-vehicle technologies; watershed-analysis software; chassis weight reduction; recruiting and marketing strategies for emerging organizations; and internal documentation systems. In our experience, no team ever follows exactly an ideal forming, norming, storming, and performing stage of team development; we make clear, too, that the materials and literature on the stages should be considered descriptive rather than prescriptive. Halfway through the workshop sequences we pause to reflect with team members where they see themselves along the team-development spectrum, why they're in that stage, and how to become a high-performing team together.

One difference between a conventional, traditional college class and our Enterprise professional development workshops is the emphasis on implementation. We learned during the first two years of offering this workshop that productive, compelling, and professional problem-solving work was emerging from the workshops and that it provided good team-building experiences for the student team members. But at the same time, not all of those benefits made it to the Enterprise team for consideration or implementation. Thus, we have built an "implementation" phase into the workshops, where team members present problem solutions, recommendations, or plans for implementation to the Enterprise teams and team advisors.

One drawback to 14-week terms is the difficulty of covering in meaningful ways the dynamics of group-development processes and the implications and consequences of team-based decisions. We are still working to strike a balance in choices of texts – case studies, stages of team development, and team communication strategies – with the time needed for teams to plan, discuss, and implement projects. We've moved away from textbooks to more industry-based reports and studies, and choose strategic planning documents that teams can use to support their efforts during the actual problem-solving projects. Our plan for the 2005 iteration of the professional-development workshop is to provide more digital versions of texts, especially those that allow annotating, editing, and collaborative text attributes such as PDFs and via CD-ROM.

IV. Sample Workshop Curricula - Communications

We currently offer three one-unit communication-intensive courses in the Program:

ENG 2962 - Communication Contexts
ENG 3962 - Communication Strategies
ENG 4952 - Complex Communication Practices

Communication Contexts is the only course required of students pursuing the Enterprise Concentration or Minor; the course is also open to any student on campus as fulfilling a General Education distribution requirement. Our goals for the sequence of communication courses are to develop an integrated series of professional development, engineering and technical communication, and collaborative writing environments. For example, we have redesigned the ENG 2962 - Communication Contexts course from a text-analysis-writing course to a professional-development conference format where team members participate in the designing, planning, and delivery of team and organizational communication issues in conference format.

Team members in ENG2962 begin the term by meeting in groups with the instructor for two consecutive weekly meetings in order to establish conferences themes, sessions, backgrounds, contexts, and a poster-session; they meet on their own for two weeks to research and produce session materials and posters; and then all teams meet for a weekend conference – two days, five hours per day – during which team members present communication-based projects and research. The conference format also allows for breakout sessions, where team members can choose from a range of technical and engineering communication sessions such as Observing & Understanding Team Dynamics; The History of Women in Engineering; Finding One's Way Onto a New Enterprise Team (first-person accounts); Collaborative Writing & Editing Software Packages; Comparing Senior Design & Enterprise Experiences (Roundtable Discussion); and concluding with a team-based Poster Session that highlights their teams' internal and external communication practices. The poster session is judged by faculty and graduate students in the Humanities, Engineering, and Business; teams conclude the professional-development conference with an award ceremony.

The ENG2962 Communication Context and Professional Development Conference is held during the spring term, and is followed in the sequence with ENG3962 -- Communication Strategies. Where the Contexts course introduces student team members to the dynamics, conventions (in both senses of the word) and expectations of team-based, organizational, and

collaborative communication, ENG3962 emphasizes the production aspects. Student team members are asked to discuss in more detail their teams' internal and external communication practices, assuming that they have a clearer and more experienced view of them since the ENG2962 conference a year prior.

Production aspects of ENG3962 focus on both team-based needs (manuals, documentation, memo and report writing), and increasingly, more business and entrepreneurial strategies for communication.

The third course in the sequence -- ENG 4952 - Complex Communication Practices -- builds on the previous two – and focuses on an advanced documentation project, research in historical or emerging engineering-communication practices, or a professional-development portfolio, depending on the student team members' interests. (See Appendix III: Professional Development Portfolio for an example of a new approach to integrating Enterprise students' learning, project activities, and leadership roles.)

Integration is our goal for the upcoming terms: while we are receiving good feedback on the usefulness and applicability from students in communication courses, we have not yet identified or assessed a coherent overall communication experience from across the range of Enterprise courses and professional-development workshops. For example, we want to know how students' writing and oral presentations in a course such as Ethics, or Leadership, or Global Competition compare or integrate with the written, visual, and oral instruction they are receiving in communication courses. Are the genres the same? Are the audiences authentic and wide-ranging? Are students making connections between Enterprise project work on their teams, in the Enterprise curriculum, and within their academic coursework? What are those connections?

In order for us to ask those questions and to measure performance and outcomes across the curriculum, we be developing more faculty professional development opportunities keyed to communication and inviting more faculty from within the Enterprise Program and allied departments to share course goals, experiences, and outcomes. At the same time we are preparing a multi-year longitudinal study of student communication practices focusing on oral, written, and visual outcomes. We plan to use this data to better understand the kinds of communication activities students are practicing, and how those practices fit within overall engineering and entrepreneurial communication contexts.

V. Feedback and Assessment

Student feedback to date regarding the usefulness of the workshop courses has generally been favorable. Many of the courses such as Teaming and Communications have gone through multiple revisions as the instructors strive to continually improve the content and format based on student feedback. Key issues that have been addressed throughout the initial years of the program include textbook selection, course scheduling, and ensuring the expected workload is appropriate for a one-credit course.

Two key areas of assessment for the program are related to the effectiveness of the Enterprise Program in preparing students to problem-solve effectively in team-based environments and to

communicate effectively. To assess the teaming aspect, we have developed a rubric to evaluate the effectiveness of enterprise students, as their project teams are video-taped while working together to solve the problems identified by their enterprise. Each team is taped twice during the semester, to gain a pre- and post- perspective on the Teaming workshop. A random sample of video tapes is viewed after each offering of the Teaming workshop and the rubric is used to score overall team effectiveness. The items on the rubric and results for the fall 2003 Teaming workshop are shown in Table I.

Table I Teaming Assessment Scores

Rubric Item	**Mean Pre-Assessment (n=8)**	**Mean Post-Assessment (n=5)**
The team had a clear task/purpose.	2.31	3.30
Meetings were well organized, efficient, and effective (Agenda was utilized and objectives were accomplished).	1.94	3.00
Communication was specific, descriptive, and problem oriented.	2.31	3.40
Team members listened to each other.	2.44	3.50
Everyone was involved—no one dominated or was completely passive.	1.50	3.10
Team members worked interdependently.	1.34	2.80
Team members challenged each other, respectfully (avoided groupthink).	1.81	2.60
There was evidence of both task and relationship roles and an absence of blocking roles.	1.81	2.90
Conflict was appropriately managed using collaboration and compromise rather than avoidance and/or dominance.	2.06	2.70
Team members appeared to trust each other and enjoy working as a team.	2.44	3.4
Average	**2.00**	**3.07**

As can be seen from the data presented in Table I, the post-assessment scores were generally higher than the pre-assessment scores with respect to teaming activities. It was noted that several undesirable traits were present in the pre-assessment videos that were not apparent in the post-assessment videos. For example, in one pre-assessment video, one team member played video games during the meeting. In another, a team member was working in the machine shop manufacturing a part while the rest of the team met. In most of the pre-assessment videos, only one or two people participated and the others looked disengaged from the process. These behaviors were largely absent in the post-assessment videos.

Assessment of the communications aspect of the program is particularly challenging as it tends to be most qualitative in nature. Furthermore, there is an inherent difference in what is considered to be "effective" communication between an academic environment and an industrial workplace. In an initial attempt at assessing communication skills, students were asked to submit a memo summarizing their design experiences over the course of the 2002-03 AY. A random sample of these memos were evaluated based on the following criteria: heading, introduction, body, tone, visual design, language level, and conclusion. Using a 4-point scale, with a resulting possible high score of 28, most memos were assessed in the 13-18 range, with a scattering falling above and below these scores. The highest score assigned was 25, the lowest

was 7. In addition to this assessment method, other mechanisms are in place to assess various other forms of student communications including memos, reports and presentations.

We use these feedback tools and assessment measures to monitor and to improve program curricula. More broadly, we see interesting and emerging connections between the work we do, the work to which students aspire, and scholarship in engineering education. For example, all of our communication assignments and activities require, by the very nature of the program, that students write for real and genuine audiences, and that their collaborative efforts result in visible and measurable outcomes. Successful problem-solving results not only in a good grade, but in a sustainable, professional business venture or engineering firm. Working with the Enterprise Program students and curricula has therefore challenged us to discover new and innovative assessment tools that can help us measure our efforts and students' progress through our integrated learning experience.

VI. Conclusion

According to David Russell, "Engineering schools have valued and consciously taught technical writing as part of students' professional training for almost a century; and since the 1890's secondary schools and colleges have formally taught business writing as well, but almost always in specialized business- or technical-writing courses" [3]. As we continue to work with students in entrepreneurial, business, and technical contexts (design, communication, and teamwork), we see these disciplinary boundaries becoming less important then they have traditionally been in engineering education.

In fact, in situations where students are responsible for managing budgets, interacting with national and international industry sponsors, and developing meaningful leadership skills, academic-disciplinary affiliation becomes practically meaningless. More important are the skills, expertise, and attitudes that emerging professionals in the Enterprise Program develop and integrate with other areas of study and inquiry during their time at Michigan Tech.

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Bibliographical Information

[1]Summary of Reports for the past 5 years from Industrial Advisory Boards of the University, College of Engineering and each Engineering Department at MTU. Prepared Fall, 1999.

[2]*Manufacturing Education Plan: Industry Identifies Competency Gaps Among Newly Hired Engineering Graduates*. Published by the Society of Manufacturing Engineers and the SME Education Foundation (1997).

[3]Russell, David R. Writing in the Academic Disciplines, 1870-1990: A Curricular History. Carbondale: Southern Illinois University Press, 2nd edition, 2002.

The Enterprise Program at Michigan Tech University: Results and Assessment to Date. Mark R. Plichta, Mary Raber. Proceedings of the 2003 ASEE Conference (2003).

Biographical Information

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Appendix I: Workshop Syllabus, Multi-Disciplinary & Cross-Functional Teaming, Fall 2004

Week 1	**Introductions & Overview: Stages of Team Development: Review Problem Solving Model**
In Class:	Forming, Defining a Project with your Faculty Advisor
Due:	Activity: The Puzzler E-mail Personal Info Sheet and Project Status Update
Week 2	**Setting the Stage: Mission, Roles and Goals**
In Class:	Designing Team Charters and Developing Ground Rules for Team Activities: Road Map, Steel Pipe
Due:	Team: Problem Statement
Week 3	**Building Trust**
In Class:	Challenge Course
Due:	Videotape team meeting to develop Charter and Ground Rules
Week 4	**Team Dynamics**
In Class:	Decision Making Skills, Effective Meetings; Listening Skills Activity: White Water Rafting
Due:	Team: Team Charter and Team Ground Rules
Week 5	**Self-Awareness**
In Class:	Norming, Giving & Receiving Feedback, MBTI Activity: Design a House
Due:	Team: Progress Report, Individual: MBTI Memo
Week 6	No Class: Scheduled Team Meetings
Week 7	**Alternative Generation and Creativity**
In Class:	Creativity Techniques; IDEO's "Deep Dive"
Due:	Team: Progress Report
Week 8	No Class: Scheduled Team Meetings
Week 9	**Team Effectiveness**
In Class:	Storming, Conflict, Consensus, and Collaboration
Due:	Team: Progress Report; Team Checklist
Week 10	**High Performing Teams**
In Class:	Teams in Action - Film Viewing & Discussion: Apollo 13
Due:	Team: Project Iteration 1.0 with Cover Memo
Week 11	No Class: Scheduled Team Meetings (Videotape Team Meeting)
Week 12	**Presentation and Persuasion**
In Class:	Presenting in Teams, Discuss Final Project Report and Team Analysis Report Expectations Activity: Practicing Presentations
Week 13	**Selling Your Solution**
In Class:	Performing, Film Viewing & Discussion: Tucker
Due:	Team: Project Iteration 2.0 with Cover Memo
Week 14	**Team Presentations, Location TBA**
Due:	Team: Team Analysis Report Individual: Peer Evaluations
Finals Week	**Scheduled Team Meetings with Instructor**
Due:	Team Project: Final Project Iteration with Letter of Transmittal

Appendix II: Initial Problem Identification, Discussion, and Analysis

ENG2961: Multi-Disciplinary & Cross-Functional Teaming, Fall 2004

Phase I: Forming

Your Team's Problem-Solving Project goes through four distinct phases of development. Phase I is the basis for the initial team-based assignments in this course; check the course calendar for individual assignments. Note how the assignments in this first phase are inter-related and how they build on each other:

Week One: Defining a Project with Your Faculty Advisor
Meet with your Enterprise Team Advisor right away. In conversation with him or her, brainstorm and discuss possibilities for a problem-based project that you can use in this class. You might aspire to a problem that can be solved and implemented within the 14 weeks of the course's duration, or you may decide to develop a plan, recommendation, or prototype for a problem-solving solution that *cannot* be implemented within the 14 weeks.

Due: E-Mail to instructor 24 hours prior to our second class meeting in which you:

- Summarize the meeting with your Enterprise Team Advisor
- Summarize the range of possible problem-solving projects that you discussed
- Explain why some ideas were dismissed, and why others were considered as possibilities
- Describe your initial problem-solving project idea
- Discuss any time, financial, or logistical concerns you might have at this early stage

Week Two: Problem Statement
Revise the information that you developed for the e-mail described above and rewrite it as a Problem Statement in a memo format, now addressing it to your Faculty Advisor. CC your Team Members and instructor. In class we use the Problem Statement to begin composing your Team Charter.

Due: In class, Week 2; bring copies for team members and instructor
Audience: Faculty Advisor (primary); Team Members and Teaming Instructor (secondary)

Week Three: Developing a Team Charter & Ground Rules
Drawing on the guidelines and examples in the text, develop a Team Charter and a Ground Rules document for your team. Videotape the session with all team members present. Team Charter should include your teams mission statement, goals, key tasks, and a timeline.

The extent to which Faculty Advisors and Teams interact, discuss Team Charters, and meet during the term will understandably vary among Enterprise Teams. By addressing this (and other documents) to your Faculty Advisor creates a necessary paper trail and documentation system.

Due: In class, Week 4; bring copies for team members and instructor
Audience: Faculty Advisor (primary); Team Members and Teaming Instructor (secondary)

Appendix III: Professional Development Portfolio

ENG4952: Complex Communication Strategies, Fall 2004

Professional portfolios have long been used by artists, graphic designers, and architects to present and showcase their work. Increasingly, however, they are good tools for engineers and scientists to (re)present their design, communication, and collaborative experiences in academic and professional contexts. For the purposes of this class, your Enterprise Professional Portfolio option will include these process steps: Selection, Design, Reflection, Assessment and Presentation

Selection
This is where you decide what to include in your Enterprise Professional Portfolio. Since all effective professional documents are audience-based, you'll need to decide first who your primary and secondary readers are going to be, and all subsequent decisions will be based on the needs and expectations of those particular audiences. In general, you might consider a range of examples that showcase oral, written, visual, technological, and design capabilities:

- Cover Page
- Cover letter
- Resume
- Letters of recommendation
- Awards
- Participation in conferences and professional workshops
- Reports
- Projects
- Presentations
- Designs (drawings, documentation, implementation)
- Newsletters
- Business Plans
- Competitions
- Budgets
- Correspondence
- Leadership activities

Portfolios can be flexible tools: after selecting your main examples, you can, of course, adjust them – adding, removing, reorganizing – for each submission and presentation.

Design
This is the fun part: what platform and what organization is most compelling and effective for your materials and for your audience – HTML? CD-ROM? Professional, high-grade binder? A box with folders and technical/engineering artifacts? What other high-tech and low-tech options are available?

Reflection
Your Cover Letter introduces your materials to your readers. The purpose of the letter is both to highlight why the materials you've chosen are appropriate and important and to guide them through the portfolio. Depending on your portfolio design, sub-sections may need additional introductions: "In this section I include slides from my presentation at the ASME Conference in Chicago … In this section I provide an example of a three-year budget cycle that I developed for our Team, keeping us consistently under budget … ")

Assessment (for the course, not for portfolio purposes)
When you submit a copy of your portfolio to me, attach a cover memo that describes *in detail* your decision-making process, choices, challenges, and self-assessment of your Enterprise Professional Portfolio. The primary audience is the instructor, but potential secondary audiences may include Enterprise team members, team advisors, and future ENG4952 students.

Presentation
At our Saturday October 23rd meeting your presentation will be based on your Enterprise Professional Portfolio: your process and product. Since you have 30 minutes for your segment, you might consider bringing multiple copies for a brief editing-and-feedback session (you'll get ten immediate and helpful responses to your work).

Recommended Process
- Research the employer or professional position desired
- Review your collection
- Assemble artifacts and document samples
- Develop a sequence for the artifacts
- Develop captions and titles
- Create an introduction & a table of contents
- Develop the first draft
- Evaluate your product get feedback
- Revise and develop finished draft
- Rehearse using your portfolio