Civil Engineering 4101: Project Management & Economics

Karl Smith

Course Overview

CE 4101W is a writing intensive (W-I) course covering three areas in project management and economics - technical aspects of project management, human aspects of project management, and engineering economics. Class sessions emphasize a practical understanding of engineering project management, including project planning, scheduling, and controlling; budgeting, staffing, task and cost control; and communicating with, motivating, leading, and managing conflict among team members. A broader "systems" approach to viewing problems with particular emphasis on the interactions among various perspectives - technological, environmental, economic, social, etc - is used to integrate all the various aspects of the course. The entire course is problem-based, that is, the emphasis is on formulating and solving problems, and interpreting and evaluating the results. The instructional approach is a combination of small-group work, experiential exercises, discussion, and lecture.

Teaching Team

Faculty:

<table>
<thead>
<tr>
<th>Karl Smith</th>
<th>Tim Eiler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Management</td>
<td>Project Management</td>
</tr>
<tr>
<td>Civil Engineering 236</td>
<td>Civil Engineering 247</td>
</tr>
</tbody>
</table>

Teaching Assistants:

<table>
<thead>
<tr>
<th>Project Management</th>
<th>Project Management/Rhetoric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandon T. Pierce</td>
<td>Lori Engstrom</td>
</tr>
<tr>
<td>Rhetoric Consultant</td>
<td></td>
</tr>
<tr>
<td>Connie Kampf</td>
<td></td>
</tr>
</tbody>
</table>

Course Objectives

As a result of taking this course, participants will be able to:

- Demonstrate knowledge of the concepts and principles of project management and economics
  - For example, explain the trade-offs among the three main goals of a project - cost, time, and performance
- Formulate and analyze project management and engineering economics problems
- Use project management and communications software
- Demonstrate knowledge of teamwork and interpersonal skills
- Process group work and the overall functioning of the course
- Demonstrate written and verbal skills
- Actively reflect on and process your learning in the course
- Apply the concepts, principles, methods, algorithms, and heuristics

**Scholarly Expectations**

The basic assumption of this course is that learning results from a continuing process of rational discourse. Within the course there are both opportunities and responsibilities. In this course you have the opportunity to learn. Your responsibilities are to maximize your learning from the course (i.e., improve your intellectual understanding), maximize and assist in the learning of your classmates, and to apply what you learn to your work. To take advantage of the opportunity and to meet your responsibilities you are to:

1. Master the basic concepts, theories, methods, and heuristics. You are expected to know a great deal more after taking this course than you did before.

2. Think critically about the course content and topics to gain understanding and insights.

3. Explain precisely to several classmates your learnings, insights, and conclusions. Your learning is not complete until you teach what you know to someone else and can describe precisely what you have learned and what you understand.

4. Ask others to share their knowledge, conclusions, and insights with you. When they do so, listen carefully, elaborate by explaining how what you learned from them fits in with previous knowledge you have learned, and thank them.

5. Engage in intellectual controversy by taking positions counter to those of your classmates, developing clear rationales for your positions, challenging their reasoning and conclusions, and arguing the issues until you or they are logically persuaded.

**ABET Outcomes**

The Department of Civil Engineering offers two ABET accredited undergraduate degrees: Civil Engineering (CE), and Geological Engineering (GeoE). (ABET stands for Accreditation Board for Engineering and Technology.) To maintain ABET accreditation, the Department of Civil Engineering must demonstrate that all of its graduates have the following eleven general skills and abilities. In this course, CE 4101 Project Management and Economics, the bolded outcomes will be specifically emphasized.

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. an ability to understand the impact of engineering solutions in a global and societal context
i. a recognition of the need for, and an ability to engage in, life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

To successfully complete this course, you will be required to learn, develop, and ultimately demonstrate these skills and abilities within the context of this course.

Resources

Required


In addition to the course notes and slides, the 1996 version of PMI's A Guide to the Project Management Body of Knowledge is available in Adobe Acrobat format (.pdf).

Policies

Scholastic Dishonesty
The University of Minnesota expects honest and ethical behavior of students; scholastic dishonesty will not be tolerated in this course. Scholastic Dishonesty includes (but is not limited to) cheating on assignments or examinations, plagiarizing, altering, or inventing research or information with the intent to deceive, submitting the same or substantially similar works for more than one course without consent of all instructors concerned, depriving others of necessary course material, and sabotaging another's work.


Scholastic dishonesty in any portion of the academic work for a course will result in an F or N on that assignment, and consequently and F or N for the entire course.

(Source: http://www1.umn.edu/usenate/policies/grades&acadwork.html).

Students with Disabilities
It is my goal that all students have equal access in the course. Please notify a member of the teaching team if you have a situation that requires additional accommodations. It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have documented disability conditions (e.g., physical, learning, psychiatric, vision, hearing,
or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services and their instructors for a confidential discussion of their individual needs for academic accommodation. Disability Services is located in Suite 180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612-626-1333 voice or TTY.

**Computer Use**
Many of the assignments will involve the use of personal computers. Microsoft Project 2000 is bundled with the required textbook. Application software is also available in the CE and IT labs in Civil Engineering.

The use of electronic mail (e-mail) is required for communication among students and between students and faculty. The course Web site also provides a lot of relevant information.

The course will also use Web CT to manage student paper submissions and allow for virtual communication. The address of the website is: http://webct.umn.edu

**Resources**
Individual projects will require the use of a variety of resources - reference library, electronic resources, professional engineers, etc. Books and journal articles are available in the library. Electronic searching for articles (by author, title, keyword, etc) can be done either on Compendex or FirstSearch*. Searching the World Wide Web may also provide useful information for many projects. Journals can also be browsed in the journal reading room. Walter Library is an excellent starting point.

*Students should remember that material published on the web is not necessarily reviewed or checked for accuracy.

**Writing Centers**

The Center for Writing has developed a Web site with information about student writing and links that address issues concerned with plagiarism. You can access this site at http://writing.umn.edu/.

The Online Writing Center (OWC) provides students the opportunity to have papers reviewed electronically. You can access the site at http://www.owc.umn.edu/. Remember that the tutor attempts to provide a 48 hour turnaround time.

The General College Writing Center is a walk-in center for writing consultation. Information on location and hours can be found http://www.gen.umn.edu/resources/arc/writing_center.html.

**Grading**
Project Management and Economics allows each student the opportunity to contract for a grade in the class. In order to successfully fulfill the course requirements, each student must take three basic competency exams, complete all assignments prior to the due date, and abide by the policy for attending sessions and the university policy regarding student conduct. The grade for each student will be based upon a contract system (see Table I), with explicit performance guidelines. The criteria for each assignment will be presented at least one week prior to the date that the assignment is due.

**Table I.** Contract system for students enrolled in CE 4101W during Spring Semester 2002.

<table>
<thead>
<tr>
<th>To Receive an A</th>
<th>To Receive a B</th>
<th>To Receive a C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage in class discussions — small group and whole class</td>
<td>Engage in class discussions — small group and whole class</td>
<td>Engage in class discussions — small group and whole class</td>
</tr>
<tr>
<td>Submit 90% of in-class writing assignments</td>
<td>Submit 80% of in-class writing assignments</td>
<td>Submit 70% of in-class writing assignments</td>
</tr>
<tr>
<td>Complete 100% of Homework at a satisfactory level</td>
<td>Complete 90% of Homework at a satisfactory level</td>
<td>Complete 80% of Homework at a satisfactory level</td>
</tr>
<tr>
<td>Receive a mean score of 85% or above for 3 exams</td>
<td>Receive a mean score of 75% or above for 3 exams</td>
<td>Receive a mean score of 65% or above for 3 exams</td>
</tr>
<tr>
<td>Complete 3 Group Projects</td>
<td>Complete 3 Group Projects</td>
<td>Complete 2 Group Projects</td>
</tr>
<tr>
<td>Complete 2 Brief Reports (see description below)</td>
<td>Complete 2 Brief Reports (see description below)</td>
<td>Complete 2 Brief Reports (see description below)</td>
</tr>
<tr>
<td>Complete Project Proposal (see description below)</td>
<td>Complete Project Proposal (see description below)</td>
<td></td>
</tr>
<tr>
<td>Complete Major Project (see description below)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abide by all Class Policies</td>
<td>Abide by all Class Policies</td>
<td>Abide by all Class Policies</td>
</tr>
</tbody>
</table>

**Competency Exams:** Three exams will be administered throughout the semester. The exams will cover (1) Engineering Economics (2) Technical aspects of project management and (3) Human aspects of project management.

**Project reports and homework that do not meet the minimum criteria may be revised once and resubmitted without penalty.**

Final grades are based on a combination of Quantity and Quality of work. Quality is more important. All work must meet the standards of acceptable performance. On the final day of
classes, students must submit a written statement of the contract they are working to fulfill (if all requirements are not met).

**Teaching Team’s Mission**
The teaching team's mission is to ensure that every student successfully masters the skills specified by ABET. We understand that personal situations arise, and we will make every effort to accommodate legitimate situations. We expect high quality work and are here to help everyone succeed. Missing deadlines and poor attendance have a significant, negative impact in professional settings - not just on your work, but also on your reliability and accountability as a professional. Therefore, all assignments, regular attendance, and in-class participation will account for your final grade (as described in the contract). All assignments must be turned in on the due date. Late assignments will not be accepted.

It is expected that students working toward a B grade (or better) in this course will spend between 12 and 16 hours per week on this course during an average week. Note: the university standard (designated average) for an average grade (C) is 9 hours per week for a three credit undergraduate course (Source: [http://www1.umn.edu/usenate/policies/semestercon.html](http://www1.umn.edu/usenate/policies/semestercon.html))

**Course Assignments**
Assignments will be graded on the following criteria:
Note: Each of these criteria may be expanded to include more detail for an assignment.

- **Content** - Content should be appropriate within the context of the assignment.
- **Audience** - All elements of writing (including, but not limited to, content, design, style and organization) should reflect the audience and context appropriately.
- **Organization** - Organization should be clear and appropriate to the context of the assignment.
- **Design** - Design should reflect standards appropriate for the assignment and/or within industry.
- **Support** - Support should be included as appropriate for the context of the assignment.
- **Expression** - Writing should be clear and concise. Use of complete sentences, correct mechanics, and correct grammar is expected.

**Course Outline**
Topics and schedule are tentative and subject to Modification. Chapters in bold should be read with care, others may be skimmed.

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Rdings:</th>
<th>Assnmts:</th>
<th>Assnmt Due:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ovrvw &amp; expcnrs. Intro to Proj mgmt &amp; econ</td>
<td>Mantel: 1.1-1.3, 1.6, 3.1-3.4 PMBOK:</td>
<td>Info Form Hmwk 1</td>
<td>Info Form</td>
</tr>
<tr>
<td>Week</td>
<td>Activity</td>
<td>Readings</td>
<td>Assignments</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>----------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Proj models. Org'l models. Proj life cycle. Proj sched. Crit Path Meth (CPM)</td>
<td>Mantel: 1.4, 2.1, 2.4, 2.5, 5.1, 5.4 PMBOK: Ch 2</td>
<td>Brief Rvw 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Eng Econ Fund'l's I</td>
<td>Hdout Notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Eng Econ Fund'l's II</td>
<td>Hdout Notes</td>
<td>Group Proj 1 Hmwk 2</td>
<td>Brief Rvw 1</td>
</tr>
<tr>
<td>2</td>
<td>Eng Econ Fund'l's III</td>
<td>Hdout Notes</td>
<td>Brief Rvw 2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Proj Sched Resc allocation CPM-cost</td>
<td>Mantel: 6.1-6.5 PMBOK: Ch 5, 6</td>
<td>Hmwk 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Exam 1 - Econ Proj Mgmt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Proj sel &amp; scrrning Benefit/ Cost Anal Incrmntl Anal. Prjt</td>
<td>Mantel: 1.5, 4.1-4.3 Hdout Notes PMBOK: Ch 7, 10</td>
<td>Hmwk 3 Proj Proposal</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Group Proj 1</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Activity</td>
<td>Reading Material</td>
<td>Assignment</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mnging proj teams cont. Negot &amp; conflict res</td>
<td>Mantel: 2.6, 3.5</td>
<td>Hmwk 4 Proj Proposal Grp Proj 2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Proj Risk Mgmt</td>
<td>Mantel: 4.4, 5.2</td>
<td>Hmwk 4 Maj Paper</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Exam 2 Tech/ Human Aspects of Proj Mgmt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Delta Design Simul (Req: A/B, Optl: C)</td>
<td>Hdwnt notes</td>
<td>Delta Design Hmwk 4</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Proj mntrng &amp; qlty mgmt</td>
<td>Mantel: 7.1-7.6 PMBOK: Ch 8</td>
<td>Hmwk 5 Delta Design Major Paper Draft</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Proj eval &amp;</td>
<td>Mantel: 8.1-</td>
<td>Hmwk 5 Maj</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The instructor reserves the right to change the content and/or the schedule in real time or otherwise.

The following items describe individual (and small team) coursework to be assigned during the semester.

**Brief Report 1**

**Project Description**
Prepare a statement of work or a project charter for your work this semester (this class, plus other classes, your employment, other activities, etc.) Or, select a project (or sub-project) from your workplace, and prepare the appropriate documents.

**Project Deliverables**

1. Develop a Project Master Plan (Mantel, et.al., 2001) or a Statement of Work (SOW) or Project Charter.
2. Create a Precedence Network and Gantt Chart in MSP and determine the Critical Path (using the Critical Path Method (CPM)).
3. Write a one page reflective memo on what you learned by creating the Project Master Plan, Project Charter or Statement of Work.
4. Three minute (or less) oral briefing in small group.

"The **statement of work** (SOW) is an integrated set of purposes, goal descriptions, resource requirements, conflicts, assumptions, and authorities that define a project and accompany the evolving master project plan during its development throughout the project (Baker & Baker,
2000. *The complete idiot's guide to project management*). See notes for project charter details and sample form. The usual minimum content of a SOW includes (Baker & Baker, 2000):

1. The purpose statement
2. The scope statement
3. The project deliverables
4. The goals and objectives
5. The cost and schedule estimates
6. The list of stakeholders
7. The chain of command
8. Assumptions and agreements
9. The communication plan


1. Write an Overview of the Project Scope
2. Determine the Team's Boundaries for Creating the Deliverables
3. Define the Customer's Criteria for Acceptance
4. Determine the Required Reviews and Approvals
5. Establish Risk Limits
6. Select the Project Leader and Team Members
7. Set Deadlines for Delivery of the Final Deliverables
8. Set Limits on Staffing & Spending
9. Create a List of Required Reports
10. Identify Organizational Constraints & Project Priorities.
11. Assemble a Project Charter

**Brief Report 2**

**Project Description**
Assume the role of project engineer. Write a brief report summarizing and critiquing a topic of interest to you related to project management or engineering economics. Your target audiences are colleagues in the engineering and management community. You will need to include headings, in text citations, and any appropriate charts or tables. Possible sources include past employers, current projects from workplace, and trade journals. Research is essential to presenting a successful Brief Review.

Common topics include: attend a seminar and write a review, review a journal article, conduct an interview, review engineering software, conduct a survey, review a chapter we're not covering, review an engineering video, etc.

**Project Deliverables**
1. Pre-writing exercise. (see attached sheet, fill in worksheet before you begin)
2. 500 - 1000 word paper (approximately two to four double-spaced pages). Two very concise pages for A or B contract. Headings are required. Citation style: APA, IEEE (if you desire to use MLA, see the instructor)
3. Three minute (or less) oral briefing in small group

Project Sections

<table>
<thead>
<tr>
<th>Section Goal:</th>
<th>Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Provide an overview of the topic you researched and why. This section should include the author/interviewee name and a thesis which previews the structure of the rest of the paper.</td>
</tr>
</tbody>
</table>
| Summary       | Detail the article or interview your read or performed, respectively. Since this is a brief review, summarize the author's/interviewee's main points and possibly include an appropriate example or case study.  
* Keep in mind that the research you perform may be appropriate for your final assignment. |
| Critique      | Based on the information you researched, analyze and evaluate the topic using the Project Management tools you have acquired. The critique is more than a discussion of the article, but an analysis of the author's/interviewee's thesis and main points. |
| Citation      | Be sure to include the full citation for the work; use a citation style of your choice (APA, MLA, IEEE). You will be asked to use a formal citation style throughout the remainder of the semester. |

Note: Each section needs a clear heading that includes words that reflect the content of the report and the section goal.

Brief Report 2: Pre-writing Exercise:

This prewriting exercise is designed to get you in the habit of thinking about what you are going to do with a focus on audience and purpose. Successful communication is hard work, and success happens more often when you think about your audience and purpose before you begin to write. Remember communication is about getting the right people to hear your message.
Before you begin you must first determine who your audience is, the action you want your audience to take as a result of reading your report and what your audience needs to know to want to take that action. Answer the questions below to help you build an understanding of your audience and purpose:

1. **Who is your audience?**

The assignment states: *Your target audiences are colleagues in the engineering and management community.*

So who will be your colleagues when you are in a work environment?

What do you colleagues know about your subject?

Why would your colleagues be interested in your topic?

What do they have to gain from the information you present?

How does what your colleagues have to gain from your subject relate to what they need to work productively?

2. **What action do you want your colleagues to take after they read your report?**

3. **What does your audience need to know before they will want to take that action?**

Now you need to use this information to guide your writing process. As you develop your ideas, you will need to keep coming back to these questions in order to develop a well-prepared and effective report.

*Note:* Be sure to thoroughly document your sources and quote and cite from them. Then your colleagues can better understand where your ideas are coming from. Also you will be able to find your source documents easily at a later time if you need more information.

**Project Proposal**

**Project Description**
Assume the role of project engineer. As a team of two (or one if you prefer), write a proposal to
conduct a study (or project) in Project Management. The proposal is intended to gain support for an activity to be completed in the future. This paper should be at least 2000 words (approximately eight double-spaced pages of text). The proposal must include external references, for example, journal articles, an interview with a project manager, etc.

**Project Deliverables**

1. Pre-writing exercise. (see attached sheet, fill in worksheet before you begin)
2. Paper length: 2000 - 3000 word paper (approximately eight to ten double-spaced pages)
3. The following format is required
4. Citation style: APA, IEEE (if you desire to use MLA, see the instructor)

One reference you may find helpful: [http://fbox.vt.edu/eng/mech/writing/index.html](http://fbox.vt.edu/eng/mech/writing/index.html)

**Overview**

A proposal is a plan for solving a problem. Seems simple right? It's not as easy as it seems. Proposal styles/standards vary depending on company policy and the project/circumstances surrounding the proposal. Bottom line is this - while the style and format of your proposal is important your emphasis for this assignment should focus on content.

**What's in a proposal**

Every proposal should contain at least the following sections:

- Executive Summary/Introduction
- Statement of Need
- Project Description
- Conclusion

**Step 1 - Executive Summary/Introduction (approximately 1 paragraph)**

The Introduction is the most important section of the proposal - it will either get your reader's attention or send them to the next proposal. To be effective, you want to outline the proposal and convince the reader that your proposal should be accepted and funded. Specifically:

A. State the problem/need that you are going to address.
B. Provide a short description of the project, including what you propose, who it will benefit.
C. Funding requirements - outline the reasons funding is necessary. Include your plans for funding.
D. Strong concluding statement.

**Step 2 - Statement of Need**

This section overviews the issue your proposal addresses. Present the facts and evidence that support the need for your proposal. Be persuasive, but succinct.
A. Decide which information supports your project most. Then, outline the details of that need. Include the current situation and why it doesn't work.
B. Give the reader hope - The reader has to believe that the project is worth funding.
C. Explain the benefits of your solution - explain why the proposal you suggest is more effective than others.

Step 3 - Project Description
This section defines the project objectives, describes the method of solution, and defines staffing and administrative requirements. Include the following sections (each of these sections should have a separate section heading and may have more than one paragraph).

- Objectives - State your objectives as measurable outcomes of the solution. Be specific - make sure your solution is achievable within a specific time frame and measurable
- Method - Describe the specific action items (actions that need to be taken in order to meet the objectives). Answer the following questions: How, When, and Why.
- Management Plan - Describe staffing, facility, and equipment needs.
- Budget Plan - Describe your budget needs as a statement of projected expenses. Include a narrative paragraph describing unusual line items, if necessary.

Step 4 - Conclusion
Review your proposal briefly. Restate what you want to do and why it's important.

Tips:

- Proofread! Check spelling and punctuation.
- Be clear. Be concise.
- Remember your goals and audience. Managers look for cost-effectiveness. Engineers look at feasibility.

Proposal Prospectus

Directions
The prompts listed below are meant to help you plan your proposal. Respond to each prompt with a brief, well-thought-out answer. Remember that this prospectus is only a plan. You will almost certainly change part of your plan, and you may even change all of it, before you complete the project/paper. So make your best predictions and plans as you answer, but don't be surprised or concerned if you alter them somewhat as you proceed.

Proposed title:
Give a brief project description (What do you plan to do?) / Purpose (Why are you choosing this topic?):
Major question(s) you hope to answer & what is your thesis? :
Products/results (What will be the measurable outcomes of your project?) / Proposed table of contents/list of major sections:
What resources do you plan to use? :
Calendar of component tasks (When will you complete each part of the project?):
Your biggest concern(s) or what question(s) do you have about the project?:

Major Paper

Description
The major paper addresses an issue or topic in project management in an organization where you currently work or previously worked (or perhaps where you hope to work). As a team of two (or one if you prefer), write either a (1) review paper on some aspect of project management in your professional area or (2) a practical application paper describing a typical application in the field of civil engineering. Major papers must include at least five external sources, such as journal articles, in the references.

1. Review paper on some aspect of project management in civil engineering. The review paper should move from the general to the specific, and may be thought of as a funneling process in which you focus more and more specifically on the topic in which you are interested. As you reach the narrow part of the funnel (research as specific as possible to the topic you have selected), some unanswered questions should become apparent. These questions can provide direction to further in this area of inquiry. In the final page of the paper, design a study to answer one of the questions identified.

2. Practical application paper - describing and apply some aspect of this course to a practical situation. The practical application paper should demonstrate an understanding of the theory and research covered in the course, but with the purpose of applying that body of knowledge to a practical situation.

Project Deliverables

1. Paper length: Individual -- 3000 words minimum (approximately 10 double-spaced pages). Two Person Teams: 4500 words minimum (approximately fifteen double-spaced pages)
2. Prospectus, Draft, Peer Reviewed Draft, Final Draft, Presentation
3. Headings are required
4. Additional Required elements: executive summary, table of contents
5. Supported with figures and tables (no more than one third the overall length
6. Sources: Minimum of five sources
7. Citation style: APA, IEEE (if you desire to use MLA, see the instructor)

Report Format

1. Font type and size = Times New Roman and 10 or 12pt
2. Spacing = double lines
3. Justify text
4. 1" margins on all sides
5. Page and name in header of each page

Possible Topics

1. Interview a Project Manager © Outline some of his/her successes and failures. Describe and analyze one (+) of his/her project(s) using PM techniques learned this semester (i.e. evaluate the project, what organization structure is used, explain where it could be improved and describe how)
2. Use one of the topics from a brief review as a starting point. (Research the topic further, detail topic, expand on alternatives, explain how the topic is applied to PM and where it can benefit industry)
3. Detail commercial PM software. Summarize the software, demonstrate its uses, and give an example of practical application of the software. (Remember to evaluate using tools learned in this class.)
4. Interview a professor from a previous class. Evaluate the class from PM perspective, what did/did not work? Suggest how to improve the class (include why).
5. Review a construction project: either built or under construction, evaluate the project from a PM perspective: how is the project organized, could it be improved, evaluate life cycle (one example is the Miller Park Baseball Stadium in Milwaukee, why was there the disaster? Could it have been prevented? Explain PM structure in place and critique.
6. Explore new a new innovation in Industry. Investigate the topic through articles or interviews; explain the pros and cons of the topic, what do critics say? Where is it used and how does/could it benefit industry?
7. Read a book relating to PM. Summarize and critique authors ideas/conclusions.

Peer Editing of Individual Projects

The Major Paper for this class needs to be written in conjunction with a group of two to four members (use you project groups). You need to hand in a copy of your paper that has been revised on the basis of at least one review by members of your group involving a minimum of two people, include the date of the review. A suggested procedure for writing the paper is as follows:

1. Each student in a group is individually responsible for writing papers in an area related to the content of the course.
2. Describe to the group what you are planning to write. Group members should listen carefully, probe with a set of questions, and help outline the research paper. They are encouraged to help you prepare a written prospectus. This procedure is repeated with every group member.
3. Search individually for the articles you need to write your paper. Keep an eye out for material useful to the other members of your group.
4. Group members are encouraged to work together to help each member get started on their paper and to successfully complete it.
5. The students write their compositions individually. Joint papers are allowed if they clearly reflect twice the work of an individual's paper (if an individual's paper is 10 pages long, a paper written by a pair should be 20 pages long).

6. When completed, the students should proofread each other's compositions, make corrections in capitalization, punctuation, spelling, use of language, review, and make general suggestions about how to improve other aspects of the research review.

7. Rewrite your paper, utilizing the suggestions for revisions.

**Major Paper Prospectus**

**Directions**
The prompts listed below are meant to help you plan your project or paper. Respond to each prompt with a brief, well-thought-out answer. Remember that this prospectus is only a plan. You will almost certainly change part of your plan, and you may even change all of it, before you complete the project/paper. So make your best predictions and plans as you answer, but don't be surprised or concerned if you alter them somewhat as you proceed.

1. Proposed title:
2. Give a brief project description (What do you plan to do?) / Purpose (Why are you choosing this topic?):
3. Major question(s) you hope to answer & what is your thesis?:
4. Products/results (What will be the measurable outcomes of your project?) / Proposed table of contents/list of major sections:
5. What resources do you plan to use?:
6. Calendar of component tasks (When will you complete each part of the project?):
7. Your biggest concern(s) or what question(s) do you have about the project?:

**Grading of Individual Projects**
Proposals and Major Papers are evaluated in two ways: Does their paper meet the quantity, and more importantly, the quality criteria. A typical individual paper review forms is shown in Figure 1. Typical rubrics for evaluating writing are shown in Figure 2.

Figure 1. Typical Individual Paper Review Form

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria Met?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Topic -- Reasoning/clarity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Background and Rationale for Topic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completeness/Detail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factual Accuracy/ Current Literature/ Sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization/ Transitions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Overall

Figure 2. Typical rubrics for evaluating writing

SUBSTANCE

1. Paper addresses the issue.
2. Paper has a focus, central idea.
3. Paper develops major aspects of the central idea.
4. Paper shows awareness of importance of main ideas.

ORGANIZATION

5. Structure or pattern of the paper is clear.
6. Paper has an introduction, development and conclusion.
7. Each paragraph is coherent.
8. Transitions from one idea to next are logical.

EVIDENCE

9. Statements are accurate.
10. Opinions are adequately supported.
11. Sources are identified and documented appropriately.

MECHANICS

13. Paper shows control of syntax.
14. Paper has few misspellings.

Group Projects

Three group projects will be assigned during the semester.

1. Project One: Project Scheduling
2. Project Two: Cost Estimation
3. Project Three: Delta Design Simulation (Required for A/B contract; Optional for C contract)

Each member of the group is encouraged to practice project manager roles and responsibilities. Suggested project manager roles and responsibilities include: coordinating the work among the members, delegating responsibilities, scheduling, monitoring progress and providing the communication link to ensure that the project is completed on time at an acceptable quality level.
Group Project Structure

1. One report is required from each group. A suggested format is shown in Figure 3.
2. Every group member must indicate that he or she agrees with the group's answer and understands the material signing the group's report.
3. Make sure all group members are involved in formulating and solving the problem and in producing the report.
4. Assist all group members in understanding the material; every member of the group is responsible for the quality of the report.
5. Complete a group contract form (See Figure 4).
6. As you will be required to do in professional practice, in this course you will be responsible to detailed time estimates and time tracking. At the beginning of each group project assignment each individual must record an estimate of the total time necessary (for both individual work alone and time spent with the group). After the report is completed, record the actual time and effort required. Time estimates and time tracking should be recorded to the nearest 15 minutes (¼ hour).

Figure 3: Suggested Group Project Report Format (Actual Format will vary with project)

Cover page - title of the project, group members, course name and number, date
Table of contents
Executive Summary (One page or less summary of the problem, formulation, method, results, and conclusion)
Problem -- Description of the problem
Formulation -- assumptions
Method -- Description of the method
Limitations, assumptions
Results -- Tables or Figures (Use graphs liberally)
Discussion of results
Effect of assumptions & method of formulation on solution (sensitivity of solution to assumptions)
Implications for other problems
References
Appendix (Computer output, Tables)
Group project "effort" report

Figure 4. Group Ground Rules Contract Form
(Adapted from a form developed by Dr. Deborah Allen, University of Delaware)

Project groups are an effective aid to learning, but to work best they require that all groups members clearly understand their responsibilities to one another. These project group ground rules describe the general responsibilities of every member to the group. You can adopt additional ground rules if your group believes they are needed. Your signature on this contract form signifies your commitment to adhere to these rules and expectations.
All group members agree to:
1. Come to class and team meetings on time.
2. Come to class and team meetings with assignments and other necessary preparations done.

Additional ground rules:
1. 

2. 

If a member of the project team repeatedly fails to meet these ground rules, other members of the group are expected to take the following actions:

Step 1: (fill in this step with your group)

If not resolved:

Step 2: Bring the issue to the attention of the teaching team.
If not resolved:

Step 3: Meet as a group with the teaching team.

The teaching team reserves the right to make the final decisions to resolve difficulties that arise within the groups. Before this becomes necessary, the team should try to find a fair and equitable solution to the problem.

Member's Signatures: Group Number:______________

1._________________________________ 3._________________________________

2._________________________________ 4._________________________________

**Group Project "Effort" Report Instructions**
Each group project requires a report on group effort. Figure 4 provides a form for this information.
Attach a copy of this form to each group project report. The purpose of this form is the promotion of individual and group accountability. The information will not be used for individual evaluation.
Figure 4. Group Project "Effort" Report.

<table>
<thead>
<tr>
<th>Group Member</th>
<th>Effort (Time)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Individual</td>
<td>Group Meeting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Estimate</td>
<td>Actual</td>
<td>Estimate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Group Project Review and Evaluation**
Review and evaluation is based on the written report. All the members of the group receive the same review. A typical group report evaluation form is shown in Figure 5.

**Figure 5: Typical Group Report Evaluation Form**

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria Met?</th>
<th>Quality Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cover Page</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table of Contents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>References &amp; Appendix</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Learner Information Sheet**
CE 4101W Spring 2003

Name Preferred Form of Address_________________

Major Degree working toward ___
Phone Number ______

E-Mail ________

Interest in this course: Low 1 2 3 4 5 High
(describe briefly)

Project Work/Management Background and Experience: Low 1 2 3 4 5 High
(describe briefly)

Engineering Economics Background and Experience: Low 1 2 3 4 5 High
(describe briefly)

Computing Experience (especially project scheduling): Low 1 2 3 4 5 High
(describe briefly)

Special learning needs:
(describe briefly)

Work Experience
(describe briefly):

Currently Working? _________ Hrs/week
(describe briefly)

Source