

The Final Project

The final project is typically implemented gradually throughout the course as topics are covered. Weekly deliverables accumulate and form the basis for the final project. Some faculty members require students pick their own project early on and others assign a single project for all students work on. In this Chapter students pick their own project.

Letting students select their own case to work on throughout the semester works well when students have had contact with managing real projects in their work environment. These students are normally a minority in the undergraduate population. The alternative is to use a common case for all students, which is covered in Chapters. Chapter 6 describes a term project that is focused on research.

The assignment is to complete, at the end of the course, a project that covers all, or at least most, of the concepts covered in the course. In addition to a formal written analysis, students are expected to present their lessons learned to the class. Several lectures were allotted to cover this. The grade on the project can be weighted between the written analysis and the class presentation.

The objectives for the final project are for the student to be able to:

- discuss and explain all of the core concepts introduced in the course;
 - write effectively about the project;
 - analyze project data and back up conclusions with analysis;
 - select a project and acquire the appropriate and relevant data;
 - apply the tools and techniques of the course to a realistic project;
 - learn enough from an analysis to be able to make useful recommendations about the project;
- and
- acquire and present the lessons learned.

Students should analyze the project and discuss the important issues about its status, such as critical-path and earned-value analyses. Finally, students provide recommendations about the project.

For reference & resources on this topic see Volume II. Chapter II-4: Final Project Assignment

It is shown in the next section for convenience.

Chapter II-4: Final Project Assignment

Objectives of the Final Project

Faculty across different disciplines and cultures are all quite emphatic in that PM courses should build to a final project. While there are many different approaches to the final project, students are expected to work through all of the elements of a project by using either an assigned case or one of their own choosing. By doing so, students practice applying project techniques and analysis.

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¹ Some universities refer to this as a “capstone” assignment. In this document, the word “capstone” is reserved for a course at the end of a program—see course PM-10.

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Content and Format

The analysis in the paper should not be too long (we suggest around 10 pages), allowing students to focus on clear communication and emphasize the presentation of an analysis of the project and its status, which are important skills for a project manager.

Detailed documents, such as scope, WBS, etc., may be included as appendices.

Students are encouraged to provide references.

Software analysis tools should be required in the project analysis (e.g., critical-path analysis, cost and schedule estimates).

Each student's project is unique, and so each will have different sections. However, the aim is to include as many of the topics from the course topic list as possible (e.g., charter, scope statement, WBS, project network, risks, etc.). Therefore, a checklist of topics to be covered in the final project should include: project charter and scope, WBS, schedule and key milestones, cost estimate, project network diagram with critical path, earned-value analysis, risk analysis, and recommendations.

One way to think about the recommendations section is to imagine that the student has been asked to brief a company manager on the status of the project (which may or may not have started, depending on which project the student picks). The student first analyzes the project and then presents his or her findings and recommendations.

Students may modify the outline to suit their projects. Different projects have different objectives, and the weight given to each section will vary. The key is clear communication.

References are very important. They show that students are aware of the PM literature (and that they are not reinventing the wheel).

Selecting a Project

Students are encouraged to pick any project to analyze. However, it is strongly recommended that they pick an organization or company they are familiar with and analyze a project in that organization. By picking a familiar project, they can ask for, and usually obtain, realistic data.

In an introductory course, it is better to encourage students to pick small, rather than large, projects. On large projects, it is difficult for faculty to assess what role the student played and to what extent the student actually produced the assigned homework content.

Using an organization known to the student also shortens the learning curve. Students should resist the temptation to select large, famous projects because they can be overwhelming. Also, it is difficult to say something new about a project that has been extensively analyzed and discussed by others.

Students may pick a project that has not started (new), one that is ongoing (active), or one that has been completed (historical). The requirements and outline will vary somewhat depending on what type of project they choose.

Students should be encouraged to concentrate on their own analyses of their projects.

General Guidelines

During the course, the faculty member should regularly discuss the students' projects and not leave it until the final few weeks. The goal should be to provide constructive feedback throughout, and answer ongoing questions as they arise. Students should be advised as to whether they appear to be proceeding in the right direction and, especially, whether their projects are feasible. A significant portion of the project should consist of research and analysis.

Grading

Projects could be evaluated in the following categories.

Communication (20%)

Communication is a key aspect of PM. The project should clearly communicate the fundamental concepts, conclusions from the data, and lessons learned. The references should be appropriate.

Students should use PM terminology correctly throughout.

Project Tools (30%)

Students should correctly use the tools and technology of the course. They should also use a diverse collection of tools and use them in appropriate ways.

Project Analysis (30%)

The project data should be analyzed in depth and the true project status reported.

Recommendations (20%)

The recommendations should be clearly derived from the data and analysis.

The project can also substitute for the final examination by having students present lessons learned in class. This enhances the presentation and communication skills, which are important objectives for PM students.

Sample Assignments

Table II-4-1: Sample assignments for PM-1 by topic

Session Topic	Sub-Topics	Sample Assessment and Activities
Projects, project management, and the project manager	Definitions Importance of project management The project manager's role Project context: internal and external environment Project structures: functional, matrix, projectized Project-delivery system: design, build, construct Project and product life cycles PM processes Knowledge and subject areas	Identify projects in the students' experience Define project processes and product and project life cycles In-class exercise: Pull up movie posters and get students to identify "the" project; what's the difference between projects and operations? Flipped classroom: Watch movie at home; explain in class the project in the movie. Strength and weakness interview: on topic project manager—presented as large group discussion Storytelling: Tell about a project you did. Put in perspective. Does it satisfy the definition of a project?
Project environment	Project governance: the project management office, sponsorship Project selection Rationale and business case Mission, goals, and strategy: organization and projects Program and portfolio management	Give examples of mismatches between projects and company missions. Perform an NPV analysis for a project. Perform an NPV analysis of the student's degree. Source students' projects, which they pursue for the whole course, applying different perspectives: (1) hired work, (2) select own project, (3) university project, (4) self-forming groups. Single assignments vs. assigned groups
Project initiation and the charter	The charter Major assumptions and constraints Project management plan Influential stakeholders	Write a charter. Write a charter based on theory input in class (unifying project across the whole semester).

Session Topic	Sub-Topics	Sample Assessment and Activities
Scope	<ul style="list-style-type: none"> Project goals and objectives Definition of project scope (i.e., what needs to be done?) Academic domain-specific outcomes (i.e., product, process, length of code) Requirements elicitation and acceptance Definition of project scope Goals, assumptions, constraints, priorities, requirements, limits, and technical requirements In-scope vs. out-of-scope Validation and verification Specification and design Statement of work (SOW) Change management Change control process Scope creep and gold plating Change control boards (CCB) Scope creep Project deliverables 	<ul style="list-style-type: none"> Write a scope. Write a scope based on theory input in class (unifying project across the whole semester).
Work breakdown structure (WBS)	<ul style="list-style-type: none"> Decomposition of scope Benefits of using WBS WBS structure and dictionary WBS formats: chart, tabular, and free formats (mind map); graphical vs. outline format Work packages Design of WBS Relationship to other processes * Control accounts 	<ul style="list-style-type: none"> Write a WBS.
Scheduling	<ul style="list-style-type: none"> Creating a network from a WBS Dependencies (mandatory, discretionary) Forward and backward pass Slack and critical path Assigning resources Lags, leads, and loops Creating a schedule Optimizing a schedule Milestones and deliverables 	<ul style="list-style-type: none"> Analyze sample network diagrams. Create a critical-path network without software; focus on theory.

Session Topic	Sub-Topics	Sample Assessment and Activities
Cost	Cost elements (labor, material, variable cost) Types of cost (direct, indirect, fixed, variable) Estimating: top-down, bottom-up Types of estimates, accuracies Estimating techniques (analogous, parametric, three-point method) Contingencies and management reserves Budget (creation): time-phased budget Negotiating and communicating: risks, budget, changes	Develop a Cost Estimate without software, only Excel, focus on theory Graduation cost exercise (a) teach using software – MS project; (b) teach cost theory
Stakeholder engagement	Identify stakeholders Classification Analysis: interest, influence, and impact Stakeholder buy-in and engagement strategy Manage stakeholder expectations Customer value proposition as a stakeholder	Create the stakeholder list and document their influence in a project. Create a communication matrix. Rehearsal role-play: provider: rehearsal, which goes through loops of work, lectured feedback, peer feedback, work, etc. Identify stakeholder and do a stakeholder-communication plan (on term project). Stakeholder mapping (power-Interest matrix) (on term project)
Communication	Communication model Communication skills Communication plan Communications tools Matrix, RAM Types of reports Meetings (kickoff, team, milestone, gate, status-update, virtual)	Write a communication plan (on term project): (a) Classroom: difficult meeting activity: set up mock meeting, assign different roles to different people, meeting falls apart. Apply methods to save meeting. (b) Online class: virtual meeting management
Human resources	Organizational structures by geography, product, etc. Basics of team organization Select, build, and manage team Feedback, coaching, etc. Making decisions Leadership and Motivation Resolving conflicts * Labor regulations	Inspiration paper on leadership

Session Topic	Sub-Topics	Sample Assessment and Activities
Project scheduling	Forward and backward passes Slack and critical path Assigning resources, milestones Lags, leads, and loops	Develop a schedule without software (only Excel); focus on theory. Use Microsoft Project to develop schedule.
Software tools for scheduling and cost	What's available Advantages, intelligent use Limitations of the software tool Scheduling tools Cost-estimation and budgeting tools Tutorial for a cost/schedule tool	Implement a project cost and schedule using an automated software tool. Create Gantt chart. Manage resources. Implement final project in software tool.
Earned value	Establishing the measurement of planned vs. actual S-curves and cumulative values Planned value, earned value, and actual cost Cost and schedule performance indices Variances and their interpretation Estimates at completion Cost and schedule analyses	Carry out an earned-value analysis using real-world data.
Risk and opportunity	Uncertainty Positive risks (beneficial) and negative (threats or detrimental) Risk-management strategies Risk analyses Analytical techniques Project contingencies and reserves and schedule buffers	Perform a qualitative risk analysis for a project. Create a risk register (list, probability, impact); prioritize risks.
Quality	Quality planning Metrics for quality Quality-planning and control tools Continuous improvement * Quality standards	Create a quality plan. Identify quality metrics to control quality. Construct a cause-and-effect diagram. Create a quality plan (for final project).

Session Topic	Sub-Topics	Sample Assessment and Activities
Procurement	<ul style="list-style-type: none"> Types of procurement (make or buy) Liability Definition of a contract and legal responsibilities; contract types and associated risks: FFP, CPFF, CPIF, T&M, BPO, BOT Authorized representatives Overview of procurement types Public vs. private tenders Partnerships and collaborations Offshore Incentive and award fees and damages Contract management Alternate dispute resolution (ADR) Negotiation, mitigation, arbitration, litigation Legal, exit clauses, etc. Non-financial risks (brand, reputation) Dispute resolution 	<ul style="list-style-type: none"> Recommend contract types to specific situations. Calculate the incentive fee for a contract.
Ethics	<ul style="list-style-type: none"> Definitions, concepts, and theories Ethics and cultural issues Personal, professional, corporate, societal Differences between approaches Team members' views, cultural issues Influences: colleagues, family, society Influence on decision making Ethics and professional responsibility Code of ethics (PMI, professional codes of ethics, etc.) Legal aspects 	<ul style="list-style-type: none"> Give example of personal ethical issues that could apply to projects. Group grading among team members/influences grade: 100 pts/U.S. dollar to spend on single team member (to include team dynamics and individual member engagement) Scenarios of ethical problem solving (ethical considerations for project managers and participants) Ethics case studies
Final Projects	Presentation of project plans/deliverables/lessons learned.	Final projects and assessments. Lessons learned.
Final Examination	Examination of key deliverables and/or examination.	Final Exam

Conclusion:

As indicated earlier, this type of project is a challenge for large class sizes.

A project involving the approach presented here is good for beginners and the PM-1 course. The professor can provide some templates from the required or recommended text.

<http://www.projectmanagement.com/Templates/> is an alternate location for free starter templates.