

# EGR 100 Introduction to Engineering Design

Summer 2017

## Project Management

As engineering projects increase in size, complexity, and duration, project management can become a very complex process. There are a wide variety of computer tools and experts that focus specifically on the methodologies associated with effective project management. The purpose of this reading is to give merely an introduction into the concepts and terminologies that are important for effective functioning on engineering project teams.

Project management consists of three components: *scope*, *budget*, and *schedule*. *Scope* defines the specific work that must be completed for the project to be successful (both in terms of quantity and quality). *Budget* describes the resources that must be committed to the project, which can be described in terms of money but also in terms of personnel, their effort (time) and materials. *Schedule* is the logical connection of the various tasks that must be performed, in terms of duration, interdependence, and the constraints of project deadlines.

Effective project management must include all three components. However, our focus at this point will be on scope and scheduling, and a few methods/tools for managing these aspects of projects. Your textbook describes a *checklist* as the simplest tool for monitoring project tasks. A slightly more structured tool is a *work breakdown structure (WBS)*, which is used to outline all the specific tasks involved in a given project, grouped into related tasks. It is essentially a structured version of a *checklist*. See <https://www.workbreakdownstructure.com/> for an example and further explanation.

A work breakdown structure typically only describes the specific tasks necessary to complete a project. It does not show the dependency of any given task on other tasks, time required to complete any given task, nor the sequencing of the tasks. There are, however, a variety of tools that can be used to show all of these things. One of the simplest of these tools is known as *Gantt charts*. Gantt charts are fairly common and easy to interpret, with each bar representing the duration of a given task. However, they do not typically show the interdependency among tasks. An example is shown here: <http://www.ganttchart.com/BasicGanttExample.html>

In order to show those connections among tasks, a *network (or precedence) diagram* is typically used. The most common methods are the *Program Evaluation Review Technique (PERT) Chart* and the *Critical Path Method (CPM)*, which are functionally equivalent. CPM diagrams can require a fair amount of effort to create, given that you need to identify in advance how much time and resources each task will require and how the tasks are interrelated. However, they consequently provide far more information in the management of large projects, with regard to coordinating personnel, budgets, equipment, etc.

All of the above are merely tools to aid teams in ensuring a quality result for their projects. It is important to remember that project success is highly dependent on effective teamwork, well-defined project statements and criteria for success, and effective communication. It is critically important that a project team records the “who, what, when, and how” for every task and communicate that information among all members of the team. It is equally important that a project management strategy includes appropriate “check points” within the project to confirm that the various elements of the project are remaining within the previously determined *scope*, *budget*, and *schedule*.