

11.8 Critical Paths

The critical path is a concept from industrial engineering and project management that shows the task or its series that will pace the project. The critical path is the longest string of dependent project tasks. Tasks on the critical path will hold up project completion if they are delayed. An example of a critical path is the mathematics sequence in an engineering curriculum. If a student delays a semester of calculus class early in his or her program, it typically delays graduation for one semester. Mathematics is on the critical path for graduation in an engineering program. Delaying an English or humanities class, however, could be accommodated by rearranging other classes or taking an overload one semester. The English and calculus classes differ in that other classes have calculus as a prerequisite. It must be taken before other classes and, thus, has a cascade effect on the overall study plan.

The same will be true for tasks in your project plan. Tasks that are not on the critical path may be rearranged without changing the project completion. Any delay of a critical path task will result in a project delay.

As you plan for your project, you have to know which tasks can be compressed or rearranged and which cannot. Some tasks can be accelerated by using more people while others cannot. The classic analogy is having a baby. Nine people cannot have the same baby in one month. Some tasks take time and special attention needs to be paid to tasks on the critical path, which cannot be compressed. This information will be valuable during the project if you need to rearrange tasks or team members.

11.9 Gantt Charts

While the PERT chart is for organizing tasks and placing priorities on timing and resources, it may be difficult to interpret for a project with many tasks, especially for people outside your team. A Gantt chart is another popular project management charting method and is easier for people to understand where your team's progress relative to your plan.

A Gantt chart is a horizontal bar chart frequently used in project management where tasks are plotted versus the time. Henry L. Gantt, an American engineer and social scientist, developed the Gantt chart in 1917, and it has become one of the most common project planning tools. In a Gantt chart, each row represents a distinct task. Time is represented on the horizontal axis. Typically, dates run across the top of the chart in

increments of days, weeks, months, or a timescale that you and your classmates have determined. A bar represents the time when the task is planned for with the left end representing the expected starting time for each task and at the right end for the end of each task. Tasks can be shown to run consecutively with one starting when the previous one ends. They can be shown to run in parallel or overlap. An example of the Gantt chart, created with Excel, is shown in Fig. 11.2.

Notice that tasks and milestones are included on the Gantt chart. Significant milestones and reports are represented with different colors. As progress is made, the cells in the spreadsheet can be changed to a different color so that someone can easily see the progress at any time in the project. If a project is partially completed, that bar can be shaded in proportion of the work done on that task. If the task is half finished, half of that bar will be shaded. A vertical line can be drawn for the current date, and progress can easily be checked based on the line. Tasks that show completion to the right of the line are ahead of schedule and those to the right of the vertical line are behind schedule.

An additional column can be added to the right of the task descriptions to show who is responsible for each task. The Gantt chart is an excellent way to see who is committed to which tasks during the project to ensure that each person has responsibilities over the entire project, and no one is being asked to do too many tasks at one time.

Many teams will use a PERT chart to arrange tasks and identify the critical path. They then transfer the tasks to a Gantt chart for project management. To make a presentation

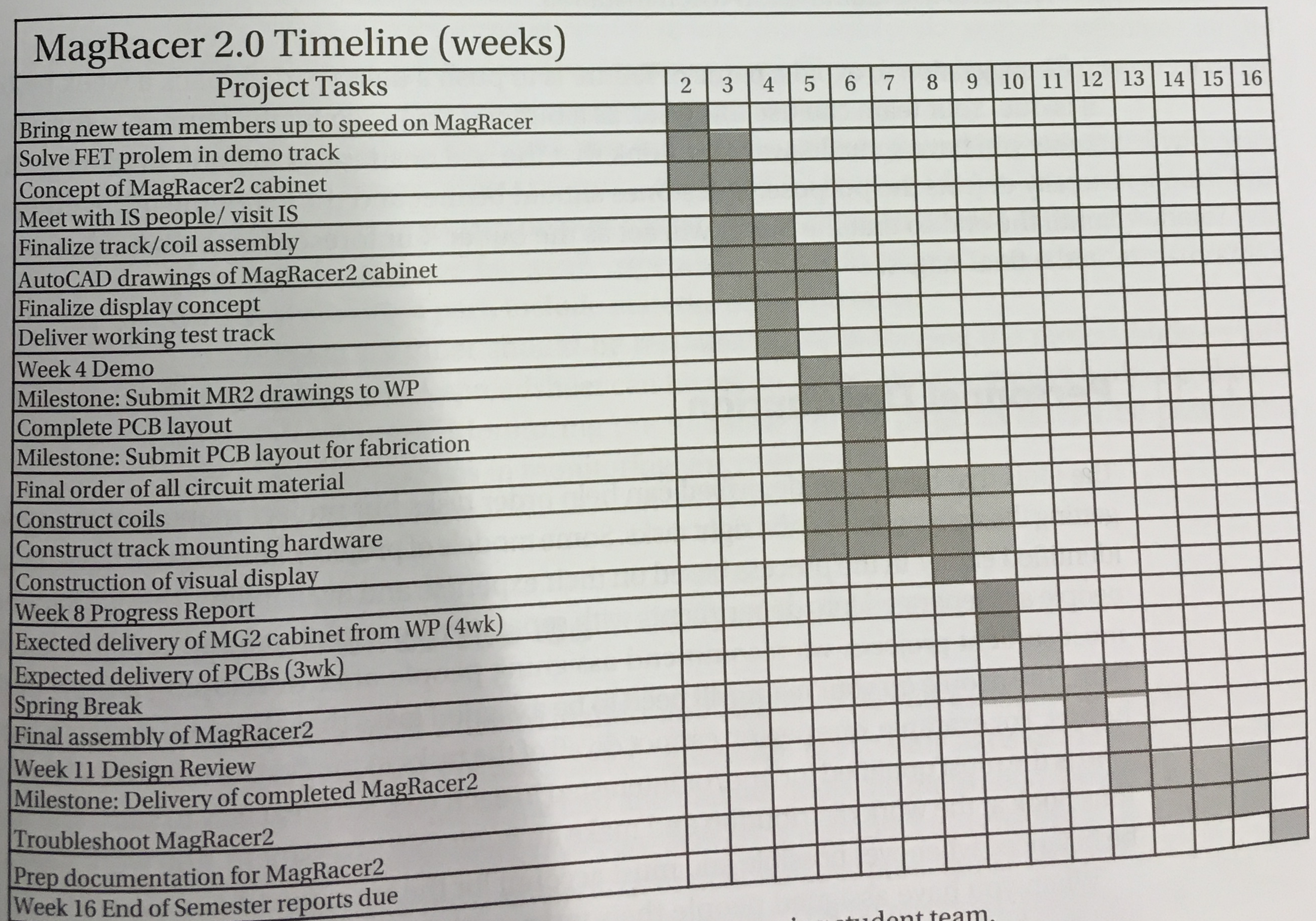


Figure 11.2 Sample Gantt chart from an engineering student team.

must be taken early or be delayed. You determined what classes you needed to start with and how many you needed to graduate. You used resources like printed sample plans as well as talking with other students, academic advisors, and faculty.

You will follow the same process in the project planning process. Take the tasks that your team identified and prioritize what must be done. Use your outline to link tasks part of the same task together.

11.7 Pert Charts

The US Navy developed Program Evaluation and Review Technique (PERT) in the 1950s to manage the Polaris missile project. This technique is still used in many industries as the major project tool to this day to track and order tasks.

In a PERT chart, each task is represented by a box that contains a brief description of and duration for the task. Milestones are represented with boxes that have rounded corners. Related tasks are connected with lines. If one task must be completed before a second task can be started, they are connected with a line originating from the right edge of the first task and connected the left edge of the second task, as show in Figure 11.1. In this example, the duration is noted in terms of days, and if your team needs a component from a vendor, the task of ordering the component and shipping it have to proceed before anything else can be done. Unrelated tasks are not connected on the PERT chart.

The PERT analysis shows pathways of tasks. Some tasks have to be done in series, and others can be done in parallel. These series can be laid out as the overall project plan is laid out.

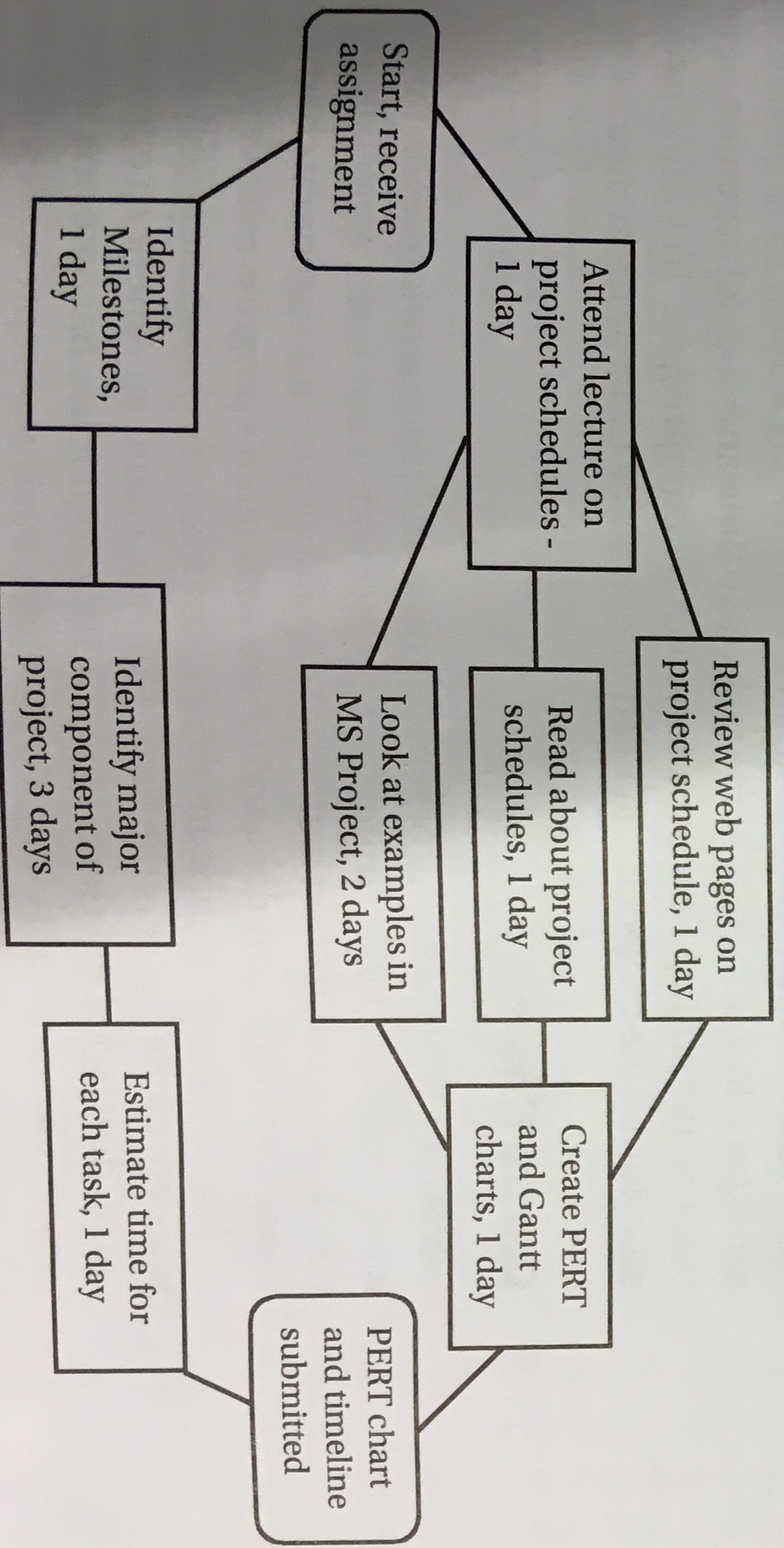


Figure 11.1 PERT chart for project planning