

Operations Research Case Study Project
(Required for Engineering 57, Optional for Economics 32)

SCHEDULE FOR FALL 2010:

August 30 – Sept. 17: Research topics and generate potential project ideas. Consult with instructor as necessary. Initiate contact with potential analysts of clients (see *Two approaches ...*, below).

***Monday, September 20:** Submit First Progress Report (1-2 pages) containing your ideas, paper references, potential contacts and copies of your correspondence.

Sept. 20 – October 6: Continue to research topics and make a final decision on your project topic. Develop and write a formal proposal for your project.

***Wednesday, October 6:** Submit Case Study Proposal (2-3 pages)

October 6 – November 8: Most of your work on the project should be completed during this period. Preliminary results should be available for incorporation into your second progress report.

***Monday, November 8:** submit Second Progress Report

November 8 – December 1: Generate final results and write up your project as a 10-20 page (double spaced) report.

***Wednesday, DECEMBER 1:** submit Final Report – at beginning of class

***Friday, December 3 and Monday December 6 :** Project Presentations to class – all students required to attend.

There are four basic stages in applications of operations research:

Problem

Identification ---> Formulation ---> Solution ---> Implementation

In this course, we spend most of our time with formulations and solution techniques. The Problem Identification and Implementation stages are difficult areas to include in the conventional course format. However, these stages are critical to the success of operations research methods. I have found that one way (perhaps the best way) to learn about these stages is through in-depth study of a "real world" problem to which operations research methods have been or can be applied. These considerations motivate the inclusion of a "Case Study Project" as an important part of this course.

*Two approaches to case study projects have been successful in the past. You should **choose one of the two**.*

1. Early in the semester, the student reads through journals and books in the library to identify one or more interesting cases to consider for the project (suggested journals are listed below). Letters are written to the authors of the papers and/or other persons connected with the project requesting additional details about the project, especially regarding the Problem Identification and Implementation stages. Often, few details are given about these stages because, quite frankly, insufficient attention has been given to problem identification, and certain aspects of the solution have not been successfully implemented. However, persons

involved in such projects are often willing to send documentation on aspects of the project, which are not explained in the published paper. If such documentation does not exist, they are often willing to write a letter or talk over the telephone to explain other aspects of their projects. Of course, Operations Research professionals are busy people and some may not be able to respond to the requests. Thus, it is wise to pursue more than one possibility at the beginning. I suggest that you request information on **at least three** different projects before choosing a project. Also, since your time is limited, *beware of projects by foreign authors* because of possible delays in international mail and potential language barriers. Submit your letters to me (with your first progress report) before you send them.

2. The student draws on past experience obtained through a previous job or other means to identify a real problem to which Operations Research methods are applicable. A student who lacks such experience might simply look around at the Swarthmore College campus to identify such a problem (such as assignment of students to dormitory rooms, operation of a waste recycling service, etc.). The student then goes through the problem identification stage, formulates and solves the problem, and finally discusses implementation with the relevant parties (such as a former employer or Swarthmore College staff).

In either case, a **Case Study Paper** is written which presents the details of the student's research. The paper should emphasize the **PROBLEM IDENTIFICATION** and **IMPLEMENTATION** aspects of the project.

Suggested journals for identifying potential case study projects.

1. **Interfaces.** Published by the Institute for Operations Research and the Management Sciences (INFORMS). It is available in Cornell Library. Pay particular attention to "Franz Edelman Award" issues (annual) which highlight projects nominated for this prestigious award to successful OR projects. Many case studies in our textbook are drawn from Interfaces.
2. **Management Science.** Published by INFORMS and available in **McCabe** Library stacks.
3. **Operations Research.** Published by INFORMS and available in **Cornell** Library stacks.

IMPORTANT BACKGROUND READING: For a more complete exposition on the stages of applying Operations Research, re-read the first chapters of your text by Hamdy Taha. Also, the text has descriptions of numerous actual case studies on the CD-ROM in "Additional" Chapter 24 along with computer solutions in the SoftwareSupport\ChapterFiles folder. Appendix E on the CDROM (file AppE.pdf) also has many short case studies that might give you some ideas. Some of these may be assigned for homework.

ADDITIONAL OPERATIONS RESEARCH METHODS: Finally, you *do not* need to limit your case study to methods we are covering in this course. There are several methods presented in your text that we will not cover (the text is designed for a full-year course). However, if the text's case studies in chapters we do not cover stimulate your interest in a particular type of problem solved by an additional method, you are welcome to delve into the topic on your own and pursue such a problem in your case study. Examples of such methods are Deterministic and Probabilistic Inventory Models, Decision Analysis and Game Theory, Queueing Systems, Simulation Modeling, and Markov Chains.