

Advanced Production Planning and Scheduling (ISE514) Fall 2009 (rev. 07/26/09)

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| Instructor: | Geza Bottlik, E-mail: bottlik514@gezabottlik.com |
| Office Hours: | Tuesdays and Thursdays, 2:00 P.M. – 3:00 P.M, Room GER 202 |
| | Phone 213 740 - 5050 |
| TA: | Xiaoqing Wang xiaoqinw@usc.edu |
| Office Hours: | 8:30 to 10:30 A.M. Mondays in GER 309 |
| Class time/place: | Tuesdays/Thursdays 3:30 P.M. – 4:50 P.M., OHE100D |

Test Schedule:

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| Midterm 1: | Tuesday, September 29, 2009 | 3:30 P.M. – 4:50 P.M. |
| Midterm 2: | Tuesday, October 27, 2009 | 3:30 P.M. – 4:50 P.M. |
| Final: | Tuesday, December 15, 2009 | 2:00 P.M. – 4:00 P.M. |

Web Page: www.gezabottlik.com

At the site you will find:

- The syllabus
- Lecture Notes, Assignments and due dates, solutions, old exams
- Messages of current interest - e.g. a cancelled class (it won't happen!)
- The DEN website is only useful for lectures, e-mail, the discussion board and group pages

Your responsibility:

- Register on the site and learn how to use the site
- Check your email on a regular basis
- Download the lecture notes and assignments for each class
- Review your grades to track your progress and standing in the class.

Assignments: Readings and Problems will be included in most weeks' assignments. It is imperative that you **prepare for class** -- you will find it extremely difficult to follow the discussion if you have not read the material. Usually, problems are assigned on Tuesday and are due on the following Monday at midnight. We will return the assignments one week later on the assignment manager if points have been deducted. Late homework **cannot** be accepted, unless **prior** arrangements have been made (e.g. out of town funeral). Homework is to be in digital format, a **single** document (no zip files), submitted through the assignment manager on the DEN website

Your name, assignment number, the date and whom you worked with must be in the header. Use a consistent template and format the output for a professional appearance. The assignments should be as professional in appearance as if you were preparing reports at work or for publication. Clearly label your conclusions for each problem, followed by the supporting calculations and discussion. The problems must be in the order assigned. Out of sequence problems will receive no credit.

It's OK to work on homework together, but finish it by yourself and indicate whom you worked with in the header. Each student must turn in a separate homework, unless the assignment is specified as a team assignment. Generated data and essay questions must be unique to each student. Homework files will be named by the assignment manager. **If the answer is given in a book, don't just copy it, explain how you got it.**

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Objectives of the course

The major objective of this course is to have you understand the nature of a production or service system – the intricate dependencies among long, intermediate and short range planning. The context of these systems - organizational, behavioral and technological must also be understood. Finally, it is a thorough understanding of the objectives, mathematical and applied methods and limitations of finite scheduling.

Grading:

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| Project | 4% |
| Homework | 23% |
| Midterm 1 | 15% |
| Midterm 2 | 22% |
| Final exam | 28% |
| Participation (attendance, asking questions, making contributions, postings on the discussion board) | 8% |

Participation for DEN students includes, e-mail, call in, and submitted questions and comments for the lectures, postings on the discussion board and is expected every week. The grade for the course will only be based on the required work listed above and **cannot** be improved with additional work. Note that 8% of the grade is for participation – so participate!

The **required** course reference materials consists of the following (Available from the book store as a reader)

1. “Modeling techniques for automated production planning in the semiconductor industry”, Robert C. Leachman from “Optimization in industry”, ed. By T. A. Ciriani and R.C. Leachman, John Wiley and Sons, 1993
2. Chapters 1 and 2 of “Manufacturing Planning and Control Systems” by T.E. Vollman, W.L. Berry, D.C. Whybark, 3rd Edition, Irwin 1992 ISBN: 025606167X
3. “Sequencing and Scheduling”, by S. French, Ellis Harwood, 1982 ISBN: 0470272295
4. “Scheduling: Theory, Algorithms, and Systems” , Michael Pinedo, Prentice Hall, 2nd Ed., 2002, pages 211 -- 230 ISBN 0 – 13 – 028138 –7
5. “Industrial Scheduling”, by D.R. Sule, PWS Publishing Company, 1997, pages 81 – 111, ISBN 0 – 534 – 95456 -1
6. “Introduction to sequencing and scheduling”, K.R. Baker, Wiley, 1974, pages 94 – end of chapter ISBN: 0471045551
7. “Sequencing with earliness and tardiness penalties: a review, K.R. Baker and G.D. Scudder. “Operations Research”, Jan/Feb 1990, pages 22 – 36

In addition there is a small text required that we will use throughout the semester:

“The fundamentals of production planning and control”, Stephen N. Chapman, Pearson Prentice Hall, 2006, ISBN 0-13-017615-X

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Course Outline:

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| 08/25 | Introduction and overview, Production planning (Week 1) |
| 09/01 | Production planning (2) |
| 09/08 | MRP (3) |
| 09/15 | Introduction to operations scheduling, definitions and performance measures, job shop model and algorithms (4) |
| 09/22 | Mathematical methods: dynamic programming, branch and bound (6), Review |
| 09/29 | Midterm 1 (5) |
| 10/06 | Schedule generation, dispatching rules (7) |
| 10/13 | Heuristics, Searches (8) |
| 10/20 | Performance guaranties, Review (9) |
| 10/27 | Midterm 2 (10) |
| 11/03 | Early/Tardy Problems (11) |
| 11/10 | Project Scheduling (12) |
| 11/17 | Batch processing, sequence dependence (13) |
| 11/24 | Stochastic Problems (14) |
| 12/01 | Review, project due (15) |
| 12/15 | Final |

References:

- Silver, Pyke and Peterson, Inventory Management and Production Planning and Scheduling, 3rd Ed. John Wiley, 1998
- R.W. Conway, W.L. Maxwell and L.W. miller, Theory of scheduling, Addison Wesley, 1967
- S. E. Dreyfus and A.M. Law, The art and theory of dynamic programming, Academic press 1977
- F.S. Hillier and G. J. Lieberman, Introduction to Operation Research, McGraw-Hill, 1990
- George W. Plossl, Orlicky's Material Requirements Planning, Second Edition, McGraw-Hill, Inc. 1994
- Michael Pinedo, Scheduling, Second Edition, Prentice Hall, 2002 ISBN – 0-13-028138-7
- T.E. Morton and D.W. Pentico, Heuristic Scheduling Systems, Wiley, 1993
- K. R. Baker, Elements of sequencing and scheduling, 2002 ISBN 0 – 9639746 – 1 – 0
- D.R. Sule, Industrial Scheduling, PWS Publishing, 1997, ISBN – 0-534-95456-1

Recommended reading:

1. Womack, J. P., Jones, D. T., and Roos, D. The machine that changed the world, Rawson Associates, NY, 1990
2. Goldratt, E.M., The Haystack syndrome, North River Press, NY, 1990

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Project

There will be a project, selected by the students. The purpose of the project is to familiarize students with the process of search, analysis, evaluation and critique of pertinent and current literature on scheduling or related topics. A special project on actual problems may be substituted. The project will be done by a team of 3 or 4 students. Consultation with the instructor is encouraged.

Project report

The body of the report is limited to no more than 5 typed (double spaced), Word document submitted on the assignment manager. The abstract and appendices are in addition to the 5 page limit

The report must include:

- A cover page with name, title and an abstract not to exceed 100 words
- Text containing conclusions, definition, development of the topic, analysis
- References (books and articles): title, author, publication, date, volume and pages

ALWAYS BE SURE TO GIVE THE SOURCE OF ALL YOUR INFORMATION. ANYTHING TAKEN VERBATIM FROM SOMEONE ELSE MUST BE IN QUOTATION MARKS AND REFERENCED. THIS INCLUDES PARTIAL SENTENCES.

This is intended to be an interactive class and your participation should increase as the semester progresses. Attendance at all classes is expected of everyone. Frequent absences will result in a reduction in grade. Punctuality is expected. If you are late, be sure not to disturb the class as you enter.

PLEASE DO NOT BRING FOOD OR DRINKS TO THE CLASS. (Water in plastic bottles is OK)

The midterm and final will be based on problems similar to the ones assigned in the homework and the discussions in class. **All tests are open book and open notes. Laptops are also allowed.** Students are expected to **apply** what they should have learned up to that point to analyzing situations, identifying the problems and applying the appropriate techniques to solve them.

NEATNESS, SPELLING, AND GRAMMAR COUNT. THEY ARE AN EXPRESSION OF YOUR COMMITMENT TO DO A GOOD JOB.

Last, but most important:

The School of Engineering and the Department of Industrial and Systems Engineering adhere to the University's policies and procedures governing academic integrity as described in Scampus. Students are expected to be **aware** of and **observe** the academic integrity standards described in Scampus. I will **enforce** these standards -- in other words, if you cheat and get caught you will get an **F** in the class.

Any Student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.