

## Advanced Production Planning and Scheduling (ISE514 Spring 2016 (rev. 01/21/2016))

Instructor:	Geza Bottlik, E-mail: bottlik@usc.edu
Office Hours:	Mon/Wed, 3:30 P.M. – 4:45 P.M, Room GER 202 or by appointment
	Phone 213 740 - 5050
TA:	Wentao Zhang wentao@usc.edu
Office Hours:	TBD
Class time/place:	Monday/Wednesday 5:00 P.M. – 6:20 P.M., OHE 100B

### Test Schedule:

Midterm 1:	Monday, February 22, 2016	5:00 P.M. – 6:20 P.M.
Midterm 2:	Wednesday, March 30, 2016	5:00 P.M. – 6:20 P.M.
Final:	Wednesday May 4, 2016	5:00 P.M. – 7:00 P.M.

Web Pages: [www.gezabottlik.com](http://www.gezabottlik.com) - Lecture notes, assignments, solutions and grades.  
<https://courses.uscden.net> At the site you will find: Assignments e-mail, and the discussion board

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 Monday and are due on the following Sunday at midnight. We will return the assignments one week later on D2L 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 printable** document (no zip files), submitted on D2L.

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. Do not give your files to others and do not use others' files. Do not copy problems. Your homework file must be named **starting with your username**. The same rules apply among teams for team assignments. Only one submission per team. **If the answer is given in a book, don't just copy it, explain how you got it.**

### 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.

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### Grading:

Homework	~15%	1.4 pts. each
Midterm 1	~14%	15 points
Midterm 2	~20%	21 points
Final exam	~31%	31 points
Participation (quizzes, attendance, asking questions, making contributions, postings on the discussion board)	~20%	1.3 pts. Each for quizzes, 0.25 for others

Participation includes, e-mail, questions, contributions and comments during lectures, postings on the discussion board and is expected every session. Students receive some partial participation credit for attendance but also need to participate. The grade for the course will only be based on the required work listed above and **cannot** be improved with additional work. Note that 20% of the grade is for participation – **so participate!**

Reading material adequate for the course will be provided each week on <https://courses.uscdcn.net>

In addition you may find the **suggested** texts for the course quite useful:

1. "The fundamentals of production planning and control", Stephen N. Chapman, Pearson Prentice Hall, 2006, ISBN 0-13-017615-X
2. "Principles of Sequencing and Scheduling", Kenneth R. Baker and Dan Trietsch, John Wiley and Sons, 2009, ISBN 978-0-470-39165-5

### References:

1. "Sequencing and Scheduling", by S. French, Ellis Harwood, 1982 ISBN: 0470272295
2. "Scheduling: Theory, Algorithms, and Systems", Michael Pinedo, Prentice Hall, 2<sup>nd</sup> Ed., 2002, pages 211 -- 230 ISBN 0 – 13 – 028138 –7
3. "Industrial Scheduling", by D.R. Sule, PWS Publishing Company, 1997, pages 81 – 111, ISBN 0 – 534 – 95456 -1
4. "Introduction to sequencing and scheduling", K.R. Baker, Wiley, 1974 ISBN: 0471045551
5. "Sequencing with earliness and tardiness penalties: a review, K.R. Baker and G.D. Scudder. "Operations Research", Jan/Feb 1990, pages 22 – 36
6. Silver, Pyke and Peterson, Inventory Management and Production Planning and Scheduling, 3<sup>rd</sup> Ed. John Wiley, 1998
7. R.W. Conway, W.L. Maxwell and L.W. Miller, Theory of scheduling, Addison Wesley, 1967
8. S. E. Dreyfus and A.M. Law, The art and theory of dynamic programming, Academic press 1977
9. F.S. Hillier and G. J. Lieberman, Introduction to Operation Research, McGraw-Hill, 1990
10. George W. Plossl, Orlicky's Material Requirements Planning, Second Edition, McGraw-Hill, Inc. 1994
11. T.E. Morton and D.W. Pentico, Heuristic Scheduling Systems, Wiley, 1993

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### **Course Outline:**

01/11	Introduction and overview, Production planning (Week 1)
01/20	Production planning (2)
01/25	MRP (3)
02/01	Introduction to operations scheduling, definitions and performance measures, job shop model and algorithms (4)
02/08	Mathematical methods: dynamic programming, branch and bound (5)
02/15	Schedule generation, dispatching rules (6) Review
02/22	Midterm 1 (7)
02/29	Heuristics, Searches (8)
03/07	Performance guaranties, Review (9)
03/21	Early/Tardy Problems (10)
03/28	Midterm 2 (11)
04/04	Project Scheduling (12)
04/11	Batch processing, sequence dependence (13)
04/18	Stochastic Problems (14)
04/25	Review, (15)
05/04	Final

### **Examinations:**

The midterms and final exams are open book and open notes. Calculators and laptops may be used. Exam problems will be both numerical and essay, with occasional true/false, fill in the blank, or multiple choice. 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.

### **Quizzes:**

There will be weekly quizzes at the start of class on Monday or Wednesday. The format is True/False and fill in the blank. The purpose of these quizzes is to encourage you to keep up with the class material. I anticipate that you will have little difficulty in answering the questions if you are up to date on the class materials, including the reading for the next class. There is normally no make-up of a missed quiz. However, if a student expects to be away from class for a valid reason (e.g. employment travel) then special arrangements can be made ahead of time to allow the quiz to be taken on-line. Each quiz will be based primarily on two subjects: the material from the previous week and the reading assignment for that week. You are expected to have read the weekly assignment prior to the start of class. Quizzes will be announced during the previous week. DEN students take the quizzes on line.

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.

### **Expectations:**

Students are expected to attend every session, be on time, to have read the preparation material and participate actively in the discussions in the class. The use of laptops, I phones or similar devices during class is discouraged. Students are also expected to post comments and questions on the discussion board (or send emails or contributions to be used in class). You should be prepared to devote the time

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necessary to take the course. The course material is cumulative and you need to keep up as we go along.

### **Method of Instruction:**

Class sessions will generally consist of quizzes and their solution, going over homework, assigning new homework, questions and answers, lecture, and discussion.

**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.**

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

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

### **Last but most important:**

#### **Academic Conduct**

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

#### **Support Systems**

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* [http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.