

ISE 514

Advanced Production Planning and Scheduling

Units: 3 – Spring 2022

Tuesday & Thursday 2:00 – 3:20 pm

Location: OHE 100 C & Online

Instructor: Dr. Shalini Gupta

Office: GER 207

Office Hours: Online via zoom

Thursday- 4 pm – 5 pm

Contact Info: shalinig@usc.edu

Teaching Assistant:

Office: TBD

Office Hours: TBD

Contact Info:

Course Description

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.

Course Notes

D2L

Required Readings and Supplementary Materials

“Introduction to the Mathematics of Planning and Scheduling”, Geza P. Bottlik, Taylor and Francis, 2017, ISBN 978-1482259216.

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
- “The fundamentals of production planning and control”, Stephen N. Chapman, Pearson Prentice Hall, 2006, ISBN 0-13-017615-X
- “Principles of Sequencing and Scheduling”, Kenneth R. Baker and Dan Trietsch, John Wiley and Sons, 2009, ISBN 978-0-470-39165-5
- Factory Physics, 3rd edition, Wallace J. Hopp and Mark L. Spearman

Description and Assessment of Assignments

Course Material: All assigned sections of the texts, plus topics discussed in lecture by the instructor.

Exams: Each exam will cover the material presented up to and including the preceding assignments. Points will be assigned to each section of the exam. No retakes will be allowed. No make-up exam will be given. The exams will not be comprehensive. All answers should be clearly and fully justified. If the steps are not clear, points will be deducted even if the final answer is correct. Any person caught cheating on an examination will be referred to judicial affairs.

Projects: The composition of project team will be arranged based on the final enrollment of the class. Each team, consisting of up to three members, will conduct an in-depth research project on the assigned topic. Additional details and instructions will be made available during the course. Each team must adhere to the following schedule of key milestones and submittals. Work is to be submitted via email unless students are otherwise instructed. Student teams will submit a comprehensive report at the end of the semester. The project is designed to exercise the skills which you develop over the course of the semester. Additional details will be provided during the course.

Homework: Homework problems will address concepts and calculations related to topics covered in the previous week's classes. Some problems will be short, quick calculations; others will be more extensive. The specific assignment will be posted on D2L. Due dates (typically one week later) will be provided on the assignment. Late homework will not be accepted. No exceptions except institution-established emergency reasons; credit for such late homework is with the discretion of the instructor. Everybody has to write his/her own solution independently and make sure to fully understand it. Exchanging solutions, consulting with people other than class members, finding solutions on the web or elsewhere, etc. are not allowed. Violations result in losing the credit for the entire homework set in addition to a significant percentage of the overall course grade, all with the discretion of the instructor. All answers should be clearly and fully justified. If the steps are not clear, points will be deducted even if the final answer is correct.

Grading Breakdown

| | |
|-----------------|-----------|
| Exams (1 and 2) | 20 % Each |
| Exams (3) | 35 % |
| Project | 20 % |
| Homework | 5 % |
| Total | 100% |

Grading Scale (Example)

Course final grades will be determined using the following scale

| | |
|----|--------------|
| A | 95-100 |
| A- | 90-94 |
| B+ | 87-89 |
| B | 83-86 |
| B- | 80-82 |
| C+ | 77-79 |
| C | 73-76 |
| C- | 70-72 |
| D+ | 67-69 |
| D | 63-66 |
| D- | 60-62 |
| F | 59 and below |

Grading Timeline

7 – 8 Days

Academic Integrity

Any form of cheating, plagiarism, personation, falsification of a document as well as any other form of dishonest behavior related to the obtention of academic gain or the avoidance of evaluative exercises committed by a student is an academic offence under the Academic Code of Conduct and may lead to severe penalties up to and including suspension and expulsion. As examples only, you are not permitted to:

- Falsify data or research results
- Sharing assignments
- Benefit from others' work
- Unfair advantage
- External assistance
- Possession of solutions
- Copy from anywhere without indicating where it came from
- Let another student copy your work and then submit it as his/her own
- Hand in the same assignment in more than one class
- Have unauthorized material/ collaboration or devices in an exam.
- Copy from someone's else exam/assignments
- Communicate with another student during an exam
- Add or remove pages from an examination booklet or take the booklet out of an exam room
- Acquire exam or assignment answers or questions
- Write an exam for someone else or have someone write an exam for you
- Submit false documents such as medical notes or student records

You are subject to the Academic Code of Conduct.

Student's Responsibilities

- Students are required to wear a mask in class. Refusal to comply with university masking policy is a disciplinary matter.
- Students are expected to read the assigned material. Some material may only be covered in class and not made available on the course website.
- Students are expected to be respectful of other people's opinions and to express their own views in a calm and reasonable way. Disruptive behavior will not be tolerated.
- Students are expected to be familiar with the Academic Code of Conduct.

To quote from a USC guidebook: "Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior, and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn, and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem, and may be reported to the Office of Student Judicial Affairs for disciplinary action."

| <u>Week</u> | <u>Date</u> | <u>Topic</u> | <u>Text Chapters</u> |
|-------------|-----------------|--|----------------------|
| 1 | 11 Jan. | EOQ Models | Ch. 3 & Suppl. |
| 2 | 13 Jan. | EOQ Models | Ch. 3 & Suppl. |
| | 18 Jan. | EOQ Models | Ch. 3 & Suppl. |
| 3 | 20 Jan. | MRP | Ch. 5 & Suppl. |
| | 25 Jan | MRP | Ch. 5 & Suppl. |
| 4 | 27 Jan. | Job shop scheduling rules & Gantt chart | Suppl. |
| | 1 Feb. | Algorithms for one machine problems | Ch. 8 & Suppl. |
| 5 | 3 Feb. | Algorithms for one machine problems | Ch. 8 & Suppl. |
| | 8 Feb. | Algorithms for two machine problems | Ch. 9 & Suppl. |
| 6 | 10 Feb. | Examination 1 | |
| | 15 Feb. | Algorithms for two machine problems | Ch. 9 & Suppl. |
| 7 | 17 Feb. | Implicit Enumerations & Dynamic Program. | Ch. 10 & Suppl. |
| | 22 Feb. | Branch and Bound | Ch. 10 & Suppl. |
| 8 | 24 Feb. | Branch and Bound | Ch. 10 & Suppl. |
| | 1 March | Heuristics Approaches | Ch. 12 & Suppl. |
| 9 | 3 March | Flow Shop Scheduling | Suppl. Material |
| | 8 March | Project Scheduling | Appendix B & Suppl. |
| 10 | 10 March | Project Scheduling | Appendix B & Suppl. |
| | 15 March | No Class | |
| 11 | 17 March | No Class | |
| | 22 March | Parallel Machine Scheduling | Ch. 13 & Suppl. |
| 12 | 24 March | Examination 2 | |
| | 29 March | Parallel Machine Scheduling | Ch. 13 & Suppl. |
| 13 | 31 March | Relaxation of Assumptions | Ch. 14 & Suppl. |
| | 5 April | Relaxation of Assumptions | Ch. 14 & Suppl. |
| 14 | 7 April | Batch processing, sequence dependence | Ch. 14 & Suppl. |
| | 12 April | Batch processing, sequence dependence | Ch. 14 & Suppl. |
| 15 | 14 April | Batch processing, sequence dependence | Ch. 14 & Suppl. |
| | 19 April | Batch processing, sequence dependence | Ch. 14 & Suppl. |
| 16 | 21 April | Project Presentations | |
| | 26 April | Project Presentations | |
| | 28 April | Project Presentations | |

Statement on Academic Conduct and Support Systems

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 Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention and Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)- (213) 740-5086 | Title IX – (213) 821-8298
equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following *protected characteristics*: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations. The university also prohibits sexual assault, non-consensual sexual contact, sexual misconduct, intimate partner violence, stalking, malicious dissuasion, retaliation, and violation of interim measures.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710

uscsa.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.