

The University of Texas at El Paso
Modeling and Analysis of Manufacturing Process – MGF 5321
Fall 2022 – Course Syllabus

Professor: Dr. Ana C. Cram

Office: Engineering Building Room A-241

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Class meets: Classroom Building, 103, Tuesday 6:00 pm – 8:50 pm

Office hours: Mondays and Wednesdays 1:00 pm to 2:00 pm or by appointment

Course web page: <https://blackboard.utep.edu/>

Course description:

Planning and scheduling are forms of decision-making that play an important role in most manufacturing and services industries. The planning and scheduling functions in a company typically use analytical techniques and heuristic methods to allocate its limited resources to the activities that have to be done. In this course, students will learn about scheduling in manufacturing and services, will review exact and approximate techniques and approaches to modeling and solving problems from a variety of manufacturing and service applications including production scheduling, assembly systems, reservation systems, timetabling problems, and workforce and crew scheduling and will get hands on experience with manufacturing analytics

Prerequisite: Permission of instructor

Course Objectives:

- To prepare students to recognize different shop configurations, manufacturing scheduling problems, and performance measures.
- To help students identify basic algorithms and procedures to use in different shop configurations.
- To provide understanding of alternative solution methodologies available while solving manufacturing and service systems scheduling problems.
- To make students aware of the current trends and future directions in manufacturing scheduling.
- To provide an introduction to manufacturing analytics and dashboard creation using Power BI/Tableau

Course Logistics:

- We will meet Tuesdays in Classroom Building 103. I will post information (online activities, discussion, starters, assignments, etc.) for the upcoming week by Tuesday at 6:00pm, so that have access to the material that will be discussed in class that day.
- Assignments are due by 6:00 p.m. MST on the due date listed in the course schedule. Late submissions will be accepted, however for every day (every 24 hours) the assignment is late after due date, 20% of the maximum will be deducted from the assignment score. No assignments will be accepted once they are five or more days late.
- An assignment file should be appended by your Last Name and First Name, such as “assignment1_LastName_FirstName.pdf”. This may make it easier for me to manage assignment files you download to my computer.

PART I – DISCRETE SYSTEMS	
1.	Types of Manufacturing Systems and Processes
2.	Project Scheduling Models
3.	Job Shop Models
4.	Flexible Manufacturing Systems
5.	Reservation Systems and Timetabling Models
PART II – MANUFACTURING ANALYTICS	
6.	Enabling agile and efficient manufacturing systems using dashboards
7.	
PART III – STOCHASTIC SYSTEMS	
8.	Differences between discrete and stochastic manufacturing systems
9.	Queuing Theory

Useful References:

1. Michael Pinedo. Planning and Scheduling in Manufacturing and Services (Springer Series in Operations Research and Financial Engineering). Springer; 2nd ed. 2009.
2. Michael Pinedo. Operations Scheduling with Applications in Manufacturing and Services. Irwin McGraw-Hill, 1999.
3. Askin, Ronald G., and Charles R. Standridge. Modeling and Analysis of Manufacturing Systems, John Wiley & Sons, 1993.
4. Elsayed Elsayed and Thomas Boucher. Analysis and Control of Production Systems. Prentice Hall International Series in Industrial and Systems Engineering. Second edition. 1994.
5. Framinan Jose M., Leisten Rainer and Ruiz Garcia Ruben. Manufacturing Scheduling Systems An Integrated View on Models, Methods and Tools. Springer 2014

Grading	
Homework Assignments	30%
Journal Presentations	10%
2 Exams (20% each)	40%
Final Project	20%

Grade percentage	
A	90 and above
B	80 < 90
C	70 < 80
D	60 < 70
F	<60

Project:

Each student (Teams of 2-3 are allowed) will work on a project. Students will select a topic or propose a project themselves or work on a real problem in an industrial setting (this will require integration/adaptation skills and creativity since many algorithms/models presented in the literature cannot be directly adapted to industrial setting). Group projects will be allowed if the project involves the development of algorithms and computer programs for a complex problem.

Students with disabilities:

Students with disabilities or who suspect they have a disability may wish to self-identify for purposes of modifications. You can do so by providing documentation to the Office of Disabled Student Services located in the UTEP Union. If you have a condition which may affect your ability to exit safely from the

premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or director of the Disabled Student Services. For general information about the American with Disabilities Act (ADA), please call 747-5184.

Cell phone policy- Cell phones are to be off during class. You should not take phone calls during class, except for emergencies.

Harassment Policy:

The department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment; but repeated questions about a grade or an administrative decision are.
- Grades are NOT negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.
- Remaining in an office after the occupant requests you leave is considered harassment and potentially threatening. You will be reported immediately without warning and depending on the severity, may be reported to law enforcement.
- Similar behavior towards department staff, and student advisors will also be treated as harassment, including persistent phone calls, emails, and badgering. Department staff and student advisors are there to help students, and should be treated with due respect

COVID-19 PRECAUTIONS

Please stay home if you: (1) have been diagnosed with COVID-19 (2) are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instructions will be provided. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org