ÇANKAYA UNIVERSITY
Faculty of Engineering
Department of Industrial Engineering
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COURSE SYLLABUS

Course Code	: **IE 366**	Semester	: **Spring 2026**
Course Title	: **Manufacturing and Service Systems Planning II**	Group(s)	: 01
Prerequisite(s)	: IE 227 Introduction to Probability IE 232 Operations Research I – Modeling	Curriculum Year	: 3
		Credit	: 4
Type of Course	: Compulsory	ETCS	: 7

Instructor:	Ferda Can ÇETINKAYA Professor B.S., M.S., Ph.D. in Industrial Engineering	Teaching Assistant (TA):	Ahmet Yücel TANRIVERDİ Research Assistant B.S. in I.E., M.S. Student in I.E.
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Office Hours:	To be announced later.	Office Hours:	To be announced later.

Lectures:	Day	Time	Classroom	Day	Time	Classroom
	WEDNESDAY	11:20 – 12:10	H-A04	FRIDAY	11:20 – 12:10	H-A04
		12:20 – 13:10	H-A04		12:20 – 13:10	H-A04

Course Description: This is the second of two sequel courses, which are designed to introduce the planning issues for manufacturing and service systems. The topics covered in the second course are stochastic and independent demand inventory management, master scheduling, capacity requirements planning, push production control systems (MRP, MRP II), production activity control (scheduling in different production environments, priority rules), pull production systems (just-in-time production, kanban).

Course Objectives: The main aims of this course are:

- to introduce basic and advanced models and solution techniques for stochastic inventory planning problems.
- to introduce solution techniques for master scheduling, capacity, and material requirements planning problems.
- to introduce basic and advanced models and solution techniques for scheduling problems in manufacturing and service systems.

Learning Outcomes: On successful completion of the course, all students will be able to:

1. Identify basic concepts and issues for manufacturing and service systems planning problems,
2. Solve stochastic inventory, master production scheduling, materials requirements planning, capacity requirements planning, production scheduling problems,
3. Formulate mathematical programming models for solving the production scheduling problems.
4. have improved skills in using the optimization software GAMS for solving production scheduling models and Microsoft Excel,
5. Be involved in teamwork.
6. Be aware of ethical issues.

Textbook: There is no specific textbook for the course. Students are recommended to obtain a copy of one of the following reference books:

1. Chapman, S.N., *The Fundamentals of Production Planning and Control*, Prentice-Hall, 2006.
2. Fogarty, D.W., Blackstone, J.H., and T.R. Hoffmann, *Production and Inventory Management*, South Publishing, 1991.
3. Nahmias, S., *Production and Operations Analysis*, McGraw-Hill, 2010.
4. Silver, E.A., Pyke, D., and R. Peterson, *Inventory Management and Production Planning and Control*, Wiley, 1998.
5. Sipper, D., and R.D. Bulfin, *Production Planning, Control, and Integration*, McGraw-Hill, 1997.
6. Vollmann, T.E., Berry, W.L., and D.C. Whybark, *Manufacturing Planning and Control Systems*, Irwin, 1992.

Aside from these books, the University Library has a good collection of introductory and advanced-level operations research books, which can be searched at http://www.cankaya.edu.tr.

Course Website: Course-related materials, including lecture notes, homework assignments, exam results, and announcements, will be uploaded to the course website at http://webonline.cankaya.edu.tr for anytime access.

Course Outline:

Week	Topic(s)
1	**Practical Techniques for Inventory Control:** ABC classification system, exchange curves
2	**Stochastic and Independent Demand Inventory Management:** continuous-review models (backordering and lost sales cases)
3	**Stochastic and Independent Demand Inventory Management:** single-period models (instantaneous and uniform demand cases)
4	**Stochastic and Independent Demand Inventory Management:** periodic-review models, safety stocks, and service levels
5	**Master Production Scheduling (MPS):** make-to-stock, assemble-, finish- or package-to order, make-to-order environments, master production schedule, linkages to other manufacturing planning and control activities, designing, creating, and managing the MPS, available-to-promise (discrete, cumulative without look-ahead, cumulative with look-ahead), final assembly schedule (FAS)
6	**Materials Requirements Planning:** Dependent demand inventory systems and hierarchy of decision making for production/order lot sizes, bill of material, product tree, material requirements planning (MRP), Lead time offsetting.
7	**Materials Requirements Planning:** Lot-sizing issues, implementing safety stocks, and safety lead times. Manufacturing Resource Planning (MRP II) and its variants.
8	**Rough Cut Capacity Planning (RCCP):** role of RCCP in the production planning and control system, RCCP techniques (capacity planning using overall factors, bill of labor approach, resource profile approach), RCCP decisions (determining capacity available, comparing capacity required to capacity available, basic options to increase capacity)
9	**Capacity Requirements Planning (CRP):** CRP logic, CRP computation, forward and backward scheduling
10	**Production Scheduling:** manufacturing lead time (MLT), methods for reducing MLT (operation overlapping, operation splitting), scheduling techniques (forward scheduling and backward scheduling, infinite loading, finite loading), dispatching rules
11	**Production Scheduling:** classification of scheduling problems, scheduling criteria (performance measures), shop structures (single machine, parallel machines, flow lines, job shops)
12	**Production Scheduling:** scheduling algorithms for solving problems in various shop structures, assembly line balancing
13	**Production Scheduling:** assembly line balancing
14	**Pull Production Systems:** just-in-time (JIT), philosophy of JIT, lean production, Kanban systems

Lectures: 4 hours of lecture) per week. In lectures, the instructor will discuss only selected, important concepts and points, and will solve problems related to the material covered. To be familiar with the material presented in lectures and participate in class discussions, students are expected to read the material covered in previous lectures before each class meeting. If students come prepared, they will find the lectures more interesting and benefit from the discussion. In doing homework assignments, students should work in teams.

Lecture Notes: Lecture notes will be posted on the course website before each lecture, allowing students to add their own notes to the provided materials.

Assignments: There will be three types of assignments: Reading and Homework.

Reading Assignments: From time to time, there will be some reading assignments that will support the lectures. For any examination, students are responsible for studying all assigned readings, even if they might not be discussed in class.

Homework Assignments: There will be **two** homework assignments (1 assignment to be submitted before Midterm Exam 1 and one assignment to be submitted before Midterm Exam 2) containing discussion questions and problems. Their submission dates will be announced later.

Study Team Formation for homework assignments:

- For homework assignments, students are required to **work in teams of three**.
- Students from both sections of the class can collaborate to form a study team.
- It is the student's responsibility to find his/her team members.
- The composition of a team is fixed for the entire semester. If a team member wants to leave their study team for any reason, they are not permitted to join another team or work alone.
- The ***Study Team Info Form***, which is available for download on the course's website, should be completed **by one team member and shared with other members**.
- Each member of the study team must upload the electronic file of the Study Team Info Form (with a .doc or .docx extension) to the course's website **no later than 23:30 on Wednesday, March 4, 2026**, to confirm their membership in the study team.
- **If a student cannot find team members**, he/she should submit the Study Team Info Form with his/her information only. It will then be assumed that this student agrees to be assigned to a team by the instructor.
- **If two students form a team but are unable to find a third member**, they should submit the Study Team Info Form with only their information. By doing this, it will be assumed that they agree to have a third member assigned to their team. Alternatively, the instructor may assign them to different teams.
- **In any of the following cases, it will be assumed that the team has not been established, and the instructor will randomly assign students to different teams.**
  - **The forms submitted by team members differ from one another.**
  - **The forms are incomplete.**
  - **Not all team members have submitted their forms.**

Homework Submission:

- Each team is required to submit **one written report** for every homework assignment.
- The ***Cover Page for the Homework Reports*** available on the course's website should be used for each homework submission.
- **If a team member does not participate in the study of a homework assignment, the other team members have the right to omit his or her name from the cover page. Consequently, that student's grade for the assignment will be zero.**
- **Each team is expected to submit an original report that reflects the efforts of its members**. Homework reports should represent the team's independent work and require original thought. Collaboration between members of different teams is not considered independent work. Additionally, it is not independent work if one team derives an answer and shares it with others. Furthermore, if two teams work separately to find their answers, compare their results, identify mistakes, and correct them together, that also does not qualify as independent work.
- **One student from each team must upload the homework report to the course's website by the assignment's due date and time.**
- Late submissions of homework reports will be accepted, but a penalty scheme will be applied.

	Total Penalty
$0 < \text{Delay} \leq 10$ minutes	25 points
$10 < \text{Delay} \leq 20$ minutes	50 points
$20 < \text{Delay} \leq 30$ minutes	75 points
$30 < \text{Delay}$	100 points (The report will not be evaluated.)

- There will be **no opportunities to make up homework assignments**.
- Additional details about the homework assignments will be provided later.

Computer Usage: Homework assignments may require the use of MS Office (Word, Excel, and Visio) as well as the optimization software GAMS to solve mathematical programming models. Students are expected to have learned how to use these software packages in courses taken in previous semesters. If you are not familiar with them, it is primarily your responsibility to learn how to use them.

Announcements & Uploads: Students should consistently check their university email accounts and the course website for announcements and uploads.

Attendance: Some information regarding the attendance is as follows:

- **Attendance will be taken during each hour.**
- **The minimum attendance requirement is 60%**, according to the University's Senate decision.
- **Students who do not meet the minimum attendance requirement will not be allowed to take the final exam, as stated by the University's rules and regulations. In this case, if a student takes the exam, their exam will be considered invalid.**
- **Medical report periods are counted as absences in the calculation of the attendance percentage, as stated by the University's rules and regulations.**
- Every hour, it is the students' responsibility to remind the instructor to take attendance.
- Students' attendance records for each week will be updated and announced on the course's website at the end of the week.
- The instructor will maintain records of student attendance.
- If students miss a lecture, it is their responsibility to learn about course-related activities and the material covered during this hour.

Class participation: Class participation goes beyond attending lectures. Students are expected to engage thoughtfully in class discussions. Regular attendance and active participation are essential for effective learning and success in this course. Students who consistently attend lectures and study regularly are likely to benefit significantly and will receive marks accordingly.

Academic Misconduct: All students at Çankaya University are expected to always uphold academic integrity, whether faculty members are present or not. Collaboration of any kind is not allowed during exams. Any suspected cases of academic dishonesty will be addressed in accordance with the University's rules and regulations.

Honesty Policy: All students admitted to Çankaya University must acknowledge their understanding and commitment to the Honor Code established by the Department of Industrial Engineering for examinations and assignments. This statement serves as a reminder of your responsibilities as a Çankaya University student, emphasizing the importance of honesty in all submitted work and during exams in this course.

Exams: There will be **three exams** (**2 midterms** and **a final)**.

- All exams will:
  - Be held in class (no take-home exam will be given).
  - Be closed-notes/closed-book.
  - Have two parts:
    - Part 1 has fill-in-the-blanks, short-answer, and discussion questions.
    - Part 2 has problem-type questions.
- Midterm Exam 2 will only cover the material studied after Midterm Exam 1.
- The Final Exam will cover all material studied throughout the semester and will take place during the designated final exam week.
- In all exams,
  - Students should ensure they take all necessary precautions before coming to the exam places and may bring their own water, snacks, and other items.
  - Students are required to bring their **University ID cards**.
  - Students should arrive early for the scheduled exam, as seating will be assigned according to a list.
  - Students are **<u>not</u>** allowed to:
    - Ask any questions.
    - Write anything on the back of each sheet of the exam booklet (If this rule is violated, the corresponding answer will not be graded, and no points will be awarded for this question.)
    - Detach the papers from the exam booklet (If this rule is violated, a penalty of 50 points will be imposed.)
    - Keep cellular phones on the desks.
    - Use smartphones.
    - Share personal belongings with other students, such as calculators, erasers, pencils, etc.
    - Use their cellular phone as a calculator.
    - Leave the exam room for any reason, including but not limited to visiting the restroom, smoking, or any other activities.

Make-up Exam Policy: Make-up exam policies are as follows:

- A make-up exam will be offered to students who miss an exam and provide a valid, verifiable, and documented excuse (e.g., a medical report approved by the Çankaya University Health Center). If those students want to take the make-up exam, they should inform the instructor by email within three days following the exam.
- There will be no additional make-up exam for the make-up exam in accordance with the University's rules and regulations. Students who do not attend a make-up exam are considered to have used their rights.
- The format of a make-up exam may differ from that of a regularly scheduled exam.

Objections: Any form of document concerning work, which is to be used by the instructor as the basis of grading, will be shown to the student upon request. Students who feel they received improper grades have the right to a formal appeal.

- An objection to the grade of the exams must be made to the instructor.
- An objection to a grade for the homework assignments must be made to the TA.

Assessment Items: The percentages below indicate the relative importance of various assessment tools considered in this course.

Assessment Item	***Marked Out of***	***Weight (%)***
Homework Assignments	100	2 ´ 5
Midterm Exams	100	2 ´ 30
Final Exam	100	30
Midterm Exams		100

Grade Improvement: The semester letter grades will be based solely on the required work listed above and cannot be improved by submitting additional work.

Grading Policy: **Letter grades** will be assigned using the standard scales of the catalog grading system described in Çankaya University regulations and listed below.

UNDERGRADUATE AND GRADUATE STUDENTS		
Letter grade	***Coefficient***	***Score Intervals***
AA	4.00	90-100
BA	3.50	85-89
BB	3.00	80-84
CB	2.50	70-79
CC	2.00	60-69
DC	1.50	50-59
DD	1.00	45-49
FD	0.50	35-44
FF	0.00	0-34

The instructor may bypass the catalog grading system if needed, allowing for different score intervals.

The Registrar's Office will announce the letter grades for the semester.

Letter Grade NA: The **occurrence of one of the cases below** will lead to **grade NA**:

- Case 1: Being **absent from all midterm and final exams on their scheduled exams, with or without taking their make-up exams**.
- Case 2: Being **absent from both midterm exams on their scheduled exams, with or without taking their make-up exams**.
- Case 3: Being **absent from a midterm exam and the final exam on their scheduled dates, with or without taking their make-up exams**.

Please note that:

- **Case 3 above does not apply to the students who will not be able to take the final exam due to not satisfying the minimum attendance requirement.**
- Students with a grade of NA are not eligible to use their Additional Exam Rights (Ek Sınav Hakları) as stated by the University's rules and regulations.

Course Evaluations: Çankaya University is committed to continuous improvement and encourages student involvement in course evaluations. Your feedback will be treated confidentially, ensuring that your identity remains unknown unless you choose to disclose it.

You are welcome to provide feedback at any point during the semester, not just at the end-of-semester evaluation. To give your comments, please write or type them on a small piece of paper without including your name. Once you have written your feedback, simply slide the paper under the instructor's office door.

Important Notes:

1. Please retain this course syllabus for future reference, as it contains important information. It will also be accessible on the course and department's website.
2. You are required to stay informed about any syllabus changes announced during lectures or on the course's website this semester.
3. If you have questions about the coursework, please refer to this syllabus first to find the answer yourself. If the answer is in the syllabus, do not ask your instructor the same question.