ÇANKAYA UNIVERSITY
Faculty of Engineering
Department of Industrial Engineering

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COURSE SYLLABUS

Course Code	: **IE 366**	Semester	: **Spring 2025**
Course Title	: **Manufacturing and Service Systems Planning II**	Groups	: 01
Pre-requisites	: IE 227 Introduction to Probability IE 232 Operations Research I – Modeling	Type of Course	: Compulsory
		Credit	: 4
Curriculum Year	: 3	ETCS	: 7

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Lectures:

Day	Time	Classroom
WEDNESDAY	11:20 – 12:10	P-101
	12:20 – 13:10	P-101
FRIDAY	15:20 – 16:10	P-101
	16:20 – 17:10	P-101

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 or 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. have improved written communication skills,
6. involved in teamwork,
7. 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 below:

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 quite a good collection of books on the introductory and advanced level in scheduling, which can be searched at http://www.cankaya.edu.tr.

Course Website: Course-related materials, including the lecture notes, homework assignments, and exam evaluation results, will be uploaded to the course's website at http://webonline.cankaya.edu.tr so that they can be reached anytime.

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

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

Lecture Notes: Lecture notes will be uploaded to the course's website before the lectures to give the students the chance to take extra notes on the lecture notes.

Assignments: There will be two 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 the Midterm Exam 1 and one assignment to be submitted before the Midterm Exam 2) containing discussion questions, and problems. Homework assignments are crucial in ensuring students understand the material they have learned in lectures.

Study Team Formation for homework assignments:

- In doing the homework assignments, students should **work in teams with three members**.
- It is the student's responsibility to find his/her team members.
- The composition of the teams cannot be changed throughout the semester. That is, if a team member wants to leave his/her study team for any reason, he/she is **neither** allowed to join another team **nor** work alone.
- Each study team should complete a **single copy** of the ***Study Team Info Form*** that can be downloaded from the course's website. The student number, name and surname, cellular phone number, and e-mail of each team member should be completed in the form. Incomplete forms are not accepted.
- **If a student cannot find team members**, he/she should submit the Info Form with his/her information only. Then, it will be assumed that this student accepts to be assigned to a team by the instructor.
- **If two students form a team but are still looking for the third member**, they should submit the Info Form with their information only. Then, it will be assumed that they accept that a third member will be assigned to their team, or they can be assigned to different teams by the instructor.
- The Study Team Info Form should only be completed **by one team member and shared with other team members**.
- By **March 5, 2025 (Wednesday), 23:30**, **the electronic file (with the extension doc or docx) of the Study Team Info Form** should be uploaded to the course's website **by each study team member** to confirm their membership in the study team.
- **In any one of the cases, where**
  - **the forms uploaded by the team members are different from each other,**
  - **the forms are incomplete,**
  - **all team members have not uploaded the form,**

  it will be assumed that the team has not been established. Thus, students will be assigned randomly to different teams by the instructor.

Homework Report Submission:

- Each team should prepare a **single written report** for each homework assignment.
- The ***Cover Page for the Homework Reports*** available on the course's website should be used as the cover page for each homework report.
- **If a team member does not participate in the study of a homework assignment**, then the other team members have the right **not** to write his/her name on the Cover Page. Thus, this student's grade from the assignment will be zero.
- Each team is expected to submit an original report, which reflects only the effort of team members. Homework reports should be the team's independent work, which requires independent thought. It is not independent work if the members of different teams work together, or one team derives the answer and then shares that answer with other teams. Likewise, it is not independent work if two teams work alone to derive their answers, compare them, find their mistakes, and then correct them together.
- **One of the students in each team** should upload the homework reports to the course's website *on* or *before* the due date and time of the assignment. This student may change from one homework and lab work to another.
- **Late submissions** of homework reports will not be accepted.
- There will be **no makeup for the homework assignments**.

Other details regarding the homework assignments will be given later.

Computer Access & Usage: Homework assignments may require the use of MS OFFICE (Word, Excel, etc.) and the optimization software GAMS to solve mathematical programming models. It is expected that students have learned to use these software packages in the courses offered in the previous semesters. If not, it is mainly the student's responsibility to learn them. A student may use his/her computer if he/she owns a personal computer. The computers in the Computer Laboratories are available for the students' use. Students should always plan if they rely on the computers in the labs. Increased demand for deadlines of homework and project reports for courses other than IE 366 will reduce the available computer time. Students should also be aware of power failures. Furthermore, students should always be courteous, considerate, and professional while using the university's computer facilities.

Announcements & Uploads: Students must regularly check their university e-mail accounts and the course's website for announcements and updates.

Attendance: Students are expected to attend all lecture hours. Some other information regarding the attendance is as follows:

- Students are expected to be in class on time. However, **a 10-minute delayed entry of the students will be permitted for the first lecture hour**. If a student has a delay of more than 10 minutes, he/she must wait outside until the break between two consecutive lecture hours is given. **No delayed entry is allowed for the second lecture hour.**
- Attendance will be taken every lecture hour, according to the requirements of the University's rules and regulations.
- During every lecture hour, students are responsible for reminding the instructor to take attendance.
- The instructor will keep students' attendance records.
- Students' attendance records will be updated at the end of each week and announced at the course's web site before the next week's lecture day.
- **The minimum attendance requirement for the whole semester is 50%**.
- Missed lectures with a valid, verifiable, and documented excuse (e.g., medical report approved by Çankaya University Health Center) will be considered for the attendance calculation at the end of semester so that students are responsible to monitor their attendance.
- If a student misses a lecture, it is the student's responsibility:
  - to be informed of course-related activities and the material covered in the missed lecture, and
  - to study all material covered in the missed lecture.

Class participation: Class participation does not mean class attendance. Students are expected to participate in class discussions intelligently. Regular class attendance and participation are needed for effective learning and success in this course. However, those students who attend lectures and study regularly will likely benefit greatly and receive marks accordingly.

Academic Misconduct: Academic integrity is always expected of all students of Çankaya University, whether in the presence or absence of faculty members. No collaboration of any kind is permitted during the exams. All suspected cases will be treated according to the University's rules and regulations.

Honesty Policy: All students admitted to Çankaya University should declare his/her understanding and belief in the Honor Code stated by the Department of Industrial Engineering for the examinations and assignments. This statement is a reminder to upload your obligation as a Çankaya University student and to be honest in all work submitted and exams taken in this course.

Exams: There will be **three exams (2 midterms and 1 final)**.

- All exams will:
  - be held in class (i.e., no take-home exam will be given.),
  - be closed-notes/closed-book type,
  - have two parts in which the first part has conceptual questions and the second part has problem-type questions.
- Midterm Exam 2 will be **non-cumulative** (i.e., it covers only the material studied after the Midterm Exam 1).
- The Final Exam will be **cumulative** (i.e., it covers all material studied in the whole semester) and will be scheduled for a day and time in the designated final exam week.
- In all exams, students may need a hand calculator, which is not programmable.
- Students should come early on the scheduled exam time because they will be seated according to a list.
- During the exams, students are **not** allowed:
  - To ask any questions.
  - To write anything on the back of each sheet of the exam booklet.
  - To detach the papers from the exam booklet.
  - To use smart watches.
  - To keep cellular phones on the desks.
  - To share other students' belongings such as calculators, erasers, pencils, etc.
  - To use a cellular phone as a calculator.
  - To go out for any purpose (visiting WC, drinking, smoking, etc.). So, they should take all necessary precautions before the exam and may bring their water, biscuits, etc.

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

- If a student misses an exam and has a valid, verifiable, and documented excuse (e.g., medical report approved by Çankaya University Health Center) for his/her absence, a make-up exam will be given.
- There will be no make-up for the make-up exam.
- A make-up exam format can be different from a regularly scheduled examination.

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.

- The objection to a grade of the midterm and final exams must be made to the instructor.
- The objection to a grade of the homework assignments must be made to the TA.

Assessment Items: The following percentages give the relative importance of various assessment tools.

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

Note that the instructor reserves the right to modify these percentages if he deems it necessary.

Grade Improvement: The semester letter grade will only be determined based on the required work listed above and cannot be improved with additional work.

Grading Policy: Semester letter grades for the Undergraduate and Graduate Programs students will be assigned using the standard scales (i.e., catalog grading system described in Çankaya University regulations) 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

Semester letter grades for the Graduate Students in the Scientific Preparation Program are S (Satisfactory) and U (Unsatisfactory). For those students, the standard scales (i.e., catalog grading system described in Çankaya University regulations) are as follows:

GRADUATE STUDENTS IN THE SCIENTIFIC PREPARATION PROGRAM		
Letter grade	***Coefficient***	***Score Intervals***
S (Satisfactory)	-	60-100 (CC and above)
U (Unsatisfactory)	-	0-59

The catalog grading system may not be considered if the instructor deems it necessary. Thus, different score intervals may be considered.

The Registrar's Office will announce semester letter grades.

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

- Absence in **any two (or all) of the exams in their scheduled dates**.
- Absence in **any two (or all) of the exams in their scheduled dates** but taking their make-up exams.
- Attendance for the whole semester is less than 50%, and the semester grade is below DD.

Also, note that students having the grade NA cannot use the Additional Exam Rights (Ek Sınav Hakları).

Course Evaluations: Çankaya University is committed to continuous improvement and seeks students' input through their participation in course evaluation. Your response will be processed so that, unless you wish otherwise, nobody will be aware of your identity.

In addition to the end-of-semester evaluation, you may provide feedback at any time during the semester by writing (or typing) your comments on a small piece of paper without indicating your identity and sliding this paper under the door of the instructor's office.

Important Notes:

1. Please keep this course syllabus for future reference, as it contains essential information. It will also be available on the course and the department's website.
2. You are responsible for knowing any changes to this course syllabus announced in lectures or through the course's website during the semester.
3. If you have questions on the coursework, please always refer to this syllabus to obtain the answer yourself first. If the answer is in the syllabus, **please do not insist on asking your instructor the same question**.