ÇANKAYA UNIVERSITY

Faculty of Engineering

Department of Industrial Engineering

COURSE SYLLABUS

Course Code	: **IE 365**	Semester	: **Fall' 2021**
Course Title	: **Manufacturing and Service Systems Planning I**	Groups	: 01 & 02
Pre-requisites	: IE 232 Operations Research I – Modeling	Type of Course	: Compulsory
Credit	: (3 2 4)	ETCS	: 6

Instructor:	Ferda Can ÇETINKAYA Professor B.S., M.S., Ph.D. in I.E.	Teaching Assistant (TA):	Hale AKKOCAOĞLU Lecturer, Ph.D. Student in I.E. B.S., M.S. in I.E.
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Office Hours: To be announced later; Appointments are also accepted.

	GROUP 01			GROUP 02		
	Day	Time	Classroom	Day	Time	Classroom
Lecture Hours:	MONDAY	13:20 – 14:10	H-A01	WEDNESDAY	13:20 – 14:10	H-A01
		14:20 – 15:10	H-A01		14:20 – 15:10	H-A01
		15:20 – 16:10	H-A01		15:20 – 16:10	H-A01
Recitation Hours:	FRIDAY	09:20 – 10:10	H-A01	FRIDAY	13:20 – 14:10	H-A01
		10:20 – 11:10	H-A01		14:20 – 15:10	H-A01

Catalog Data: This is the first of two sequel courses, which are designed to introduce the planning issues for manufacturing and service systems. The topics covered in the first course are manufacturing and service systems, long-range planning, forecasting, aggregate planning, deterministic and independent demand inventory management, dynamic lot sizing.

Course Objectives: This course aims to introduce basic and advanced models and solution techniques for forecasting, aggregate planning and inventory planning problems for manufacturing and service systems.

Learning Outcomes: On successful completion of the course, all students will have developed:

- Ability to identify basic managerial concepts and issues in manufacturing and service systems
- Capability to use quantitative methods to model, analyze, and optimize manufacturing and service systems planning problems
- Capability to formulate mathematical programming models for solving a variety of manufacturing and service systems planning problems, and have improved their skills in mathematical modeling
- Ability to understand the shortcomings and limitations of analytical models and quantitative solution techniques devised for solving the manufacturing and service systems planning problems and how qualitative decision making can be incorporated
- Skills in using basic mathematical programming and optimization software GAMS, interpreting the solutions obtained, and coding an algorithm in a general purpose language

On successful completion of the course, all students will have:

- Improved their written communication skills
- Improved their teamwork skills
- Awareness of ethical issues

Textbook: S. Nahmias, Production and Operations Analysis (6th ed.), McGraw-Hill, 2010.

Some reference books are as follows:

1. D. Sipper, and R.D. Bulfin, Production Planning, Control, and Integration, McGraw-Hill, 1997.
2. E.A. Silver, D. Pyke, and R. Peterson, Inventory Management and Production Planning and Control (3rd ed.), Wiley, 1998.

3. T.E. Vollmann, W.L. Berry, and D.C. Whybark, Manufacturing Planning and Control Systems (3rd ed.), Irwin, 1992.
4. S. Chopra, and P. Meindl, Supply Chain Management: Strategy, Planning, and Operation (4th ed.), Prentice-Hall, 2009.

Note that aside from these books; 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 Web Site: Course related materials including the lecture notes, term project study and homework assignments, exam evaluation results, and announcements will be uploaded to the webonline site of the course on the link http://webonline.cankaya.edu.tr so that they can be reached at any time.

Course Outline: A tentative outline of the topics is given below, and the instructor reserve the right to make changes as he sees necessary.

Week	Topic(s)
1	INTRODUCTION: Introduction and background of production planning. Business strategies for being competitive. Components of operations strategy. Decision making and time horizons in production and operations management. Market-driven systems and global competition. The product life cycle. The process life cycle. Trade-off between production spectrum and production volume. Learning and experience curves.
2	FORECASTING: Classification of forecasting: Qualitative and quantitative approaches. Error analysis and evaluation of quantitative methods. Time series approach in forecasting. Methods for stationary series. Moving averages and exponential smoothing
3	FORECASTING: Methods for series with increasing or decreasing trend. Double exponential smoothing. Seasonal series. The seasonal trend model and Winter's method.
4	FORECASTING: Linear regression for causal forecasting and time series forecasting. Monitoring of forecasts. Tracking signal and corrective action.
5	AGGREGATE PLANNING: Hierarchy of decision making in production and operations management. Aggregation and aggregate units. Spreadsheet methods for aggregate planning. Alternative strategies for spreadsheet methods.
6	AGGREGATE PLANNING: Formulation of aggregate planning problems by linear programming. Fixed work-force models and the transportation problem approach for aggregate planning. Nonlinear programming models for aggregate planning. Solution approaches by mixed integer programming.
7	INVENTORY MANAGEMENT: Significance of inventories for production planning, conventional inventory policies, continuous review versus periodic review. Deterministic lot sizing and the economic order quantity (EOQ) model.
8	INVENTORY MANAGEMENT: Sensitivity of inventory problems. Infinite replenishment versus finite rate production systems and the economic production quantity (EPQ) model.
9	INVENTORY MANAGEMENT: Deterministic continuous review problems with backordering and finite production rate. EOQ models with all units discount and incremental discount.
10	INVENTORY MANAGEMENT: Resource constrained inventory problems. Multiple item EOQ models in the presence of budget and storage space limitations.
11	INVENTORY MANAGEMENT: Multi item ordering. Joint replenishment of multiple products lot sizing with multiple products or customers
12	INVENTORY MANAGEMENT: Mathematical programming models for deterministic demand discrete lot sizing inventory problems. Wagner-Whitin algorithm. Silver-Meal, Least unit cost, and Part period balancing methods. Trial-error solution techniques using spreadsheets.
13	SUPPLY CHAIN MANAGEMENT: Supply chain management as a part of business strategy. Goals of the supply chain. Supply chain process cycles. Supply chain macro processes in a firm. Successful examples of supply chain management.
14	SUPPLY CHAIN MANAGEMENT: Supply chain management modeled as a transportation problem. The Greedy Heuristic. The linear programming formulation. Distribution resource planning. Vehicle routing. Warehousing. Multilevel distribution systems.

Lectures & Recitations: Lectures and recitations will be held face-to-face in the classroom.

Lecture Notes: Lecture notes will be uploaded to the course webonline site within one day before the lectures to give the chance to the students to take extra notes on the lecture notes.

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

Reading Assignments: From time to time, there will be some reading assignments, which are supporting the lectures. For any type of examination, students are also responsible from studying all assigned readings, even if they might not be discussed in class.

Homework Assignments: In this course, homework assignments play crucial role in ensuring students from understanding of the material that they have learned in lectures. Some details are as follows:

- There will be **three homework assignments** containing some discussion questions, problems, and computer exercises based on lecture notes and reading assignments.
- In doing the homework assignments, students should **work in teams with two or 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, then he/she is **neither** allowed to join into another team **nor** work alone.
- Each study team should fill out a **single copy** of the ***Info Form of a Homework Study Team***, which can be downloaded from the course's webonline site, on which the student number, name and surname, cellular phone number and e-mail of the team members are complete. Incomplete forms are not accepted.
- If a student fails to form a team, and submits a form with his/her name only then it will be assumed that he/she accepts to be assigned to a team by the instructor.
- If two students form a team but could not able to find the third member 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.
- By **October 20, 2021 (Wednesday); 23:30**, **the electronic file (with the extension doc or docx) of the *Info Form of a Homework Study Team*** should be uploaded to the webonline site of the course **by each member of the study team** to confirm their membership in the study team.
- Each team should prepare a **single written report** for each homework assignment.
- It is expected that each team will submit an original report, which reflects only the effort of team members. Homework study should be the teams' independent work which requires independent thought. If the members of different teams work together or one team derive the answer and then share that answer with other teams is not an independent work. Likewise, if two teams work alone to derive their answers, compare them and find their mistakes, and then correct them together is not an independent work.
- **One of the students in each team** should upload the written report to the webonline site of the course *on* or *before* the due date and time of the term project assignment.
- Note that late submissions of homework reports will not be accepted.
- Other details regarding the homework assignments will be given later.

Exams: There will be **two midterm exams** and the **final exam**.

- All exams will be scheduled to be in-class exams.
- Midterm Exam 2 will be non-cumulative (i.e., it covers only the material studied after the Midterm Exam 1).
- Midterm exams will have two parts (Part 1 is closed-notes/closed-book type for conceptual questions; Part 2 is open-notes/closed-book type for discussion-type questions and problems.)
- Final exam will be cumulative (i.e., it covers all material studied throughout the semester), and will be scheduled for a day and time in the designated final exams week.
- Final exam will have only part, which is open-notes/closed-book type for discussion-type questions and problems.
- Students should come early on the scheduled exam time because they will be seated according to a list.
- During the exams,
  - Students will not be allowed to go out for any purpose (visiting WC, drinking, smoking, etc.). So, they should take all necessary precautions before coming to the exam, and may bring their water, biscuits, etc.
  - Students may need a hand-calculator.
- To discourage last minute cramming, the instructor will not answer any question from students on one day before or on the day of an exam.

Makeup Policy: There will be **no makeup for the homework assignments**. Exams may be considered for makeup. Make-up exam policies are as follows:

- If a student misses an exam and has a valid, verifiable, and documented excuse for his/her absence, a make-up exam will be given.
- A make-up exam format can be different than a regularly scheduled examination. For example, an oral exam can be used as a part or whole of the make-up exam.

Computer Usage: Some homework assignments may require the use of software package GAMS for solving mixed integer linear programming models. It is the students' responsibility to learn how to use this software package. On the other hand, students need computers with webcam, speakers and microphone in order to follow the lectures if the education and training activities will be held via distance learning system.

Announcements & Uploads: It is the students' responsibility to regularly check their e-mail accounts and the course webonline site of the course for announcements and updates.

Attendance: Students are expected to attend all lectures and recitations, and be in class on time. Regular class attendance is not a sufficient condition for effective learning and success in this course. However, those students who attend lectures and study regularly are likely to benefit greatly and receive marks accordingly. Some other information regarding the attendance is as follows:

- Attendance will be taken every lecture and recitation and hour, due to the requirement of the University's rules and regulations, but will not be considered as an assessment item.
- During every lecture and recitation hour, students are responsible to remind the instructor/TA for taking the attendance, and sign the attendance sheet.
- Students' attendance records will be kept by the instructor and TA.

Class participation: Class participation does not mean class attendance. Students are expected to intelligently participate in class discussions.

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

Grading Policy: Although the student's overall grade will be based on the general assessment of the instructor, the following percentages may give an idea about the relative importance of various assessment tools.

Assessment Item	*Marked Out of*	*Weight (%)*
3 Homework Assignments	100	3 ´ 5
2 Midterm Exams	100	2 ´ 27.5
Final Exam	100	1 ´ 30
TOTAL		100

Note that the instructor reserves the right to modify these percentages in case he deems it necessary. In general, overall grades will be assigned using the standard scales for the letter grades. Depending on the difficulty of the exams and the performance of the class, they may be curved accordingly. Semester letter grades will be announced by the Registrar's Office.

Grade Improvement: The grade for the course will only be based on the required work listed above and can not be improved with additional work.

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 strongly that they have received grades that are improper, have the right of formal appeal. The objection to any grade must be made to the instructor <u>within 10 days following the announcement of the grades</u>.

Course Evaluations: Çankaya University is committed to continuous improvement, and seeks students' input to that process through their participation in course evaluation process. Your response will be processed so that, unless you wish otherwise, the course instructor will not be aware of your identity. Please help us to help our future students by providing feedback on your experiences in this course. In addition to the end of semester evaluation, you may also provide your 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 important information. It will also available in the webonline site of the course and the department's web site.
2. You are responsible to know any changes to this course syllabus announced in lectures or through the webonline during the semester.
3. If you have any question on the coursework, please always refer to this syllabus to obtain the answer yourself first. If the answer is in the syllabus, then <u>please do not insist on asking the same question to your instructor or teaching assistant</u>.