ÇANKAYA UNIVERSITY
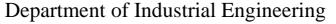
Faculty of Engineering

Department of Industrial Engineering

COURSE SYLLABUS

Course Code : **IE 365**
Course Title : **Manufacturing and Service Systems Planning I**
Prerequisites : IE 232 Operations Research I – Modeling
Credit : (3 2 4)

Semester : **Fall' 2022**
Groups (Sections) : 01 & 02
Type of Course : Compulsory
ETCS : 6

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	GROUP 01			GROUP 02		
	Day	Time	Classroom	Day	Time	Classroom
Lecture Hours:	MONDAY	13:20 – 14:10	L-B05	TUESDAY	14:20 – 15:10	L-B05
		14:20 – 15:10	L-B05		15:20 – 16:10	L-B05
		15:20 – 16:10	L-B05		16:20 – 17:10	L-B05
Recitation Hours:	FRIDAY	09:20 – 10:10	L-B05	FRIDAY	11:20 – 12:10	L-B05
		10:20 – 11:10	L-B05		12:20 – 12:10	L-B05

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, supply chain management, and distribution planning and scheduling.

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 this course unit, students/learners will or will be able to:
· Identify basic concepts and issues for manufacturing and service systems planning problems
· Solve forecasting, aggregate planning, and deterministic inventory problems
· Formulate mathematical programming models for solving the aggregate planning and dynamic lot sizing problems
· Have skills in using the office tool Microsoft Excel and the optimization software GAMS for solving the aggregate planning models
· Have improved team work skills
· Aware of ethical issues

Textbook: There is no specific textbook for the course. Students are recommended to obtain a copy of one the following reference books below, especially the one by Sipper and Bulfin.
1. Chapman, S.N., *The Fundamentals of Production Planning and Control*, Prentice-Hall, 2006.
2. Chopra, S., and P. Meindl, *Supply Chain Management: Strategy, Planning, and Operation*, Prentice-Hall, 2013.
3. Fogarty, D.W., Blackstone, J.H., and T.R. Hoffmann, *Production and Inventory Management*, South Publishing, 1991.
4. Nahmias, S., *Production and Operations Analysis*, McGraw-Hill, 2010.
5. Silver, E.A., Pyke, D., and R. Peterson, *Inventory Management and Production Planning and Control*, Wiley, 1998.
6. Sipper, D., and R.D. Bulfin, *Production Planning, Control, and Integration*, McGraw-Hill, 1997.
7. Vollmann, T.E., Berry, W.L., and D.C. Whybark, *Manufacturing Planning and Control Systems*, Irwin, 1992.

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

Week	Topic(s)
1	**Production and Inventory Management Environments:** manufacturing and service systems, product positioning strategy (make-to-stock, assemble-to-order, make-to-order), process positioning strategy (flow shop, job shop, fixed site production), distribution process design, product life cycle, production and inventory management functions (planning, planning horizon, long-range planning, medium-range planning, short-range planning)
2	**Forecasting:** data, forecast horizon and scope, basic forecasting techniques, qualitative forecasting, time series analysis (moving averages, weighted moving averages)
3	**Forecasting:** time series analysis (exponential smoothing, double-exponential smoothing), forecast error measurement, tracking signal
4	**Forecasting:** time series decomposition, Winter's three-factor model
5	**Aggregate Planning:** aspects of aggregate planning problem, managing demand, managing supply, costs relevant to the AP decision, AP models and decision techniques. Spreadsheet methods (level and chase strategies).
6	**Aggregate Planning:** linear programming models, transportation models, controlling the aggregate plan
7	**An Overview of Inventory Management:** inventory decisions, classification of inventory, inventory control policies, (periodic review and continuous review policies), quantity decisions, inventory costs, inventory decision costs
8	**Deterministic and Independent Demand Inventory Management:** basic economic order quantity (EOQ), sensitivity analysis on the EOQ, basic economic production quantity (EPQ)
9	**Deterministic and Independent Demand Inventory Management:** quantity discounts (all-units and incremental quantity)
10	**Deterministic and Independent Demand Inventory Management:** multiple product systems (EOQ model without constraints, EOQ model with a single constraint, EOQ model with multiple constraints, EOQ model with a fixed cycle, EPQ model without constraints, EPQ model with a fixed cycle on a single facility
11	**Deterministic and Independent Demand Inventory Management:** stockout cases (EOQ with backordering, EOQ with lost sales), joint replenishment for multiple products (with constant product cycle, with varying product cycle)
12	**Deterministic and Independent Demand Inventory Management:** dynamic lot sizing problem, mathematical programming model, heuristics (fixed period demand, lot-for-lot, period order quantity, EOQ, Silver-Meal, least unit cost, part-period balancing), network representation, Wagner-Whitin algorithm, capacitated lot sizing problem (mathematical programming model and heuristic solutions)
13	**Supply Chain Management:** supply chains in manufacturing and service industries, elements of supply chain management, physical distribution, channels of distribution,
14	**Supply Chain Management:** design of distribution networks, vehicle routing

Lectures & Recitations: In lectures, the instructor will discuss only selected important concepts and points. 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. During the recitations, the teaching assistant solves problems related to the material covered in the lectures. In doing homework and term project assignments, students should work in teams.

Lecture Notes: Lecture notes will be uploaded to the course webonline site 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 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 the 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 cannot find team members**, he/she should submit 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**, they should submit a form with their names 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.
- By **October 19, 2022 (Wednesday); 23:30**, the electronic file (with the extension **doc** or **docx**) of the *Info Form of the 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.
- For each homework report, the *Cover Page for the Homework Reports* available in the course' web site should be used as the cover page.
- **If a team member does not participate in the study of a homework assignment**, then the other members in the team have the rights **not to write** his/her name on the Cover Page for the Homework Reports. Thus, this student's grade from the homework assignment will be zero.
- 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 homework report to the webonline site of the course *on* or *before* the due date and time of the assignment.
- **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.

Exams: There will be **two midterm exams** and the **final exam**.
- All exams will be in-class exams unless it is stated before.
- All exams will have two parts, which are closed-notes/closed-book type. Part 1 is for conceptual questions (multiple-choice, true/false, fill-in-the blanks, matching, etc.). Part 2 is for discussion-type questions and problems.
- For the problem-type questions of the exams, all necessary **formulas** will be provided in the questions booklet.
- Midterm Exam 2 will be **non-cumulative** (i.e., it covers only the material studied after the Midterm Exam 1).
- 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.
- **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.**
- 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 will not be allowed to ask any question.
  - Students may need a hand-calculator.

Makeup Policy: 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:	Homework assignments may require the use of: · the optimization software package GAMS for solving linear, integer or mixed-integer programming models and · some tools of Microsoft Office such as Word and Excel. It is the students' responsibility to learn how to use these software packages.
Announcements & Uploads:	It is the students' responsibility to regularly check their university 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.
	· **Minimum attendance should be 60% in both lectures and recitations**.
	· **If the attendance is less than 60% in lectures or recitation hours**:
	  - the semester letter grade for the **undergraduate students** will be NA when **the overall grade is below DD**.
	  - the semester letter grade for the **graduate students including the ones in the Scientific Preparation Program** will be U when **the overall grade is below CC**.
	· 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 the exams. All suspected cases will be treated according to the University's rules and regulations.
Grading Policy:	Although the student's overall semester 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, semester letter grades will be assigned using the standard scales below. However, depending on the performance of the class, semester letter grades may be curved accordingly.

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

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 cannot 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 **please do not insist on asking the same question to your instructor or teaching assistant**.