**EASTERN MEDITERRANEAN UNIVERSITY**

**DEPARTMENT OF INDUSTRIAL ENGINEERING**

**IENG431 PRODUCTION PLANNING II**

**COURSE OUTLINE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **COURSE CODE** | IENG431 | **COURSE LEVEL** | Fourth Year | |
| **COURSE TITLE** | Production Planning II | **COURSE TYPE** | **Area Core** | |
| **CREDIT VALUE** | (4, 1, 0) 4 | **ECTS Credit Value** | 6 | |
| **PRE-REQUISITE(S)** | IENG332 | **CO-REQUISITE(S)** |  | |
| **PREPARED BY** | Dr. Hüseyin GÜDEN | **SEMESTER / ACADEMIC YEAR** | Spring 2021-2022 | |
|  | | | | |
|  | **Name(s)** | **E-mail** | **Office** | **Telephone** |
| **LECTURER(S)** | Dr. Hüseyin GÜDEN | [huseyin.guden@emu.edu.tr](mailto:huseyin.guden@emu.edu.tr) | IE-B206 | +90 392 630 1097 |
| **ASSISTANT(S)** | Behzad S., Zhanel Z. |  |  |  |
| **COURSE SCHEDULE** | Monday 12:30-14:20; Wednesday 12:30-14:20; Friday 09:30-10:20 (Lab and Tutorials)  Office Hour: Monday 14:30-15:20 | | | |
| **COURSE WEB LINK** | http://staff.emu.edu.tr/huseyinguden/en/teaching/ieng431-mane431 | | | |
|  | | | | |
| **COURSE DESCRIPTION**  This course is a continuation of IENG332. The topics covered in the course are material requirement planning, lot sizing, capacity planning, machine scheduling and loading, project scheduling in production environments, recent advances in production and operations management such as Just-in time production (JIT), Flexible Manufacturing Systems (FMS), and Optimized Production Technology (OPT). | | | | |
| **COURSE OBJECTIVES**  The main objectives of this course are:   1. Fundamental concepts of production planning and production systems (Strategic/Tactical/Operational decisions, Aggregate Planning, Master Production Scheduling, Rough Cut Capacity Planning, Material Requirement Planning, etc.) (Contributing Student Outcome 4) 2. Transforming an Aggregate Planning Problem to a Shortest Path Problem and solve it as a SPP (Contributing Student Outcomes 1, 2, 6) 3. Transforming an Aggregate Planning Problem to a Transportation Problem and solve it as a TP (Contributing Student Outcomes 1, 2, 6) 4. Heuristic strategies in Aggregate Planning (Chase, Level, Subcontracting, Overtime, Mix strategies) (Contributing Student Outcomes 1, 2) 5. Mixed Integer Programming (MIP) formulations in production planning (Contributing Student Outcomes 1) 6. Heuristic methods in MRP (LFL, EOQ, PPB, LAC) (Contributing Student Outcomes 1, 2, 6) 7. Single level scheduling (Gantt Chart, FIFO, LIFO, SPT, EDD, etc.) (Contributing Student Outcomes 1, 2, 6) 8. Multi level flow type scheduling (Johnson Algorithm, Revised Johnson Algorithm, CDS, Dannenbring Method, etc.) (Contributing Student Outcomes 1, 2, 6) 9. Basic heuristic methods (RPWM, COMSOAL) and MIP formulations in Assembly Line Balancing (Contributing Student Outcomes 1, 2) 10. Searching and learning basic knowledge on various production management topics like Flexible Manufacturing Systems, Agile Manufacturing, Lean Manufacturing, Supply Chain Management, Logistics Management, MRP-II, ERP, DRP. (Contributing Student Outcomes 4, 7) | | | | |
| **COURSE LEARNING OUTCOMES**  On successful completion of this course, students are expected to develop **knowledge** and **understanding** of:   1. levels of production control 2. aggregate planning (AP) 3. master production scheduling (MPS) 4. material requirement planning (MRP) 5. basic techniques of scheduling 6. assembly line scheduling 7. just-in-time and pull systems     On successful completion of this course, students are expected to develop **their skills** in:   1. production planning 2. scheduling 3. assembly line balancing   On successful completion of this course, students are expected to develop their appreciation of and respect for **values and attitudes** regarding the issues of:   1. importance of production planning 2. decision making 3. well-organized systems | | | | |
| **CONTRIBUTION OF THE COURSE TO CRITERION 5**  Mathematics and Basic Sciences : 0  Engineering Topics : 4 (√)  General Education : 0 | | | | |
| **RELATIONSHIP OF COURSE TO STUDENT OUTCOMES**   |  |  |  |  | | --- | --- | --- | --- | |  | **Level of Contribution** | | | | **Student Outcomes** | **No** | **Moderate** | **High** | | (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics | 🞏 | 🞏 | 🗹 | | (2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors | 🞏 | 🞏 | 🗹 | | (3) an ability to communicate effectively with a range of audiences | 🗹 | 🞏 | 🞏 | | (4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts | 🞏 | 🗹 | 🞏 | | (5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives | 🗹 | 🞏 | 🞏 | | (6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions | 🞏 | 🗹 | 🞏 | | (7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies | 🞏 | 🞏 | 🗹 | | | | | |
|  | | | | |
| **GRADING CRITERIA**  **Exams:** All examinations will be based on lectures, tutorials, labs, assigned readings, project study or other work. To pass these exams students will need to have studied the material well in advance in order to understand the concepts, procedures and techniques. To discourage last minute cramming, the instructor and the assistants will not answer any questions from students on the day of an examination. Exam results will be announced on the portal program as soon as the exam papers have been evaluated. Descriptions of these examinations are as follows:   |  |  | | --- | --- | |  |  | | *Quiz*: | There will be 5 face-to-face, in class quizzes. There will NOT be any make up for the quizzes. | | *Midterm Exam:* | There will be one face-to-face, in class midterm exam at the mid of the semester. Exam date will be determined later by the university. | | *Final Exam:* | There will be a face-to-face, in class final exam at the end of the semester. Exam date will be determined later by the university. | | *Make-up Exam:* | There will be ONLY ONE make-up exam at the end of the semester, after the final exam. Dates will be announced later. Make-up examination will only be offered to students who missed the **final or midterm exams** and provided adequate documentations for the reason for their absence within three working days at the latest after the examination date. A student’s illness will only be accepted as a valid excuse if it is supported by a written report of a physician from the Health Center of the EMU. Students who missed both of the midterm and final exams will have a chance to take the make-up exam only for the final exam. Students will be responsible from all the topics covered in the semester in the make-up exam. | |  |  |   **Note:** The students may need a calculator so they should bring their calculators to all lecture/tutorial/lab/exam hours.  **Assignments:**  There will be 6 research assignments. All necessary explanations will be made in advance. For any type of examination, students are also responsible from studying all assigned materials, even if they might not be discussed in class. | | | | |
| **NG GRADE**  **Students who do not enter midterm exam OR final exam without any valid excuse will take NG grade. Students who do not enter 3 or more of the 5 quizzes will take NG grade.**  **METHOD OF ASSESSMENT**  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.   |  |  | | --- | --- | | Homeworks | 6 % (1 % each) | | Quizzes | 25 % (5 % each) | | Midterm | 34 % | | Final | 35 % | | **TOTAL** | **100 %** |   Note that the instructor reserves the right to modify these percentages in case he finds it necessary. Letter grade equivalents of numerical performances will be announced by the Registrar’s Office after the last day for the submission of letter grades.  **RELATIONSHIP WITH OTHER COURSES**  It is a synthesis course of all the previously taken departmental courses.  **LEARNING / TEACHING METHOD**  The instructor will lecture in class by writing on the board and using computer presentations. Several examples will be covered and discussed in detail by the lecturer in the classrooms. The function of teaching is to enable students to learn. Therefore students are required to study from the declared books and other operations management, production planning, manufacturing planning, etc. books. Students are expected to use the library and internet in their searches and studies. | | | | |
| **TEXTBOOK/S**  Students must have the following textbook:   * Sipper, D., Bulfin, R.L., Production planning, control and integration, McGray-Hill, New York, 1998. * Heizer, J., Render, B., Operations Management, Prentice Hall, 2004. * Chase, R.B., Aquilano, N.J., Jacobs, F.R., Operations Management for Competitive Advantage, McGraw Hill, 2001.   **INDICATIVE BASIC READING LIST**   * Narasimhan, S. L., McLeavey, D. W., Billington, P. J., Production Planning and Inventory Control, Second Edition, Prentice Hall International Inc., America, 1995. * Pochet, Y., Wolsey, L.A., Production planning by mixed integer programming, Springer, USA. 2006 * Johnson, L. A., Montgomery, D.C., Operations Research in Production Planning, Scheduling and Inventory Control, John Wiley and Sons, 1974. * Vollman, T.E., Berry, W.L., Whyberk, D.C., Manufacturing Planning and Control Systems, Irwin, 1997. * Nahmias, S., Production and Operations Analysis, Irwin, 1997 * Pinedo, M., Scheduling: theory, algorithms and systems, Prentice Hall, 1995.   **EXTENDED READING LIST**  Note that aside from these books, EMU Library has quite a good collection of books on the intermediate and advanced levels in the related fields of industrial engineering discipline. | | | | |
| **TOPICS COVERED and COURSE SCHEDULE**   |  |  | | --- | --- | | **WEEK** | **TOPICS** | | 1 | Introduction, Review of decision levels and production types | | 2 | Aggregate Planning, ULS, ULSB | | 3 | Aggregate Planning, ULS, ULSB | | 4 | Aggregate Planning, heuristic methods | | 5 | Master Production Scheduling | | 6 | Master Production Scheduling, Rough cut capacity planning | | 7 | Material Requirement Planning | | 8 | **MIDTERM EXAM WEEK** | | 9 | Material Requirement Planning | | 10 | Scheduling | | 11 | Scheduling | | 12 | Scheduling | | 13 | Assembly line balancing | | 14 | Assembly line balancing | | | | | |
| **ACADEMIC HONESTY, PLAGIARISM & CHEATING**  This is intentionally failing to give credit to sources used in writing regardless of whether they are published or unpublished. Plagiarism (which also includes any kind of cheating in exams) is a disciplinary offence and will be dealt with accordingly. According to university by laws cheating and plagiarism are serious offences punishable with disciplinary action ranging from simple failure from the exam or project/report, to more serious action (suspension from the university for up to one semester). Disciplinary action is written in student records and may appear in student transcripts. Any act not suitable for a university student will not be tolerated and may lead to formal disciplinary action. Example of this are: getting someone else to take the examinations for you, misrepresentation of your own answer sheet as another’s work, cheating, knowingly assisting other students to cheat, abusing the tolerance or breaking the discipline of the class. | | | | |

**PLEASE KEEP THIS COURSE OUTLINE FOR FUTURE REFERENCE AS IT CONTAINS IMPORTANT INFORMATION!!!**