

Academic year
2026/2027

Course Guide:

PRODUCTION MANAGEMENT



FACULTY OF
CHEMICAL SCIENCES



1. IDENTIFICATION

Degree Program	Bachelor's Degree in Chemical Engineering			Course Code	801563
Course Name	Production Management			ECTS	6
Subject Area	Sustainability in Chemical Production				
Module	Chemical Technology				
Course Type	Optional	Year	Fourth Year	Semester	Second Semester
Department	Business Organisation (Faculty of Economics and Business Sciences)				

Teaching Staff

Activity	Lecturer	Email	Office
Lectures/Seminars/Tutorials	ANNY DEL MAR AGÁMEZ ARIAS	aagamez@ucm.es	

2. OBJECTIVES

General objective

Study of the production system of companies from both a strategic and tactical perspective. To achieve this, the different strategic and tactical production decisions will be analysed with an eminently practical approach through company cases and exercises.

Specific objectives

For the students to become familiar with the reality of Operations Management concerning its design, operational, and control decisions within the production system. Consequently, they will acquire the skills to design a functional production strategy, and will gain knowledge about the techniques used for production system design (products, processes, location, capacity, and plant layout) as well as for its operation and control (supply chain management, production planning, inventory management, quality control, and Just-in-Time).

3. PRIOR KNOWLEDGE AND RECOMMENDATIONS

Recommendations

It is recommended that students have a basic level of English to allow them to handle English-language bibliography, perform information searches, and communicate both in writing and orally in this language. Furthermore, it is advisable for students to have basic knowledge of Excel for problem-solving purposes.

4. CONTENTS

Brief description

Production Management. Operations strategy within the company. Product selection and design. Process selection and design. Work design, measurement, and compensation. Production system capacity. Facility location and plant layout. Inventory management systems and Just-in-Time techniques. Quality and quality management systems. Quality management.



Course syllabus

PART I: INTRODUCTION TO OPERATIONS STRATEGY

Topic 1: Operations strategy

- 1.1. Introduction to Operations Management and Brief Historical Overview
- 1.2. The idiosyncrasies of the service sector
- 1.3. Emerging trends in operation management
- 1.4. Operation Strategy: objectives and decisions
- 1.5. The Operations strategy planning process

PART II: STRATEGIC PRODUCTION DECISIONS

Topic 2: Product and Process Design and Development

- 2.1. New product development: life cycle and success factors
- 2.2. Techniques and practices to consider in the different stages of NPD
- 2.3. Production process strategies
- 2.4. The product-process relationship. Service process design
- 2.5. Plant layout and types of process layouts

Topic 3: Capacity planning and facility location

- 3.1. Concept and metrics of productive capacity
- 3.2. Planning and management strategies for productive capacity
- 3.3. The localization process: levels, phases and factors

Topic 4: Design, measurement and compensation of work

- 4.1. Human Factor: Introduction
- 4.2. Job Design: Human and Technical Methods
- 4.3. Compensation methods

PART III: TACTICAL PRODUCTION DECISIONS

Topic 5: Medium and short-term production planning

- 5.1. Introduction to medium and short-term production planning
- 5.2. Concept and principles of aggregated planning
- 5.3. Aggregate planning strategies
- 5.4. Obtaining an aggregate production plan

Topic 6: Supply chain management

- 6.1. Supply chain management and logistics
- 6.2. Key factors and management strategies in the supply chain
- 6.3. ISTR0 reference model and relationships between companies in the chain
- 6.4. Supply chain risks

Topic 7: Inventory management with independent demand

- 7.1. Inventory management
- 7.2. Economic Order Quantity (EOQ) Model
- 7.3. Model of economic production lot size
- 7.4. Quantity discount for EOQ model

Topic 8: Inventory management with dependent demand

- 8.1. Elements of the MRP system
- 8.2. Lot size in MRP systems
- 8.3. Evolution of MRP systems

Topic 9: Just-in-Time Systems (JIT)

- 9.1. Just-in-time philosophy
- 9.2. Objectives and Elements of the Just-in-Time System
- 9.3. Advantages of the Just-in-Time System
- 9.4. JIT in service companies

Topic 10: Quality management

- 10.1. Concept of Quality
- 10.2. Total quality management
- 10.3. Quality management models
- 10.4. The costs of quality

5. COMPETENCES

General competences

CG1	Use concepts from basic and technological subjects that enable autonomous learning of new methods and theories and the ability to address new situations.
CG4	Solve problems in the field of chemical engineering with initiative, decision-making ability, and critical reasoning.

Specific competences

CE15-SPQ1	Describe the reality of management about decisions concerning production-system design (products, processes, location, capacity and plant layout), as well as its operation and control (inventories, just-in-time, quality).
CE21-SPQ1	Describe the principles on which production management is based.

Cross-cutting competences

CT1-TQ1	Develop capacity for analysis and synthesis.
CT8-TQ1	Demonstrate capacity for critical and self-critical reasoning.

6. WORKLOAD DISTRIBUTION BY ACTIVITY

Activity	In-class (hours)	Self-study (hours)	Credits
Lectures	35	65	4
Seminars	10	15	1
Tutorials/guided work	4	6	0,4
Coursework and examination preparation	3	12	0,6



Total	52	98	6
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7. METHODOLOGY

Attendance and active participation in class

- Master classes or discussions led by the professor on the topics covered in the course syllabus.
- Study and analysis of cases related to business activity.
- Oral presentations by students on the cases studied, allowing them to share information with their classmates and discuss the content and conclusions reached.
- Completion of self-assessment exercises, where students can monitor their own progress in business administration.

Guided work

- Individual or group tutorials.
- Consultation sessions.
- Learning monitoring sessions.

Exams and guided assignments

- Preparation of assignments and reports on business activity and business administration.
- Comprehensive study of the information collected.
- Taking exams.

The UCM Virtual Campus will be used to support these learning activities.

Some of the recommended bibliography and support materials available on the virtual campus for this course will be in English.

8. BIBLIOGRAPHY

Basic bibliography

- ARIAS ARANDA, D.; MINGUELA RATA, M.: "Production and operations management. Strategic decisions", Pirámide, Madrid, 2018.
- ARIAS ARANDA, D.; MINGUELA RATA, M.: "Production and operations management. Tactical decisions", Pirámide, Madrid, 2018.

Complementary bibliography

- ALFALLA LUQUE, R.; GARCÍA SÁNCHEZ, M.R.; CARRIDO VEGA, P., GONZÁLEZ ZAMORA, M.M. and SACRISTÁN DÍAZ, M.: "Introduction to Tactical-Operational Operations Management: A Practical Approach", Delta, Madrid, 2008.
- CARRETERO DIAZ, L.E.; PIRES, S.: "Supply Chain Management". McGraw-Hill, Madrid, 2007.
- CHASE, R.; JACOBS, F.; AQUILANO, N.: "Operations Management", 13th edition, McGraw-Hill, Madrid, 2014.
- CUATRECASAS ARBÓS, L. "Production Organisation and Operations Management: Current Systems of Efficient and Competitive Management", Díaz de Santos, Madrid, 2011.
- DAVIS, M.M.; AQUILANO, N.J.; CHASE, R.B.: "*Fundamentals of Operation Management*", McGraw-Hill, Madrid, 2002.
- HEIZER, J.; RENDER, B.; MUNSON, C.: "Operations Management: Sustainability and Supply Chain Management", 14th Edition, Pearson, Global Edition, 2023.

- MIRANDA GONZÁLEZ, F.J.; RUBIO LACOB, S.; CHAMORRO MERA, A.; BAÑEGIL PALACIOS, TM.: "Operations Management Manual", Thomson, Madrid, 2004.

9. EVALUATION

The evaluation will have a continuous and formative nature and can be carried out at both an individual and group level, consistent with the nature of the proposed learning activities. The evaluation criteria (formula and weighting) will be established and communicated to students appropriately before the course begins.

The final course grade will be calculated as the weighted average of the different assessable activities. However, to pass the course, students must obtain the minimum grade established for each activity. If this requirement is not met, the final grade will be the weighted average, capped at 4.5 out of 10. This criterion shall apply to both the ordinary and extraordinary assessment periods.

The grades of the activities planned for the evaluation of the subject (midterm exams, tutorials, delivery of problems...) will be communicated to the students sufficiently in advance before the final exam, so that they can adequately plan the study of this or other subjects.

Specifically, grades for midterm exams will be communicated within a maximum of 20 days, except for the second midterm, where the timeframe may be shorter to adapt to the final exam.

In any case, a minimum period of ten days between the publication of grades and the date of the final exam for the course will be respected.

❖ WRITTEN EXAMINATION: 60%

Students will have the option of taking two written or online midterm exams (via the virtual campus and in person in the classroom), which they must pass with a minimum grade of 5 out of 10. If they fail either midterm exam, they must take the final exam for the course with the material corresponding to the failed midterms. The assessments will be practical in nature, will represent 60% of the overall grade, and will serve to evaluate the knowledge acquired and the skills related to the competencies (CG4, CE21-SPQ1, CT1-TQ1).

The extraordinary exam sessions will consist of a single exam, which will be evaluated in the same way as the regular exam sessions.

Final exams, for both the regular and extraordinary sessions, as well as the midterm exams, may be written or online (via the virtual campus and in person in the classroom).

To approve the course, a minimum grade of 5 is required on the midterm exams or the final exam, in both the theoretical and practical components.

The midterm exam schedule will be set by the professor outside of regular class hours. The final exam will be held during the official session established by the Dean of the Faculty of Chemical Sciences.

❖ PERSONAL WORK AND GUIDED ACTIVITIES: 10%

The evaluation of individual learning process carried out by the students will be based on the following factors:

- The student's ability in solving problems and/or answering questionnaires provided by the professor during seminars.



- Presentation to the class of the most significant topics of the reading proposed by the professor.
- Evaluation of group tutorials, with mandatory attendance, and to which students will be summoned periodically throughout the semester.

The evaluation of these aspects will allow us to know the degree of achievement of the general competence CG1, the specific competences CE21-SPQ1 and the transversal competence CT8-TQ1.:

❖ **GUIDED ACTIVITIES: 30%**

Students, working in groups, will complete a practical case study of a real company throughout the course, applying the theoretical concepts covered in the course material. Each group will present the progress of their work during scheduled practical sessions (tutorials). To evaluate this activity, the professor will consider:

- The quality of the presentation, including the correct application of theoretical concepts and each student's oral communication skills.
- The clarity of the presentation and the accuracy of the answers to questions posed by the professor and/or classmates.
- The quality of the written report, in terms of content and presentation.

The evaluation of these aspects will determine the degree of achievement of the general competencies CG1 and CG4, the specific competencies CE15-SPQ1, and the transversal competencies CT1-TQ1 and CT8-TQ1.

❖ **ATTENDANCE AND PARTICIPATION IN CLASSES:**

Students are required to participate in at least 70% of the in-person activities where attendance has been recorded by the professor. Guided tutorials are mandatory. If a student does not attend at least 70% of the in-person activities, they will not be eligible for continuous assessment, and all activities and assignments completed throughout the course will be invalidated, along with the corresponding grades.

- Students who fail to complete the practical activities for the course during the first month of instruction will not be eligible for continuous assessment and will be required to take the final exam covering all course material or receive a grade of "NOT PRESENT" in the ordinary exam period.
- Students who do not take the July exam scheduled by the Academic Secretary will be considered NOT PRESENTED, regardless of whether they have completed the continuous assessment. If the student takes the July exam, their grade will be calculated using the percentages established in the course syllabus.
- If students fail the course in the ordinary examination period, the grades obtained during the continuous assessment will remain valid for the July examination period.

ACTIVITY SCHEDULE

UNIT	ACTIVITY	HOURS	GROUPS	START	END
Topic 1: Operations strategy	Lectures	3	1	1st week	1st week
Topic 2: Design of new products and processes	Lectures	4	1	1st week	3rd week
	Seminars	2	1		
Topic 3: Capacity planning and facility location	Lectures	4	1	3rd week	4th week
	Seminars	3	1		
Topic 4: Design, measurement and compensation of work	Lectures /practice classes	2	1	5th week	5th week
Topic 5: Medium and short-term production planning	Lectures /practice classes	4	1	5th week	6th week
	Seminars	1	1		
Topic 6: Supply chain management	Lectures /practice classes	4	1	6th week	8th week
	Seminars	2	1		
Topic 7: Inventory management with demand independent	Lectures /practice classes	4	1	8th week	9th week
	Seminars	2	1		
Topic 8: Inventory management with demand dependent	Lectures /practice classes	6	1	9th week	10th week
Topic 9: Just-In-Time Systems	Lectures	2	1	11th week	11th week
Topic 10: Quality management	Lectures /practice classes	2	1	11th week	11th week
Scheduled tutorials	Tutorials	4	1	They will be scheduled	

NOTE: This calendar is indicative.

SUMMARY OF ACTIVITIES

ACTIVITY	ASSOCIATED COMPETENCES	TEACHING ACTIVITY	STUDENT ACTIVITY	EVALUATION	P	NP	TOTAL	C
Theory classes	CG1, CE15-SPQ1, CE21-SPQ1, CT1-TQ1, CT8-TQ1	Exposition of theoretical concepts	Taking notes	Qualification of the answers made in writing to questions related to the theoretical concepts explained	35	65	100	
Self-work (Seminars)	CG1, CE21-SPQ1, CT8-TQ1	Application of theory to the resolution of exercises and problems	Taking notes. Performing exercises. Formulation of questions and doubts	Qualification of the answers (approach and result) made in writing for the resolution of practical exercises and numerical problems	10	15	25	15%
Guided activities (Tutorials)	CG1, CG4, CE15-SPQ1, CT1-TQ1, CT8-TQ1	Helps the student direct their study and group work with explanations and bibliographic recommendations. Correct and evaluate the work done by the student	Consult the teacher about the conceptual and methodological difficulties encountered when studying the subject. Preparation of group work proposed by the teacher (report and presentation with computer)	Work evaluation	4	6	10	25%
Exams	CG4, CE21-SPQ1, CT1-TQ1	Proposal, supervision and correction of the exam. Student qualification.	Preparation and realization		3	12	15	60%

P: In-class activities

NP: Non-classroom activities (self-study)

C: Assessment weighting