

**COURSE DATA****Data Subject**

|                      |                     |
|----------------------|---------------------|
| <b>Code</b>          | 35829               |
| <b>Name</b>          | Production planning |
| <b>Cycle</b>         | Grade               |
| <b>ECTS Credits</b>  | 6.0                 |
| <b>Academic year</b> | 2020 - 2021         |

**Study (s)**

| <b>Degree</b>                                           | <b>Center</b>        | <b>Acad. year</b> | <b>Period</b> |
|---------------------------------------------------------|----------------------|-------------------|---------------|
| 1313 - Degree in Business Management and Administration | Faculty of Economics | 3                 | Second term   |

**Subject-matter**

| <b>Degree</b>                                           | <b>Subject-matter</b>                                                         | <b>Character</b> |
|---------------------------------------------------------|-------------------------------------------------------------------------------|------------------|
| 1313 - Degree in Business Management and Administration | 24 - Compulsory subjects in the pathway: operational management and logistics | Optional         |

**Coordination**

| <b>Name</b>          | <b>Department</b>          |
|----------------------|----------------------------|
| MOCHOLI ARCE, MANUEL | 257 - Business Mathematics |

**SUMMARY**

The objective is to provide the student with the appropriate mathematical and computer tools to make decisions regarding the problems of localization of industrial plants, production planning, the sequence of tasks and projects and the management of inventories. The resolution of software problems requires the resolution of information for the most adequate problem resolution and to be able to make improvement proposals.

In addition, it is intended that students learn to discuss with their peers, expose and defend their opinions about the rest and make criticisms relevant to the opinions of others, from the discussions that the teacher encourages in practical classes and seminars.



- Develop the ability to work in groups.
- Ability to obtain information and describe a real problem in mathematical terms.
- Being able to present and defend their ideas in a coherent manner, and with the necessary arguments to convince their colleagues of the appropriateness of their proposals and know how to accept or refute their criticisms.

Create a critical attitude that allows you to make argued judgements and defend them with rigor and tolerance about the works and opinions expressed by your colleagues

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

Mathematics II of the first grade

## OUTCOMES

### 1313 - Degree in Business Management and Administration

- Demonstrate capacity for analysis and synthesis.
- Demonstrate oral and written communication skills in the native language.
- Be able to solve problems.
- Be able to make decisions.
- Be able to work in a team.
- Have critical and self-critical capacity.
- Be able to learn autonomously.
- Be able to make decisions under certainty and uncertainty environments.
- Be able to apply analytical and mathematical methods for the analysis of economic and business problems.
- Be able to define, solve and present complex problems systemically.
- Be able to express oneself in formal, graphic and symbolic languages.

## LEARNING OUTCOMES

- Know the different models of production planning, task and project sequencing and inventory management.
- Be able to model and implement real business problems corresponding to the issues addressed.
- Be able to analyze the solutions obtained and make proposals for improvement.



## DESCRIPTION OF CONTENTS

### 0. GAMS Software

- 1 Introduction
- 2 Mandatory Blocks
- 3 Indexed Models

### 1. Basic Concepts

- 1 Models and classification
- 2 Phases of the modeling process
- 3 Fundamental aspects in molling
- 4 Implementation and resolution

### 2. Inventory Theory

1. Introduction
2. Variables involved
3. Economic order quantity
4. Economic lot size

### 3. Modeling of particular conditions

- 3.1 Problems with Semicontinuuos variables
- 3.2 Either Or constraints
- 3.3 If Then constraints

### 4. Production Planning

1. Introducció
2. Master production planning
3. Materials requeriment

### 5. Project Scheduling and Network Planning

- 1 Introduction
- 2 Gantt Chart
- 3 Network planning
- 4 Evaluation and Review Technique (PERT)
- 5 Critical Path Method (CPM)

**6. Job Shop Scheduling**

- 1 Introduction
- 2 Scheduling on a single Machine
- 3 Parallel Machines Scheduling

**7. MULTIOBJECTIVE PROGRAMMING**

1. Introduction
2. Modeling problems with multiple objectives
3. Generating techniques
4. Goal Programming

**WORKLOAD**

| ACTIVITY                                     | Hours         | % To be attended |
|----------------------------------------------|---------------|------------------|
| Theory classes                               | 30,00         | 100              |
| Computer classroom practice                  | 30,00         | 100              |
| Development of group work                    | 5,00          | 0                |
| Development of individual work               | 5,00          | 0                |
| Study and independent work                   | 40,00         | 0                |
| Readings supplementary material              | 5,00          | 0                |
| Preparation of evaluation activities         | 5,00          | 0                |
| Preparing lectures                           | 10,00         | 0                |
| Preparation of practical classes and problem | 15,00         | 0                |
| Resolution of case studies                   | 5,00          | 0                |
| <b>TOTAL</b>                                 | <b>150,00</b> |                  |

**TEACHING METHODOLOGY**

The development of the subject is structured in a session of theory once a week of two hours, and in a practice session of the same duration.

In the theoretical classes, the teacher, of each subject, will highlight the most relevant aspects and what is considered the most difficult for the student to understand. He will make some examples and guide the learning of the students through the materials available in the virtual classroom, the teacher's website, as well as the reference manuals. At the end of the class, the teacher will comment on the materials of the virtual classroom that the student must prepare for the following class.



In the practical classes it will be combined the resolution of problems by the teacher and by the students, for which, with at least a week before each practical class, the teacher will publish in the virtual classroom some problems so that the students try to solve them and in each of the practical sessions. In these sessions the teacher will raise the analysis and discussion among the students of the models proposed by them, as well as the best implementation to be solved with the computer and the decisions to make from the solutions obtained.

It is considered ESSNTIAL for an adequate follow-up of the subject that the students attend the theory classes with the teaching material, which will be completed with the class explanations and the practical classes with the proposed problems solved

The modality of classes for students will depend on the social and health conditions and the restrictions established by the competent authorities.

In the case of online teaching, classes will be given by videoconference, preferably synchronous, using Blackboard Collaborate, Teams, Skype or the tool that the lecturer considers appropriate to optimize the student's teaching-learning process during the scheduled program sessions, which remain the same days and times.

In the case of blended teaching, the students will have to access the classroom in alternate weeks according to the initial of their last name (A-M or L-Z). The classes will be broadcast so that the students will have face-to-face teaching one week, and the next week they will follow the classes in streaming.

## EVALUATION

The subject will be evaluated based on the consideration, in this order of importance, of the following aspects:

- Final exam at the end of the semester that will allow you to obtain up to 70% of the final grade (7 points out of 10). This exam will consist of theoretical and practical questions and problems to solve by using a computer.
- Evaluation of the activities developed by the student (individual and / or group) during the semester both from the preparation of papers, oral presentations and the delivery of solved problems, their active participation in class and their attitude towards their classmates. This part of the evaluation will allow the student to obtain up to 30% of the final grade (3 points out of 10).

This way, the total evaluation of the student is broken down as follows:

|                                             |     |
|---------------------------------------------|-----|
| Performing exercises and works and attitude | 30% |
| Final exam at the end of the semester       | 70% |

However, for all those students who have not done the continuous evaluation or have not obtained a satisfactory grade, they will be able to perform a synthesis test valued at 10 points in both callings.

The subject will be considered passed if the student gets 5 points out of 10 as a weighted sum of all the previous concepts. Nevertheless, it is considered essential to pass the final exam, which is mandatory. In case of not passing the final exam, the maximum grade that the student can obtain as sum of all the components will be of 4.5 points.





Regarding the behavior in the performance of work and examinations, the student must take into account that copying in an exam or plagiarizing the work of other people is considered a very serious fault, so it will not be tolerated in any case. In the event that the teacher suspects that a student has copied in any written test or delivery of work, this student will obtain a zero in that test. Therefore, it is extremely important to avoid the suspicion that you have copied (for example, by looking at a colleague's exam or copying your work) or plagiarism has been committed (that is, using other people's sentences as if they were their own) for the consequences that this may entail

## REFERENCES

### Basic

- Fernandez Sanchez, E.(2006) Estrategia de Producción Mc Graw Hill. Madrid
- Fernandez Sanchez, E. Vazquez Ordás C.J.(1994) Dirección de la Producción II. Métodos Operativos Cívitas. Madrid
- Heizer, J. y Render, B (2001) Dirección de la Producción. Decisiones Tácticas Prentice Hall. Madrid
- Davis, M.M.; Aquilano, N.J. y Chase, R.B. (2001) Fundamentos de Dirección de Operaciones Mc Graw Hill. Madrid
- Dominguez Machuca, J.A.(1995). Dirección de >>Operaciones. Aspectos Tácticos y Operativos. Mc Graw Hill. Madrid
- GAMS (2020): A User's Guide, by Richard Rosenthal. GAMS Development Corporation, Washington, DC, USA
- MCcCarl, B.A. (2016): McCarl Exdpaned Gams User Guide. GAMS Development Corporation.

### Additional

- Taha, H.A. (2012) Investigación de Operaciones. Pearson Prentice Hall. México
- Ballou, R.H.(2004). Logística. Administración de la cadena de suministro Pearson Prentice hall. México
- Martin Peña, M.L.(2003) Dirección de la producción: Problemas y ejercicios resueltos. Pearson Madrid.

## ADDENDUM COVID-19

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

## English version is not available

Si durante el curso se suspenden las clases presenciales y se pasa a docencia online o directamente se comienza con docencia online, se atenderá a lo siguiente



## **1. Contenidos**

Se mantendrán todos los contenidos inicialmente programados en la guía docente tanto para las clases teóricas como prácticas

## **2. Volumen de trabajo y planificación temporal de la docencia**

Las 4 horas semanales de clase (2h teoría y 2h prácticas) se reducirán a una única sesión semanal de 2 horas mediante videoconferencia dedicada a resolver las dudas sobre el material de teoría y a resolver los problemas planteados como trabajos para cada semana. Debiendo dedicar el estudiante las dos horas semanales no impartidas al aprendizaje autónomo con los materiales preparados para teoría y a resolver los problemas para esa semana

## **3. Metodología docente**

Sustitución de la clase presencial práctica por la videoconferencia síncrona mediante creación de tareas “Videoconferencia” en el aula virtual y ejecución de estas por Blackboard Collaborate el día y a la hora de la clase presencial.

Power point en aula virtual de cada uno de temas adaptados a la no presencialidad y subida al aula virtual de las soluciones de los problemas propuestos como tarea semanal con el fin de que los estudiantes puedan autocorregirlos y plantear las dudas para la sesión virtual semanal por videoconferencia.

Utilización del foro del aula virtual para fomentar los debates y atender todas las dudas no resueltas durante las sesiones de videoconferencia.

Sistema de tutorías. Se mantiene el programa de tutorías virtuales (atención en 48 horas laborables máximo por correo electrónico) y en el horario de tutorías presenciales

## **4. Evaluación**

Si se comienza con presencialidad y posteriormente se pasa a docencia online, se mantendrán todas las notas resultantes de la evaluación continua obtenidas antes de la suspensión de la presencialidad.

Tanto si se comienza con clases online o se cambia a este sistema, una vez iniciado el curso, se incrementará el peso de la evaluación continua que supone el 30% en la guía docente hasta el 50%. Se mantienen las actividades evaluables de manera continua de la guía original: resolución de problemas y de casos prácticos individual y/o en grupo y se aumentará la realización de controles periódicos.



Reducción del peso del examen final, pasará del 70% al 50%. Para aquellos estudiantes que superen con una nota superior o igual a cinco todas las pruebas individuales realizadas, el peso de la evaluación continua será del 100% de la nota final.

La Prueba de evaluación final, se basará en un cuestionario del aula virtual con varias preguntas que, el estudiante deberá contestar en el propio cuestionario, en los espacios habilitados para ello y subir los ficheros adjuntos correspondientes en los apartados en que se así se solicite. No se admitirá ninguna respuesta o fichero enviado por cualquier otro medio, email, foro, etc.

El cuestionario se generará de forma aleatoria a partir de un banco de preguntas de dificultad similar, lo suficientemente amplio para que cada estudiante tenga un examen distinto.

El examen se realizará en la fecha prevista en el calendario de exámenes de la titulación, en el aula si es presencial o online, la hora de comienzo del examen se indicará en la convocatoria oficial que se publicará al efecto en el aula virtual. Si el examen es online, para la realización del examen el profesor podrá exigir que los estudiantes se conecten mediante videoconferencia BBC (se proporcionará la URL para su conexión) con la cámara activada y el micrófono silenciado para su identificación, que también podrá ser realizada por otros medios que el profesor avisará con la suficiente antelación en la convocatoria del examen. Al estudiante que no se identifique correctamente, no se le admitirá el examen. Durante la realización del examen, el profesor podrá pedir al estudiante que muestre los folios de operaciones o comparta la pantalla para su comprobación.

Si una persona no dispone de los medios para poder seguir las clases o realizar los controles, deberá avisar al profesor para su conocimiento y ponerse en contacto con decanato para que estudien la posibilidad de habilitar los medios necesarios para poder seguir las clases, mediante el préstamo del equipo correspondiente o lo que se considere oportuno o resulte factible.

## **5. Bibliografia**

Se potenciarán los apuntes, transparencias, colecciones de problemas y cualquier otro material subido al aula virtual, para facilitar el seguimiento de las clases.