

Course guide

240226 - 240AU064 - Innovation and Development in Automotive

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 732 - OE - Department of Management.
737 - RMEE - Department of Strength of Materials and Structural Engineering.

Degree: MASTER'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2019). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Ayneto Gubert, Xavier

Others: Bautista Valhondo, Joaquin
Ayneto Gubert, Javier
Barrios Vicente, José Manuel

PRIOR SKILLS

Knowledge of production technology, product engineering, economics, and business administration at grade level

REQUIREMENTS

Minimum level of knowledge of Spanish: B2

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEAU 1. (ENG) Realitzar models d'enginyeria, aplicar mètodes innovadors en la resolució de problemes i aplicacions informàtiques adequades, per al disseny, simulació, optimització i control de processos i sistemes.

CEAU 2. (ENG) Explicar les bases de la indústria de l'automoció, el seu contexte econòmic i legislatiu, així com la seva evolució.

CEAU 7. (ENG) Gestionar la investigació, desenvolupament i innovació tecnològica, atenent a la transferència de tecnologia i els drets de propietat.

CEAU11. (ENG) Planificar, portar un seguiment i controlar el desenvolupament de productes, aplicant coneixements d'electricitat, electrònica i els sistemes d'emmagatzematge d'energia.

CEAU15. (ENG) Realitzar, presentar i defensar un exercici original realitzat individualment davant d'un tribunal universitari, consistent en un projecte integral d'Enginyeria d'Automoció de naturalesa professional en què se sintetitzin les competències adquirides en els ensenyaments.

Transversal:

CTAU1. (ENG) EMPRENEDORIA I INNOVACIÓ: Conèixer i comprendre l'organització d'una empresa i les ciències que regeixen la seva activitat; tenir capacitat per comprendre les normes laborals i les relacions entre la planificació, les estratègies industrials i comercials, la qualitat i el benefici.

CTAU3. (ENG) TREBALL EN EQUIP: Ser capaç de treballar com a membre d'un equip interdisciplinari, ja sigui com un membre més, o realitzant tasques de direcció, amb la finalitat de contribuir a desenvolupar projectes amb pragmatisme i sentit de la responsabilitat, assumint compromisos tenint en compte els recursos disponibles.

TEACHING METHODOLOGY

The course is 3 ECTS credits and lasts 14 weeks, divided into 2-hour sessions per week.

It is developed in five themes consisting of three types of activities: (1) theory and masterclass sessions (2) practice defense sessions, linked to the resolution of a real challenge provided by an automotive company and (3) work sessions autonomous for the development of the challenge. For this, work groups will be defined, made up of 4 to 6 students, stable throughout the course.

In the theory sessions, the teaching staff exposes the theoretical and practical contents of the subject (methodologies and innovation tools), giving active participation of the students. The agendas of these sessions are included in the content section. In relation to each topic, a masterclass will be held by a professional from the sector who is an expert in the subject matter who will present his case in first person.

The practice defense sessions take place throughout the course and correspond to the presentation of the students' progress in solving a real challenge provided by an automotive company. The details of these sessions are collected in the practical section.

In addition, students must carry out autonomous work outside of class to generate these advances. In the planning section the approximate sequence of this dynamic is collected, which takes place in 2-hour sessions divided into two consecutive 1-hour blocks.

During the spring term of the 2020-2021 academic year, and as a consequence of the health crisis caused by the Covid19, the teaching methodology will be presented as follows

The theory classes will be held online using Google Meet, and will be maintained both on line and in the rest of the activities planned, including the master classes, which will be given online by external speakers, and the course work and practices based on entrepreneurial innovation.

LEARNING OBJECTIVES OF THE SUBJECT

Develop innovation capacities for future professional development in highly competitive environments of the automotive sector. Beyond mere creativity, it is about students approaching innovation as a strategic business process that allows the transformation of new ideas into value for companies, in their diverse fields of product, service, processes and business models.

STUDY LOAD

| Type | Hours | Percentage |
|-------------------|-------|------------|
| Hours small group | 9,0 | 12.00 |
| Hours large group | 18,0 | 24.00 |
| Self study | 48,0 | 64.00 |

Total learning time: 75 h

CONTENTS

1. Innovation, engine of change in the automotive sector

Description:

Presentation and debate on the concept of innovation and its areas and trends in the automotive sector. Presentation of the innovation challenges to be developed during the course. Introduction to strategic tools (surveillance and forecasting).

Temary:

- 1.1 CONFERENCE: Innovation in the automotive sector and its trends. IDIADA's vision.
- 1.2 What do we understand by innovation?: strategy, process, result.
- 1.3 Areas and types of innovation of innovation in the industry
- 1.4 The innovation process and its phases.
- 1.5 How to avoid being surprised: vigilance and foresight.

Specific objectives:

Introduce the concept of innovation from different points of view. Present the methodologies associated with the initial phase of innovation. Start working groups and assign challenges

Related activities:

Presentation of the innovation challenges to be developed during the course. Immersion and search for information on the challenge posed.

Full-or-part-time: 15h

Theory classes: 4h

Practical classes: 1h

Self study : 10h

2. Product innovations

Description:

The product innovation topic is presented, with special emphasis on everything related to digitization. The concept of circular economy is also presented, which will be related later to that of industry 4.0. The concept of concurrent engineering and new forms of agile management of product innovation projects are presented.

Temary:

- 2.1 Innovation and circular economy in the automotive sector.
- 2.2 Development through concurrent engineering.
- 2.3 How to innovate in an agile way.
- 2.4 Practical case: Vehicle digitization, FICOSA's vision.

Specific objectives:

Explore new trends in product innovation, both at the level of the product itself and at the level of how its design and development is managed.

Related activities:

Initial phase of innovation challenges: generation of ideas.

Full-or-part-time: 12h

Theory classes: 3h

Practical classes: 1h

Self study : 8h

3. Automotive as a service: innovation in business models

Description:

Innovation in services and business models is presented as an additional element to add value beyond the physical product, in a sector as competitive as the automotive sector.

Temary:

- 3.1 Innovation focused on the user: design thinking.
- 3.2 Innovation in services: customer journey and service blueprint.
- 3.3 innovation in business models: Business model canvas.
- 3.4 Case study: New trends in urban mobility, SEAT's vision.

Specific objectives:

Present an overview of existing trends and present the most generalized tools for the design of services and the creation of new business models.

Related activities:

Innovation challenges: Maturation of ideas and generation of concepts

Full-or-part-time: 18h

Theory classes: 4h

Practical classes: 2h

Self study : 12h

4. Industry 4.0 in the automotive sector: innovation in processes

Description:

The concept of Industry 4.0 is presented from all its aspects, with special emphasis on its impact in relation to innovation in industrial processes. The problem of the implementation of innovations is addressed and the concepts and techniques associated with the technological strategy in the company are presented.

Temary:

- 4.1 What is meant by Industry 4.0? Main focuses of Industry 4.0: integration, consistency, people.
- 4.2 Innovation in technologies associated with industry 4.0
- 4.3 How to innovate for migration to industry 4.0
- 4.4 Technological strategy in the company.
- 4.5 Case study: Industry 4.0 in the automotive sector, the vision of GESTAMP.

Specific objectives:

Promote industry 4.0 and its role as an engine of innovation. Apply technological strategy tools

Related activities:

Innovation challenges: Development of solutions and creation of technological roadmaps.

Full-or-part-time: 18h

Theory classes: 4h

Practical classes: 2h

Self study : 12h

5. How to organize and develop innovation in automotive companies

Description:

Various concepts and techniques related to innovation in the company are presented, emphasizing how to develop it both internally and through collaboration with external agents.

Specific objectives:

Get the student to develop a vision beyond the mere execution of projects, and focus on issues related to innovation strategy, organization and management at the corporate level and with open innovation networks.

Related activities:

Retos de innovación: Presentaciones finales de los resultados de los retos.

Full-or-part-time: 18h

Theory classes: 4h

Practical classes: 2h

Self study : 12h

GRADING SYSTEM

There are two types of evaluation: (1) continuous and (2) special.

1. CONTINUED EVALUATION

Continuous assessment is intended for students who can follow the course on a regular basis. The teaching methodology has been designed for this modality. The elements taken into account for the evaluation are: (1) partial test, (2) practice presentations, (3) final presentation of the challenge. (4) final test. With the 4 previous elements, 4 notes are built: (NEP) partial test, (NP) practice note that incorporates the notes of the presentations and the delivered works, (NEF) final test, and (NTC) note of the course work and presentation of the challenge. The final grade (NF) is obtained by weighing the four previous elements as follows:

Qualification system: $NF = 0.2 * NEP + 0.2 * NP + 0.2 * NEF + 0.4 * NTC$

If the subject is suspended, a reevaluation exam may be taken. In this case, the grade for the reevaluation exam (NER) will replace the grades for the final exam (NEF) and part exam (NEP) in the calculation of the final grade:

Qualification system: $NF = 0.4 * NER + 0.4 * NTC + 0.2 * NP$

2. SPECIAL EVALUATION

The special assessment is designed for students who, due to the circumstances, cannot attend class regularly. This modality excludes the previous one, and mixed approaches are not possible. To adhere to it, it must be communicated in writing at the beginning of the course, before the constitution of the work teams.

NOTE: The automotive master is face-to-face, so distance support will not be available for the non-face-to-face development of the subject.

There are three assessment elements: (NEP) partial test, (NFP) final practice test and (NEF) final concept test. The (NFP) and (NEF) tests take place on the same day and constitute the final exam. The final grade (NF) is obtained by weighing the three previous elements as follows:

Qualification system: $NF = 0.2 * NEP + 0.5 * NFP + 0.3 * NEF$

If the subject is suspended, a reevaluation exam may be carried out on the entire subject, with a theoretical part (NET) equivalent to $NEP + NEF$ and another practice equivalent to NFP.

Qualification system: $NF = NER = 0.5 * NET + 0.5 * NFP$

During the spring term of the 2020-2021 academic year, and as a consequence of the health crisis caused by the Covid19, the qualification method will not be changed. The qualification system and the weighting of each part will be as initially foreseen in this teaching guide:

$NF = 0.2 * NEP + 0.2 * NEF + 0.2 * NEC + 0.4 * NTC$

EXAMINATION RULES.

- a) Partial Exam: There will be a theoretical-conceptual exam on the subjects taught up to that moment.
- b) Evaluation Practices: They will be carried out by scoring the presentations of practices 1 to 4 corresponding to the various phases of solving the proposed challenge.
- c) Course work: a work will be delivered and the final presentation of the resolution will be made to the proposed challenge in front of a court. The evaluation will be personal and collective.
- d) Final exam: There will be a theoretical-conceptual exam on subjects additional to those already examined in the part.
- e) Reevaluation Exam: It will be equivalent to the exams that it substitutes.

During the spring term of the 2020-2021 course, and as a result of the health crisis caused by the Covid19, the qualification method will present the following changes:

The oral presentations of the practices and the final session will be carried out online using Google Meet, and will be open to all students. Students will present their work using Powerpoint and shared screen. At the end of the presentation of each group, the teachers will be able to ask clarifying questions that will be answered directly.

The partial and final examinations will be of a theoretical and conceptual nature on the subjects taught during the course (topics 1, 2 and 3 in the partial, and topics 3 and 4 at the end) and will be carried out in person or using the means available to this particular Athena, depending on the health situation at any given time.

BIBLIOGRAPHY

Basic:

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- Christensen, Clayton M; Raynor, Michael E; Guix, Joan Carles. La Solución de los innovadores : cómo crear y mantener un entorno satisfactorio. Madrid [etc.]: McGraw-Hill, cop. 2004. ISBN 8448141903.
- Ulrich, Karl T; Eppinger, Steven D; Yang, Maria C. Product design and development. Seventh edition. New York, NY: McGraw-Hill Education, [2019]. ISBN 9781260566437.
- Davenport, Thomas H. Innovación de procesos : reingeniería del trabajo a través de la tecnología de la información. Madrid: Díaz de Santos, 1996. ISBN 8479782706.
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