# UNIVERSIDAD DE CASTILLA - LA MANCHA
## GUÍA DOCENTE

## 1. General information

**Course:** MACHINE DESIGN

**Type:** CORE COURSE

**Degree:** 2328 - MASTERS DEGREE PROGRAMME IN INDUSTRIAL ENGINEERING

**Center:** 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL

**Year:** 1

**Main language:** Spanish

**Use of additional languages:**

**Web site:**

**Code:** 310622

**ECTS credits:** 6

**Academic year:** 2020-21

**Group(s):** 10  20  21

**Duration:** First semester

**Second language:** English

**English Friendly:** N

**Bilingual:** Y

Lecturer: **JESUS MIGUEL CHACON MUÑOZ** - Group(s): **20**

| Building/Office | Department | Phone number | Email | Office hours |
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Lecturer: **ANGEL LUIS MORALES ROBREDO** - Group(s): **20**

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Lecturer: **PUBLIO PINTADO SANJUAN** - Group(s): **21**

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Lecturer: **FRANCISCO JAVIER SANCHEZ-REYES FERNANDEZ** - Group(s): **20  21**

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## 2. Pre-Requisites

A solid background in the following fields is required:

- Dynamics, mechanisms, machine components. The student must have taken courses such as: "Mechanism and machine theory", "Theory of elasticity and strength of materials", "Machine component design", or "Mechanisms and structures".
- Engineering graphics. All courses in this field, as required for a bachelor's degree in engineering, must have been taken.

## 3. Justification in the curriculum, relation to other subjects and to the profession

**Reasons for including this course in the program**

This subject or course belongs to the group designated "Industrial Tecnologies", and is linked to specific abilities as described in the Appendix of CIN/311/2009 (February-9-2009). This regulation specifies the requirements of study programs that confer the status of Professional Industrial Engineer.

The course reinforces abilities that are key in the development of Master's Dissertations related to mechanical design.

## 4. Degree competences achieved in this course

**Course competences**

| Code | Description |
|---|---|
| A01 | To have appropriate knowledge of the scientific and technological aspects of mathematical, analytical and numerical methods in engineering, electrical engineering, energy engineering, chemical engineering, mechanical engineering, continuous medium mechanics industrial electronics, automation, manufacturing, materials, quantitative management methods, industrial computing, town planning, infrastructures, etc. |
| A02 | To plan, calculate and design products, processes, facilities and plants. |
| B03 | Capacity to design and test machines. |
| CB06 | Knowledge and skills to organise and manage enterprises. |
| CB07 | Strategy and planning knowledge and skills applied to different organisational structures. |
| CB08 | Knowledge of commercial and labour law. |
| CB09 | Knowledge of financial and costs accounting. |
| CB10 | Knowledge of information systems for management, industrial organisation, production, logistics and quality management systems. |
| D05 | Knowledge of transportation and industrial maintenance methods and techniques. |

## 5. Objectives or Learning Outcomes

**Course learning outcomes**

Description

Acquire knowledge to enable them to design and analyse machines and mechanisms.

Apply the basic features of computer tools for solid modelling, kinematic and dynamic analysis of mechanisms, and stress and deformation analysis in key components.

Use a process of learning-by-doing, being assigned the design of a machine or mechanism with a specific function and requirements. With the assistance and tuition of the teaching staff responsible for the course, students will have to complete the design of a machine or mechanism with all its mechanical and geometric details.

## 6. Units / Contents

**Unit 1: Introduction to machine design.**

**Unit 2: Principles and computer tools for solid modelling.**

**Unit 3: Principles and computer tools for kinematic and dynamic analysis of mechanisms and machines.**

## 7. Activities, Units/Modules and Methodology

| Training Activity | Methodology | Related Competences (only degrees before RD 822/2021) | ECTS | Hours | As | Com | Description |
|---|---|---|---|---|---|---|---|
| Class Attendance (theory) [ON-SITE] | Lectures | A01 A02 B03 CB06 CB07 CB08 CB10 D05 | 0.6 | 15 | N | - | Theoretical content explained in the classroom. The content is also discussed with the active participation of students. |
| Class Attendance (practical) [ON-SITE] | Lectures | A01 A02 B03 CB06 CB07 CB08 CB10 D05 | 0.4 | 10 | N | - | Problem solving in class while encouraging student participation. |
| Computer room practice [ON-SITE] | Cooperative / Collaborative Learning | A01 A02 B03 CB07 CB10 | 0.4 | 10 | N | - | Hands-on work in the lab and/or the computer room |
| Workshops or seminars [ON-SITE] | Workshops and Seminars | A01 CB06 CB07 CB09 CB10 | 0.2 | 5 | N | - | Practical exercises. Group discussion of results. |
| Progress test [ON-SITE] | Combination of methods | A02 B03 CB06 CB07 CB09 | 0.2 | 5 | N | - | Personal or group meetings (direct interaction instructor-student), as well as midterm presentation of projects for discussion, comments and advise. |
| Project or Topic Presentations [ON-SITE] | Group Work | A02 B03 CB06 CB07 CB08 CB09 | 0.2 | 5 | Y | Y | Presentations. |
| Writing of reports or projects [OFF-SITE] | Guided or supervised work | A02 B03 CB06 CB07 CB08 CB09 | 4 | 100 | Y | Y | Work to be done by the students on their own under the supervision of the instructor. |
| **Total:** | | | **6** | **150** | | | |
| **Total credits of in-class work: 2** | | | | **Total class time hours: 50** | | | |
| **Total credits of out of class work: 4** | | | | **Total hours of out of class work: 100** | | | |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

## 8. Evaluation criteria and Grading System

| Evaluation System | Continuous assessment | Non-continuous evaluation* | Description |
|---|---|---|---|
| Oral presentations assessment | 50.00% | 50.00% | N1 = Grade corresponding to the oral presentation of the assigned project. |
| Practicum and practical activities reports assessment | 50.00% | 50.00% | N2 = Grade corresponding to the report submitted for evaluation. |
| **Total:** | **100.00%** | **100.00%** | |

*According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).*

**Evaluation criteria for the final exam:**

**Continuous assessment:**

Continuous assessment based on instructor-student interaction.

In order to pass this course the following conditions should be met: N1>=5 AND N2>=5

Final grade (if conditions are met) = (N1+N2)/2

**Non-continuous evaluation:**

In order to pass this course the following conditions should be met: N1>=5 AND N2>=5

Final grade (if conditions are met) = (N1+N2)/2

**Specifications for the resit/retake exam:**

A final exam does not apply since grading of this course is based on the presentation of a design project.

**Specifications for the second resit / retake exam:**

A final exam does not apply since grading of this course is based on the presentation of a design project.

In compliance with the regulations in art.14 (2) of "Reglamento de evaluación del estudiante de la UCLM" (UCLM student evaluation rules), the exam option is not available due to the specific characteristics of the educational activities and grading system (projects and group presentation) of the course.

## 9. Assignments, course calendar and important dates

### Not related to the syllabus/contents

| Hours | hours |
|---|---|
| Progress test [PRESENCIAL][Combination of methods] | 5 |
| Project or Topic Presentations [PRESENCIAL][Group Work] | 5 |
| Writing of reports or projects [AUTÓNOMA][Guided or supervised work] | 100 |

**General comments about the planning:** Since the evolution of the COVID-19 pandemic cannot be forecast, the methodologies and contents specified in this guide may have to be modified as needed. Even the grading system may require some adjusting. This will be done with the approval of "Vicerrectorado de Docencia" and making sure that the educational goals of this course are met.

### Unit 1 (de 3): Introduction to machine design.

| Activities | Hours |
|---|---|
| Class Attendance (theory) [PRESENCIAL][Lectures] | 4.5 |
| Class Attendance (practical) [PRESENCIAL][Lectures] | 2 |

### Unit 2 (de 3): Principles and computer tools for solid modelling.

| Activities | Hours |
|---|---|
| Class Attendance (practical) [PRESENCIAL][Lectures] | 5 |
| Computer room practice [PRESENCIAL][Cooperative / Collaborative Learning] | 5 |
| Workshops or seminars [PRESENCIAL][Workshops and Seminars] | 3.5 |

### Unit 3 (de 3): Principles and computer tools for kinematic and dynamic analysis of mechanisms and machines.

| Activities | Hours |
|---|---|
| Class Attendance (theory) [PRESENCIAL][Lectures] | 10.5 |
| Class Attendance (practical) [PRESENCIAL][Lectures] | 3 |
| Computer room practice [PRESENCIAL][Cooperative / Collaborative Learning] | 5 |
| Workshops or seminars [PRESENCIAL][Workshops and Seminars] | 1.5 |

### Global activity

| Activities | hours |
|---|---|
| Computer room practice [PRESENCIAL][Cooperative / Collaborative Learning] | 10 |
| Workshops or seminars [PRESENCIAL][Workshops and Seminars] | 5 |
| Progress test [PRESENCIAL][Combination of methods] | 5 |
| Project or Topic Presentations [PRESENCIAL][Group Work] | 5 |
| Writing of reports or projects [AUTÓNOMA][Guided or supervised work] | 100 |
| Class Attendance (practical) [PRESENCIAL][Lectures] | 10 |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 15 |
| **Total horas:** | 150 |

## 10. Bibliography and Sources

| Author(s) | Title/Link | Publishing house | City | ISBN | Year | Description |
|---|---|---|---|---|---|---|
| Chacón, J.M., Sánchez-Reyes,J. | Expresión Gráfica en Ingeniería Industrial  www.editoraldonostiarra.com | Donostiarra | San Sebastián | 978-84-7063-476-5 | 2013 | Texto básico sobre dibujo normalizado |
| Erdman, A. G. | Mechanism Design: Analysis and Synthesis, Vol. I | Prentice-Hall | | | 1997 | |
| Gómez, S. | El gran libro de SolidWorks  http://www.marcombo.com/El-gran-libro-de-solidworks_isbn9788426721730.html | Marcombo | | 9788426721730 | 2015 | Texto básico sobre SolidWorks |
| Hamrock, Bernard J. | Elementos de máquinas | McGraw-Hill/Interamericana | | 970-10-2799-X | 2000 | |
| Juvinall, Robert C. | Fundamentals of machine component design | John Wiley & Sons | | 0-471-24448-1 | 2000 | |
| Mabie, Hamilton H. | Mecanismos y dinámica de maquinaria | Limusa Wiley | | 978-968-18-4567-4 | 2007 | |
| Mott, Robert L. | Diseño de elementos de máquinas | Pearson Educación | | 978-970-26-0812-7 | 2006 | |
| Pintado, Publio | Teoría de Máquinas | UCLM | | | 1999 | |
| Shigley, Joseph Edward | Diseño en ingeniería mecánica | McGraw-Hill Interamericana | | 970-10-3646-8 | 2002 | |
| Spotts, Merhyle Franklin | Elementos de máquinas | Prentice Hall | | 970-17-0252-2 | 1999 | |
| Sánchez-Reyes, J., Chacón, J.M. | Apuntes de la asignatura  https://campusvirtual.uclm.es/ | UCLM Campus virtual | | | 2018 | |
| Tran, P. | SolidWorks 2018. Basic Tools  https://www.sdcpublications.com/Textbooks/SOLIDWORKS-2018-Basic-Tools/ISBN/978-1-63057-162-7/ | SDC Publications | | 978-16305701627 | 2017 | Texto básico sobre SolidWorks |