PERSONA CIÈNCIA EMPRESA
Universitat Ramon Llull

TITLE OF COURSE: THEORY OF MACHINES

MATTER: Fundamentals of Mechanical Engineering
MODULE: Common to Industry Branch
PROGRAM TITLE: Degree on Industrial Technologies Engineering

GENERAL CHARACTERISTICS*

Type: ☐ Basic training, ☑ Compulsory elective, ☐ Optional
☐ Final degree project, ☐ Practicum

Duration: Semiannual **Semester/s**: 4
Number of credits ECTS: 4,5
Language/s: Spanish

DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION (the meaning of the course in relation to the studies. Between 100 and 200 words.)

The use of machines in everyday life of human beings and essential study by engineers in general. Since the Industrial Revolution began to define laws necessary to create mechanisms (synthesis) able to help human beings to perform the work facing. Also established methodologies for studying the function of these (analysis) and thus improve and optimize them.
The course explains the laws Machine theory for synthesis and analysis mechanisms. Rigid model is used to study the behavior of elements forming mechanisms and machines. We study mechanisms levers and other more specific as cams and gears.

COMPETENCES (of the course made in relation to preassigned competences in this area.)

• Ability to understand and apply the basic and technical skills, including other: computer graphic expression, mechanics and materials necessary for the industrial engineering practice (E2).
• Knowledge of materials science and technology that enables them to ' learning new methods and theories of dowry and versatility to adapt to new situations (E3).
• Ability to solve problems with initiative, decision making, creativity, and critical thinking (E4).
• Ability to develop, plan and implement analytical and numerical methods for the development of mathematical models in the field of industrial engineering (E7).
• Ability to communicate effectively, both orally and in writing, to impart knowledge and skills in the field of engineering industrial. (T1)
• Knowledge of the principles of the theory of machines and mechanisms (CRI7).

PREREQUISITES* (modules, matters, courses and knowledge needed to follow the course. Can be stated that courses must have been completed.)
Competences of the earlier educational stages.

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CONTENTS (as a relationship of the chapters that constitute the contents, or topics covered, of the course to a second level detail.)

1. Introduction to the Theory of Machines
Elements, kinematic pairs, kinematic chains and mechanisms, degree of mobility of Assur groups
2. Synthesis of Mechanisms
Graphic synthesis, synthesis numerical
3. Analysis of Mechanisms
Kinematic and kinetic analysis, selection of actuators
4. Dynamic mechanisms
Balanced, speed control, vibration isolation
5. mechanical drives
Transmissions gears, transmissions with flexible elements, unaligned axes, couplings, bearings
6. Mechanisms cam
7. Mounts and Accessories

METHODOLOGY

TRAINNING ACTIVITIES* (Complete the table relating activities, workload in ECTS credits, and competences.)

Training activities	ECTS Credits	Competences
Sessions presentation of concepts (A1)	0,9	E2, E3, CRI7
Sessions for resolution of exercises, problems and cases (A2)	0,5	E4, E7
Seminars (A3)	0,1	
Personal mandatory activities professor-student (A4)	0,05	
Practical work / laboratory (A5)	0,9	E4, E7
Oral and writing presentations (A6)	0,1	T1
Personal study activities by students (A7)	1,75	E2, E3, CRI7
Evaluation activities (exams, tests,…) (A8)	0,2	E4
TOTAL	**4,5**	

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EXPLANATION OF THE TEACHING METHODOLOGY (justifying the teaching methods used in relation to the competences and course contents. Between 100 and 200 words.)

The teaching methods used in the course is based on theoretical and practical problem solving classes in combination with labs. The lectures and problem-solving classes are linked with dynamic explanatory
(Presentation content) dynamic demonstration (the teacher solve a problem) and active dynamic (the student solve the problem). At the end of each class the student considers the problem to be solved for a future class manner that promotes work outside the classroom.
Practical work in the laboratory consists of explanations by the professor of the tasks to be performed, detailed reading of each practice to carry them out and pass out the report of this practice.
For personal study the student is provided with complete documentation of the course theory, problems, lab. Also recommended exercises supplementary literature course.

EVALUATION

EVALUATION METHODS* (Fill in the table relating evaluation methods, competences and weight in the qualification of the subject.)

Evaluation Methods	Weight	Competences
Final Exam (A)	43%	E2, E3, E4, CRI7
Examination / s Partial / s / control / s scheduled / s (B)	17%	E4, CRI7
Activities done in class (C)	5%	CRI7
Reports realizats work (E)	6%	T1
Presentations and / or oral examinations (F)	1%	T1, CRI7
Modeling, Proposed, etc.. (G)	5%	E2, E4, E7, CRI7
Laboratory reports (H)	8%	T1
Practical work / lab (I)	13%	E4, CRI7
Participations (K)	2%	T1, CR17

LEARNING OUTCOMES (Explanation of the achievements of students that allow competences evaluation, relating to competences and evaluation methods.)
• The student must demonstrate knowledge of the structure and nomenclature mechanisms and laws for combining elements and form schemes. (E2, E3, E4, E7, T1, CRI7) [A, B, C, E, F, G, H, I].
• The student must demonstrate knowledge of troubleshooting analysis kinematic, kinetic and dynamic mechanisms. (E2, E3, E4, E7, T1, CRI7) [A, B, C, E, F, G, H, I].
• The student must demonstrate knowledge of Mechanical Transmission movement between driving sources and bodies of work. (E2, E3, E4, E7, T1, CRI7) [A, B, C, E, F, G, H, I].

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QUALIFICATION (Explanation of the calculation system of qualifying the course.)
The course evaluation will consider all aspects of assessment in the table with its corresponding weight. The greater weight of the note falls on the Final Exam (A) 43%. Also included in the final results of programmed controls (B) 17% Activities done in class (C) 5% Reports works (E) 6%, presentations and / or oral examinations (A) 1 % Preparation of projects, models, etc.. (G) 5% Laboratory reports (H) 8% and assignments / lab (I) 13% and participation (K) 2%.
To pass the course you must have a minimum of five points. each of assessment activities, including the final exam must have a minimum of 4 points so that you can average the rest. We have also approved the Works practical / laboratory and project development, etc. models.

EVALUATION OF COMPETENCES (Defining expressions of calculation for each competence based on corresponding evaluations activities.)

To evaluate the skills of the subject (E2, E3, E4, E7, T1, CRI7) at each assessment activities part of the grade will reflect the skills acquired. The ability to understand and apply basic technical knowledge of computer graphic expression, mechanics and materials (E2) evaluated in the modeling and projects as well as the final exam. E3 Competition will assess specific aspects of the questions in the final exam. Competition E4 evaluated in solving problems for the final exam, scheduled checks and the practical laboratory project and considering the resolution method, treatment results, the application of modeling and simulation. The competition shall be calculated in the E7 model development lever mechanisms for the project and making a physical model. Competition is measured T1 delimiting the ability to present and defend the work reports. Competition CRI7 measured in specific sections of the exam, controls programmed project, practices and knowledge of theory presentations measuring machines. Each activity will have a maximum grade assessment of ten points will be divided into amounts to quantify the degree of acquisition of skills by the student.

TEXTBOOKS (recommended and accessible to students.)

☐ Calero, R.; Carta, J.A. “Fundamentos de mecanismos y máquinas para ingenieros”. McGraw-Hill, 1999

☐ Norton, R.L. “Diseño de Maquinaria”. 4ª Ed. McGraw-Hill, 2009

☐ Shigley, J.; Uicker, J.J. “Teoría de Máquinas y Mecanismos”. McGraw-Hill, 1998

☐ Cardona, S.; Clos, D. “Teoría de Máquinas”. Edicions UPC, 2001

☐ Norton, R.L. “Elementos de Máquinas”. McGraw-Hill, 1999

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☐ Beer & Jonhston. “Mecánica vectorial para ingenieros: Estática”. McGraw-Hill, 1998

☐ Beer & Jonhston. “Mecánica vectorial para ingenieros: Dinámica”. McGraw-Hill, 1998

HISTORICAL DOCUMENT

EARLIER CHANGES
January 2011. Dr. Guillermo Reyes Pozo

LAST REVISION

February 2012. Dr. Guillermo Reyes Pozo