PERSONA CIÈNCIA EMPRESA
Universitat Ramon Llull

TITLE OF COURSE: APPLIED MECHANICS

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**: 3
Number of credits ECTS: 4.5
Language/s: Spanish, Catalan, English

DESCRIPTION

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

The subject of applied mechanics student creates a necessary basis for analysis of any component from the point of view of static analysis efforts and dynamic. The course is designed as a continuation of knowledge acquired in physics to create a good basis for analysis of structures in following subjects as elasticity and resistance of materials or theory machines for the analysis of mechanisms.

The course includes analysis of reaction forces in structures, diagrams internal efforts, analysis of hydraulic dams, structures or beams hyperstatic cables among other cases. On the subject is divided into dynamic analysis called kinematic motion and dynamic forces called kinetics.

To carry out all the tests students receive training on habits, centroids, review of vector calculus, trigonometry and other tools integration mathematics.

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

- Ability to understand and apply basic scientific knowledge (mathematics, physics and chemistry) necessary for the practice of industrial engineering.(E1)
- 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)
- Ability to develop, plan and implement analytical methods and numerical mathematical modeling in the field of industrial engineering. (E7).

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• 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.

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

1. Introduction and overview of physical, mechanical vector units, significant figures.
2. Calculating centroids, inertia and mass surface for use in static problems and then dynamic.
3. Simplify Media as reaction forces and moments of forces and force bat to a point.
4. Analysis of internal efforts axial torsor, cutting, bending and resolution beams.
5. Analysis gates subjected to hydrostatic pressure.
6. Structural analysis of beams with hyperstatic simplify sections of force the null.
7. Analysis of cables.
8. Study of movement from rigid equations and vector analysis geometric.
9. Study of relative speeds and accelerations to Coriolis acceleration cases.
10. Study of reaction forces and even

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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	E1,E2
Sessions for resolution of exercises, problems and cases (A2)	0,6	E7
Seminars (A3)		
Personal mandatory activities professor-student (A4)		
Practical work / laboratory (A5)	0,5	E1,E2,E7
Oral and writing presentations (A6)		T1
Personal study activities by students (A7)	1,8	E1
Evaluation activities (exams, tests,…) (A8)	0,2	E1
Jobs (A9)	0,5	E1
TOTAL	**4,5**	

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 lectures and classes practical problems in combination with hands-on labs and production mechanical parts in the workshop. The lectures and problem solving explanatory link to dynamic classes (presentation of content), Dynamic demonstration (teacher solves a problem) and active dynamic (the student meets the problem). At the end of each class the student poses the problem to solve for a future kind of way that promotes the work outside the classroom. Practical work in the laboratory consists of explanations by the teacher of the tasks to perform, detailed reading of each practice to carry them out and pass make the report of the practice.

Practical work in the workshop begins with an explanation by the teacher of the health and safety standards to look to later describe the regulations and apply the theory related to the manufacture of the workpiece. For the student's personal study documentation is provided with the full course theory, problems, laboratories and manufacturing drawings workshop piece. Furthermore it is recommended supplementary exercises literature course.

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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%	E1, E2, CRI7
Examination / s Partial / s / control / s scheduled / s (B)	17%	CRI7
Activities done in class (C)	3%	CRI7
Exercises outside of class (D)	2%	E1
Reports realizats work (E)	6%	CRI7
Presentations and / or oral examinations (F)	1%	CRI7
Modeling, Proposed, etc.. (G)	5%	E7
Laboratory reports (H)	8%	CRI7
Practical work / lab (I)	13%	CRI7
Work in other centers (Practicum) (J)		
Participations (K)	2%	T1, CRI7

LEARNING OUTCOMES (Explanation of the achievements of students that allow competences evaluation, relating to competences and evaluation methods.)

• The student must demonstrate knowledge of internal efforts at resolution beams applying concepts reaction forces, distribution of loads, centroids and simplify support. (E1, E2, E7, T1, CRI7) [A, B, C, D, E, F, G, H, I, K].
• The student must demonstrate knowledge of solving hydrostatic pressure gates in applying the concepts of inertia, Steiner, and calculation of centroids reactions. (E1, E2, E7, T1, CRI7) [A, B, C, D, E, F, G, H, I, K].
• The student must demonstrate knowledge of speed and resolution acceleration mechanisms considered in relative motions. (E1, E2, E7, T1, CRI7) [A, B, C, D, E, F, G, H, I, K].
• The student must demonstrate knowledge of the resolution of forces and moments
dynamic balance using inertial mass inertia, Steiner equations
energy and momentum. (E1, E2, E7, T1, CRI7) [A, B, C, D, E, F, G, H, I, K]

QUALIFICATION (Explanation of the calculation system of qualifying the course.)

The course evaluation will consider all deliverables listed in the table assessment with its corresponding weight. A large part of the grade obtained at Final Exam (A) 43% and will be adding to the grade achieved during the course Exam (B) 17%, activities performed in class (C) 3% exercises

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outside of class (D) 2%, reports of work done (E) 6%, presentations and / or orals (A) 1% Project development, (g) 5% Laboratory reports (H) 8% Workshop and laboratory work (I) 13%, and finally Participation (K) 2%. During the completion of the final exam will be given the opportunity to recover all deliverables to the student fails the minimum of four.

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

To assess the competencies of the subject E1, E2, E7, T1, CRI7 be used subsections of each deliverable facing students during course. Each deliverable part of the grade will reflect the ability to extrapolate learned in physics and mathematics to assess the basic module E1. To evaluate E2 is The ability to reflect mechanical deliverable. Analyzed to assess E7 solving engineering problems using mathematical artifacts like the similarity between centroids and moments to calculate integrals, theorems of Pappus-Guldin for assimilate centroids and volumes of revolution or ability to simplify equations cases of zero force, symmetries ... Finally the jurisdiction that gives students the opportunity to continue Elasticity and Strength of Materials for a banda and by another with Theory of Machines and Mechanisms evaluated each year with important concepts within the power CRI7. Ultimately each year to evaluate it assess 10 points for each note stating competition.

TEXTBOOKS (recommended and accessible to students.)

☐ “Ingeniería Mecánica. Estática”, Riley, W.F.; Sturges, L.D.; Reverté, (1995), ISBN 84-291-4255-X

☐ “Ingeniería Mecánica. Dinámica”, Riley, W.F.; Sturges, L.D.; Reverté, (1996), ISBN 84-291-4256-8

☐ “Engineering Mechanics. Statics”, Meriam, J.L.; Kraige, L.G.; Wiley, (2003), ISBN 0-471-26607-8

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☐ "Engineering Mechanics. Dynamics", Meriam, J.L.; Kraige, L.G.; Wiley, (2003), ISBN 0-471-26606-x

☐ "Mecánica vectorial para ingenieros. Estática", Beer, F.P.; Russell Johnston, E.; Eisenberg, E.R.; McGraw Hill, (2004), ISBN 970-10-4469-X, ISBN 007-2304936

☐ "Mecánica vectorial para ingenieros. Dinámica", Beer, F.P.; Russell Johnston, E.; Eisenberg, E.R.; McGraw Hill, (2004), ISBN 970-10-4470-3 ISBN 007-230492-8

☐ "Mecánica para ingeniería y sus aplicaciones: Estática", McGill,D.J.; King,W.W.; Grupo Editorial Iberoamérica, (1991), ISBN 968-7270-69-1

☐ "Mecánica para ingeniería y sus aplicaciones: Dinámica", McGill,D.J.; King,W.W.; Grupo Editorial Iberoamérica, (1991), ISBN 968-7270-70-5

HISTORICAL DOCUMENT

EARLIER CHANGES

January 23, 2011, Dr. Andrés Amador García Granada
November 12, 2010, Dr. Andrés Amador García Granada

LAST REVISION

March 8, 2011, Dr. Andrés Amador García Granada