



Asignaturas Libre Configuración en INGLÉS

Courses in ENGLISH

History of the Universe

1st Semester – 4.5 Credits

Academic staff: José L. Garrido-Pestaña and Josep Martí-Ribas
(Department of Physics).

Objectives: The course is designed to target both science and non-science students with an interest in what astronomers are learning about the Universe and how they do it.

Contents:

1. Our place in the universe.
2. Cosmology.
3. The origin of the light elements.
4. Properties of stars.
5. The life and death of stars.
6. Formation of stars and protoplanetary disks.
7. Life on Earth.
8. Extrasolar planets.
9. Interstellar communication.
10. SETI projects.

Provisional schedule:
Monday and Wednesday
18.30 -19.30

Main activities:

Lectures and joint group discussions. Basic observational projects using the astronomical facilities of the *Universidad de Jaén* (subject to weather conditions).

Offered to all

University of Jaén and Erasmus students

<http://eps.ujaen.es/>



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The Beauty of Mathematics

1st Semester – 4.5 Credits

Academic staff: Ildefonso Castro López (Department of Mathematics).

Objectives: The course is offered to students who have previously attended an instrumental course in any of the branches of Mathematics and are interested in other topics of Mathematics. The final objective of the course is to show the intrinsic beauty of this science and its status as the Language of Nature.

Contents:

1. Famous numbers:
 - 1.1 Number pi
 - 1.2 Number e
 - 1.3 Golden ratio
2. Famous problems:
 - 2.1 Topology: The four-colours problem
 - 2.2 Number Theory: Fermat's Last Theorem
 - 2.3 The Continuum Hypothesis: The different faces of infinity
3. Mathematics and Music:
 - 3.1 Can one hear the shape of a drum?
4. Geometric Art
 - 4.1 Fractals
 - 4.2 Curves and surfaces for design

<http://eps.ujaen.es/>

Provisional schedule:

Monday, Tuesday
and Wednesday
11.30 -12.30

Main activities:

Student participation in class and exploration of websites devoted to the various topics of the program. Practice: computer-based interactive activities.



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Introduction to Robotics

1st Semester – 4.5 Credits

Academic staff: Juan Gómez Ortega, Javier Gámez García and Silvia Satorres (Department of Electronics and Automation Engineering).

Objective: The course aims to acquaint students with the concepts and techniques of Robotics, particularly those employed in industrial manipulators and mobile robots.

Contents:

1. What is a robot?
2. Robotics and its branches.
3. Industrial robots.
4. Service and mobile robots.
5. Robot applications (space, submarine, surgery, industry, assistance, etc.)
6. Computer vision in robotics.
7. The future of robots.

Provisional schedule:

Monday 11.30 -12.30

Wednesday 11.30-13.30

Main activities:

During the course students will test commercial industrial manipulators and real mobile robots built by themselves. The final objective is to submit a student-built robot to a national competition where other robots, designed by students from different universities, can “meet” each other.

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CLOSE RANGE PHOTOGRAMMETRY

2nd Semester – 4.5 Credits

Academic staff: Javier Cardenal Escarcena (Department of Geomatics).

Objectives: Close Range Photogrammetry uses accurate imaging techniques to analyse the three-dimensional shape of a wide variety of manufactured and natural objects. The course is addressed to undergraduate students of Geomatics, Surveying or Geodetics and Cartographic Engineering who are interested in specific methods and instruments of non-cartographic photogrammetric applications, and to students wishing to broaden their knowledge of measuring techniques for industrial, civil and environmental engineering and cultural heritage (architectural and archaeological photogrammetric surveys).

Contents:

1. Basic photogrammetric background
2. Overview of photogrammetric solutions
3. Applications in engineering and manufacturing
4. Applications in environmental sciences, architecture and archaeology

Provisional schedule:

The final timetable for the semester will be decided at a Meeting in early February 2008.

Main activities:

Students will receive intensive practice in easy and low-cost methods in photogrammetry, particularly amateur digital cameras and their applications. The skills acquired will be assessed through a full case project developed by the students.

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GEOGRAPHICAL INFORMATION SYSTEMS

2nd Semester – 4.5 Credits

Academic staff: Francisco J. Ariza López and Manuel Ureña Cámara (Department of Geomatics).

Objectives: The course is an introduction to GIS. Participants will get acquainted with the different components of GIS, data types and their sources, and the concept of spatial analysis. General basic GIS techniques will be tackled: spatial data import & export, data edition, and GIS analysis and modelling. A real project, developed by means of some hands-on software exercises, will provide exposure to basic GIS tools and principles. Note: This is a survey course providing a basic overview of GIS. Participants with prior GIS knowledge and experience may waive this course in favor of another.

Contents:

- 1.- Introduction to GIS.
- 2.- The raster model.
- 3.- The vectorial model.
- 4.- Digital Elevation Models.
- 5.- GIS Analysis.

Main activities:

Students will get intensive practice in easy and low-cost methods in photogrammetry, particularly amateur digital cameras and their applications. The skills acquired will be assessed through a full case project developed by the students.

Provisional schedule:

Preferably reduced to one month:
2 theory hours + 4 practice hours.

The final timetable for the semester will be decided at a Meeting in early February 2008.

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USEFUL AND EASY ELEMENTS OF NUMERICAL MATHEMATICS

2nd Semester – 4.5 Credits

Academic staff: Daniel Cárdenas (Department of Mathematics).

Objectives: The course deals with efficient numerical methods for the solution of problems arising in engineering and applied sciences. It is assumed that a computer will be available to perform most arithmetic operations. The main objective is to match a suitable method with the particular task to be carried out, no emphasis being made on the theoretical aspects of the methods. The methodology employed will be very practical and, throughout the course, students will be led from specific examples to the more general situation.

Contents:

1. How computers compute.
2. Iteration, an essential tool. Outstanding applications.
3. Evaluating, differentiating and integrating functions by basic operations.
4. The great equations that a scientist or engineer should know .

Provisional schedule:

The final timetable for the semester will be decided at a Meeting in early February 2008.

Main activities:

The course hours will be divided as follows: some 10 hours in a classroom, making use of the blackboard and a computer; 30 hours in the computer lab, practising with specific mathematical software and using on-line resources to illustrate the main topics of the course; seminars for the students to describe their projects.

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