



Facultad de Ciencias
Universidad Zaragoza

Faculty of Science, UZ



University of Zaragoza

Zaragoza: where?

- 300 km to Madrid/Barcelona/Valencia/Bilbao
- 120 km to Pyrenees





Universidad
Zaragoza



Zaragoza-Saragosse: the history

- Founded in 14 BC by Augustus
- Roman: Caesaraugusta
- Islamic: Saraqusta (capital of the Taifa of Zaragoza)
- Christian: Saragossa (capital of the Kingdom of Aragon – Crown of Aragon)
- Zaragoza: capital of Aragon (Spain)





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Zaragoza: notable people

- Miguel Servet. XVI. Theologist, physician



- Jordán de Asso. XVIII. Naturalist



- Francisco de Goya. XVIII-XIX. Painter



- Ramón y Cajal. XIX-XX. Nobel prize in Medicine





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Zaragoza: the city

- Dry weather: 200 mm rain/year
- Min 2 °C, Max 32 °C
- Population: 600.000
- Safe city: ½ crime rate vs. Madrid, Barcelona, Valencia
- Modern city. Comfortable city
- Affordable city
- Public transportation: bus, tram, bikes





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Zaragoza: leisure

- Cultural activities: concerts, theatre...
- Festivals
- Sport events: football, basketball...
- Nature: Pyrenees, Monegros





**Universidad
Zaragoza**



Zaragoza: the UNIVERSITY

- Founded in 1542
- Campus in Zaragoza, Huesca, Teruel, La Almunia, Jaca
- 35.000 students
- 4.000 professors/researchers
- 54 Bachelor's degrees
- 52 Master's degrees
- 44 PhD programs
- Top 500 in the world (QS 2016)





Universidad
Zaragoza

The University: faculties

- Law
- Economics and Business
- **Science**
- Engineering and Architecture
- Medicine
- Veterinary
- Philosophy and Arts
- Social Sciences
- Education





Universidad
Zaragoza



The University: Mobility

Students 15/16	Europe	North America- Oceania- Asia	Latin America	Total
Incoming	701	22	121	844
Outgoing	857	14	42	913





FACULTY OF SCIENCE



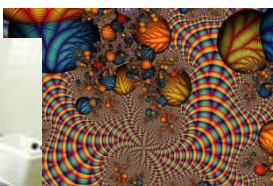
SAN FRANCISCO
CAMPUS
(near the city center)





FACULTY OF SCIENCE

- 1850 students
- 450 professors
- 100 researchers
- 100 support staff
- 40 classrooms
- 20 teaching labs
- 150 research labs
- 9 computer classrooms





HIGH LEVEL RESEARCH: More than 1.000 research papers per year
In the top 200 universities in the world in Natural Sciences&Mathematics (2016 ARWU)

It was the seed of several RESEARCH INSTITUTES





HIGH LEVEL RESEARCH

Canfranc Underground Laboratory

- Founded by the research group in Nuclear Physics and Astroparticle Physics
- Under the Pyrenees
- Dark matter detection
- 17.000 ft sq (2nd biggest in Europe)



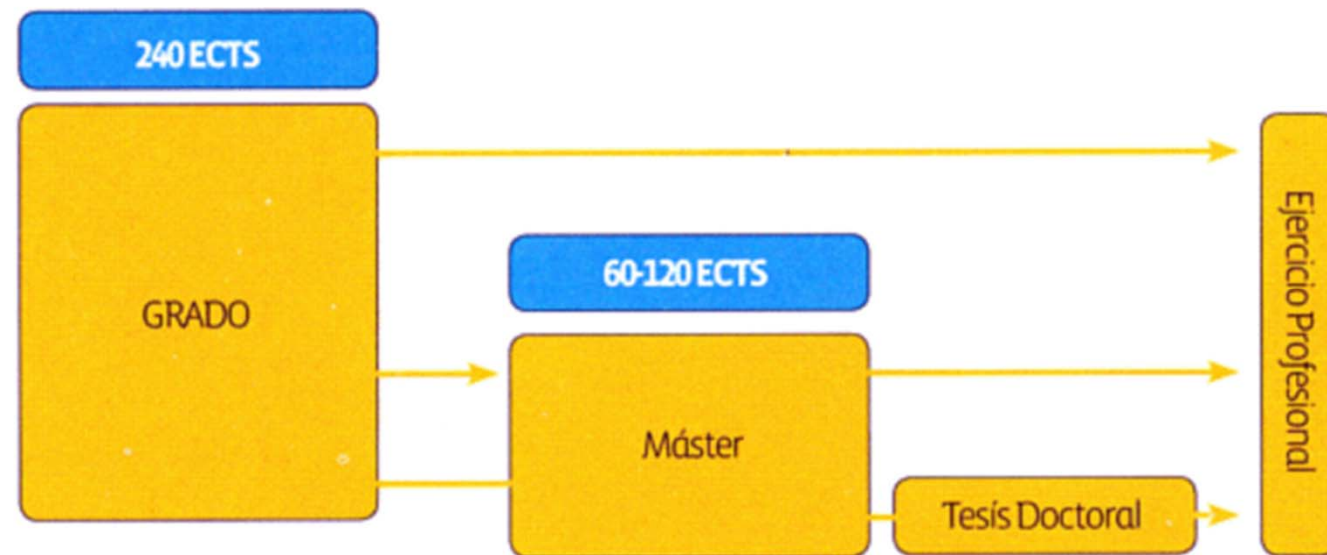


Universidad
Zaragoza



OUR STUDIES: EUROPEAN ACADEMIC FRAME

Espacio
Europeo
Educación
Superior

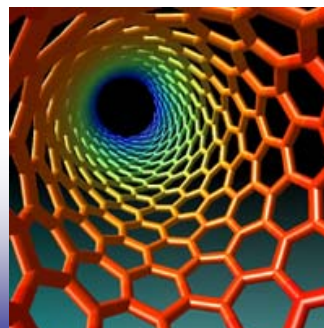
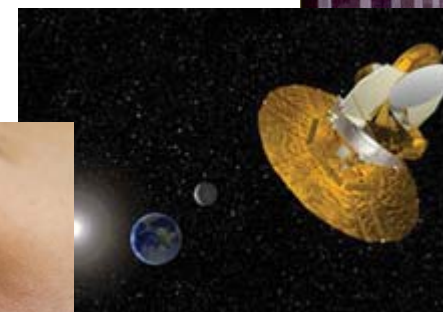




BACHELOR'S DEGREE PROGRAMS

4 Years

- BIOTECHNOLOGY
- CHEMISTRY
- GEOLOGY
- MATHEMATICS
- OPTICS-OPTOMETRY
- PHYSICS



Facultad de Ciencias
Universidad Zaragoza



MASTER'S DEGREES (1 year)

- ✓ MOLECULAR AND CELLULAR BIOLOGY
- ✓ QUANTITATIVE BIOTECHNOLOGY* (*in English*)
- ✓ PHYSICS AND PHYSICAL TECHNOLOGIES
- ✓ GEOLOGY: TECHNIQUES AND APPLICATIONS
- ✓ MATHEMATICAL MODELLING AND RESEARCH, STATISTICS AND COMPUTATION
- ✓ MOLECULAR CHEMISTRY AND HOMOGENEOUS CATALYSIS
- ✓ INDUSTRIAL CHEMISTRY
- ✓ ENVIROMENTAL NANOTECHNOLOGY
- ✓ NANOSTRUCTURED MATERIALS AND NANOTECHNOLOGICAL APPLICATIONS (*in English*)
- ✓ ERASMUS MUNDUS ON MEMBRANES ENGINEERING (*in English; 2 years*)



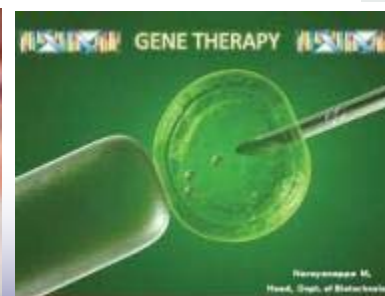
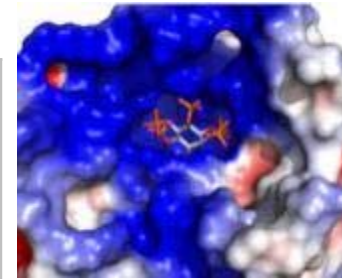
* From 2017/18

BSc IN BOTECHNOLOGY

Interdisciplinary study plan merging the application of basic science, applied science, chemical engineering and biological sciences to biomedicine, agriculture and bioremediation. These topics are grouped in blocks:

BASIC AND FUNDAMENTAL SCIENCE modules (first course)	Structural and Molecular Biology, Genetic Engineering, Analytical Instrumentation, Bioinformatics, Immunology, Microbiology, Cell Biology
Bioprocessing, Management Systems, Social and Legal Elements	Clinical, Plant, Animal, Environmental and Microbial Biotechnology
Final Degree Project	Optative modules

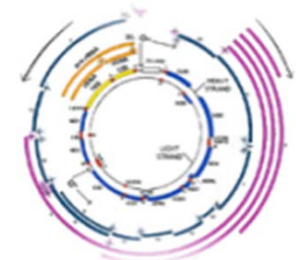
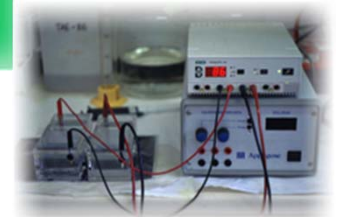
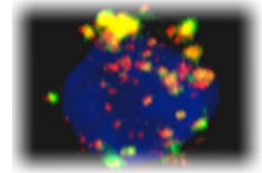
Optative Topics:
Molecular bases of Cell Communication and Cancer, Biophysics, Pharmacology, Biotechnology in Immunology and Microbiology, and, Food, Wine, or Veterinary Biotechnology



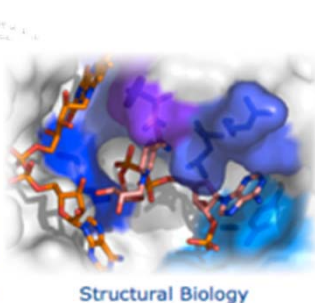
MSc IN MOLECULAR AND CELLULAR BIOLOGY

Curriculum

- 1ST SEMESTER. MANDATORY MODULE
QUALITY CONTROL AND LEGISLATION IN BIOTECHNOLOGICAL PROCESSES
ADVANCED METHODS IN BIOPHYSICS
ADVANCED METHODS IN MOLECULAR AND CELLULAR BIOLOGY
- 2ND SEMESTER. OPTIONAL MODULE (2 SUBJECTS FROM:)
ADVANCES IN MOLECULAR PATHOLOGY
FUNCTIONAL GENOMICS
ADVANCED IMMUNOLOGY
CELLULAR SEPARATION. CELL VIABILITY ANALYSIS
- YEARLONG EXPERIMENTAL MODULE (MANDATORY)
FINAL DEGREE PROJECT (Original research work)



Mitochondrial Biogenesis and Pathology



Structural Biology



Neuroscience



SPERM BIOLOGY

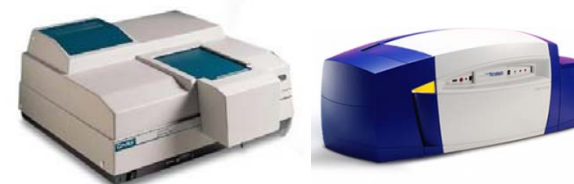
Sperm Biology

MSc IN QUANTITATIVE BIOTECHNOLOGY (in English)

Curriculum

1ST SEMESTER. MANDATORY MODULE

- Systems and Synthetic Biology
- Simulation of Biomolecules
- Bioactive Molecules - Identification, design and development



Instituto Universitario de Investigación
**Biocomputación y Física
de Sistemas Complejos**
Universidad Zaragoza

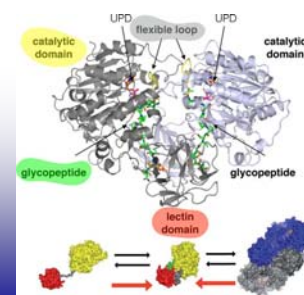
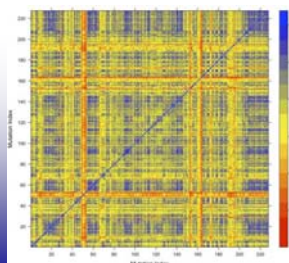
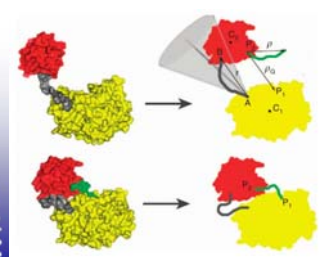
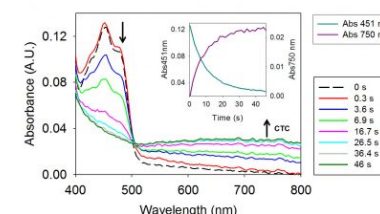
2ND SEMESTER. OPTIONAL MODULE (3 SUBJECTS FROM)

- Molecular Biotechnology - Instrumental techniques
- Cell and Organism Biotechnology - Experimental methodology
- Biostatistics and Bioinformatics
- Biological Modelling
- The SME-Biotech
- Regulation and Quality Control Issues



YEARLONG EXPERIMENTAL MODULE (MANDATORY)

FINAL DEGREE PROJECT (Original research work. It can be done at BIFI labs or at the most prominent Biotech companies in Aragón co-supervised by a BIFI researcher)





CHEMISTRY AT ZARAGOZA

- ✓ RANKED AMONG THE FIRST 100 IN THE WORLD
- ✓ RANKED FIRST-SECOND IN SPAIN
- ✓ LEADING RESEARCH PROJECTS
 - ✓ EUROPEAN PROJECTS
 - ✓ INDUSTRIAL PROJECTS
- ✓ STRONG RESEARCH GROUPS IN:
 - ✓ CHEMICAL SYNTHESIS
 - ✓ CATALYSIS
 - ✓ MATERIALS CHEMISTRY
 - ✓ NANOSCIENCE
 - ✓ ANALYTICAL CHEMISTRY
 - ✓ COMPUTATIONAL CHEMISTRY
 - ✓ SUSTAINABLE CHEMISTRY



BSc IN CHEMISTRY

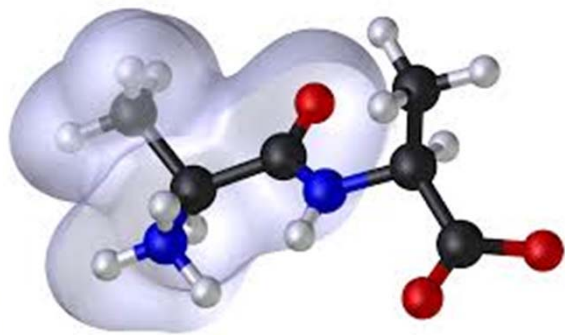
Our study plan covers many topics grouped in blocks:

BASIC modules: Mathematics, Physics, Chemistry, Biology, Statistics & chemistry laboratory (first year)

Fundamentals of Chemistry: Organic, Inorganic, Physical and Analytical Chemistry (second and third year)

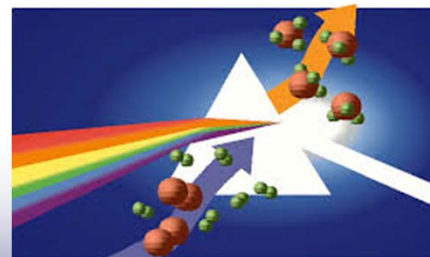
Optional modules (fourth year)

Final Degree Project (9 ECTS)



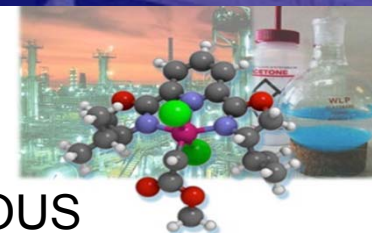
Elective modules:

Quality control in Lab, Materials Science, Spectroscopy, Environmental analysis, Catalysis, Molecular modeling, Organometallic chemistry, Industrial Organic Chemistry, Fast analysis methods, Processes, hygiene and security in industry.

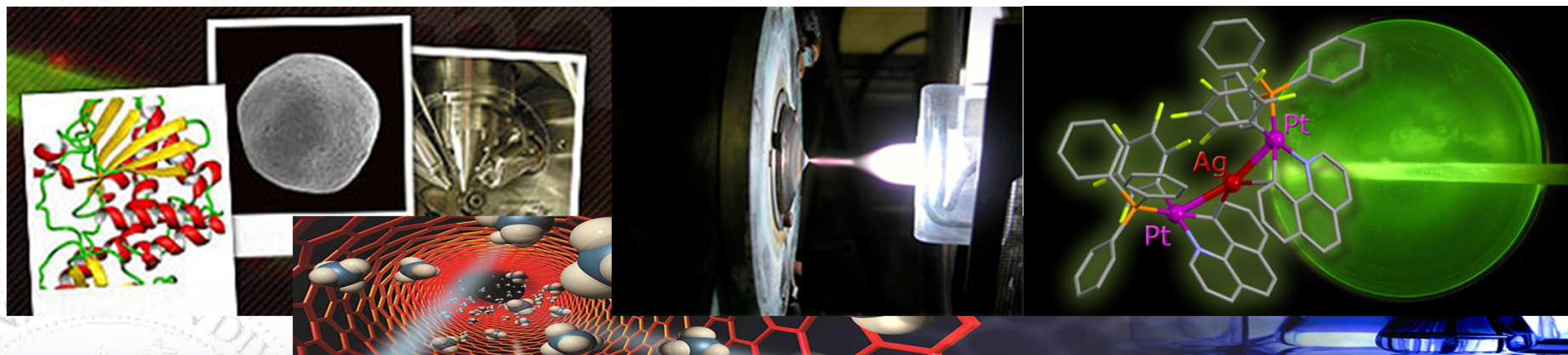


MSc PROGRAMS RELATED TO CHEMISTRY

- MSc DEGREE IN INDUSTRIAL CHEMISTRY
- MSc DEGREE IN ENVIRONMENTAL NANOTECHNOLOGY
- MSc DEGREE IN MOLECULAR CHEMISTRY AND HOMOGENEOUS CATALYSIS
- MSc DEGREE IN NANOSTRUCTURED MATERIALS AND NANOTECHNOLOGICAL APPLICATIONS (*in English*)
- MSc ERASMUS MUNDUS ON MEMBRANES ENGINEERING (*in English*)



FINAL DEGREE PROJECT (Original research work)





GEOLOGY AT ZARAGOZA

- ✓ ARAGON: GREAT DIVERSITY OF GEOLOGICAL STRUCTURES
 - ✓ PYRENEES
 - ✓ EBRO BASIN
 - ✓ IBERIAN RANGE
- ✓ PIONEERING GEOLOGICAL STUDIES IN SPAIN
- ✓ MINERAL AND ENERGETIC RESOURCES
 - ✓ COAL
 - ✓ RENEWABLE ENERGIES: SUN, WIND, WATER
- ✓ FOSSIL SITES



BSc IN GEOLOGY

Our study plan covers many topics grouped in blocks:

BASIC modules

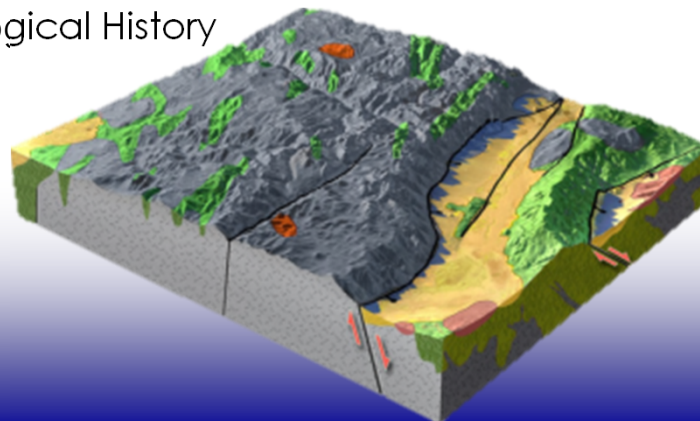
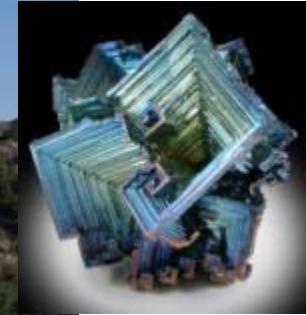
Fundamentals of Geology

Applied Geology

Final Degree Project

Topics:

Stratigraphy and Sedimentology, Tectonics and Structural Geology, Geophysics, Geomorphology and Hidrogeology, Petrology and Geochemistry, Paleontology and Micropaleontology, Crystallography and Mineralogy, Environmental Geology, Geological Hazards, Geological Engineering, Economic and Petroleum Geology, Geological History of the Earth.



MSc IN GEOLOGY: TECHNIQUES AND APPLICATIONS

Methods and Techniques in Geology

Treatment, representation and modeling of geological data

Scientific and technical communication

Paleontology and dynamics of the biosphere

Economic and applied mineralogy

Earth: processes and interactions on a large scale

Facies analysis and sedimentary models

Analysis and mitigation of geological hazards

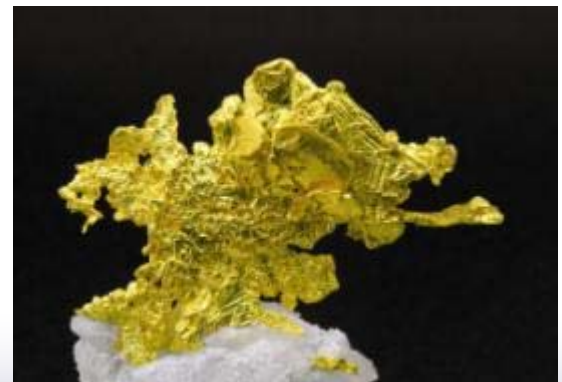
Subsurface geology

Climate change, events and geological record

Geological repositories

Integrated study of sedimentary basins

Characterization of geological materials



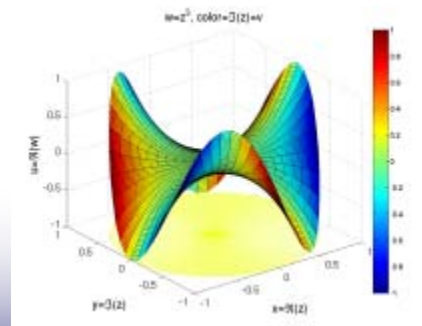
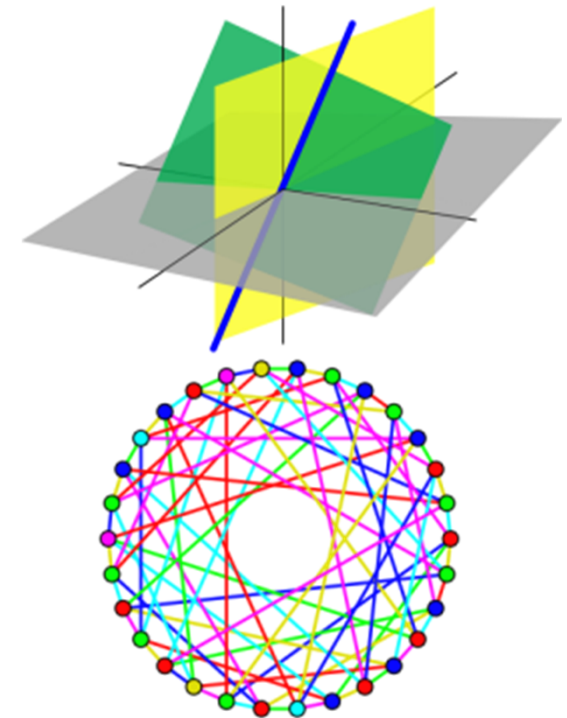
BSc IN MATHEMATICS

Our study plan covers many topics grouped in blocks:

Linear algebra and geometry	Calculus
Computing	Algebraic structures
Physics	Discrete mathematics and optimization
Numeric simulation	Geometry and topology
Differential equations	Probability and statistics
Mathematical modelling	Advanced calculus
Astro dynamics	History of mathematics
Advanced geometry and topology	Advanced algebra

Final Degree project 10 ECTS

6 Modules taught in English



$$\begin{aligned}
 \frac{\partial}{\partial b} \left(\int_a^b f(x) dx \right) &= \lim_{\Delta b \rightarrow 0} \frac{1}{\Delta b} \left[\int_a^{b+\Delta b} f(x) dx - \int_a^b f(x) dx \right] \\
 &= \lim_{\Delta b \rightarrow 0} \frac{1}{\Delta b} \int_b^{b+\Delta b} f(x) dx \\
 &= \lim_{\Delta b \rightarrow 0} \frac{1}{\Delta b} [f(b)\Delta b + \mathcal{O}(\Delta b^2)] \\
 &= f(b) \\
 \frac{\partial}{\partial a} \left(\int_a^b f(x) dx \right) &= \lim_{\Delta a \rightarrow 0} \frac{1}{\Delta a} \left[\int_{a+\Delta a}^b f(x) dx - \int_a^b f(x) dx \right] \\
 &= \lim_{\Delta a \rightarrow 0} \frac{1}{\Delta a} \int_a^{a+\Delta a} -f(x) dx \\
 &= \lim_{\Delta a \rightarrow 0} \frac{1}{\Delta a} [-f(a)\Delta a + \mathcal{O}(\Delta a^2)] \\
 &= -f(a).
 \end{aligned}$$

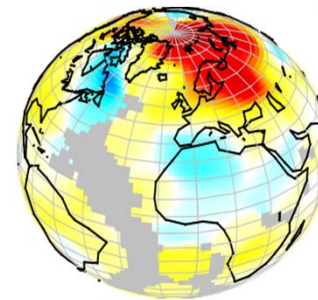
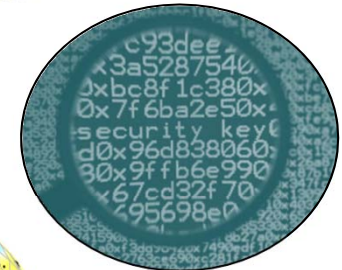
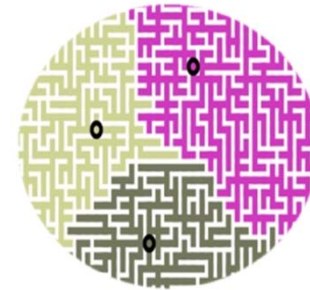
MSc IN MATHEMATICAL MODELLING, RESEARCH, STATISTICS AND COMPUTING

- **Inter-university program:** Basque Country, Navarre, Rioja, La Laguna (Tenerife) and Zaragoza.
First semester: Bilbao
Second semester: Zaragoza
- **2 lines:**
 - **Research:** Algebra, Calculus, Geometry/Topology, Probability
 - **Applications of Mathematics:** Modelling&Numeric simulation, Optimization, Statistics &Data Analysis, Computing

Catalogue of 20 optional modules (6 ECTS)

Final Degree project (12 ECTS, second semester)

- Research paper
- Application of maths to real problem solving (Company)



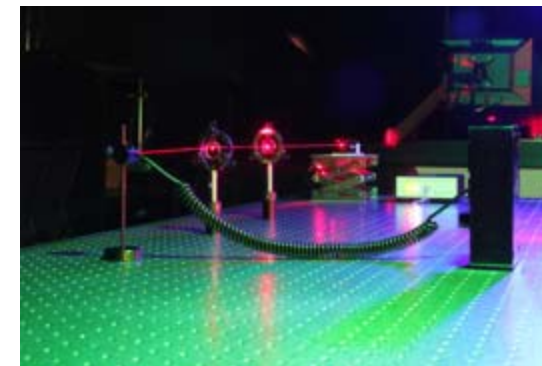
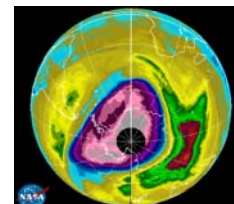
BSc IN PHYSICS

Our study plan covers many topics grouped in blocks:

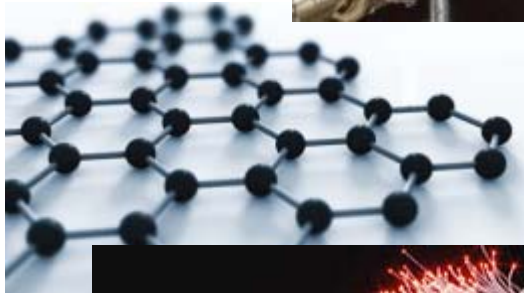
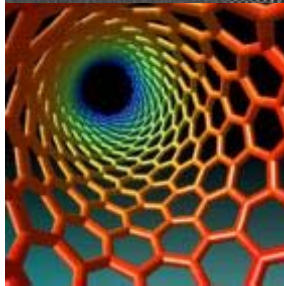
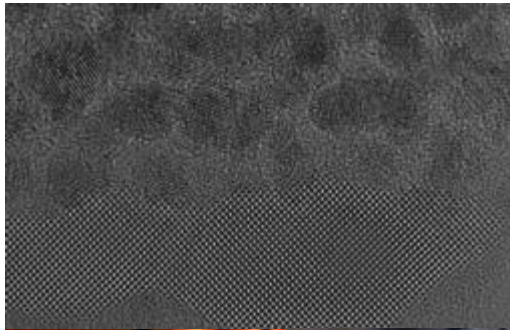
BASIC modules (first year)	Mathematical Methods
Classical Physics	Physical Techniques
Matter Structure	Optative modules
Final Degree Project	

Optative modules:

Atmospheric physics, Chaos, Microwaves, Astronomy and Astrophysics, Gravitation and Cosmology, Dosimetry and Radioprotection, Laser and Applications, Biological Physics, High Energy Physics, Geophysics, Nuclear Technology, Photonic devices, Micro and Nano systems, etc.



MSc IN PHYSICS AND PHYSICAL TECHNOLOGIES



Nanoscience and Nanotechnology

Industrial applications of optics

Intelligent Instrumentation

Low Temperature Physics and Quantum Technologies

Complex system and Statistical Physics

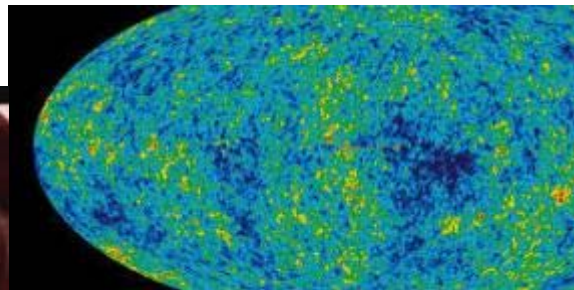
Environmental Physics

Materials Science

Relativistic Astrophysics, Astroparticles and Cosmology

Particle Physics

Etc.





WE PARTICIPATE IN MANY STUDENT MOBILITY PROGRAMS AT NATIONAL AND INTERNATIONAL LEVELS



- ✓ SICUE PROGRAM (national)
- ✓ ERASMUS (European)
- ✓ MOBILITY WITH LATIN AMERICA
- ✓ MOBILITY WITH NORTH-AMERICA, ASIA-PACIFIC
- ✓ Exchange students: 41 IN, 47 OUT (2015/16)



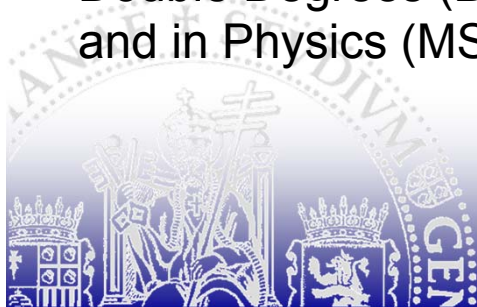


WE PARTICIPATE IN MANY STUDENT MOBILITY PROGRAMS AT NATIONAL AND INTERNATIONAL LEVELS – ERASMUS PROGRAM



- ✓ 24 agreements for PHYSICS
- ✓ 12 agreements for BIOTECHNOLOGY
- ✓ 19 agreements for GEOLOGY
- ✓ 20 agreements for MATHEMATICS
- ✓ 61 agreements for CHEMISTRY
- ✓ 2 agreements for OPTICS-OPTOMETRY

Double Degrees (BSc and MSc) in Mathematics with the University of Pau (France)
and in Physics (MSc) with the University of Cergy-Pontoise (France)





Program UZ-IBEROAMÉRICA

- a) Universidad Autónoma de Yucatán (Mérida, México): Matemáticas y Física
- b) Universidad Simón Bolívar (México DF, México): Biotecnología y Química
- c) Universidad Nacional del Sur (Bahía Blanca, Argentina): Geología, Química, Física, Matemáticas y Biotecnología
- d) Universidad Católica del Norte (Antofagasta, Chile): Geología
- e) Universidad de Sao Paulo (Sao Paulo, Brasil): Matemáticas
- f) Universidad Nacional del Litoral (Santa Fe, Argentina): Bioquímica y Biotecnología
- g) Universidad Nacional de Mar del Plata (Argentina): Bioquímica y Biotecnología





Program UZ-NORTH-AMERICA, ASIA-PACIFIC

a) USA:

University of Northern Arizona (Arizona)

Centre College (Kentucky)

George Mason University (Virginia)

San Diego State University (California)

Troy University (Alabama)

University of Oklahoma (Oklahoma)

University of Idaho (Idaho)



b) Canadá:

Université du Québec à Montréal (Montréal, Québec)



c) Australia:

University of New South Wales (Sydney, New South Wales)

Australian National University (Canberra)





INCOMING STUDENTS

3 MSc taught in English

6 BSc / 7 MSc taught in Spanish (*English-language friendly*)

ENGLISH-LANGUAGE FRIENDLY

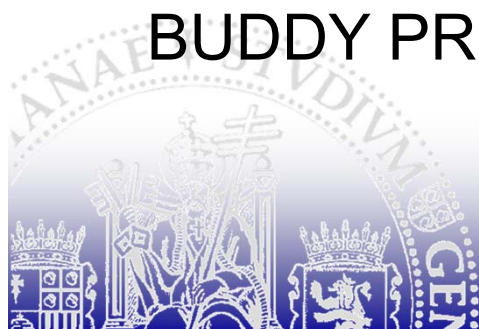
- ✓ Most modules
- ✓ Optional for English-speaking students
- ✓ Material in English
- ✓ Office hours in English
- ✓ Homework & exams in English



RESEARCH PROJECTS IN ENGLISH

COURSES OF SPANISH FOR FOREIGNERS

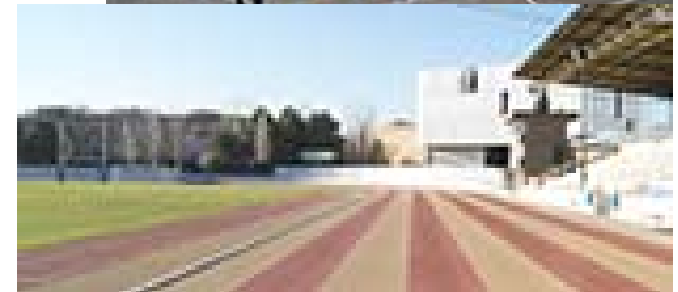
BUDDY PROGRAM



STUDENT LIFE

- SPORTS: Soccer, Basketball, Handball, Rugby, Running, Tennis...
- MOUNTAIN ACTIVITIES: Hiking, Mountain Cycling, Canoeing, Skiing, Climbing...
- Conferences
- Students council
- ESN (Activities for foreign students)

OVER 85% SATISFACTION (INCOMING)





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Universidad de Zaragoza



javier.lopez@unizar.es





Thank you very much for your attention

