

Escuela de Ingeniería y Arquitectura (EINA) School of Engineering and Architecture Campus Río Ebro University of Zaragoza, Spain

The Spanish Law 1393/2007 of 29 October which establishes the framework of official university education specifies the following structure in accordance with the general guidelines of the European Higher Education Area. There are three study levels: Bachelor Degree, Master's Degree, and Doctorate. Access to professional practice is possible from any of these levels.

The School of Engineering and Architecture, located in the Campus Río Ebro in Zaragoza, enjoys high prestige for its training of engineering professionals, their degrees are widely recognised and highly valued in the national and international labour market, and the level of graduate employment is impressive. The School of Engineering and Architecture has been the result of the merge of two well know and reputated schools of engineering, the "Centro Politécnico Superior" and the "Escuela Universitaria de Ingeniería Técnica Industrial".

About 6,000 students are currently studying in the School of Engineering and Arquitecture at the Bachelor's and Master's degrees. There are about 300 postgraduate and doctoral students. We have about 650 lecturers and 250 administration and service professionals. In the surrounding campus there are various other teaching centres, research institutes, technology centres and business incubation centres. These provide an attractive focal point for development and training, an excellent study environment, excellent relationships with colleagues and contact with the worlds of business and research.

We have all the necessary facilities (laboratories and centres for practicals, computer rooms, WiFi network with free access for students, libraries, etc.) to guarantee excellent teaching conditions. We also have an office for international relations and an office for business relations in order to arrange work placements, applications for grants and the development of final degree projects, etc.

In the academic year 2010-11 was started the implementation of the Bologna structure offering 9 official Bachelor's degrees and 8 Master's degrees, fully adapted to the new structure. This offer comprises 6 degrees in the area of Industrial Engineering, 2 in the area of Information and Communication Technologies (ICT) and a degree in Architecture. This extensive range includes degrees deriving from the former Technical Engineering diplomas and the first cycles of full Engineering degrees. In future years official Master's degrees will replace the former second cycles in engineering, which may be taken following the completion of the corresponding bachelor degrees. The combined bachelor and Master's degree will qualify graduates as engineers in the areas of Industrial Engineering, Chemical Engineering, Telecommunications Engineering and Computer Science Engineering. Equally, some bachelor degrees will themselves lead to qualifying as technical engineers. In this brochure you will find information about the nine bachelor degrees now offered so that you see what they consist of, the main professional employment opportunities and what you will need to study.

# Contents

| WELCOME   | 5        |
|---|----------|
| BEFORE ARRIVAL  | 6        |
| WHERE WE ARE  | 6        |
| Campus Río Ebro   | 7        |
| What you will find at the Campus Rio Ebro                         | 7        |
| TRAVELLING TO ZARAGOZA  | 8        |
| ENTRY AND RESIDENCE PERMITS                                       | 9        |
| HEALTH INSURANCE  | 9        |
| EXPENSE ESTIMATE  | 0        |
| ACCOMMODATION 1   | 1        |
| Halls of Residence  | 1        |
| Flats and Rooms1  | 1        |
|   | 2        |
|   | 0<br>0   |
|   | ა<br>ი   |
|   | 3        |
| PRE-REGISTRATION AND ENROLMENT DEADLINES                          | 3        |
| Exchange Students   | 4        |
| Other Students  | 4        |
| Exchange Students 14  | 4        |
| EXAM REGULATIONS 14   | 4        |
| LECTURES IN ENGLISH 14  | 4        |
| BACHELOR'S DEGREES  | 5        |
| BACHELOR'S IN THE AREA OF ARCHITECTURE                            | 6        |
| Degree in Architecture  | 6        |
| BACHELOR'S IN THE AREA OF INDUSTRIAL ENGINEERING                  | 8        |
| Degree in Electrical Engineering18                                | 8        |
| Degree in Electronic and Automatic Control Engineering 20         | 0        |
| Degree in Mechanical Engineering                                  | :1       |
| Degree in Chemical Engineering                                    | 2        |
| Degree in Industrial Decimology Engineering                       | .3<br>96 |
|   | .0       |
| Degree in Computer Science Engineering                            | .0<br>20 |
| Degree in Telecommunication Technologies and Services Engineering | 0        |
| MASTER'S AND DOCTORATE DEGREES                                    | 3        |
| MASTER'S IN RENEWABLE ENERGIES AND ENERGY FFFICIENCY              | 34       |
| MASTER'S IN COMPUTER AND SYSTEMS ENGINEERING                      | 35       |

| MASTER'S IN APPLIED MECHANICS   | 36 |
|---|----|
| MASTER'S IN MECHANICAL SYSTEMS  | 37 |
| MASTER'S IN THE INTRODUCTION TO RESEARCH IN CHEMICAL  |    |
| AND ENVIRONMENTAL ENGINEERING   | 38 |
| MASTER'S IN ELECTRONIC ENGINEERING  | 39 |
| INTERUNIVERSITARY MASTER'S IN INFORMATION AND COMMUNICATIONS TECHNOLOGIES<br>IN MOBILE NETWORKS | 40 |
| MASTER'S IN BIOMEDICAL ENGINEERING  | 41 |
| DOCTORATE PROGRAMMES  | 42 |
| EINA POSTGRADUATE PROGRAMMES  | 42 |
| STUDENT ACTIVITIES  | 44 |
| TUTORIAL PROGRAMME  | 44 |
| Welcome meetings EcEdIA   | 44 |
| Exchange students welcome meeting (ESWeM)   | 45 |
| Student advisory services   | 46 |
| STUDENTS' UNION & STUDENTS ASSOCIATIONS   | 46 |
| UNIVERSITY SERVICES   | 49 |
| COURSES OF SPANISH AS A FOREIGN LANGUAGE  | 49 |
| UNIVERSITY LIBRARIES  | 49 |
| COMPUTER FACILITIES   | 50 |
| SPORTS  | 50 |
| BUDDY PAIR PROGRAMME  | 50 |
| MISCELLANEOUS   | 51 |
| SPANISH LANGUAGE  | 51 |
| MONEY MATTERS   | 51 |
| THE WEATHER   | 51 |
| ELECTRICITY   | 52 |
| SPANISH TIMETABLES  | 52 |
| THE CITY OF ZABAGOZA  | 53 |
| CITY TBANSPOBT  | 53 |
| STROLLING ABOUND THE CITY   | 53 |
| GOING OUT: "TAPAS" & DRINKS   | 54 |
| CELEBRATIONS  | 5⊿ |
| ENLIQYING THE REGION & THE COUNTRY  | 54 |
|   |    |
| USEFUL CONTACTS   | 55 |



Welcome to the School of Engineering and Architecture (EINA) of the University of Zaragoza.

We hope these pages make it easy to find your way out among us. Practical issues such as academic information, health care, accommodation, courses on Spanish as a foreign language,... are described for you to have, before arrival, a first contact with your daily life as an Erasmus student.

You can contact us whenever you need some more details or your queries find no answer in the information provided in this booklet:

International Relations office Postal address: María de Luna 3. 50018 - Zaragoza (Spain) Phone & Fax: +34 976 76 22 33 e-mail address: irsea@unizar.es Visiting hours: from Monday to Friday from 12.00 to 14.00 Torres Quevedo Building - Ground floor - Office 1



# **Before Arrival**

Where we are



The city of Zaragoza has always benefited from a strategic location as it lies in the junction of the main crossroads in North-Eastern Spain that link Madrid with Barcelona and Bilbao with Valencia.



Zaragoza is just one of the four cities where our University has settled its campuses: Together with Huesca, Teruel and La Almunia de Doña Godina, studies in almost every field of knowledge are offered by our Institution.

The School of Engineering and Architecture is located in the University of Zaragoza's northern campus, Campus Río Ebro, which we share, among others, with the School of Business. The university community involved in teaching engineering and architecture in Zaragoza share facilities and services in the Ada Byron, Leonardo Torres Quevedo and Agustín de Betancourt buildings.

For further information, see the EINA website:

eina.unizar.es



### Campus Río Ebro



### What you will find at the Campus Río Ebro



CAI cashpoint and Banco Santander and IberCaja branches

# Travelling to Zaragoza

### Direct International flights from/to ZARAGOZA

#### www.zaragoza-airport.com

RYANAIR www.ryanair.com: Bologna, Milano-Bergamo, Roma, London, Brussels, Paris

### From MADRID

The capital of Spain is 300 km away from Zaragoza

BY TRAIN: High-speed trains run approximately every 90 minutes, the same time trip takes. The «Puerta de Atocha» Railway station (underground station, «Atocha Renfe», line 1) is in the centre of Madrid. Timetables and prices can be checked in Internet: RENFE www.renfe.es

BY BUS: There are coaches almost every hour (a journey of 3 hours 45 minutes). The coach station is located on eastern Madrid (underground station «Avenida de América»). Information about timetables and prices on this site: ALSA **www.alsa.es** 

BY CAR: There is a dual carriageway: A-2 (toll-free).

### From BARCELONA

The second largest city in Spain is also only 300 kilometres away from Zaragoza.

BY TRAIN: From Barcelona airport you can reach the railway station "Sants" by commuter trains and take there a high-speed one that will bring you to Zaragoza in approximately two hours. Timetables and prices can be checked in RENFE's site: **www.renfe.es** 

BY BUS: Coaches run almost every hour (a three-hour trip by motorway). The coach station «Barcelona Nord» is at the «Arc del Triunf» (underground L1 and bus line 54). Information about timetables and prices on the Internet: ALSA **www.alsa.es** 

BY CAR: You can take either the toll motorway AP-2 or the trunk road A-2.

### From **BILBAO**

BY TRAIN: There are two trains a day (a four-hour journey). Timetables and prices can be checked at **www.renfe.es** 

BY BUS: There is a coach service every two hours (a four-hour journey on the motorway). Information about timetables and prices on the Company site: ALSA **www.alsa.es** 

BY CAR: Take the toll motorway AP-68.

## Entry and Residence Permits

Nationals of a member state of the European Economic Area (EU and Norway, Island and Liechtenstein) or Switzerland just need a valid identification card (passport included) to enter Spain.

Nationals of any other country have to apply for a visa at the Spanish embassy or consulate before leaving their home country. Details of the procedure and lists of the Spanish consular representations can be found at www.mae.es

The countries on the table below have a consular representation in our city:

| CONSULAR REPRESENTATIONS IN ZARAGOZA  |   |  |  |  |
|---|---|--|--|--|
| <b>Germany</b><br>Consul: María López Palacín<br>Cinco de Marzo, 7, 1º, izda.<br>50001 Zaragoza<br>Tf. 976 794 275<br>Fax 976 214 783<br>Email:<br>mariailpa@grupoilssa.com | Slovak Republic<br>Consul: Jean Paul Bastiaans<br>Fray Luis Amigó, 4<br>50006 Zaragoza<br>Tf. 976 253 192<br>Fax 976 377 568<br>E-mail:<br>consulado@rep-eslovaquia.org | <b>France</b><br>Consul: Mireille Gelas de Ledesma<br>Josefa Amar y Borbón, 5, pral. B<br>50001 Zaragoza<br>Tf. 976 216 917<br>Fax 976 223 188 |  |  |
| <b>Italy</b><br>Vice-Consul: Massimo Marchetti<br>San Miguel 2, 9º A<br>50001 Zaragoza<br>Phone 976 22 86 59<br>Fax. 976 22 32 94   | <b>Mexico</b><br>Consul: Luis Fernández Ordóñez<br>Lagasca 29, 4º D<br>50006 Zaragoza<br>Phone. 976 220 986<br>976 552 298  | <b>Portugal</b><br>Consul: Jesús Bergua Camón<br>San Ignacio de Loyola, 5, 1º, D<br>50008 Zaragoza<br>Phone: 976 218 885                       |  |  |

# Health Insurance

Students from the EU do just need their European Health Insurance Card. The international office of your University will certainly inform you on how/where to get it.

Students from a country that has a national insurance agreement with Spain have to ask for information and appropriate documents at their insurance agency. In case health care service was not included in the agreement a private insurance must be purchased.

Those students whose country does not have an insurance agreement with Spain should also purchase a private insurance.

If you are provided with the European card and need health assistance, you may get this at the so called "Centros de Salud": every district in the city counts one or two of these centres. Once you have a place to live here (as it depends on your address), you should inform yourself on which one you may get health assistance from.

# **Expense Estimate**

Except for the tuition fees of official studies<sup>1</sup>, exchange students have to assume all other expenses. The table below may help you preparing your budget:

| ACCOMO  | DATION                      |           |         |
|---------|-----------------------------|-----------|---------|
| HALLS C | OF RESIDENCE                |           |         |
|         | Full board in a single room | 600 / 700 | €/month |
|         | Apartment with kitchen      | 270       | €/month |
| APARTM  | ENTS/FLATS                  |           |         |
|         | A flat                      | 500 / 600 | €/month |
|         | A room                      | 200 / 300 | €/month |
| UNIVERS | SITY LIFE                   |           |         |
|         | 1 meal                      | 5,10      | €       |
|         | 10 meals voucher            | 41        | €       |
|         | photocopies, books          | 30        | €/month |
| UNIVERS | SITY SPORT CLUB             |           |         |
|         | Single day ticket           | 1,4       | €       |
|         | Access card                 | 38        | €/year  |
|         | Activities                  |           |         |
| PUBLIC  | TRANSPORT                   |           |         |
| URBAN I | BUS                         |           |         |
|         | 1 trip                      | 1,05      | €       |
| TAXI    | minimum                     | 4         | €       |



<sup>1.</sup> Courses of Spanish as a foreign language are not official studies (not included in University curricula)

# Accommodation

### Halls of Residence

If a Hall of Residence is your best liked choice, just decide where in the city you would like to live.

For those who appreciate proximity the most and look for a student atmosphere, the hall "Residencia Goya II" (http://www.unizar.es/hoy/doc/cartel\_resi.pdf) offers all they may need in a modern building close to our Campus.

If you prefer the lively atmosphere of the city centre but also want to enjoy the advantages and ambience of a student hall, try those at Campus San Francisco. Exchange students have to apply for a place through the form at http://wzar.unizar.es/servicios/inter/alojamiento/aloja.html\*. This may be an interesting option since public transport properly links our campus with that of Plaza San Francisco.

In case you applied a bit late and got no place at the University halls (applicants usually outnumber places), you can directly contact those below promoted by private institutions:

| C.M. CARDENAL XAVIERRE | http://www.xavierre.com/               |            |
|------------------------|--|------------|
| C.M. MIRAFLORES        | http://www.miraflores.es               | Only men   |
| C.M. VIRGEN DEL CARMEN | http://www.unizar.es/carmelo/index.htm | Only men   |
| C.M. AZAILA            | http://www.cm-azaila.es                | Only women |
| C.M. LA ANUNCIATA      | cm.anunciata@unizar.es                 | Only women |
| C.M. PEÑALBA           | http://www.colegiomayorpenalba.com     | Only women |
| C.M. JOSEFA SEGOVIA    | http://www.unizar.es/cmujs             | Only women |

A general overview of halls of residence in the city is provided by the city council at http://www.zaragoza.es/ciudad/sectores/jovenes/cipaj/publicaciones/aloja05.htm.

### Flats and Rooms

The priority for those who prefer to live in a flat is to arrange accommodation for their first days in Zaragoza: you can either directly contact the Youth Hostels below or apply for short term accommodation through the **form** provided above.

#### Albergue Juvenil «Baltasar Gracián»

C/ Franco y López, 4 – 50005 ZARAGOZA Booking: (+34) 902 088 905 / raaj.iaj@aragon.es

#### Albergue Zaragoza

C/ Predicadores, 70 – 50003 ZARAGOZA Booking: http://www.alberguezaragoza.com

In case this option was not available at the time of your applying or you have other preferences, a list of hotels in the city can be looked up at

http://www.zaragoza.es/ciudad/turismo/default\_en.htm

<sup>\*</sup> Information on the services provided in the different Halls is given on the form itself

Your main task during these first days will be looking for a flat: the offer is wide and it does not normally take more than a week to find a place.

These are some aspects to keep in mind before starting your search:

- Campus Río Ebro is located in northern city, in the area known as ACTUR
- Reaching this campus from the furthest district in the city takes no more than a half-an-hour bus ride
- Prices rank from 500€ if you want to live by yourself until 200€ if you get a room in a shared flat
- The main sources of information on flats and rooms to rent are:
  - The lists updated by the University Accommodation Service (information-only service, no support to contact the owners or arrange the rental agreement is provided) http://wzar.unizar.es/ciur/alojamiento.html
  - The Youth Housing Service held by the City Council (information, legal assistance may be provided) http://www.zaragoza.es/ciudad/sectores/jovenes/vivienda/buscavivienda.htm

The notice boards in the Faculties and Schools: most students and landlords put their ads on them, both searching and offering places to live: you are invited to do so too.

#### HOMESHARE WITH ELDERLY PEOPLE

Within the Homeshare International network, the programme "vive y convive" puts together students looking for cheap accommodation and elderly householders willing to exchange housing by support: students get their own room for free and offer help and companionship.

More information can be obtained at the web page of the promoter http://obrasocial.caixacatalunya.es/osocial/main.html?idioma=2

and at:

Service of Social Management Office 311. Interfacultades Builiding, 3<sup>rd</sup> floor C/ Pedro Cerbuna 12 – 50009 Zaragoza E-mail: asocial@unizar.es Phone: 976 761000 (ext. 3010)





# Higher Education in Spain

The Bologna process has resulted in new curricula all over Europe. The curriculum of a Bachelor diploma in Spain is made up of 240 ECTS and most of Master ones are made of between 60 and 120 ECTS. In our School, Master's degrees have been running since 2008 and Bachelor's ones since 2010, so old and new degrees will run together for the next years until 2014.

The curriculum of the Studies of Architecture is made up of 300 credits and according to the Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications.

# The Academic Year

The academic year runs from September to September, including both lectures and vacation periods. It consists of two semesters, Autumn (September-January) and Spring (February-June). The exact dates may vary from one year to another but Autumn semester lectures usually start by the last third of September and finish by similar dates of January. There is then a break for examinations. Spring semester opens by middle February and ends by last May-beginning of June and the examinations of this term usually run all June long. A second call for failed or not sat examinations opens in September.

There are three main vacation breaks, Christmas (approx. from 23<sup>rd</sup> December until 7<sup>th</sup> January), Easter (about ten days in spring) and summer (from middle July until last August) and some other public holidays (rarely more than a couple of days) distributed all year long.

The academic calendar and class timetable can be seen at http://eina.unizar.es

# Pre-Registration and Enrolment Deadlines

### **New Students**

Admittance to UNDERGRADUATE and MASTER DEGREE PROGRAMMMES Pre-registration dates:

- First stage: 18 June to 6 July
- Second stage: 14 to 18 September (only if there are still places available)

Enrolment dates:

- Students admitted in the first stage: 17 to 24 July.
- Students admitted in second stage: before 8 October.

Admittance to MASTER DEGREE PROGRAMMES Registration dates:

- First stage:18 June to 10 July
- Second Stage: 14 to 18 September (only if there are still places available)

More information in http://www.unizar.es/secretaria\_virtual.html

#### School of Engineering and Architecture

### **Exchange Students**

You have to arrange your registration at the international office in your first days here. The courses you should sign up are those you proposed in your learning agreement: timetables may restrict your choice so, you will be allowed to select some other courses once you have checked, accordingly with your home and host coordinators, that the contents fit your learning agreement. Once you decide the courses of your interest you have to hand the registration form (provided at the international office) at the admission office. You should do this within the first 10-15 days.

On-line application procedure for Incoming Erasmus students

http://wzar.unizar.es/servicios/inter/Incoming.htm

### **Other Students**

As of the date assigned in the appointment given and in any case before 8 October.

### **Registration Deadline Extension**

15 to 19 February 2010.

# **Exam Regulations**

The means and criteria of assessment of the knowledge acquired are decided by the professors and must be published before registration. Although examinations are not the only means of assessment, they are the most common one. There are two calls to take exams: exams of subjects attended in Autumn semester can be sat in February and/or in September and those of Spring semester in June and/or in September. Qualifications are graded from 0 to 10 and you are considered to have passed a test when you get a grade of 5. Not sitting an exam of a subject you have registered for is not penalized but your transcript of records will reflect this with the mention "Absent".

# Lectures in English

From 2006/07 academic year on we are offering courses lectured in English in all our degrees of Engineering. The list is available at

http://www.cps.unizar.es/ori/students/





The bachelor's degrees (Graduado) are the new studies adapted to the European Higher Education Area. The University of Zaragoza is offering 9 bachelor's degrees at the Campus Rio Ebro.

### Degree in the area of Architecture (300 ECST)

• Degree in Architecture

### Bachelor's in the area of Industrial Engineering (240 ECTS)

- Degree in Electrical Engineering
- Degree in Electronic and Automatic Control Engineering
- Degree in Mechanical Engineering
- Degree in Chemical Engineering
- Degree in Industrial Technology Engineering
- Degree in Industrial Design and Product Development Engineering

# Bachelor's in the area of Information and Communication Technologies (240 ECTS)

- Degree in Computer Science Engineering
- Degree in Telecommunications Technology and Services Engineering





# Bachelor's in the area of Architecture

### Degree in Architecture

The **Degree in Architecture** offered by the University of Zaragoza provides the knowledge necessary for practising the profession of Architect. It covers training in various activities from architectural design to urban planning, combining technical and humanistic skills involving creativity and graphic expression.

The fact that the implementation of this Degree coincides with the adaptation process of the European Higher Education Area (EHEA) has enabled the study plan to be developed in an innovative manner, incorporating the most advanced training and learning systems into small student groups and with a faculty –a



team of professors, lecturers and architects in practice- highly skilled both academically and professionally.



The training of architecture students at the University of Zaragoza is carried out within the nucleus of a broad network of schools and centres, adopting a model of **open source architectural education**, a network of students and experts in which ideas can freely circulate and where learning methodologies specific to the profession can be easily exchanged. In this way the responses required to new architectural challenges can be produced, in terms of employment and labour, new technologies and new ways of thinking and planning, together with

architectural involvement in cities, in landscapes or in urban areas requiring improvement or recovery.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

The range and depth of study means that this degree prepares students for a wide range of professional outlets. These include the following:

- Designing architectural projects at all levels and scales, and supervising construction work.
- Drafting urban projects. Urban planning at all levels from general planning to urban development; joining territorial organisation planning teams.
- Authoring and development of urban and territorial organisation projects.
- Parks and landscape planning projects.
- Working for development and construction companies. Architects undertake management and supervisory roles, organisation and control of works, health and safety coordination on building sites, writing technical reports, etc. They can also act as site managers for construction companies.

- Industrial and graphic design work.
- Teaching various subjects both at school and university level.
- Providing expert opinions.
- Valuations.
- Joining the public administration at higher technical level.
- · Research, publication and editorial work.

#### WHAT DO YOU STUDY?

The **Programme of Studies** has been designed from a perspective of integration within architectural teaching. *The project has become the focus of teaching* while the other subjects are not treated in isolation. Given

the various viewpoints from which history, construction and technology can be considered, the scope of the project provides a framework for the meeting and synthesis of all the visions giving such extraordinary complexity to architecture and urban development. The teaching philosophy recognises the **student as a potential architect** prepared to confront the complexity of architectural reality as an integrating discipline. The Architecture Degree is able to provide an integrated form of teaching because of the limited number of students and the effective teacher coordination. An easy



separation of subjects is not encouraged. Instead, meeting spaces are provided such as *integrated design workshops*. These project workshops are progressively integrated year by year during the degree with the areas of graphic expression, urban planning and construction as students acquire knowledge in these subjects.

#### **CURRICULAR STRUCTURE**

| Type of subject      | ECTS |
|----------------------|------|
| Basic training       | 60   |
| Compulsory           | 204  |
| Optional             | 24   |
| Final degree project | 12   |
| TOTAL                | 300  |

#### **Basic contents**

- · Services, installations and fittings
- Architectural composition
- Construction
- Structures
- · Graphical expression
- Physics
- · History of art and architecture
- Computer studies
- Mathematics
- Organisation, administration and legislation in architecture
- Final degree project
- · Architectural projects
- Integrated project workshop
- Urban planning
- Landscape and environment (Optional)
- Construction innovation (Optional)

FURTHER INFORMATION http://titulaciones.unizar.es/arquitectura/



### Bachelor's in the area of Industrial Engineering

### Degree in Electrical Engineering

We all know that electricity is the most common form of energy. It can be found in all processes, both industrial and in everyday life, in such a way that its use has completely changed human development itself, dramatically increasing our productive capacity and diversity. As a consequence, Electrical Engineering has become one of the pillars on which contemporary society rests. The needs and demands of our society direct this branch of engineering towards new developments in the fields of generation with renewable energies, new distribution networks, developing new systems for the electric vehicles of the future, and providing the control and automation necessary for



improving energy efficiency in buildings. We are continually searching for the best technical and economic solutions while respecting our environment.

The Electrical Engineering degree offered by the University of Zaragoza teaches future professionals to face the current and future challenges of the discipline, providing the tools enabling them to take part in interdisciplinary teams, to adapt to continuous training and to exercise their profession responsibly within their social environment.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

Graduates in Electrical engineering are much in demand and enjoy a wide range of professional outlets including the following:

- Technical Director, given that the combined training in different areas of Industrial engineering and specific training in Electrical engineering enables graduates to join executive and operational teams.
- Project Manger, responsible for the development of new products and the design and execution of new installations.
- Responsibilities in technology centres and in research departments of large private companies or public institutions.
- Entrepreneur, setting up a new business developing a professional career in the private sector, undertaking, executing and implementing new projects.
- Technical Manager in electrical energy generation and distribution companies; management, supervision and control of electrical power and energy systems.
- Teaching at the various levels and areas as set out in the relevant legislation.
- Planning and management of electricity generation, transport and distribution.

- Development and use of renewable energies.
- Design and control of electric machines.
- Design and control of electric traction and transport systems.
- Design and execution of all types of high and low tension electrical installations.
- Design and management of automatic control systems in industry.
- Design and implementation of systems for energy control in buildings.
- Advice, consultancy and expert opinions for electrical engineering works.

#### WHAT DO YOU STUDY?

Electrical Engineering graduates are professionals trained to join the labour market within the European Area where they can work in industrial engineering spheres in general as well as the electrical sphere in particular. They are also equipped to learn continuously, to develop strategies for autonomous learning, and to work in multidisciplinary groups in a multilingual environment within the exercise of their professional activities.

The specific objectives of the degree provide graduates with the abilities to:





- Conceive, design and develop electrical engineering projects.
- Plan, cost, organise, direct and control tasks, people and resources.
- Combine basic and specialist knowledge to generate innovative and competitive proposals within their professional activities.
- Take decisions with initiative, creativity and critical reasoning.
- Apply information and communication technologies in engineering.
- Direct, manage and apply technical specifications and comply with legal requirements in the practice of their profession.
- Guarantee appropriate use of electrical energy.
- Analyse and assess the social and environmental impact of technical solutions, acting ethically and with professional responsibility and social commitment, always striving for high quality and continual improvement.

#### FURTHER INFORMATION http://titulaciones.unizar.es/ing-electrica



### Degree in Electronic and Automatic Control Engineering

This degree in Electronic and Automatic Control Engineering trains the specialised and highly qualified professionals required in our socio-economic environment, professionals for the XXI century, who will be working within an international context. Our extensive teaching experience in these technologies together with numerous international contacts has facilitated the mobility of hundreds of students over the past 20 years. We also have the experience of many years of collaboration in R+D activities in electronic technologies and automation with a large number of companies in our sector, enabling students to undertake work placements as a first step in their professional careers.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

The Electronic and Automatic Control degree qualifies graduates to work in the industrial engineering profession. The trained engineer needs to be able to supply the services required by social and labour demand, applying his or her knowledge to the design of systems leading to improvements in the most varied industrial processes, the development of new products, the maintenance of industrial installations, etc. Electronic and control systems are also applicable in more specific areas such as the automotive sector, communications, biomedical applications, agriculture, distribution of goods, traffic management, energy production and distribution, etc.



#### WHAT DO YOU STUDY?

The Electronic and Automatic Control Engineering degree covers the conception, design and development of electronic and automation systems for products, equipment and processes used in modern industry.

On the one hand, the degree provides training in basic scientific and technological subjects, in common with other degrees in the Industrial Engineering area, aimed at training engineering professionals for the European labour market, with a solid general base including aspects related to business organisation, manufacturing and production, the environment, projects, etc.

On the other hand, the degree includes detailed contents concerning technologies specifically related to electronics and automatic control, orientated towards helping the student to acquire the ability to design and develop electronic and control systems. The specialised contents taught in the degree course include the following: electrical circuits, electro-technology, analogue electronics, digital and microprocessors, power electronics, electronic instrumentation, automatic regulation and control techniques relating to industrial automation, systems modelling and simulation, robotics and industrial informatics.

#### FURTHER INFORMATION http://titulaciones.unizar.es/ing-elec-automatica/



### Degree in Mechanical Engineering

The degree in Mechanical Engineering trains professionals with the skills required to design, manufacture, and exploit industrial machinery and installations with the highest performance, while ensuring quality, economic and environmental standards. Students are also taught to develop their capacities for communication and initiative.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

The degree in Mechanical Engineering qualifies graduates to exercise the profession of Industrial Engineer in the area of mechanics. Mechanical engineers work in practically all industrial sectors and benefit from a broad range of employment opportunities. Some of the most common occupations include:

- Design of equipment and consumer goods and products: machines, motors, vehicles, domestic appliances, tools, medical equipment, etc.
- Production planning, supervision and control.
- Design and calculation of thermal, pneumatic and hydraulic installations.
- Design, management, maintenance and operation of power plants.
- Calculation and construction of industrial installations: buildings, silos, warehouses, antenna installations and supports, etc.
- Works supervision.
- Consultancy and technical advice to all types of business.
- Participation and management of research, development and innovation teams.
- Technical sales specialists in all types of industrial companies.
- Technical experts in the public administration.

#### WHAT DO YOU STUDY?



The Mechanical Engineering degree enables graduates to acquire the technical knowledge necessary for planning, directing and co-ordinating all industrial activities relating to mechanical engineering, such as the design and manufacture of machines or vehicles and their components, or the calculation and building of industrial installations an structures.

Students learn to resolve problems and take decisions creatively and exercising critical judgement, to encourage, develop and communicate innovation in the area of mechanical engineering, as well as to work in multidisciplinary research, development and innovation teams at an international level. In order to achieve these objectives, in common with other branches of industrial engineering students are given a solid grounding in physics, mathematics and all fundamental industrial technologies. They also study subjects from

other disciplines, for example ICT or the fundamentals of business management or project management.

FURTHER INFORMATION http://titulaciones.unizar.es/ing-mecanica/



### Degree in Chemical Engineering

The **Degree in Chemical Engineering** covers the conception, calculation, construction, installation, startup and operation of equipment and processes involving the handling of chemical substances at an industrial scale. It includes the transformation of such substances into finished products, or their use for developing other manufacturing processes, with the constant aim of achieving the best in terms of finance and the environment. A chemical engineering graduate is specialised in mass transfer, heat and momentum processes, as well as in chemical transformation processes occurring in industrial equipment and installations in chemical plants. The chemical engineer must be able to work in multi-disciplinary environments and have an open and flexible attitude to change.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

Graduates may work in manufacturing industry or in consultancy and design businesses in the area of chemical engineering. They are able to reach positions of responsibility in production, quality and environmental departments, or on the commercial side of industrial chemistry installations. Chemical engineers can also play an important role in environmental areas, including control, measurement, evaluation, correction, and the minimising and prevention of pollution in all its forms. Finally, graduates are able to undertake technical advisory work, exercise their profession in the private sector, or enter the public administration or teaching.

#### WHAT DO YOU STUDY?

The basic disciplines common to all degrees relevant to industry are studied. Specifically, subjects include those basic to chemical engineering such as mass transfer, kinetics and aspects related to the design of chemical processes, including reactors and separation operations. Other subjects relevant to industrial installations include thermo-technology and flow technology, as well as the transformation of materials and products in industry. Sustainability is considered essential, and subjects related to the environmental management of all types of wastes are studied. Chemical engineering is now very prominent in research groups working in several areas. These include the thermo-chemical processing of waste (gasification, pyrolysis, and combustion), catalysis, molecular separation, characterisation and treatment of waste, risk analysis and food technology. Research groups in these areas have official recognition from the Government of Aragon and are based at the University of Zaragoza and at the "Instituto de Carboquímica" of the National Council for Scientific Research. They are active in undertaking technology transfer projects and in



consultancy work for business and institutions in the surrounding area, contributing to the consolidation of chemical engineering in the region.

#### FURTHER INFORMATION http://titulaciones.unizar.es/ing-quimica/



### Degree in Industrial Technology Engineering

The degree in Industrial Technology Engineering represents a training offer within the European Higher Education Area (EHEA) that together with the Master's in Industrial Engineering is the natural successor to the prestigious Industrial Engineering degree, leading to officially recognised professional qualifications.

The aim of this degree is to train general engineers who will have an important productive and technological role to play in society, increasing the added value of products and services, generating wealth and wellbeing, and providing answers to the challenges posed by society today and in the future which will require effective technological solutions.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

Graduates in Industrial Technology Engineering will be wellplaced to work in the socio-industrial framework of our country. SMEs, which have a very significant presence on the industrial scene, as well as large businesses will benefit from the existence of professionals having the generalist and multi-faceted training inherent in the philosophy behind the structuring of this degree.

Sectors in which our engineers provide cutting edge solutions include the following: the aerospace industry, the car industry, industrial architecture, urban planning, the agro-alimentary industry, biotechnology, renewable energies, biofuels, logistics, electronic systems for buildings (comfort, security, energy saving and



communications), robotics, industrial production machinery and technology, intelligent electrical networks, nanotechnology and photonics, public works management and engineering, the railway industry, environmental technologies, the paper industry, the cement industry, ironworks.

#### WHAT DO YOU STUDY?

The studies included in this degree have the following goals:

- To provide students with general all-purpose training, with the necessary determination, innovation and adaptation skills required to meet the challenges of their professional lives whether in industry, services, research and teaching centres, or the public administration.
- To provide graduates with the solid base of scientific and technological knowledge necessary for any future specialist training they may undertake throughout their professional lives.
- To train sufficiently qualified professionals able to apply the scientific and technical knowledge basic to industrial technology to technology projects, technical management and innovation.
- To train professionals to take part in multi-disciplinary projects integrating the various technologies included within the ambit of industrial engineering.

- To train professionals to model systems and complex processes in all areas of industrial engineering.
- To provide graduates with the skills required in order to develop their professional activities in national and international competitive environments, with aptitudes for team work, critical reasoning, solving problems and lifelong learning.

#### **FURTHER INFORMATION**

http://titulaciones.unizar.es/ing-tec-industriales/

#### **CURRICULAR STRUCTURE**

All Industrial Bachelor's degrees share the following academic structure:

| Common Basic training (60 ECTS) |      |
|---------------------------------|------|
| Subjects                        | ECTS |
| Mathematics                     | 18   |
| Physics                         | 12   |
| Informatics                     | 6    |
| Business administration         | 6    |
| Chemistry                       | 6    |
| Graphic design                  | 6    |
| Statistics                      | 6    |

| Common Technical training (72 ECTS)   |      |  |
|---------------------------------------|------|--|
| Common subjects                       | ECTS |  |
| Fundamentals of Electrical            | 6    |  |
| Fundamentals of Electronics           | 6    |  |
| Mechanical                            | 6    |  |
| Environmental Engineering             | 6    |  |
| Organization and Management           | 6    |  |
| Project Office                        | 6    |  |
| Strength of Materials                 | 6    |  |
| Control Systems                       | 6    |  |
| Fundamentals of engineering           |      |  |
| thermodynamics and heat transfer      | 6    |  |
| Fluid mechanics                       | 6    |  |
| Fundamentals of Materials Engineering | 6    |  |
| Manufacturing technologies            | 6    |  |

| Mandatory (74-92 ECTS)          |       |
|---------------------------------|-------|
| Subjects                        | ECTS  |
| English language B-1            | 2     |
| Specific Technology             | 60-78 |
| Final Bachelor's Degree Project | 12    |







The specific tecnologies for each bachelor's degrees are

| Specific Technologies                    |      |  |      |
|--|------|--|------|
| Electrical Engineering                   | 72   | Electronics and Automation Engineering | 72   |
| Subject                                  | ECTS | Subject                                | ECTS |
| Electrical Machinery                     | 18   | Electrotechnique                       | 6    |
| Control Engineering                      | 6    | Electronic Materials                   | 6    |
| Electrical Installation                  | 12   | Digital Electronic                     | 6    |
| Power Lines and Electrical Power Systems | 12   | Programmable Eletronic Systems         | 10   |
| Power Electronics                        | 6    | Power Electronics                      | 6    |
| Electrical Circuit Analysis              | 6    | Electronic Instrumentation             | 6    |
| Power and Renewables                     | 12   | Signals and Systems                    | 6    |
| Mechanical Engineering                   | 72   | Engineering Control                    | 6    |
| Subject                                  | ECTS | Industrial Robotics                    | 6    |
| Industrial Drawing                       | 6    | Industrial Automation                  | 6    |
| Theory of Mechanisms and Machines        | 6    | Industrial Technologies Engineering    | 66   |
| Applied Knowledge of Thermal Engineering | 12   | Subject                                | ECTS |
| Deformable Solid mechanics               | 6    | Control Engineering                    | 6    |
| Theory of Structures and Industrial      |      | Machine Design Criteria                | 6    |
| Constructions                            | 6    | Digital electronics and power          | 6    |
| Fluid Mechanics                          | 6    | Thermal Engineering                    | 6    |
| Technology of Materials                  | 6    | Fluid machinery and plant facilities   | 6    |
| Manufacturing Technology II              | 6    | Deformable Solid Mechanichs            | 6    |
| Machine Design Criteria                  | 6    | Materials Technology                   | 6    |
| Chemical Engineering                     | 72   | Electrical power systems               | 6    |
| Subject                                  | ECTS | Manufacturing processes and industrial |      |
| Foundations of Chemical Engineering      | 12   | drawing                                | 6    |
| Chemical Process Design                  | 12   | Industrial chemical processes          | 6    |
| Chemical Process Control                 | 6    | Electric Machinery                     | 6    |
| Thermal and Fluid Engineering            | 12   |  |      |
| Transformation of raw materials          |      |  |      |
| and resources                            | 6    |  |      |
| Experiments in Chemical Engineering      | 12   |  |      |



### Degree in Industrial Design and Product Development Engineering

Industrial design is a technical and creative discipline specialising in the development of all types of products, whether consumer products, capital equipment, communication equipment or cultural goods. The methodology covers the whole range of work from conception and representation of these products to the definition of their functional, technological and formal characteristics enabling them to be manufactured.

Although there are no specific entry conditions for studying the Industrial Design and Product Development Engineering degree, it is understood that potential students should have the following profile:

- An interest in innovation and in applying creativity to solving problems.
- An interest in studying ongoing improvements to our surroundings.
- An interest in the technology, culture, study and evolution of our social environment.
- An ability to transmit ideas and knowledge by means of appropriate verbal expressiveness and knowledge of languages.
- An ability to understand and solve technical problems.
- A degree of skill for understanding aesthetics, and to communicate ideas and knowledge through the plastic arts.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

This work can be carried out in the private sector in the area of product development, either in an industrial design studio or in the design department of an industrial company. There are also opportunities in the public sector in areas such as design management, product origination and development, technical office work, management tasks, and other work in quality, the environment or risk prevention.

Graduates can assume responsibilities for conceptual product design, new product development, decision making in production and in the selection of manufacturing techniques, graphic design and product communication, and business management in these and other product-related areas.



#### WHAT DO YOU STUDY?

Industrial design methodology is taught through the development of projects supported by the acquisition of theoretical training. In this way students become familiar with the practice of a professional discipline in which they will have to research, document, analyse, deduce and obtain conclusions in such a way that they will be able to generate alternative and creative solutions, commercially and technically viable for the origination and development of products.



Methods are not only learnt, but understood, applied and adapted to the problem or project in hand, as in real life situations. It is also common to use methodologies deriving from case studies, whether of businesses or products.

Some specific projects and exercises are undertaken using various materials and within certain subjects in such a way that the relationship between materials and theoretical contents are reinforced and applied in the development of the projects in question.

Subject areas included in the curriculum are as follows: Physics, mathematics, information technology, business studies, artistic expression, graphical expression, statistics, materials, mechanics, manufacturing processes, electrical and electronic technologies, computer-assisted design, design workshop, design methodology, office technology, ergonomics, aesthetics, creativity, graphic and communications design, marketing, legal issues, product development, business design management.

#### **CURRICULAR STRUCTURE**

| Type of subject      | ECTS |
|----------------------|------|
| Basic training       | 60   |
| Compulsory           | 105  |
| Optional             | 45   |
| Final degree project | 30   |
| TOTAL                | 240  |

#### **Basic contents (ECTS)**

- Statistics 6
- Graphic Expression 15
- Physics 9
- Computer Science 6
- Mathematics 9
- Company 6
- Artistic Expression 15
- Marketing and legal aspects 6
- Materials 6
- Mechanics 9
- · Computer-aided design 9
- Creativity 6
- Graphic design and communication 6
- Ergonomics 9
- Aesthetics and the History of Design 11
- Methodology of design 9
- Processes 9
- Design workshop 18
- · Electrical/electronic technology 6
- Project management office/Projects 6

#### **FURTHER INFORMATION**

http://titulaciones.unizar.es/ing-dis-industrial/



# Bachelor's in the area of Information and Communication Technologies

### Degree in Computer Science Engineering

The Computer Science Engineering degree trains professionals able to analyse, originate, write, organise, plan and execute projects in the computer field. Projects include the conception, development and exploitation of computer equipment, systems, services and applications, and students are trained to direct these activities. The training is characterised by excellent knowledge of information and communication technologies, and by the ability of students to be able to apply such knowledge in business or in the private or public institutions in which they will work.

Baccalaureate students from the science and technology side may study the degree. A good grounding in mathematics and a reasonable knowledge of English are desirable. An ability to work both individually and in a team is also a requirement. Previous knowledge of computers is not essential, but an interest in information and communication technologies is a distinct advantage.

#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

Computer engineers are employed by businesses of many types:

- Information technology consultancy companies.
- Companies involved in the development and marketing of IT solutions (equipment, systems, applications and products).
- Companies from other sectors (construction, banking, manufacturing, publishing, the media and other services) requiring computer systems for their organisation and functioning (equipment, networks, applications and development).



A significant number of computer engineers choose to start up their own businesses.

Public organisations and administrations (town councils, local authorities, regional governments, central government administration, universities, etc.) also need professionals qualified in computer engineering for their data processing centres. Another important area of employment for computer engineers is teaching and research in schools and colleges, professional training centres, universities and other organisations involved in research.

Opportunities for professionals are not confined to a national level. Many computer engineers choose to work for companies or institutions in other countries. This broad scope for employment means that it is relatively easy for computer engineering professionals to find a job. The negative effects of periodic economic crises are certainly less in this sector than in other professional spheres.

#### WHAT DO YOU STUDY?

The study of mathematics (calculus, algebra and discrete mathematics) represents the greater part of the scientific training.

Studying and training in the following fields make up the basis for the specific training of computer engineers:

- Hardware devices, being the physical support for computer systems.
- Computer programming, from the basics of algorithm design to large-scale software development projects.
- Databases and information systems.
- Operating systems.
- Computer networks and distributed systems.

Students reach a degree of specialisation in the final stage of their studies and are able to choose one of the following areas to study in depth:

- Computation, for those who wish to increase their knowledge of algorithms and programming in order to be able to deal with complex design problems in fields of application as diverse as intelligent systems, bio-engineering, robotics, computer vision, computer graphics, videogames, etc.
- Computer engineering, for those with a particular interest in the design, start up and exploitation of computers, embedded systems, computer networks, data processing centres, etc.
- Software engineering, for those with a special interest in participating in large-scale software development projects.
- Information systems, for students interested in designing and administering information systems used by organisations (businesses, public institutions and administration).
- Information Technologies, for students with a special interest in selecting, integrating, and organising the functioning of equipment, systems, applications and processes required by organisations (companies, public administration and institutions, etc.).

#### FURTHER INFORMATION

http://titulaciones.unizar.es/ing-informatica/

#### **CURRICULAR STRUCTURE**

| Common Basic training (60 ECTS) |      |  |
|---------------------------------|------|--|
| Subject                         | ECTS |  |
| Mathematics                     | 18   |  |
| Physics                         | 6    |  |
| Informatics                     | 24   |  |
| Business Administration         | 6    |  |
| Statistics                      | 6    |  |

| Computer Technologies (102 ECTS)             |      |  |  |
|--|------|--|--|
| Subjects                                     | ECTS |  |  |
| Computer Architecture and Organization       | 6    |  |  |
| Programming and Computing                    | 30   |  |  |
| Operating systems and computer networks      | 18   |  |  |
| Software engineering and information systems | 30   |  |  |
| Distributed Systems                          | 6    |  |  |
| Computer Security                            | 6    |  |  |
| Hardware Projects                            | 6    |  |  |

| Specific Technologies (48 ECTS) |      |  |
|---------------------------------|------|--|
| Technology                      | ECTS |  |
| Software Engineering            | 48   |  |
| Computing                       | 48   |  |
| Computer Engineering            | 48   |  |
| Information Systems             | 48   |  |
| Information Technologies        | 48   |  |

| Mandatory (14 ECTS)             |      |  |  |
|---------------------------------|------|--|--|
| Subjects                        | ECTS |  |  |
| English language B-1            | 2    |  |  |
| Final Bachelor's Degree Project | 12   |  |  |

| Optional and free elective (16 ECTS)         |      |  |
|--|------|--|
| Subjects                                     | ECTS |  |
| Free elective                                | 6    |  |
| Optional technical subjets, company training | 10   |  |



### Degree in Telecommunication Technologies and Service Engineering

People have always had the **need to communicate** with each other, to **share thinking**, **ideas and knowledge**; in short, to **share information**. The creation, search and exchange of information are intrinsic in human nature. The XXI century is characterised by the **globalisation of knowledge**, the instant obtaining and sharing of information from whatever place in whatever form. This new revolution in society is based on **telecommunication technologies and services**.

It is impossible to understand socio-economic progress today without the deployment of communications networks and services. Both in the present and in the future, **telecommunication engineers** will play a pivotal role in the functioning of society.

The degree in Telecommunication Technologies and Services Engineering, taught at the Río Ebro campus of the University of Zaragoza, provides the scientific, technological and socio-economic training necessary for exercising the profession of telecommunications engineer technician.



#### WHAT ARE THE OPPORTUNITIES FOR GRADUATES?

Graduates in Telecommunications Technologies and Services Engineering have a professional profile clearly oriented to working in the Information and Communication Technologies sector (ICT).

Professionals are qualified to work in the **private sector** (companies in the areas of development and maintenance of telecommunication infrastructures, electronics, telematic services, radiofrequency equipment and systems, audiovisual installations, technical consultancy, education, etc.), as **self-employed engineers** (project studies, expert opinions, technical certification, etc.), in the **public administration** (technical staff in the areas of ICT, education, etc.) and in **research**, **development and innovation** (R+D departments in both the private and public sectors).

The range and depth of study means that this degree prepares students for a wide range of professional outlets. These include the following:

- Management, planning and operation of telecommunications networks and services.
- Design, operation and management of information services.
- Telecommunication infrastructure, construction and deployment of telecommunications networks (cable, fiber, radio).
- Environmental and Architectural acoustics.
- Design, planning and management of acoustic engineering projects in public institutions, businesses and private homes.

- Performing acoustic measurements, spectral analysis, vibration, absorption and insulation materials, reverberation,...
- Projects, certifications and work direction of audiovisual facilities.
- Production of audiovisual content.
- Control systems and processes. Industrial Automation.
- Management, planning and operations in areas not specified above (human resources, financial management, etc.).
- Consulting (technological, strategic, etc.).
- Education

#### WHAT DO YOU STUDY?

The subjects studied provide the basic **scientific and technical training** required to meet the needs of **present and future telecommunication** services, in addition to the ability to apply the technical, scientific and human knowledge and processes needed to work in the profession. Within the specialisations included in the degree, graduates are trained to design, analyse, implement, exploit, maintain and manage services, systems, components or processes in the sphere of telecommunications engineering, and to comply with the required specifications.

The degree is offered with 4 possible routes (selected from the third year) related to the following specific technologies:

- **Telecommunication Systems**. Information processing is studied in depth (audiovisual communications, digital signal processing, etc.), in addition to telecommunication techniques (radiocommunication systems, telecommunication services and systems, etc.) and information transmission technologies (radiofrequency, optical transmission, high frequency, equipment and systems, etc.).
- Telematics. In-depth study of the design of telematic services (network management, network and service security, quality of service, e-commerce, etc.) and of network and service architectures (access networks, transport networks, mobile networks, design and evaluation, etc.).



- **Electronic Systems**. In-depth study of analogue electronic systems (electronic instruments, power electronics, radiofrequency, etc.), electronic systems technology (audio and video, electronic design, digital systems etc.) and electronic communication systems.
- **Sound and Image**. In-depth study of acoustic engineering, architectural and environmental acoustics, sound and image systems (signals, systems and equipment, installation projects, etc.) and audiovisual systems (coding and transport, production, multimedia engineering, etc.).

#### **FURTHER INFORMATION**

http://titulaciones.unizar.es/ing-tec-serv-telecomunicacion/

### **CURRICULAR STRUCTURE**

| Common Basic training (60 ECTS)                |      |  |
|--|------|--|
| Subject  | ECTS |  |
| Mathematics                                    | 18   |  |
| Physics  | 12   |  |
| Informatics                                    | 6    |  |
| Business administration                        | 6    |  |
| Electronic Technology,<br>Circuits and Systems | 12   |  |
| Statistics                                     | 6    |  |

| Telecommunication (90 ECTS)           |      |  |  |
|---------------------------------------|------|--|--|
| Subject modules                       | ECTS |  |  |
| Signals and Communications            | 33   |  |  |
| Electronics                           | 18   |  |  |
| Networks, Systems and Services        | 33   |  |  |
| Telecommunications Project Management | 6    |  |  |

| Specific Technologies (48 ECTS) |      |  |  |
|---------------------------------|------|--|--|
| Technology                      | ECTS |  |  |
| Telecommunication Systems       | 48   |  |  |
| Telematics                      | 48   |  |  |
| Electronic Systems              | 48   |  |  |
| Sound and Image                 | 48   |  |  |

| Mandatory (14 ECTS)             |      |  |  |
|---------------------------------|------|--|--|
| Subjects                        | ECTS |  |  |
| English language B-1            | 2    |  |  |
| Final Bachelor's Degree Project | 12   |  |  |

| Optional and free elective (28 ECTS)            |      |  |
|---|------|--|
| Subjects  | ECTS |  |
| Free elective                                   | 6    |  |
| Optional technical subjets,<br>company training | 22   |  |





Master's and Doctorate Degrees are already adapted to the European Higher Education Area.

The official courses leading to the award of a Master's degree are intended to provide advanced specialized or multidisciplinary training, aimed at academic or professional specialization, or an introduction to research work leading to a doctorate programme and obtaining a PhD.

The doctorate programme is intended to give students advanced training in research techniques. It can include courses, seminars and other activities directed at research training, and will include creating and presenting a doctoral thesis consisting of an original research project. The Doctorate programme consists of two periods, the training and research periods. The training period correspond to the Master's degree.

The actual offer at the Campus Rio Ebro on Master's degrees is focused on introduction to research, corresponding to the training period of the doctorate programmes. The official Master's degrees and Doctorate programmes offered at the Campus Rio Ebro are:

- Master's degree and Ph.D in Renewable Energies and Energy Efficiency.
- Master's degree and Ph.D in Computing and Systems Engineering.
- Master's degree in Applied Mechanics and Ph.D in Computational Mechanics.
- Master's degree and Ph.D in Mechanical Systems.
- Master's degree and Ph.D in Introduction to Research in Chemical and Environmental Engineering.
- Master's degree and Ph.D in Electronic Engineering
- Master's degree and Ph.D in Information and Communication Technologies in Mobile Networks
- Master's degree and Ph.D in Biomedical Engineering

To enter to a Master's degree course you need to hold of an official degree from either a Spanish university or an equivalent higher education institution from the European Higher Education Area that allows the holder to undertake a Master's degree course in the awarding country.

To enter the Doctorate programme in the research period, you will need an official Master's degree or a qualification of the same level issued by a higher education institution in the European Higher Education Area.



# Master's in Renewable Energies and Energy Efficiency

Orientation: Research Number of credits to obtain title: 60 credits Maximum number of places: 30 Minimum number of places: 10 Minimum number of credits per year: 20 *Coordinator:* Inmaculada Arauzo Pelet, *e-mail:* iarauzo@unizar.es

#### Admission profile:

This Master's course is designed for students who have completed degrees in the following areas:

- A: Engineering or science degrees.
- B: Technical engineering, specialising in mechanics, electrics, chemistry and other areas related to energy.

Students without basic knowledge of thermodynamics, heat transfer, circuit theory and electrical machines are obliged to take the subject "Fundamentals of electrical and energy engineering" within the 60 credits to be passed in order to obtain the Master's title.

#### Structure and contents of the Master's

The courses are organised so that a total of 60 ECTS credits must be completed, 45 of these through formal teaching and 15 through a Master Thesis.

The Master's has three basic recommended routes:

- Emphasis on renewable energies: this route encompasses introductory subjects related to the main renewable energies (solar, wind and biomass) during the first semester, specialising in advanced concepts during the second.
- Emphasis on electrical systems: renewable energies for electrical energy production (wind and photovoltaic) and related advanced issues such as the management and reliability of electrical networks, integration of renewable energies, distributed generation, electrical markets, etc.
- Emphasis on thermal systems: renewable energies for heat production and thermoelectric power plants (solar heat and biomass) and advanced issues such as energy processes with thermal transformations, such as polygeneration, capture and storage of CO<sub>2</sub>, bioclimatic architecture, etc.

# Master's in Computer and Systems Engineering

Orientation: Research Number of credits to obtain title: 60 credits Maximum number of places: 40 Minimum number of places: 10 Minimum number of credits per year: 8 Coordinator: Juan Domingo Tardós Solano; e-mail: tardos@unizar.es

#### Admission profile:

Recent graduates who wish to deepen their knowledge of computer and systems engineering in order to improve their professional prospects.

Recent graduates requiring an introduction to the methodology of research, development and innovation (R+D+i) with the intention of doing a doctoral thesis in the future.

Business professionals wishing to update or complete their knowledge of R+D+i methodologies or to deepen their studies of specific techniques in order to improve their specialist knowledge and adapt it to the labour market (life-long learning).

The subjects covered by the Master's degree are aimed particularly at engineering or science graduates.

#### Structure and contents of the Master's

The courses are organised so that a total of 60 ECTS credits must be completed, 30 of these through formal teaching and 30 through a Master Thesis.

The Master prepares the student to undertake professional practice in R+D+I in industry in the area of Systems and IT Engineering.

Training will be provided in research and development in specific fields in IT (hardware and software) and Systems Engineering (real time, robotics and discreet event systems). The proposed programme covers the following lines of work in the sphere of Information Technology and Systems Engineering:

- Discreet Event Systems Engineering. Convention and formal methods for modelling, analysis and design of "artificial" manufacturing, logistical, traffic (air, rail, urban, etc.), information distribution, decentralised work, etc. production systems
- Robotics, Perception and Real Time. Robotics for services and intervention; advanced perception systems; computer vision; real time systems.
- Advanced Computer Graphics. Graphic treatment. Real and synthetic images both static and animated.
- Computer architecture. High performance computations. Memory hierarchy. Design oriented towards performance and energy consumption.
- Digital topology for digital image processing, and engineering of the method and evolution of databases.
- Advanced Information Systems. Software technology for information systems with geo-referenced data, mainly in Space Data Infrastructure (SDIs).
- Distribution Information Systems. Design and development of access systems for information located remotely. Distributed databases, affiliated information systems, web, wireless devices.

# Master's in Applied Mechanics

Orientation: research Teaching method: classes Number of credits to obtain title: 60 credits Maximum number of places: 30 Minimum number of places: 10 Minimum number of credits per year: 8 Coordinator : Begoña Calvo Calzada. E-mail : bcalvo@unizar.es

#### Admission profile:

This master's course is designed for students who have completed one of the following degrees:

- A: Technical engineering
- B: Engineering
- C: Physics or Mathematics.

#### Structure and contents of the Master's

The courses are organised so that a total of 60 ECTS credits must be completed, 45 of these through formal teaching (30 obligatory and 15 optional) and 15 through a Master Thesis.

The objective of the Master's lies in the training of the postgraduates in advanced mechanical engineering, with competence in all the topics which comprise the field of the corresponding qualification. As regards achievements and abilities, this proposed Master's uses the Descriptors of Dublin and Royal Decree 1393/2007 as its framework.

More in particular, specifically for the present Master's, at the end of which the students should have acquired the following general abilities:

- Have shown a systematic understanding of the field of mechanical engineering and a mastery of the skills and research methods related to this field.
- Have shown the ability to conceive, design and put into practice different mechanical elements under scientific rigour, as well as the terminology and basic concepts of solid and fluid mechanics.
- Be able to perform a critical analysis, evaluation and synthesis of new and complex ideas.
- Know the peculiarities of work in the industry and in research centres, and the social and economic repercussions of actions within mechanical engineering.
- Know how to communicate with colleagues, the academic community in its entirety and society in general about mechanical engineering.
- Know the research methodology sufficiently to be able to undertake a doctoral thesis in any area of Solid or Fluid Mechanics.

# Master's in Mechanical Systems

Orientation: research Teaching method: classes Number of credits to obtain title: 60 credits Maximum number of places: 30 Minimum number of places: 10 Minimum number of credits per year: 20 Coordinator: Emilio Larrodé Pellicer. E-mail: elarrode@unizar.es

#### Admission profile:

This master's course is designed for students who have completed one of the following degrees:

- A: Technical engineering
- B: Engineering
- C: Physics, chemistry or mathematics.

#### Structure and contents of the Master's

The courses are organised so that a total of 60 ECTS credits must be completed, 45 of these through formal teaching and 15 through a Master Thesis. These 60 credits do not include complementary training credits that students may be required to complete for admission purposes.

The objectives of the programme focus on the training of the student in the general area of Mechanical Systems and in the specific aspects of analysis, design and optimisation of component elements and integrated systems related to industrial machines and vehicles, as well as the production processes involved - stressing the latest technological advances in the field and the most advanced developments for their calculation, analysis and design. The specific objectives of the programme allow the student to acquire a new conception of mechanical systems, their component elements, the integration into more complex systems, the optimal working of these systems which allows greater mechanical and energy efficiency, the most ideal material for the configuration and the most correct and advanced production processes which allow the required level of quality and reliability control. This comes through a deeper knowledge of the behaviour of these matters from a mechanical, structural, thermal and functional point of view.

# Master's in the introduction to research in chemical and environmental engineering

Orientation: Research Number of credits to obtain title: 60 credits Maximum number of places: 30 Minimum number of places: 10 Minimum number of credits per year: 20 Coordinator: Javier Herguido Huerta, e-mail: jhergui@unizar.es

#### Admission profile:

Recent graduates who wish to deepen their knowledge of chemical and environmental engineering technologies in order to improve their professional prospects.

Recent graduates requiring an introduction to the methodology of research, development and innovation (R+D+i) with the intention of doing a doctoral thesis in the future.

Business professionals wishing to update or complete their knowledge of R+D+i methodologies or to deepen their studies of specific techniques in order to improve their specialist knowledge and adapt it to the labour market (life-long learning).

The subjects covered in the Master's course are designed especially for

- A: Chemical engineers, industrial engineers, graduates in chemistry or environmental sciences.
- B: Technical engineers, specialising in industrial chemistry.

For other degrees, the Master's Academic Committee will need to provide a favourable report for admission of the student, indicating the complementary subjects that must be taken if the previous studies are not considered sufficient for being able to satisfactorily achieve the objectives of the Master's course.

#### Structure and contents of the Master's

The Master's course does not involve routes or specialities, and is organised in three principal blocks:

**Compulsory subjects:** these include areas of general interest for the acquisition of research skills in any of the lines on which the Master's is structured, namely: modelling, characterisation of materials and research management (2 subjects of 6 ECTS credits each). Also included in this block is compulsory laboratory practices (12 ECTS credits) in which the student will carry out an initial research work under the direction of the Master's teaching professor.

**Optional subjects**: representing specialist training in the various research lines covered by the Master's course. The student must take 21 ECTS credits out of the 48 offered in optional subjects.

**Master Thesis**, a compulsory work representing 15 ECTS credits. This will consist of the carrying out of an initial research or innovation technology project by the student under the direction of a teacher of the Master's. For evaluation purposes, the students will have to provide a report to be presented in public.

The courses are organised so that a total of 60 ECTS credits must be completed, 45 of these through formal teaching (24 from the block of compulsory subjects and 21 from the optional subjects) and 15 through the Master Thesis.

# Master's in Electronic Engineering

Orientation: Research Number of credits to obtain title: 60-90 credits <sup>(\*)</sup> Minimum number of credits per year: 20 <sup>(\*\*)</sup> Coordinator: Arturo Mediano Heredia, **e-mail**: amediano@unizar.es

#### Admission profile:

Recent graduates who wish to deepen their knowledge of electronic engineering technologies in order to improve their professional prospects.

Recent graduates requiring an introduction to the methodology of research, development and innovation (R+D+i) with the intention of completing a doctoral thesis in the field of electronic engineering in the future.

Business professionals from the electronics sector wishing to update or complete their knowledge of R+D+i methodologies or to deepen their studies of specific techniques in order to improve their specialist knowledge and adapt it to the labour market (life-long learning).

#### Structure and contents of the Master's

The Master's is organised in three modules:

Basic levelling subjects (between 10 and 40 ECTS to be taken by the student, depending on previous studies): This module includes the subjects necessary to achieve a similar level among students starting the course with different degrees, providing the appropriate common knowledge and skills required for subsequent studies. Each student must take the subjects corresponding to this module (between 10 and 40 ECTS) which have not previously been taken and accredited, depending on the nature of the original degree and previously taken optional subjects.

**Optional subjects (30 ECTS to be taken by the student):** specialist training in the various research lines covered by the Master's course. Students are not expected to do a specific speciality, it being possible to choose more general or more specialised studies subject to the agreement of the tutor. However, in order to create specific routes for specialist study, the subjects in this module are organised into two specialist subject blocks and one common block.

**Master Thesis (20 ECTS)**, which is compulsory. This will consist of the carrying out of an initial research or innovation technology project by the student under the direction of a teacher of the Master's. For evaluation purposes, the students will have to provide a report to be presented in public.

<sup>(\*)</sup> Depending on the student's previous studies (see Structure and contents of the Master's).

<sup>(\*\*)</sup> Except in cases where the number of credits pending to obtain the title is less.

### Interuniversitary Master's in Information and Communications Technologies in Mobile Networks

Orientation: Research Number of credits to obtain title: 60 credits Maximum number of places: 60 Minimum number of places: 10 Minimum number of credits per year: 8 Coordinator: José Ruíz Más. E-mail: jruiz@unizar.es

#### Admission profile

Graduates in Telecommunications, Information and Electronics Engineering, and first cycle graduates (with complementary access)

#### Structure and contents of the Master's

The courses are organised so that a total of 60 ECTS credits must be completed, 44 of these through formal teaching (4,5 obligatory and 39,5 optional) and 16 through a Master Thesis.

The objective of the programme is the training of research professionals in the field of Information and Communication Technology in Mobile Networks. This training includes the study of the mobile networks from the point of view of telecommunications systems, radio technology, digital signal treatment and data transmission. The programme covers aspects of 3G mobile networks and systems going further –known as "beyond 3G"– as well as local area networks via radio, personal networks, WPAN and WBAN, in addition to terrestrial communications systems: LDMS, MVDS, WiMAX, TDT, etc.

The programme provides knowledge and abilities to develop research work in the following specific areas of R+D+I:

- Telematic systems in mobile and wireless communication, aspects of safety, service quality, protocol design, multiple access techniques, error control mechanisms and network planning
- · Branch systems based on fibre optics and technology related to fibre optic systems
- Systems planning via radio, study and characterisation of spreading channels across different band widths. Application to mobile and wireless communications and implications for the designing of mobile networks
- Design the architecture of networks to provide mobile service based on heterogeneous technology and the convergence of standards
- Algorithms and advanced techniques for voice signal processing. Signal processing applied to wireless communications and algorithms to optimise the capacity of the radio-electric channels in mobile communications and the correct size of network resources.
- · Modelling the active devices and circuit designs in hybrid and monolithic technologies
- · Design telecommunications systems. Channel models
- Antennas

# Master's in Biomedical Engineering

Orientation: Research Number of credits to obtain title: 60 credits Maximum number of places: 30 Minimum number of places: 10 Minimum number of credits per year: 8 Coordinator: Pablo Laguna Lasaosa e-mail: laguna@unizar.es

#### Admission profile:

This master's course is designed for students who have completed one of the following degrees:

- A: Technical engineering
- B: Engineering
- C: Biology, Pharmacy, Physics, Mathematics, Surgery or Chemistry

#### Structure and contents of the Master's

The courses are organised so that a total of 60 ECTS credits must be completed, 45 of these through formal teaching and 15 through a Master Thesis.

The objective of the programme is the training of researchers in matters relating to Biomedical Engineering. The formative objectives are directed towards training people who will revitalise research centres and groups in both the public and private spheres. It is intended that by the end of the Master's, the students will have acquired the abilities necessary to work on a doctoral thesis in any area within Biomedical Engineering. Having a competitive position in this field in the future requires quality research, for which reason well-trained doctors are needed. The main objective of the programme is the training of doctors in areas related to biomedical engineering so that they can join research projects occurring in the University and in companies. The achievement of the aforementioned general objective requires posing and reaching the following smaller objectives:

- a) The training on offer will be based on the research areas of the research groups involved. This objective ensures the quality of the teachings involved.
- b) Encourage students to be multidisciplinary, to exchange ideas, and to co-operate effectively in the different facets of biomedical engineering, with particular emphasis on clinical/medical and technical aspects.

Biomedical Engineering is an area of engineering that is highly interdisciplinary. It aims to provide solutions to any engineering problem found in the field of biology and medicine. Thus, a very important aspect of training will lie in being able to develop abilities (individually, but basically in teams) that combine the necessary knowledge and specialities to respond to the problems that the student will have to face when working professionally.

It will be necessary to know both the engineering methodologies related to the design process and the medical terminology, basic concepts of biology and medicine, peculiarities of work with tissues, organs and living beings –in particular in the clinic environment– and the social and economic repercussions of the action.

### **Doctorate Programmes**

The Doctorate programmes are coordinated by universitary departments or research institutes. The University of Zaragoza is offering the following Doctorate Programmes at the Campus Rio Ebro.

| PhD Programmes   | Department or Institute                           |
|--|---|
| Biomedical Engineering   | UZ Engineering Research Institute (I3A)           |
| Renewable Energies and Energy Efficiency                       | UZ Institute of Research, CIRCE                   |
| Design and Manufacturing Engineering                           | Design and Fabrication Engineering                |
| Systems and Computer Engineering                               | Computer Science and Systems Engineering          |
| Electronic Engineering   | Electronic and Communication Engineering          |
| Chemical and Environment Engineering                           | Chemical Engineering and Environmental Technology |
| Computational Mechanics  | Mechanical Engineering                            |
| Fluid Mechanics  | Science and Technology of Materials and Fluids    |
| Mechanical Systems   | Mechanical Engineering                            |
| Information Technologies and Communications in Mobile Networks | Electronic and Communication Engineering          |

### EINA Postgraduate Programmes

The EINA has originated, promoted and coordinated a wide-ranging offer of postgraduate courses since 1989, with the support and initiative of university departments in the area of technology, the CIRCE foundation, the Engineering Research Institute of Aragon, etc. Currently fifteen master's and postgraduate degrees are offered in various engineering disciplines, with training programmes constantly updated to match the needs of industry and of society.

Postgraduate studies at the EINA represent excellent additional educational value for young engineers and graduates who wish to expand their knowledge and skills in specific technology fields and improve their employment prospects. They are also of great interest to working professionals seeking to update their education and training.



| Category   | ECTS | Duration | Cost<br>(euros) | Telephone              | E-mail                            |
|--|------|----------|-----------------|------------------------|-----------------------------------|
| MASTER   |      |          |                 |                        |                                   |
| Industrial and Technological Diversification                           | 60   | 1 year   | 6,000           | 976761894              | anasanz@unizar.es                 |
| Ecodesign and Energy<br>Efficiency in Construction                     | 70   | 1 year   | 4,725           | 976762146              | master.ecodiseno@unizar.es        |
| Ecoefficiency and Energy<br>Markets. Class attendance<br>or On-line    | 70   | 1 year   | 4,800           | 976762146              | circe@unizar.es                   |
| Renewable energies. On-line  | 60   | 1 year   | 4,525           | 976762146              | circe@unizar.es                   |
| European Renewable<br>Energies. Class attendance<br>or On-line         | 90   | 1 year   | 5,665           | 976762146              | circe@unizar.es                   |
| Thermoelectric Generation.<br>Zero Emission Technologies.<br>On-line   | 60   | 1 year   | 4,450           | 976762146              | circe@unizar.es                   |
| Environmental Engineering.   | 60   | 1 year   | 4,100           | 976761873              | cnerin@unizar.es                  |
| Pipeline Engineering   | 50   | 1 year   | 6,000           | 976761000<br>Ext. 5053 | olga@unizar.es                    |
| POSTGRADUATE   |      |          |                 |                        |                                   |
| Biomass Energy   | 30   | 5 months | 3,175           | 976762146              | circe@unizar.es                   |
| Renewable Energies   | 30   | 6 months | 3,325           | 976762146              | circe@unizar.es                   |
| Climatization Engineering  | 30   | 1 year   | 3,000           | 976762042              | Postgrado.climatizacion@unizar.es |
| Design Engineering<br>and Industrial Fluid<br>Installation Engineering | 30   | 1 year   | 3,000           | 976765048              | piping@unizar.es                  |
| Water Resources<br>Engineering on-line                                 | 30   | 1 year   | 2,100           | 976765057              | pigar@unizar.es                   |
| Industrial Organisation  | 89   | 1 year   | 3,800           | 976762101              | carnava@unizar.es                 |
| SPECIALITY   |      |          |                 |                        |                                   |
| Technological analysis of irrigation systems. On-line                  | 14   | 6 months | 1,100           | 976765057              | pigar@unizar.es                   |
| Energy Certification<br>of Buildings                                   | 20   | 6 months | 2,000           | 976762042              | Diploma.certificacion@unizar.es   |
| Fluvial Engineering. On-line   | 12   | 6 months | 1,000           | 976765057              | pigar@unizar.es                   |
| Hydrogen and combustible battery technologies                          | 15   | 6 months | 1,675           | 976762146              | circe@unizar.es                   |



# **Tutorial Programme**

Tutoring is one of the responsibilities of university teachers. The EINA tutorial programme extends the traditional function of resolving doubts arising within a specific subject to other aspects of student life at the university.

#### The tutor:

- Offers support and information to students in connection with the various services of the EINA and the university.
- Assists in the development of learning skills and strategies.
- Identifies issues that can interfere with the academic performance of the student.
- Provides guidance about university study methods.
- Encourages the student to take part in training improvement activities
- Monitors the academic progress of the student.



Participation in the tutorial action programme is voluntary

throughout the degree course, and information about joining is available at the welcome meetings organised by the EINA management (Meeting with Engineering and Architecture Studies-EcEdIA'2009, 17 and 18 September 2009). You can also find all the information at the EINA website eina.unizar.es.

The experience of the tutorial action programme has been entirely positive since its inception in 2003. For students it provides an opportunity and means of support in their academic and personal development, with the tutor representing both an educational professional and a human face within the university environment. For tutors and the EINA, the programme is a valuable and indispensable means of gathering information about the process of adaptation and progress of the students, and helps to improve academic achievement.

### Welcome meetings EcEdIA

Every year the EINA organises welcome meetings for new engineering students before the course begins. The aim of the EcEdIA meetings is to help new first year students to settle in at the university. Registration is free and done at the EINA Secretariat or via internet (eina.unizar.es). The meeting is held just the days before the academic year start. The usual schedule of the meeting is as follows:

#### **FIRST DAY**

#### 09:00-10:00. Welcome to the University

The Rector of the University of Zaragoza and the Director of the School of Engineering and Architecture will welcome new students and give an introduction to the university and the EINA.

#### 10:00-11:00. Teaching at the EINA (I)

The teaching process at the EINA will be explained: the programme of studies, the tutorial programme, exams, curricular assessment, work experience in companies, language teaching, study periods abroad, how the campus library works, sports activities, etc.

11:00-11:30. Break

11:30-13:00. Teaching at the EINA (II)

13:00-14:00. Students take the floor

Students currently studying engineering and architecture at the EINA will talk about learning at the centre (classes, facilities, exams, teacher-students relations, etc.), about university life at the EINA and about opportunities and extracurricular activities organised by student associations.

#### **SECOND DAY**

9:00-10:30. Finding out about your degree: the syllabus

Parallel sessions will take place, one for each degree. These first sessions will be devoted to an introduction and explanation of the syllabus for each degree together with the educational objectives.

10:30-11:00. Break

11:00-12:20. Finding out about your degree: qualifications

In these parallel sessions, qualified engineers will discuss the training of engineers and/or architects, the demands of the job market, and advice on how to approach the early stages of study.

#### 12:20-12:40. Break

12:40-14:00. Finding out about your degree: students

Parallel sessions in which students from each degree course will discuss their experience, provide an assessment of their studies and, most importantly, answer questions from their new student colleagues.

### Exchange students welcome meeting (ESWeM)

Students coming from mobility programmes are invited to a welcome meeting that usually takes place during the first week of the academic year. The aim of the ESWeM meeting is to present the School and the campus to the new exchange students. Also, it is a great opportunity for the exchange students to meet each other.



### Student advisory services

There are four advisory services, staffed by professionals, situated in the Management area, next to the Secretariat in the Torres Quevedo building. Here you will find help and advice about resolving your problems. This service is free and anonymity is repected.

**Study advice.** Here you can obtain information and advice about any doubts you may have concerning your academic future.

Legal advice. This service provides advice about any issue related to employment, setting up an association, or how to make a complaint or claim.

**Psychological advice.** Help and advice is available about any worries you may have or feelings of insecurity or anxiety.

Sexual advice. Advice is available on how to avoid pregnancy, avoidance of risks and approaching your sexuality.

To use these services you only have to ask for an appointment (asesoria@unizar.es or Tel. 976 761356).

## Students' Union & Students Associations

Students are represented and participate in the University governmental bodies through the students' unions.

They do also enliven the Centre with their initiatives and play an important role in the organization of events such as employment fairs, cultural activities... you can meet them at http://eina.unizar.es

There are also specific associations where students gathered as they share common interests: meeting and helping incoming students are among the interests shared by AEGEE, ESN, AIESEC... They organize parties, meetings and trips all of them widely announced.

The EINA enjoys an active student life with opportunities to take part in cultural activities, games, cooperation projects, sports, professional activities, exchanges, etc. The focus is always on the students.



#### **Student Representatives**

Torres Quevedo building (ground floor) Tel.: 976 761866 E-mail: cpsdda@unizar.es

Web: www.cps.unizar.es/dda

#### **Cultural Committee**

Torres Quevedo building (ground floor) Tel.: 976 761866 Fax: 976 761861 E-mail: cultcps@unizar.es Web: www.cps.unizar.es/cultura

#### University of Zaragoza Telecommunications Students Association (A.A.T.U.Z.)

Ada Byron building Tel.: 976 761000. Ext. 5337 E-mail: aatuz@unizar.es

Fax: 976 761866 Web: http://aatuz.cps.unizar.es/

#### Association of Chemical Engineers of Aragon (A.I.Q.A.)

Torres Quevedo building (ground floor) Tel.: 976 761866 E-mail: aiqa@unizar.es

Fax: 976 761861 Web: www.cps.unizar.es/~aiqa/

#### Association of IT Engineers of Aragon (A.I.I.A.)

Avda. César Augusto nº 58, 1º 50.003 Zaragoza Tel.: 647.43.38.63 E-mail: junta@aiia.es

Fax: 976.29.20.31 Web: www.aiia.es

Fax: 976 761861

Web: www.euzii.es

#### University of Zaragoza Industrial Engineering Students Association (A.E.U.Z.I.I.)

Torres Quevedo building (ground floor) Teléfono: 976 761866 E-mail: euzii@iespana.es

Engineers' Choir Torres Quevedo building (Culture room) Teléfono: 976 761866

#### Engineers Without Borders (I.S.F. Aragón)

Office: Ada Byron building (first floor). Tel.: 976 761000 Ext. 5339 E-mail: isf@unizar.es

#### Dir-Europa

Ada Byron building (second floor) Tel.: 976 762384 E-mail: info@direuropa.org

#### I.A.E.S.T.E.

Ada Byron building (second floor) Tel.: 976 761000. Ext. 5339 E-mail: iaeste@unizar.es Web: www.cps.unizar.es/iaeste

#### In-Forum

Torres Quevedo building Tel.: 976 761977 E-mail: inforum@unizar.es

Fax: 976 761861 Web: http://inforum.cps.unizar.es

#### I.S.C. Junior-Empresa

Centro Politécnico Superior (Torres Quevedo building)Tel.: 976.76.18.67Fax: 976.76.18.61 (especificar ISC)E-mail: isc@unizar.esWeb: http://www.solucionesisc.com/

#### La Cueva de Smaug (Smaug's cave)

Torres Quevedo building E-mail: smaugcps@terra.es Web: www.terra.es/personal6/smaugcps/

#### La Tuna

Torres Quevedo building (basement floor) E-mail: tunadeingenieros@hotmail.com Web: www.tunadeingenieros.com



E-mail: coroingenieros@unizar.es

Web: www.isf-aragon.org

Fax: 976 761861 Web: www.cps.unizar.es/~dire/

Fax: 976 761861

#### IEEE University of Zaragoza Student Branch

Ada Byron building Teléfono 976 761000 Ext. 5337 E-mail: ieeesb@unizar.es

Web: http://ieeesb.cps.unizar.es

**Club de Malabares (juggling)** Edificio Torres Quevedo F-mail: malabari@unizar.es

Web: www.cps.unizar.es/malabares

**Society of modern audiovisual culture studies (SECAM)** Web: http://secam.cps.unizar.es

### Púlsar (University of Zaragoza free software association)

Edificio Torres Quevedo E-mail: pulsar@unizar.es

Web: http://pulsar.unizar.es/

Association for the promotion of space research and development (APSIDE)

E-mail: jonatan.peris@leem.es

Web: http://sseti.unizar.es/





# Courses of Spanish as a Foreign Language

The University of Zaragoza has been teaching Spanish to foreign students since 1927 and its courses are worldwide reputed. The University is also an Official Examination Centre for the Diploma of Spanish as a Foreign Language (Diploma de Español como Lengua Extranjera - DELE), with exams in May and November.

Courses run throughout the year in the venue of Zaragoza (Campus of Plaza San Francisco) but in summer they are transferred to the tourist resort of Jaca (Huesca) in the Pyrenees. Among those lectured in Zaragoza, intensive ones (three weeks, three hours a day) are the most popular and exchange students are offered a reduction on their tuition fees.

Information on the courses and application forms can be found at http://wzar.unizar.es/uz/difusion/zaragoza/ default\_e.html

## **University Libraries**

The library for studies of Engineering and Architecture is called Hypathia de Alejandría library and is located in the *Agustín de Betancourt* Building, in campus Río Ebro. You will be allowed to borrow books and look up its sources as soon as you get registered and, since it takes part of the net of the University libraries, to do so at any of them.

The Hypathia de Alejandría library offers the following services:

**LOANS.** The library catalogue can be consulted at http://roble.unizar.es To use the loan service a current University of Zaragoza user's card is required. Items available in the Roble catalogue can be borrowed and returned at any of the Zaragoza university libraries. Items can be reserved and renewed through the web. Further information is available at http://biblioteca.unizar.es Renewals and reservations can also be made by telephone on 976 761000, ext. 5256.

**PHOTOCOPYING AND INTERLIBRARY LOANS.** Photocopies and documentation from other libraries and organisations can be supplied subject to copyright restrictions. Requests can be made by e-mail at pihypatia@unizar.es or by completing the form at http://biblioteca.unizar.es/pinter.php

**REFERENCE LIBRARY.** Most of the journals and periodicals in the collection are available in electronic form through the general catalogue at http://roble.unizar.es and the A to Z list. The free access display contains the most recent issues of each title subscribed to in printed form. Since 1997 the lists of contents of periodicals available in printed form have been made available in electronic form. This service can be accessed at hypatia@unizar.es

**DATABASES**. A collection of databases accessible by internet is available at http://biblioteca.unizar.es/ basesdatos.php Access is also available at the library if a computer and time is requested at the Reference Library counter (2nd floor).

**INFORMATION AND REFERENCE.** Enquiries can be answered in person, by e-mail at hypatia@unizar.es., by telephone or via the website at the mailbox service.

**SELF ACCESS LANGUAGE LEARNING**. The self access language learning room situated on the first floor is equipped with computers and material provided by the university language institute. Items available from the catalogue can be accessed at http://roble.unizar.es/search\*spi/r?SEARCH=bca

**WEBSITE**: http://biblioteca.unizar.es is the website of the university library. Information about resources and services of the Hypatia library can also be consulted at http://bca.unizar.es

**USER TRAINING.** The Hypatia library organises training sessions in the use of databases and e-resources. Information is available via the website and mail lists. Further information can be found at http://biblioteca.unizar.es/ cursosformacion.php The courses are general, specialised or "à la carte" according to user requirements.

**OTHER RESOURCES.** Work rooms Group I and II (reservations may be made at the loans counter), reference and database computers (reservations at the reference counter).

**HYPATIA LIBRARY QUALITY CERTIFICATION**. The "Hypatia de Alejandría" library was awarded in July 2006 the Quality Certification ISO 9001, establishing a quality commitment to users. Details at http://bca.unizar.es/btcainforma.php

**USER INVOLVEMENT.** Library Committee with student and teacher representatives. Suggestion and complaint forms available at library counters and at http://biblioteca.unizar.es/quejas.php. Communication by letter or personal interview request (via e-mail: hypatia@unizar.es).

FURTHER INFORMATION ABOUT THE RANGE OF SERVICES OFFERED BY THE HYPATIA LIBRARY at: http://bca.unizar.es/Carta\_de\_Servicios.pdf

### By now you can have a look at the Hypathia library's digital services at http://bca.unizar.es/

Reading rooms where to study your own notes or books are also at your disposal in every building.

# **Computer Facilities**

The University of Zaragoza has been settling a WI-FI net since 2004 and now is totally implemented in all its campuses. User id. and password are provided when registering.

Besides equipped classrooms for regular courses there are open-access PC's available in several rooms for students to freely use them. Any student of the University is allowed to use other faculties' and schools' facilities according to their rules.

### Sports

Main campus at Plaza San Francisco counts a complete sports complex with a gym, indoor and outdoor courts for basket ball and five-a-side football, an athletics track, a volley ball court, football pitch,... Furthermore, teams may be made up to take part in University leagues in some of these sports.

Other sports and physical activities are also available on the basis of monitored courses: from aerobics to tai-chi you just need to become a member of the sports club ('Servicio de Actividades Deportivas' -SAD-) and sing up for the activities chosen. Timetables and prices are described at http://www.unizar.es/deportes/promocion/

# Buddy Pair Programme

Some of our students will be delighted to help you to prepare your stay among us and take the best of it: when you are contacted by the international office you will be offered the possibility of meeting this programme and we do encourage you to do so: your integration in the Centre, in the University and also in the city life will doubtlessly benefit from.



# Spanish Language

Exchange students are not required to take any test of proficiency in Spanish language at our Institution. However, since most courses are lectured in Spanish and your daily meetings with Spanish people will rarely be in English, we do encourage you to take courses of Spanish prior and upon arrival as far as you feel you have a weak knowledge at present.

### **Money Matters**

Spain's currency is the Euro. If you need to exchange money you should go to a bank, exchange offices are rarely found in our city.

Spanish people are very keen on credit cards and also on cash-dispensers; you may find them in shopping centres, within some University buildings (Ada Byron and Torres Quevedo got) and almost one in every street.

If you want to open a bank account you need to bring your passport, you will be required to identify yourself through it.

# The Weather

Zaragoza's weather is a bit extreme and really windy, as in many regions with a similar characteristic, our wind also deserves to have its own name: you will soon feel the "cierzo". These are average temperatures, both 40°C in summer and below 0°C in winter are usually reached.



#### Average temperatures

# Electricity

The standard voltage is 220V. Two-pin plugs are standard on most electrical equipment. Adapters can be bought at electronics shops and in supermarkets.

# **Spanish Timetables**

The Southernmost country in Europe, with some more sunlight hours, has different timetables from those of the rest of the Continent:

Labour activities do normally start by 8 or 9 a.m. and finish by 6 or 7 p.m. with a two-hour-break for lunch at 2 p.m. At University, lectures may run even until 9.00 p.m.

Shops open from 9.30 to 13.30 in the morning and from 17.00 to 20.30 in the evening. Supermarkets and shopping centres are normally opened from 9.00 to 21.00 or 10.00 to 22.00. These timetables usually run from Monday to Saturday.

Bank timetables may vary from one to another but they normally open by 8.30 a.m. approx. and close by 2 p.m.

As per meals, we have lunch at 14.00 approx. and dinner at about 21.00 or a bit later but restaurants have wider timetables and University canteens start serving lunch at 13.00.



## **City Transport**

Public transport is supplied by a wide network of urban buses that links city quarters among them and with the city centre. As per lines and fares, check out the information at the webpage of the company (www.tuzsa.es), since this may be one of the first services to use when arriving, it may help to have a view on how it works beforehand.

# Strolling Around de City

Doing it on your own or enjoying the offer of the Tourism Board? One complete each other: Thematic strolls and guided visits are scheduled by the Tourism Board for visitors to have a deeper insight in the city History (*Enter History, Colour Strolls*) and also in its natural surroundings (*Enter Nature*).

You can also tour the city at the "Tourist Bus" or at the "Tourist Taxi", proposals set up in collaboration with the Municipal Tourism Board.

Find more information about these services:

http://www.zaragoza.es/ciudad/turismo/en/ or contact the Tourism Board at: 902 20 12 12.



# Going Out: "Tapas" & Drinks

The "tapas" culture, so popular in Spain, is widely represented in the city and specially in the "Casco Histórico". There, places like "Santa Marta" or "Santa Cruz" squares and the "Tubo" have become emblematic.

Going out with friends to have a drink is a popular way to enjoy the week-end among young people: the city centre and the "Casco Histórico", and also the University district, count dozens of bars where students and young people meet at Friday and Saturday night.

# Celebrations

#### **OCTOBER**

During one week by October 12<sup>th</sup>, the Pilar Festival, with its religious, folkloric and institutional ceremonies, performances on stage and on the streets, sport competitions, exhibitions, fireworks... cheers the city, its

inhabitants and the thousands of visitors attracted every year by its fame.





#### **SPRING**

Easter in Zaragoza also has an outstanding place within the festive tradition of the city. Processions, whose origins go back to the 13th century, gather Faith, tradition and popular feeling in the deafening sound of the drums.

These are just two of the numerous festivals we enjoy in the city, to know more of all of them try this site:

http://www.zaragoza.es/ciudad/turismo/es/agenda/fiestas.htm

# Enjoying the region & the country

Do not forget the location of our city so near Madrid, Barcelona,... for your week-end trips and neither forget the Pyrenees if you are keen on winter sports: all of them can be enjoyed in Aragón. Some students associations organize journeys to visit some of the most interesting places in Spain, do not miss their advices on our board once you are here!





#### Secretary's office

Tel.: 976.76.18.64. Fax: 976.76.28.66. E-mail: seceina@unizar.es

#### Administration

Administrator: María Soledad Pérez Pérez Tels.: 976.76.10.00. (ext. 5021) or 976.76.18.64 E-mail: sperez@unizar.es

#### Library and reference room

Actur campus library "Hypatia de Alejandría". Betancourt building. Telephones: • Management: 976.76.18.62.

- Administration: 976.76.21.71.
- Loans: 976.76.10.00, ext. 5256.
- Reference room: 976.76.10.00, ext. 5201.

Fax: 976-762189 or 976.76.18.61

E-mail: • Bibliographic information, photocopying: bibactur@posta.unizar.es

• Loans and reservation enquiries: circu410@unizar.es

Web: http://bca.unizar.es

#### Reception

Tel.: 976.76.20.32. Fax: 976.76.18.61. E-mail: csjcepsz@unizar.es

#### **Business Relations Office**

Tel.: 976.76.24.05 Fax: 976.76.20.31 E-mail: cpsind@unizar.es Distribution lists: cpspracticas@listas.unizar.es and cpsempleo@listas.unizar.es

#### Universa

E-mail: univactur@unizar.es Web: www.unizar.es/universa

#### International Relations Office

Tel.: 976.76.22.33 Fax: 976.76.28.66 E-mail: irsea@unizar.es

#### Reprography

Tel.: 976.76.10.00. (Ext. 5002) Fax: 976.76.18.61. E-mail: repro@unizar.es

### Management secretary

Tels.: 976.76.10. 00 (ext. 5033) or 976.76.18.68. Fax: 976.76.20.31. E-mail: rpoza@unizar.es / yubigod@unizar.es

#### School of Engineering and Architecture

#### **Campus IT Services**

General information: http://sicuz.unizar.es E-mail: http://www.unizar.es/sicuz/correo/index.html?menu=correo Enquiries: http://moncayo.unizar.es/sicuz/faqsis.nsf/correoweb Remote access: http://www.unizar.es/sicuz/infracomu.html?menu=infracomu Computer rooms: http://www.unizar.es/sicuz/ordenpro.html?menu=ordenpro Emergencies: Tel.: 976.76.10.00 (Ext 5004, 5006 and 5008) Problems, suggestions, requests: salascps@unizar.es Teaching server "merlin": Emergencies: Tel. 976.76.10.00, ext. 1976 Access problems: http://www.unizar.es/sicuz/siscen/index.html?menu=siscen follow the link "Solución automática de problemas de acceso al servidor de docencia".

#### **Campus maintenance service**

Tel.: 976.76.19.76 E-mail: fpeguero@unizar.es

#### **Research support services:**

- Precision Mechanics Service Tel.: 976.76.19.72
- SElectronic Microscopy Service Tel.: 976.76.10.00 (Ext.5128) Web: http://wzar.unizar.es/invest/sai/

#### University information and claims centre

Tels.: 976.76.10.02 or 976.76.10.00 (Ext.5003) Web: www.unizar.es/gerencia/ vgacademicos/ciur/index.html

#### Language Institute

Tel.: 976.76.10.00 (Ext. 5246) Fax: 976.76.10.25 E-mail: idiomas@unizar.es Web: http://www.unizar.es/idiomas

#### Student advisory services

Offices in the management area (Torres Quevedo building, next to Secretary's Office)

- Legal advice
- Counselling service
- Sexual advice

• Advice on study techniques. Tel. 976.76.13.56 E-mail: asesoria@unizar.es

| Useful telephone numbers |              |  |
|--------------------------|--------------|--|
| Emergencies              | 112          |  |
| Sanitary emergency:      | 061          |  |
| National Police:         | 091          |  |
| Local Police:            | 092          |  |
| Duty Chemist's:          | 901 71 23 77 |  |
| Civil Protection:        | 006          |  |
| Guardia Civil:           | 062          |  |
| Firemen:                 | 080          |  |

| Municipality's Information        |              |  |
|-----------------------------------|--------------|--|
| City Council:                     | 010          |  |
| Citizen relationship office:      | 976 72 12 47 |  |
| CIPAJ. Information for youngers:  | 976 72 18 18 |  |
| Information office for consumers: | 976 39 61 50 |  |
| Woman House:                      | 976 39 11 16 |  |
| Tourism in Zaragoza:              | 902 20 12 12 |  |
| Water (Malfunctions):             | 976 72 15 50 |  |
| Electricity and gas:              | 976 76 00 00 |  |
| Central Post office:              | 976 23 68 68 |  |

| Transports       |                            |              |
|------------------|----------------------------|--------------|
| Taxi:            | Radio Taxi Aragón:         | 976 38 38 38 |
|                  | Radio Taxi Zaragoza:       | 976 42 42 42 |
|                  | Cooperativa Auto Taxi:     | 976 75 15 15 |
| City Bus-TUZSA:  | 902 39 2008 / www.tuzsa.es |              |
| Railway station: | 902 24 02 02               |              |
| Airport:         | 902 404 704                |              |