ASIIN Seal & EUR-ACE Labels

Accreditation Report

Bachelor's Degree Programme
Chemical Engineering
Mechanical Engineering

Provided by
University Rovira I Virgili

Version: 23 September 2022

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A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Grau en Enginyeria Quimica	Bachelor Chemical Engineering	ASIIN, EUR-ACE® Label		TC 1
Grau en Enginyeria Mecanica	Bachelor Mechanical Engineering	ASIIN, EUR-ACE® Label		TC 1
Date of the contract: December 2021 **Submission of the final version of the self-assessment report:** 13.05.2022 **Date of the onsite visit:** 30 June and 1 July 2022 **at: Tarragona**				
Peer panel: Peers from ASIIN Prof. Dr. Guido Mihatsch, University of Applied Sciences Gelsenkirchen Prof. Dr. Anne Schulz-Beenken, University of Applied Sciences Suedwestfalen Peers from AQU Cesar Valdés Álvarez, MA, Dow Chemical, Prof. Dr. Antonio López Cabanes, University of Murcia, Lola Ache Moreno, Politechnical University of Catalonia (Student) Prof. Dr. Pablo Moreno Pedraz, University of Salamanca,				

[1] ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes.

[2] TC: Technical Committee for the following subject areas: TC 01 - Mechanical Engineering/Process Engineering; TC 02 - Electrical Engineering/Information Technology; TC 03 - Civil Engineering, Geodesy and Architecture; TC 04 - Informatics/Computer Science; TC 05 - Physical Technologies, Materials and Processes; TC 06 - Industrial Engineering; TC 07 - Business Informatics/Information Systems; TC 08 - Agriculture, Nutritional Sciences and Landscape Architecture; TC 09 - Chemistry; TC 10 - Life Sciences; TC 11 - Geosciences; TC 12 - Mathematics; TC 13 - Physics.

Representative of the ASIIN headquarter: Dr. Michael Meyer **Representative of the AQU headquarter:** Dr. Beatriz Atienza Carbonell	
Responsible decision-making committee: Accreditation Commission	
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 01 – Mechanical Engineering/Process Engineering as of December 9, 2011;	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Ba Chemical Engineering	Bachelor in Chemical		Level 6	Full time	--	8 Semester	240 ECTS	2010/11
Ba Mechanical Engineering	Bachelor in Mechanical Engineering		Level 6	Full time	--	8 Semester	240 ECTS	2010/11

For the Bachelor's degree programme in Chemical Engineering the institution has presented the following profile in the self-assessment report and the website:

Students in the Bachelor in Chemical Engineering will be trained as a multidisciplinary professional and expert in the field of chemical engineering, with skills in the analysis, conception, calculation, design, construction, monitoring, control, optimization and operation of installations, equipment and products in the chemical industry. At the same time, they should will be qualified to exercise the regulated profession of industrial engineer.

Graduates should be able qualified to work in:

- Chemical and petrochemical companies.

and as part of multidisciplinary teams in the:

- Food industry.
- Pharmaceutical industry.
- Energy and environmental industry.
- Engineering companies.
- Water treatment and purification industry.

[3] EQF = The European Qualifications Framework for lifelong learning

- Electric and nuclear industry.

For the Bachelor's degree programme Mechanical Engineering the institution has presented the following profile in the self-assessment report and the website.

Graduates in Mechanical Engineering should be able to design, manage and maintain industrial supply systems, air conditioning and fluid transport systems, oil-hydraulic and pneumatic systems, thermal machines and motors and heat exchange systems. They should acquire the skills needed to plan and design machine elements and structures based on calculation methods, materials, and the conditions related to their manufacture. To do so, they should learn to use CAD, CAE and CAM tools, and analytical and experimental techniques. Graduates should become experts in the designing, planning and interpretation of trials of machinery and mechanical assemblies. They should be able to apply the principles and methods related to quality management, and you will develop the skills needed to analyse and assess the social and environmental impact of technical solutions, as well as to optimize and rationalize production processes.

Graduates should be qualified to work in the following areas:

- Planning and management of projects related to fluid transport systems, industrial refrigeration and cooling, ventilation and heating.
- Design and management of industrial structures and installation projects.
- Project, design, construction, testing and use of all kinds of mechanical systems.
- Design and control of the processes related to the manufacture of machines and mechanical actuators.
- Computer aided design and manufacturing.
- Project, design and use of new materials.

C Peer Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

Evidence:

- Self-Assessment Report
- Webpage of all study programmes
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors base their assessment of the learning outcomes as provided on the websites and in the Self-Assessment Report of the two Bachelor's degree programmes under review. They refer to the Subject-Specific Criteria (SSC) of the respective Technical Committee for Mechanical Engineering and the EUR-ACE framework.

The peers come to the following conclusions:

Graduates of the Bachelor's degree programme should gain extensive technical knowledge as to engineering, mathematics and natural science with a view to chemical respectively mechanical engineering and an understanding of the multi-disciplinary context of Engineering Sciences. In the formulated objectives of the university, the peers recognise that graduates should be qualified to identify, formulate and solve problems peculiar to chemical and mechanical engineering, to analyse and assess products, processes and methods used in their discipline and to choose suitable methods of analysing, modelling, simulating and optimising and apply them. Additionally the peers recognise that graduates should have the ability to conceive designs for machinery, devices, EDP programmes or processes and to develop them according corresponding to the status of their knowledge. Regarding transferable skills graduates should be able to work in teams, to communicate effectively

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

and to be aware of the health, safety, legal issues and responsibilities of engineering practice and of the impact of engineering solutions in a social and environmental context. They also should be able to apply investigation methods in order to find information needed for their work.

The auditors hold the view that the objectives and intended learning outcomes of both degree programmes under review are reasonable and well founded. They appreciate that various stakeholders are involved in the constant review and development of the objectives and curricula. Both programmes are linked closely with the regional industry via an advisory board, which is given constantly recommendations about the further development of the programmes. Due to these connections, the peers understand the concentration on chemical engineering even in the programme of mechanical engineering as the regional industry is focused on this field.

In summary, the auditors are convinced that the intended qualification profiles of both programmes under review allow students to take up an occupation, which corresponds to their qualification. The peers conclude that the objectives and intended learning outcomes of the degree programmes adequately reflect the intended level of academic qualification and correspond sufficiently with the ASIIN Subject-Specific-Criteria (SSC) of the Technical Committee 01 – Mechanical Engineering and the EUR-ACE framework.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors confirm that the English translation and the original Catalan/Spanish names of the degree programmes under review correspond with the intended aims and learning outcomes.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Reports
- Study plans of the degree programmes

- Module descriptions
- Webpages of all study programmes
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The Curriculum of the bachelor's degree programme in chemical engineering contents in the first four semester fundamentals of mathematics, natural sciences and engineering fields (Mathematics 1 to 3, Chemistry 1 and 2, Physics, Physical Chemistry, Graphical Expression, Computing in Process Engineering, Fluid Mechanics, Fundamentals of Process Engineering, Transport Phenomena, Thermodynamics, Electrotechnics, Chemical Kinetics, Chemical Process and Products Transport). Additional, students learn fundamentals of economy and industrial organisation. In the third year more specific fundamentals like Material Sciences, Resistance of Materials, Technical Thermodynamics, Biotechnology are combined with the application of the fundamental knowledge in modules like Control and Instrumentation, Industrial Safety, Design of Heat exchange operations, Design of separation operations, Simulations and Analysis of Chemical Processes, Environmental Technology. Additional, students get first impressions of project management and specific modules with laboratory work are implemented each year. The last year contents compulsory modules about Design of Equipment and Chemical Plants, Electronics, Machines and Mechanisms and the Bachelor Thesis. Additional, students choose several elective courses and have the opportunity for an optional internship.

The Curriculum of the bachelor's degree programme in mechanical engineering contents in the first two years fundamentals of mathematics, natural sciences and engineering fields (Mathematics in Engineering 1 and 2, Numerical Methods and algorithmic Programming, Physics in Engineering 1 and 2, Chemistry in Engineering, Technology of Materials, Elasticity and Strength of Materials 1 and 2, Mechanics 1 and 2, Thermal Engineering 1 and 2). Additional students get an introduction in Business Administration and Organisation of Production and become familiar with CAD. In the third year, more specific fundamentals are implemented like Fluid Mechanics, Electrical Technology, Mechanical Technology, Automation and Electronics Technology, Hydraulics and combined with first applications in modules like Industrial Heating and Cooling, Theory and Design of Structures and Machine Design. Additional, students get first impressions of operation management and besides specific modules with laboratory work projects with 6 ECTS points are implemented each year. The last year contents compulsory modules about Industrial Construction, Dynamics of Mechanical Systems Technical Office, Technical English and the Bachelor Thesis. Additional, students choose several elective courses and have the opportunity for an optional internship.

From the point of view of the peers, both programmes are structured very well. The curricula implement all the defined study aims and learning outcomes. Especially the panel appreciates the broad range of laboratory work implemented in the programmes and for the bachelor programme in mechanical engineering the project oriented teaching as well.

Out of the discussion with representative of the industry, the peers learn that graduates have a good general overview and are able to find solutions even for problems they do not know at the beginning of a project. They are able to specialise themselves in specific topics, are good team workers and have extended practical experiences comparing to graduates from other universities. On the other side, the representatives of industry mentioned that the English skills of the graduates could be improved as well as the programming skills of the graduates in chemical engineering. As these are the only deficits marked in the discussion the peers recommend to the university to react on these points.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Reports
- Decree of Minister of Education and Science May 24, 2021, No. 241
- Discussions during the audit

Preliminary assessment and analysis of the peers:
According to the Self-Assessment Reports, admission procedures and policies for new undergraduate students follow the Royal Decree 412/2014. The requirements, schedule and registration venue test are announced on the webpage and thus accessible for all stakeholders. Applicants are ranked regarding the school grades and the enrolment follows this ranking list until all places has been assigned.

The auditors find the terms of admission to be binding and transparent. They confirm that the admission requirements support the students in achieving the intended learning outcomes. Nevertheless, the peers notice that the demand for the programmes is a challenge for the university. On the one hand, most qualified students prefer universities in Barcelona due to the attractiveness of the city. On the other side, the number of applicants is not as high as wished by the university, as the titles of the programmes are not attractive to pupils. However, due to legal regulations the university cannot use keywords like sustainable life science or similar titles applicants would be more interested in.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

The peers are grateful for the correction of a mistake by the comment of the university. By mistake the peers wrote in their preliminary assessment that internships would be optional in both programmes. As in the programme in chemical engineering the internship already is compulsory they suggest the corresponding recommendation only for the bachelor programm mechanical engineering.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Discussions with programme coordinators, teaching staff and students

Preliminary assessment and analysis of the peers:

The structure of the programmes under review is clearly outlined on the subject specific website for each study programme. The programmes consist of modules, which comprise a sum of teaching and learning. The module descriptions are also published on the subject specific website. Based on the analysis of the sequence of modules and the respective module descriptions the peers concluded that the structure of both programmes ensures that the learning outcomes can be reached. The programmes also offers several elective courses, which allows students to define an individual focus. Based on the analysis of the curriculum and the module descriptions the peers confirmed that the objectives of the modules and their respective content help to reach both the qualification level and the overall intended learning outcomes.

As the panel agrees with the programme coordinators that internships force the connection with industry, allow students additional qualifications and help graduates to find jobs more easily, the auditors recommend to define the currently optional internships as mandatory part of the curricula.

In order to support the international mobility of students the faculty has established several student exchange programmes with international universities. For the recognition of courses finished abroad the university has defined transparent regulations.

20-30% of the students take part in the exchange programmes but only few students came in exchange to Tarragona. From the point of view of the auditors, the number of outgoing students could be even increased by offering additional attractive cooperating universities. To become more interesting for exchange programmes with international universities it could be helpful to establish more international structures in the programmes by offering more courses in English or Spanish. As many foreign students speak English or Spanish but not Catalan, such offers could increase the number of interested foreign exchange students and in succession, additional international universities could be interested in student exchange cooperation.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
To define the student workload the university uses the ECTS credit point system taking into account the time for lectures and self-studies. Regarding the objectives and the content of the single modules, the calculated workload seems to be appropriate and students confirm this impression in general.

The peers discuss the comparing high dropout rate with 25-30% in Chemical Engineering and about 18% in Mechanical Engineering and the long study times. As main reason to leave the programmes without graduation students and programme coordinators mention the transfer from school to university. Students are not familiar with the higher workload at university and have difficulties to manage the higher requirements. This conjecture is confirmed by the fact that nearly all dropout take place in the first year. As most students do not have a high school graduation and many are the first academics in their families, they have more difficulties dealing with the circumstances at universities.

The university offers crush courses and tutorials and students confirm that these offers are very helpful. Nevertheless, the demand by students is very low. From the point of view of the auditors it would be very helpful to increase the support of students in the first year.

For example they mentioned so called long tracks in which students have the opportunity to extend the first semester or year to one or two years. Experiences from other universities show that such regulations facilitate the change from school to university especially for those students who perform low.

Regarding the long study time the auditors understand that nearly all students have to work in order to finance their studies and part time programmes are not offered yet.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Reports
- Study plans of the degree programmes
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Various teaching and learning methods (including lectures, computer training and classroom and lab exercises, individual and group assignments, seminars and projects) have been implemented.

The auditors especially appreciate the extended project work. From the discussion with representatives they learn that graduates do not need long time to involve themselves into processes of the companies due to their experiences in projects. The projects are organised with different roles and responsibilities of the students. Within the projects the students train as well their social competences regarding teamwork, communication skills and leadership.

Regarding practical experiences of the students, the peers appreciate the proportion of laboratory work implemented in the curricula. In the Bachelor in chemical engineering the students are divided in groups up to three persons whereas in the Bachelor of mechanical engineering the students mentioned that most of the exercises are only demonstrated by lecturers and students only do few experiments by themselves due to a lack of workstations. For both programmes students mentioned that in some cases they could not finalise their experiments due to damaged equipment. During the visitation of the laboratories the auditors got the impression that the equipment of the teaching labs could be modernised indeed while the research labs are equipped adequately.

During the discussion with the peers the students wished to get more opportunities to improve their English skills. Although there are some modules about English language implemented in the curricula the students mentioned a lack of technical English and wish to get more field specific modules taught in English as well in order to be better prepared for international activities. This wish of the students correlate with the impression of representatives of industry mentioned above and the peers underline their recommendation to offer more opportunities for students to improve their English skills.

In summary, the peer group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concept of both undergraduate programmes comprises a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format although institutional conditions like the equipment of teaching laboratories limited the effects. It actively involves students in the design of teaching and learning processes (student-centred teaching and learning).

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Reports
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Besides the field specific advisory system by the lecturers, the university offers support in medical and social belongings for the students. Also a career center is implemented at the university and dormitories are available for students.

For the personal support of students the university established a tutorial system in which lecturers are contact persons for specific students. While the peers in general appreciate the implementation of such a system, it seems not to work very well. As students are appointed to the tutors, most of them prefer to contact lecturers they already know out of projects or laboratory work in case of problems. The peers encourage the university to discuss the organisation of the tutor system with the students.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

The peers appreciate that the university clarify a misunderstanding about part time studies in its comment. Out of the comment the peers learn that there is a part time study offer but this is only chosen by few students.

Nevertheless, the peers confirm their preliminary assessment.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Self-Assessment Report
- Module descriptions
- Examination regulations

Preliminary assessment and analysis of the peers:
According to the Self-Assessment Report, the students' academic performance is evaluated based on their attendance and participation in class, their laboratory works and reports, assignments, homework, project works and presentations. In general, exams are written tests. In several courses also oral presentations of lab reports or project work are required. In addition, group discussions and practical exams in courses with high laboratory practice are conducted.

The peers inspect samples of examination papers and final theses and are overall satisfied with the general quality of the samples. The requirements in the exams, projects and theses correspond for the auditors with the qualification level of the two programmes.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

As the university waived to comment the report the peers confirm their preliminary assessment.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self Assessment Report
- Staff handbook
- Discussions with programme coordinators and teaching staff

Preliminary assessment and analysis of the peers:
In the bachelor's degree programme in chemical Engineering 16 Professors and 23 senior lecturers are involved while 2 Professors and 9 senior lecturers are teaching in the bachelor's degree programme in mechanical engineering. Temporary staff only is involved in higher semester for specific topics within several modules.

The majority of the teaching staff in mechanical engineering will retire within the next years. As the average age of the staff is relatively high, the replacements have to be done within a comparing short period, could be a challenge for the department. The auditors appreciate the statement of the rectorate that all positions will be replaced. Nevertheless, they recommend to start the recruiting process early in order to find appropriate successors even if the most retirements will take place after the accreditation period will be over.

The professors are involved in several research projects most in cooperation with other European universities. Over all the peers see an appropriate network of the university and the department with national and international research institutions. From the point of view of the peers the quantity and qualification profile of the current staff ensure the implementation of both programmes.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The peers discuss with the members of the teaching staff the opportunities to develop their personal skills and learn that the teachers are satisfied with the internal qualification programme, their opportunities to further improve their didactic abilities.

In summary, the auditors confirm that the university offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to further develop their professional and teaching skills.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussions with programme coordinators and teaching staff
- visit of the laboratories, lecture rooms, and the library

Preliminary assessment and analysis of the peers:
The peers were explained that financial sources for the university is originated from government funding. The operational funds are distributed to the departments based on a specific formula depending on the number of students.

The peers were convinced that the financial means were sufficient and secured for the timeframe of the accreditation. The equipment of the institution ensures to conduct the education in the programmes in the defined way, besides the fact that some equipment of the teaching laboratories could be modernised.

From the student the peers learn that they have online access to national and international literature.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

As the university waived to comment the report the peers confirm their preliminary assessment.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions

Preliminary assessment and analysis of the peers:
The students, as all other stakeholders, have access to the module descriptions via internet. The module description are published on the websites of the programmes in Spanish and Catalan. Regarding the exchange of students the peers mark that is could be helpful if the description would be available in English as well.

After studying the module descriptions, the peers confirm that they include all necessary information about the persons responsible for each module, the teaching methods and work load, the awarded credit points, the intended learning outcomes, the content, the applicability, the admission and examination requirements, and the forms of assessment and details explaining how the final grade is calculated.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Reports
- Sample Diploma for each degree programme
- Sample Diploma Supplement for each degree programme

Preliminary assessment and analysis of the peers:
The peers confirm that the students of all degree programmes under review are awarded a Diploma and a Diploma Supplement after graduation. The samples of the Diploma Supplements contains detailed information about the educational objectives, intended learning outcomes as well as about the educational system of Spain and statistical data according to the ECTS-Users' guide in addition to the final grade.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Reports
- All relevant regulations as published on the university's webpage

Preliminary assessment and analysis of the peers:
The auditors confirm that the rights and duties of both university and students are clearly defined and binding. All rules and regulations are published on the university's website and hence available to all stakeholders. In addition, the students receive all relevant course material in the language of the degree programme at the beginning of each semester.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

As the university waived to comment the report the peers confirm their preliminary assessment.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Reports
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors discuss the quality management system with the programme coordinators and the students. They learn that there is a continuous process in order to improve the quality of the degree programmes and it is carried out through internal and external quality assurance.

All programmes are regular part of internal quality assessment procedures of the Management and Quality System. This includes also evaluations of the single courses by students. The results of the student evaluations are taken into account for the further development of the programmes.

Student confirm to the peers that they get a feedback about the results but the remark that they get no information about the measures taken in order to improve the programmes based on the student evaluation.

The auditors gain the impression that the Departments take the students' feedback seriously and changes are made if necessary. They understand that in some cases measures need time to be implemented so students do not see changes as they already finished the corresponding course. Nevertheless, it could be helpful to communicate the reaction on the evaluation more intensively in order to improve the motivation of the students to take part in the evaluation.

The panel confirms that the quality management system is suitable to identify weaknesses and to improve the degree programmes.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

As the university waived to comment the report the peers confirm their preliminary assessment.

D Additional Documents

„No additional documents needed“

E Comment of the Higher Education Institution

The university waives to comment the report.

F Summary: Peer recommendations

The peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN-seal	Maximum duration of accreditaiton	Subject-specific label	Maximum duration of accreditaiton
Ba Chemical Engineering	Without requirements	30.09.2028	EUR-ACE	30.09.2028
Ba Mechanical Engineering	Without requirements	30.09.2028	EUR-ACE	30.09.2028

* Subject to the approval of the ENAEE Administrative Council

Recommendations

For both programmes

E 1. (ASIIN 1.3) It is recommended to promote more intensively the English skill of the students.

E 2. (ASIIN 2.2) It is recommended to intensify the support of students during the first semesters.

E 3. (ASIIN 2.3) It is recommended to modernize the equipment of the education laboratories.

For the Bachelor Chemical Engineering

E 4. (ASIIN 1.3) It is recommended, to promote more intensively students' programming skills.

For the Bachelor Mechanical Engineering

E 5. (ASIIN 1.3) It is recommended to implement a mandatory internship.

E 6. (ASIIN 4.1) It is recommended to develop a strategy for the staff replacements in the next years especially regarding modern requirments for digitalization.

G Comment of the Technical Committee

The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.

The Technical Committee recommend to award of the seals as follows:

Degree Programme	ASIIN-seal	Maximum duration of accreditaiton	Subject-specific label	Maximum duration of accreditaiton
Ba Chemical Engineering	Without requirements	30.09.2028	EUR-ACE	30.09.2028
Ba Mechanical Engineering	Without requirements	30.09.2028	EUR-ACE	30.09.2028

* Subject to the approval of the ENAEE Administrative Council

H Decision of the Accreditation Commission

Assessment and analysis for the award of the ASIIN seal:

The Accreditation Commission discusses the procedure and followst he assessement oft he peers and the Technical Committee without any changes.

Assessment and analysis for the award of the EUR-ACE® Label:

The Accreditation Commission deems that the intended learning outcomes of the degree programmes do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 01 – Mechanical Engineering/Process Engineering.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Chemical Engineering	Without requirements	EUR-ACE	30.09.2027
Ba Mechanical Engineering	Without requirements	EUR-ACE	30.09.2027

Recommendations

For both programmes

E 1. (ASIIN 1.3) It is recommended to promote more intensively the English skill of the students.

E 2. (ASIIN 2.2) It is recommended to intensify the support of students during the first semesters.

E 3. (ASIIN 2.3) It is recommended to modernize the equipment of the education laboratories.

For the Bachelor Chemical Engineering

E 4. (ASIIN 1.3) It is recommended, to promote more intensively students' programming skills.

For the Bachelor Mechanical Engineering

E 5. (ASIIN 1.3) It is recommended to implement a mandatory internship.

E 6. (ASIIN 4.1) It is recommended to develop a strategy for the staff replacements in the next years especially regarding modern requirements for digitalization.

Appendix: Programme Learning Outcomes and Curricula

According to the SAR the Bachelor degree programme in Chemical Engineering shall achieve the following **objectives** and **learning outcomes (intended qualifications profile)**:

[…]

ASIIN - SSC 01	Intended Learning Outcomes of the GEM
1. Knowledge and understanding	
Graduates have in particular:	
KU1 Gained extensive technical knowledge as to engineering, mathematics and natural science with a view to mechanical engineering / process engineering / chemical engineering, enabling them to carry out scientifically substantiated work and act responsibly in their professional activities.	A1.1 Consistently apply knowledge of basic scientific and technological subjects pertaining to engineering
	A3.1 Ability to solve a wide range of mathematical problems in engineering. Ability to apply the knowledge of linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial differential equations, numerical methods, numerical algorithms, statistics and optimisation (FB1)
	A3.2 Comprehension and dexterity in the application of the fundamentals and the general laws of mechanics, thermodynamics, fields, waves, electromagnetism and their application to solve engineering problems (FB2)
	A3.3 Basic knowledge of the use and programming of computers, operating systems, databases and software for engineering applications (FB3)
	A3.4 Ability to understand the basics of general chemistry, organic and inorganic chemistry, and their applications in engineering (FB4)
	A3.5 Ability for spatial vision and graphical representation techniques, using both traditional methods of metric and descriptive geometry and computer-aided design (FB5)
	A4.1 Knowledge of applied thermodynamics and heat transfer. Fundamental laws and their application to engineering problems (RI1)
	A4.2 Knowledge of the fundamental principles of fluid mechanics and their application to engineering problems. Calculation of piping networks, channels and fluid systems (RI2)

	A4.3 Knowledge of materials science, technology and chemistry fundamentals. Understanding the relationship between their microstructure, their synthesis, their processing and their properties (RI3)
	A4.4 Knowledge and use of the fundamentals of circuit theory and electric machines (RI4)
	A4.5 Knowledge of the fundamentals of electronics (RI5)
	A4.6 Knowledge of the fundamentals of automation technology and control methods (RI6)
	A4.7 Knowledge of the principles of the mechanism and machine theory (RI7)
	A4.8 Knowledge and use of the principles of strength of materials (RI8)
	Intended Learning Outcomes of the GEQ
	A4.8 Knowledge and use of the principles of the strength of materials (RI8)
	A4.10 Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	B4.4 Knowledge in basic and technological subjects that enables them to learn new methods and theories and gives them the versatility to adapt to new situations. (G3)
	A1.3 Ability to analyse and assess the social and environmental impact of technical solutions (G7)
	A2.3 Ability to write, sign off and develop industrial engineering projects, in the field of industrial chemistry for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
	B3.1 Ability to work in a multilingual and multidisciplinary environment. (G10)
2. Engineering Analysis	
Graduates are particularly qualified to:	
EA1 Identify, formulate and solve problems peculiar to mechanical engineering / process engineering / chemical engineering based on	A1.1 Consistently apply knowledge of basic, scientific and technological subjects pertaining to engineering
	Knowledge and ability to mandatory standards and legislation to practise professionally as a qualified "enginyer tècnic industrial, especialitat en Química Industrial" (G11)

the application of established scientific methods.	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
	Ability to solve problems with initiative, decision-making, creativity and critical reasoning, and to communicate and transmit knowledge, skills and abilities in the field of Iindustrial Ttechnical Eengineering, specialiseding in Iindustrial Cchemistry. (G4)
EA2 Analyse and assess products, processes and methods used in their discipline based on scientific facts.	Knowledge to perform measurements, calculations, valuations, assessments, appraisals, studies, reports, work plans and analogous tasks (G5)
	A5.4 Capacity to design, manage and operate procedures (QI4)
	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
EA3 Choose suitable methods of analysing, modelling, simulating and optimising and apply them with a high degree of competence.	A3.3 Basic knowledge of the use and programming of computers, operating systems, databases and software for engineering applications (FB3)
	A5.2 Ability to analyse, design, simulate and optimise processes and products (QI2)
	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
3. Engineering Design	
Graduates are particularly qualified to:	
ED1 The ability to conceive designs for machinery, devices, EDP programmes or processes correspondent to the status of their knowledge and to develop them according to specified requirements.	A1.4 Ability to apply the principles and methods of quality control (G8)
	A2.1 Ability to deal with specifications, regulations and mandatory standards (G6)
	A2.3 Ability to write, sign off and develop industrial engineering projects, in the field of industrial chemistry for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A5.1 Knowledge of material and energy balances, biotechnology, mass transfer, separation operations, chemical reaction engineering, reactor design and valorisation and transformation of raw materials and energy resources (QI1)

	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
ED2 A practically orientated understanding of design methods and the ability to apply them in a competent manner.	Ability to deal with specifications, regulations and mandatory standards (G6)
	A2.3 Ability to write, sign off and develop industrial engineering projects, in the field of industrial chemistry for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A5.2 Ability to analyse, design, simulate and optimise processes and products (QI2)
	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
4. Investigations and Assessment	
Graduates are in particular qualified to:	
ASIIN - SSC 01	**Intended Learning Outcomes of the GEQ**
IA1 Carry out literature research in accordance with the status of their knowledge and understanding and to use data bases and other sources of information for their work.	Ability to write, sign off and develop industrial engineering projects, in the field of industrial chemistry for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
	B1.5 Use ICT to efficiently manage information and knowledge
IA2 Plan and carry out suitable experiments correspondent to the status of their knowledge and understanding, to interpret the data and draw suitable conclusions.	A1.2 Design, execute and analyse experiments related to engineering
	A5.3 Ability to design and manage applied experimental procedures, especially to determine thermodynamic and transport properties and to model phenomena and systems in the field of chemical engineering, fluid flow systems, heat transfer, mass transfer operations, kinetics of chemical reactions and reactors (QI3)
	A5.4 Capacity to design, manage and operate procedures (QI4)
5. Engineering Practice	
Graduates are in particular able to:	

EP1 Able to transfer new findings in engineering and natural sciences to industrial and commercial production under consideration of economic, ecologic and safety requirements as well as sustainability and environmental compatibility.	Ability to manage specifications, regulations and mandatory standards (G6)
	A2.3 Ability to write, sign off and develop industrial engineering projects, in the field of industrial chemistry for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A2.4 Knowledge and ability to mandatory standards and legislation to practise professionally as a qualified ”enginyer tècnic industrial, especialitat en Química Industrial” (G11)
	Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
EP2 Able to plan, control and monitor processes and to develop and operate systems and equipment.	A1.4 Ability to apply the principles and methods of quality control (G8)
	Ability to write, sign off and develop industrial engineering projects, in the field of industrial chemistry for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A4.6 Knowledge of the fundamentals of automation technology and control methods (RI6)
	A4.9 Basic knowledge of production and manufacturing systems (RI9)
	A4.12 Knowledge and ability to organise and manage projects; understanding of the organisational structure and the functions of a project office (RI12)
	A5.2 Ability to analyse, design, simulate and optimise processes and products (QI2)
	A5.4 Capacity to design, manage and operate procedures (QI4)
EP3 Able to independently consolidate the knowledge gained.	A6.1 Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
	Learn independently and with initiative.
EP4 Aware of the non-technical effects of engineering activities.	A1.3 Ability to analyse and assess the social and environmental impact of technical solutions (G7)
	A2.1 Ability to deal with specifications, regulations and mandatory standards (G6)

	Ability to write, sign off and develop industrial engineering projects, in the field of industrial chemistry for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A4.10 Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	Individually elaborate an original project in the field of industrial engineering, to be presented and defended in front of an examination panel. The project must focus on professional practice and apply and integrate the set of skills acquired along the degree (TFG1)
	Apply ethical principles and social responsibility as a citizen and as a professional (CT7)
6. Transferable Skills	
Graduates are able to:	
TS1 Function effectively as an individual and as a member of a team, including where relevant coordination of the team.	B1.3 Work effectively and resist adversity
	Ability to organise and plan in the company and other institutions and organisations (G9)
	B2.2 Ability to manage the activities of engineering projects related to the profession of Industrial Technical Engineering, specialised in Industrial Chemistry. (G2)
	B2.3 Influence and guide others to improve performance. (b)
	B2.4 Promote a suitable environment for the development of individuals. (b)
	B2.5 Provide guidelines for defining and achieving objectives. (b)
	B2.6 Establish and maintain productive relationships with team members and "clients" by gaining their trust and respect. (b)
	B3.2 Contribute effectively to achieving the team's objectives through cooperation, participation and commitment to the shared vision and goal.
	B3.3 Work as a team in a collaborative way, with shared responsibility and initiative.
	B3.4 Resolve conflicts in a constructive way.
	B5.1 Work independently with responsibility, initiative and innovative thinking.
	B5.2 Take on entrepreneurial positions.
TS2	B1.1 Communicate information clearly and accurately to diverse audiences
	B1.5 Use ICT to efficiently manage information and knowledge

Use diverse methods to communicate effectively with the engineering community and with society at large.	B2.7 Relate with internal or external "clients" to identify their needs. (a)
TS3 Demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.	A1.3 Ability to analyse and assess the social and environmental impact of technical solutions (G7)
	Ability to deal with specifications, regulations and mandatory standards (G6)
	Knowledge and ability to mandatory standards and legislation to practise professionally as a qualified "enginyer tècnic industrial, especialitat en Química Industrial" (G11)
	A4.10 Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	B6.1 Show ethical behaviour towards members of the university community and society in general.
	B6.2 Apply ethical principles and social responsibility as a citizen and as a professional.
TS4 Demonstrate awareness of project management and bussines practices, such as risk and change management, and understand their limitations.	A3.6 Adequate knowledge of the concept of company and its institutional and legal framework. Business organisation and management skills (FB6)
	A4.11 Applied knowledge of business organisation (RI11)
	A4.12 Knowledge and ability to organise and manage projects; understanding of the organisational structure and the functions of a project office (RI12)
	B1.2 Adapt to a changing environment
	B2.1 Ability to organise and plan in the company and other institutions and organisations (G9)
	B2.2 Ability to manage the activities of engineering projects related to the profession of Industrial Technical Engineering, specialised in Industrial Chemistry. (G2)
TS5 Recognise the need for, and have the ability to engage in independent, life-long learning.	B1.2 Adapt to a changing environment
	B4.1 Learn effective ways to assimilate knowledge and behaviour.
	B4.2 Identify the learning process and academic and professional preferences
	B4.3 Learn independently and with initiative.
	B4.4 Knowledge in basic and technological subjects that enables them to learn new methods and theories and gives them the versatility to adapt to new situations. (G3)
TS6 Work and communicate in national and international contexts.	B1.1 Communicate information clearly and accurately to diverse audiences
	B3.1 Ability to work in a multilingual and multidisciplinary environment. (G10)

The following **curriculum** is presented:

First year		Total credits: 60 ECTS					
Major		**Subject**					
	ECTS		**ECTS**	**Type**	**Period**	**Credits**	
						1st	**2nd**
Graphical Expression	6	•Graphical Expression	6	BC	1st	6	
Physics	12	•Physics •Physical Chemistry	6 6	BC	1st 2nd	6	 6
Computing	6	•Computing in Process Engineering	6	BC	2nd		6
Mathematics	9	•Mathematics I	9	BC	Annual	6	3
Process and Product Engineering	9	•Fundamentals of Process Engineering (AI 1-4)	9	COMP	Annual	6	3
Fluid Mechanics	6	•Fluid Mechanics Engineering	6	COMP	2nd		6
Chemistry	12	•Chemistry I •Chemistry II	6 6	BC BC	1st 2nd	6	 6

Second year		Total credits: 60 ECTS					
Major		**Subject**					
	ECTS		**ECTS**	**Type**	**Period**	**Credits**	
						1st	**2nd**
Mathematics	12	• Mathematics II • Mathematics III	6 6	BC	1st 2nd	6	 6
Business	6	• Economy and Industrial Organization	6	BC	2nd		6
Electrotechnics and Electronics	6	• Electrotechnics	6	COMP	2nd		6
Transport Phenomena	6	• Transport Phenomena	6	COMP	1st	6	
Process and Product Engineering	9	• Chemical Processes and Products (AI-2)	9	COMP	Annual	4,5	4,5
Chemical Engineering Laboratory	6	• Transport Phenomena and Fluid Mechanics Laboratory • Chemical Thermodynamics and Kinetics Laboratory	3 3	COMP COMP	Annual Annual	1,5 1,5	1,5 1,5
Chemical Kinetics and Reactor Design	9	• Chemical Kinetics and Reactor Design	9	COMP	Annual	4,5	4,5
Thermodynamics	6	• Thermodynamics	6	COMP	1st	6	

Third year	Total credits: 60 ECTS
Major	**Subject**

	ECTS		ECTS	Type	Period	Credits	
						1st	2nd
Automation and Control	6	• Control and Instrumentation	6	COMP	1st	6	
Biotechnology	3	• Biotechnology	3	COMP	2nd		3
Process and Product Engineering	9	• Simulation and Analysis of Chemical Processes (AI-3)	9	COMP	Annual	3	6
Unit Operations Laboratory	6	• Unit Operations Laboratory	6	COMP	Annual	3	3
Materials	6	• Materials Science • Resistance of Materials	3 3	COMP COMP	1st 2nd	3	 3
Heat Exchange Operations	5	• Design of Heat Exchange Operations	5	COMP	2nd		5
Separation Operations	9	• Design of Separation Operations	9	COMP	Annual	5	4
Thermodynamics	4	• Technical Thermodynamics	4	COMP	1st	4	
Projects	3	• Project Management	3	COMP	2nd		3
Industrial Safety	3	• Industrial Safety	3	COMP	1st	3	
Environment	6	• Environmental Technology	6	COMP	Annual	3	3

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Fourth year		**Total credits: 60 ECTS**					
Major		**Subject**					
	ECTS		**ECTS**	**Type**	**Period**	**Credits**	
						1st	**2nd**
Mechanical Design	6	• Design of Equipment and Chemical Plants	6	COMP	1st	6	
Electrotechnics and Electronics	3	• Electronics	3	COMP	1st	3	
Mechanical Design	3	• Machines and Mechanisms	3	COMP	2nd	3	
Projects	6	• Technical Office	6	COMP	1st	6	
Optional subjects	18	• Team Leadership Practices • Optional 1 • Optional 2 • Optional 3 • Optional 4 • Optional 5 • Optional 6	9 6 6 6 3 3 3	OP OP OP OP OP OP OP	Annual 1st 1st 1st 2nd 2nd 2nd	6 6 6 6	3 3 3 3
Work Placement	12	• Work Placement	12	COMP	2nd		12
Bachelor's Thesis	12	• Bachelor's Thesis	12	COMP	2nd		12

According to the SAR the Bachelor degree programme in Mechanical Engineering shall achieve the following **objectives** and **learning outcomes (intended qualifications profile)**:

ASIIN - SSC 01	Intended Learning Outcomes of the GEM
1. Knowledge and understanding	
Graduates have in particular:	
KU1 Gained extensive technical knowledge as to engineering, mathematics and natural science with a view to mechanical engineering / process engineering / chemical engineering, enabling them to carry out scientifically substantiated work and act responsibly in their professional activities.	A1.1 Consistently apply knowledge of basic scientific and technological subjects pertaining to engineering
	A3.1 Ability to solve a wide range of mathematical problems in engineering. Ability to apply the knowledge of linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial differential equations, numerical methods, numerical algorithms, statistics and optimisation (FB1)
	A3.2 Comprehension and dexterity in the application of the fundamentals and the general laws of mechanics, thermodynamics, fields, waves, electromagnetism and their application to solve engineering problems (FB2)
	A3.3 Basic knowledge of the use and programming of computers, operating systems, databases and software for engineering applications (FB3)
	A3.4 Ability to understand the basics of general chemistry, organic and inorganic chemistry, and their applications in engineering (FB4)
	A3.5 Ability for spatial vision and graphical representation techniques, using both traditional methods of metric and descriptive geometry and computer-aided design (FB5)
	A4.1 Knowledge of applied thermodynamics and heat transfer. Fundamental laws and their application to engineering problems (RI1)
	A4.2 Knowledge of the fundamental principles of fluid mechanics and their application to engineering problems. Calculation of piping networks, channels and fluid systems (RI2)
	A4.3 Knowledge of materials science, technology and chemistry fundamentals. Understanding the relationship between their microstructure, their synthesis, their processing and their properties (RI3)
	A4.4 Knowledge and use of the fundamentals of circuit theory and electric machines (RI4)
	A4.5 Knowledge of the fundamentals of electronics (RI5)

	A4.6 Knowledge of the fundamentals of automation technology and control methods (RI6)
	A4.7 Knowledge of the principles of the mechanism and machine theory (RI7)
	A4.8 Knowledge and use of the principles of strength of materials (RI8)

ASIIN - SSC 01	Intended Learning Outcomes of the GEM
	A4.9 Basic knowledge of production and manufacturing systems (RI9)
	A4.10 Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	B4.4 Knowledge in basic and technological subjects that enables the acquisition of new methods and theories and provides the versatility needed to adapt to new situations. (G3)
KU2 Gained an understanding of the multi-disciplinary context of Engineering Sciences.	A1.3 Ability to analyse and assess the social and environmental impact of technical solutions (G7)
	A2.3 Ability to write, sign off and develop industrial engineering projects in the field of mechanical engineering for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
	B3.1 Ability to work in a multilingual and multidisciplinary environment (G10).
2. Engineering Analysis	
Graduates are particularly qualified to:	
EA1 Identify, formulate and solve problems peculiar to mechanical engineering / process engineering / chemical engineering based on the application of established scientific methods.	A1.1 Consistently apply knowledge of basic scientific and technological subjects pertaining to engineering
	A2.4 Knowledge and ability to apply the mandatory standards and legislation to practise professionally as a qualified "ingeniero técnico industrial, especialidad mecánica" (G11)

	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
	B5.3 Ability to solve problems with initiative, decision-making, creativity and critical reasoning, and to communicate and transmit knowledge, skills and abilities in the field of Industrial Technical Engineering, specialised in Mechanics. (G4)
	A1.10 Design, optimise and analyse production processes
ASIIN - SSC 01	**Intended Learning Outcomes of the GEM**
EA2 Analyse and assess products, processes and methods used in their discipline based on scientific facts.	A2.2 Knowledge to perform measurements, calculations, assessments, appraisals, surveys, studies, reports, work plans and analogous work (G5)
EA3 Choose suitable methods of analysing, modelling, simulating and optimising and apply them with a high degree of competence.	A2.5 Use computational tools to efficiently perform professional tasks
	A3.3 Basic knowledge of the use and programming of computers, operating systems, databases and software for engineering applications (FB3)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
3. Engineering Design	
Graduates are particularly qualified to:	
ED1 The ability to conceive designs for machinery, devices, EDP programmes or processes correspondent to the status of their knowledge and to develop them according to specified requirements.	A1.4 Ability to apply the principles and methods of quality control (G8)
	A2.1 Ability to manage specifications, regulations and mandatory standards (G6)
	A2.3 Ability to write, sign off and develop industrial engineering projects in the field of mechanical engineering for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A5.2 Knowledge of and ability to calculate, design and test machines (M2)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)

ED2 A practically orientated understanding of design methods and the ability to apply them in a competent manner.	A2.1 Ability to manage specifications, regulations and mandatory standards (G6)
	A2.3 Ability to write, sign off and develop industrial engineering projects in the field of mechanical engineering for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A5.1 Knowledge of and ability to apply graphic engineering techniques (M1)
	A5.3 Applied knowledge of thermal engineering (M3)
ASIIN - SSC 01	**Intended Learning Outcomes of the GEM**
	A5.4 Knowledge of and ability to apply the fundamentals of elasticity and strength of materials to the behaviour of real solids (M4)
	A5.5 Knowledge of and ability for the calculation and design of structures and industrial constructions (M5)
	A5.6 Applied knowledge of the fundamentals of fluid mechanics systems and machinery (M6)
	A5.7 Knowledge of and ability for the application of materials engineering (M7)
	A5.8 Applied knowledge of manufacturing processes and systems, metrology and quality control (M8)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
4. Investigations and Assessment	
Graduates are in particular qualified to:	
IA1 Carry out literature research in accordance with the status of their knowledge and understanding and to use data bases and other sources of information for their work.	A2.3 Ability to write, sign off and develop industrial engineering projects in the field of mechanical engineering for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
	B1.5 Use ICT to efficiently manage information and knowledge

IA2 Plan and carry out suitable experiments correspondent to the status of their knowledge and understanding, to interpret the data and draw suitable conclusions.	A1.2 Design, execute and analyse experiments related to engineering
	A1.7 Design, plan and interpret machine and mechanical assembly tests
5. Engineering Practice	
Graduates are in particular able to:	
EP1 Able to transfer new findings in engineering and	A2.1 Ability to manage specifications, regulations and mandatory standards (G6)
natural sciences to industrial and commercial production under consideration of economic, ecologic and safety requirements as well as sustainability and environmental compatibility.	A2.3 Ability to write, sign off and develop industrial engineering projects in the field of mechanical engineering for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A2.4 Knowledge and ability to apply the mandatory standards and legislation to practise professionally as a qualified "ingeniero técnico industrial, especialidad mecánica" (G11)
	A4.10 Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
EP2 Able to plan, control and monitor processes and to develop and operate systems and equipment.	A1.4 Ability to apply the principles and methods of quality control (G8)
	A1.5 Project and manage the maintenance of different industrial energy supply and HVAC
	A1.8 Project and manage the maintenance of fluid distribution systems, oleo-hydraulic and pneumatic systems
	A1.9 Project thermal machinery and heat exchange systems
	A2.3 Ability to write, sign off and develop industrial engineering projects in the field of mechanical engineering for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)

	A4.12 Knowledge and ability to organise and manage projects: understanding the organisational structure and functions of a project office (RI12)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
EP3 Able to independently consolidate the knowledge gained.	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
	B4.3 Learn independently and with initiative.
EP4 Aware of the non-technical effects of engineering activities.	Ability to analyse and assess the social and environmental impact of technical solutions (G7)
	A2.1 Ability to manage specifications, regulations and mandatory standards (G6)
	A2.3 Ability to write, sign off and develop industrial engineering projects in the field of mechanical engineering for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electrical and electronic systems, industrial facilities and plants, and manufacturing and automation processes (G1)
	A4.10 Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	A6.1 Elaborate individually an original project in the field of Industrial engineering, to be presented and defended in front of an examination panel. The project integrates the competences and skills acquired in the degree. (TFG1)
	B6.2 Apply ethical principles and social responsibility as a citizen and as a professional
6. Transferable Skills	
Graduates of Bachelor's degree programmes are able to:	
TS1 Function effectively as an individual and as a member of a team, including where relevant coordination of the team.	B1.2 Adapt to a changing environment.
	B1.3 Work effectively and resist adversity.
	B2.1 Ability to organise and plan in the company and in other institutions and organisations. (G9)
	B2.3 Influence and guide others to improve performance.
	B2.4 Foster a suitable environment for the development of individuals.

	B2.5 Provide guidelines for defining and achieving objectives.
	B2.6 Motivate and transmit enthusiasm to others.
	B3.2 Contribute effectively to achieving the team's objectives through cooperation, participation and commitment to the shared vision and goal.
	B3.3 Work autonomously and as part of a team with responsibility and initiative.
	B3.4 Resolve conflicts in a constructive way.
	B5.1 Work independently with responsibility, initiative and innovative thinking.
	B5.2 Take on entrepreneurial positions.
	B6.1 Show ethical behaviour towards members of the university community and society in general.
	B1.1 Communicate information clearly and accurately to diverse audiences
TS2 Use diverse methods to communicate effectively with the engineering community and with society at large.	B1.5 Use ICT to efficiently manage information and knowledge.
TS3 Demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.	A1.3 Ability to analyse and assess the social and environmental impact of technical solutions (G7)
	A2.1 Ability to manage specifications, regulations and mandatory standards (G6)
	A2.4 Knowledge and ability to apply the mandatory standards and legislation to practise professionally as a qualified "ingeniero técnico industrial, especialidad mecánica" (G11)
	A3.6 Adequate knowledge of the concept of company and its institutional and legal framework. Business organisation and management skills. (FB6)
	A4.10 Basic knowledge and application of environmental technologies and the principles of sustainability (RI10)
	B6.1 Show ethical behaviour towards members of the university community and society in general.
	B6.2 Apply ethical principles and social responsibility as a citizen and as a professional
TS4 Demonstrate an awareness of project management and business practices, such as risk and change management, and understand their limitations.	A4.11 Applied knowledge of business organisation (RI11)
	A4.12 Knowledge and ability to organise and manage projects: understanding the organisational structure and functions of a project office (RI12)
	B1.2 Adapt to a changing environment.
	B2.1 Ability to organise and plan in the company and in other institutions and organisations. (G9)
	B2.2 Ability to manage the activities of engineering projects related to the profession of Industrial Technical Engineering, specialised in Mechanics. (G2)

TS5 Recognise the need for, and have the ability to engage in independent, life-long learning.	B1.2 Adapt to a changing environment.
	B4.1 Learn effective ways to assimilate knowledge and behaviour.
	B4.2 Identify the learning process and academic and professional preferences
	B4.3 Learn independently and with initiative.
	B4.4 Knowledge in basic and technological subjects that enables them to learn new methods and theories and gives them the versatility to adapt to new situations. (G3)
TS6 work and communicate in national and international contexts.	B1.1 Communicate information clearly and accurately to diverse audiences
	B1.4 Use information in a foreign language (preferably English) effectively.
	B3.1 Ability to work in a multilingual and multidisciplinary environment (G10).

The following **curriculum** is presented:

First Year		**Total credits: 60 ECTS**			
Major		**Subject**			
	ECTS		**ECTS**	**Type**	**Period**
Physics	12	Fundamentals of Physics in Engineering I Fundamentals of Physics in Engineering II	6 6	BC BC	1st 2nd
Graphical Expression	12	Graphical Expression and Computer-Aided Design I Graphical Expression and Computer-Aided Design II	6 6	BC BC	1st 2nd
Mathematics	12	Fundamentals of Mathematics in Engineering I Fundamentals of Mathematics in Engineering II	6 6	BC BC	1st 2nd
Chemistry	6	Fundamentals of Chemistry in Engineering	6	BC	1st
Business	6	Business Administration and Organization of Production	6	BC	1st
Computing	6	Numerical Methods and Algorithmic Programming	6	BC	2nd
Projects	6	Final Project I	6	COMP	2nd

Second Year		**Total credits: 60 ECTS**			
Major		**Subject**			
	ECTS		**ECTS**	**Type**	**Period**
Mathematics	6	Statistical Methods in Engineering	6	BC	1st
Mechanics and Theory of Mechanisms	15	Mechanics and Theory of Mechanisms I Mechanics and Theory of Mechanisms II Machines and Mechanisms Laboratory	6 6	COMP COMP	1st 2nd

			3	COMP	2nd
Elasticity and Strength of Materials	15	Elasticity and Strength of Materials I Elasticity and Strength of Materials II Elasticity and Strength of Materials Laboratory	6 6 3	COMP COMP COMP	1st 2nd 2nd
Thermal Engineering	12	Thermal Engineering, I Thermal Engineering II	6 6	COMP COMP	1st 2nd
Science of Materials	6	Science and Technology of Materials	6	COMP	1st
Projects	6	Final Project II	6	COMP	2nd

Third year		**Total credits: 60 ECTS**			
Major		**Subject**			
	ECTS		**ECTS**	**Type**	**Period**
Fluids engineering	15	Engineering Fluid Mechanics Hydraulics Hydraulics Laboratory	6 6 3	COMP COMP COMP	1st 2nd 2nd
Thermal Engineering	6	Industrial Heating and Cooling Thermal Machines Laboratory	3 3	COMP COMP	1st 1st
Manufacturing	6	Mechanical Technology Mechanical Technology Laboratory	3 3	COMP COMP	1st 1st
Structures and construction	6	Theory and Design of Structures	6	COMP	1st
Electrotechnics	6	Fundamentals of Electrical Technology	6	COMP	1st
Electronics and automation	6	Fundamentals of Electronic and Automatic Technology	6	COMP	2nd
Machines	6	Machine Design	6	COMP	2nd
Projects	6	Final Project III	6	COMP	2nd
Business	3	Operations Management	3	COMP	2nd

Fourth year		**Total credits: 60 ECTS**			
Major		**Subject**			
	ECTS		**ECTS**	**Type**	**Period**
Projects	6	Technical Office	6	COMP	1st
Structures and construction	3	Industrial Construction	3	COMP	1st
Machines	9	Dynamics of Mechanical Systems Machine Testing Laboratory	6 3	COMP COMP	1st 1st
English	3	Technical English	3	COMP	2nd

Optional subjects	27	Work Placement Optional subjects	12 15	OP OP	1st 2nd
Bachelor's Thesis	12	Bachelor's Thesis	12	COMP	2nd