

26-27

Degree Guide



GRADO EN INGENIERÍA DE LA ENERGÍA

CODE 6805

UNED

26-27

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PRESENTATION

There is no need to emphasise the fundamental role that energy plays in the development of society, nor the economic and political implications associated with access to energy resources, the efficient use of these resources, the promotion of renewable energy sources, and the environmental impacts they entail at both local and global levels.

This Degree in Energy Engineering aims to address current technological challenges by training future professionals with a solid background in the basic and general disciplines inherent to the professional practice of engineering. Graduates will be able to contribute to areas such as sustainability, global efficiency, professional ethics, and all those elements that enable individuals, companies and institutions to develop energy policies based on saving, sustainability and rationality in the generation and use of energy.

To this end, the training provided by this degree will enable future graduates to:

- Understand fossil and nuclear energy resources, their properties and the different characteristics required for their use, as well as the environmental issues associated with them and the technological measures available to minimise their negative impact.
- Understand the operating principles and design basis of equipment used in thermal energy generation, as well as the design basis of power plants, thermal engines and associated equipment, including the specific design features required when using nuclear energy or renewable energy sources.
- Understand the design basis of thermal machines and hydraulic machines.
- Understand the technologies associated with nuclear energy and, in particular, the characteristics of fission and fusion reactors.
- Understand the principles and techniques of safety and radiological protection in nuclear and radioactive facilities, as well as their environmental impact.
- Understand the technologies associated with the use of different renewable energy sources: wind, solar photovoltaic, solar thermal, hydropower, biomass and the use of renewable waste.
- Understand the design basis of heating, ventilation and air-conditioning systems, as well as energy efficiency measures in buildings and industry.
- Understand the measures aimed at reducing the formation of the different types of pollutant emissions. Graduates will also become familiar with the techniques used to control such emissions once generated, in order to prevent their release into the environment.
- Understand the operating mechanisms of energy markets and the management of energy supply and demand.

INFORMATION NOTE ON THE IMPLEMENTATION OF THE DEGREE

The School of Industrial Engineering informs that ANECA has communicated the final verification of the Degree in Energy Engineering. The first and second years will begin to be implemented in the 2022/23 academic year. The third year will be implemented in the 2023/24 academic year. Finally, the fourth year will be implemented in the 2024/25 academic

year.

SKILLS

SPECIFIC COMPETENCES OF THE DEGREE PROGRAMME (ORDER CIN/351/2009)

In accordance with Order CIN/351/2009 of 9 February, establishing the organisation of official university studies, with regard to the report required for the verification of official degrees.

BASIC COMPETENCES

CB1 –Students must have demonstrated knowledge and understanding in a field of study that builds upon general secondary education and is typically at a level which, while supported by advanced textbooks, also includes some aspects involving knowledge from the forefront of their field of study.

CB2 –Students must be able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and the resolution of problems within their field of study.

CB3 –Students must have the ability to gather and interpret relevant data, usually within their field of study, in order to make judgements that include reflection on relevant social, scientific or ethical issues.

CB4 –Students must be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB5 –Students must have developed the learning skills necessary to undertake further studies with a high degree of autonomy.

GENERAL COMPETENCES

CG03 –Knowledge of basic and technological subjects that enables students to learn new methods and theories, and provides them with the versatility required to adapt to new situations.

CG04 –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 Engineering within the area of Energy.

CG05 –Knowledge required to carry out measurements, calculations, assessments, appraisals, expert reports, studies, work plans and other similar tasks.

CG06 –Ability to handle specifications, regulations and mandatory standards.

CG07 –Ability to analyse and assess the social and environmental impact of technical solutions.

CG08 –Ability to apply quality principles and methods.

CG09 –Ability to organise and plan within the context of companies and other institutions and organisations.

CG10 –Ability to work in a multilingual and multidisciplinary environment.

CG11 –Knowledge, understanding and ability to apply the legislation required for the professional practice of Industrial Engineering within the field of Energy.

SPECIFIC COMPETENCES IN BASIC TRAINING

CEB01 –Ability to solve mathematical problems that may arise in engineering. Aptitude to

apply knowledge of linear algebra, geometry, differential geometry, differential and integral calculus, ordinary and partial differential equations, numerical methods, numerical algorithms, statistics and optimisation.

CEB02 –Understanding and command of the basic concepts of the general laws of mechanics, thermodynamics, fields and waves, and electromagnetism, and their application to the resolution of engineering problems.

CEB03 –Basic knowledge of the use and programming of computers, operating systems, databases and software applications in engineering.

CEB04 –Ability to understand and apply the principles of basic knowledge of general, organic and inorganic chemistry and their applications in engineering.

CEB05 –Ability to visualise spatially and knowledge of graphic representation techniques, both through traditional methods of metric geometry and descriptive geometry, and through computer-aided design applications.

CEB06 –Adequate knowledge of the concept of enterprise, and of the institutional and legal framework of business. Business organisation and management.

SPECIFIC COMPETENCES COMMON TO THE INDUSTRIAL BRANCH

CEC01 –Knowledge of applied thermodynamics and heat transfer. Basic principles and their application to the resolution of engineering problems.

CEC02 –Knowledge of the basic principles of fluid mechanics and their application to the resolution of problems in the field of engineering. Calculation of pipes, channels and fluid systems.

CEC03 –Knowledge of the fundamentals of materials science, technology and chemistry. Understanding of the relationship between microstructure, synthesis or processing, and material properties.

CEC04 –Knowledge and use of the principles of circuit theory and electrical machines.

CEC05 –Knowledge of the fundamentals of electronics.

CEC06 –Knowledge of the fundamentals of automation and control methods.

CEC07 –Knowledge of the principles of the theory of machines and mechanisms.

CEC08 –Knowledge and use of the principles of strength of materials.

CEC09 –Basic knowledge of production and manufacturing systems.

CEC10 –Basic knowledge and application of environmental technologies and sustainability.

CEC11 –Applied knowledge of business organisation.

CEC12 –Knowledge and skills required to organise and manage projects. Knowledge of the organisational structure and functions of a project office.

SPECIFIC TECHNOLOGY COMPETENCES

CEE01 –Ability to calculate and design electrical machines.

CEE10 –Applied knowledge of renewable energies.

CEM03 –Applied knowledge of thermal engineering.

CEM06 –Applied knowledge of the fundamentals of fluid-mechanical systems and machines.

CEQ03 –Introduction to the design, management and procedures for simulation, control and instrumentation of chemical processes related to the subject area.

CFC01 –Extended knowledge of fluid mechanics and its application to the resolution of problems in the field of engineering.

CFC02 –Extended applied knowledge of differential and integral calculus.

CFC03 –Extended knowledge of the general laws of mechanics, fields and waves, and their application to the resolution of engineering problems.

CFC04 –Knowledge of nuclear engineering.

BACHELOR'S DEGREE FINAL PROJECT COMPETENCE

CETFG –Original work to be carried out, presented and defended individually before a university committee, within the field of the specific technologies of Energy Engineering, in which the competences acquired throughout the degree programme are synthesised and integrated.

CREDIT AWARDS

Plazos. Consulte los plazos de solicitud de reconocimientos en esta web. Toda solicitud presentada fuera de estos plazos será devuelta al estudiante.

Normativa. La normativa se encuentra en el enlace siguiente: (enlace a la normativa).

Procedimiento para solicitar el reconocimiento de estudios utilice el (enlace a la página de procedimiento).

Antes de iniciar el proceso tenga en consideración lo siguiente (consulte la página de reconocimiento de créditos de la Escuela):

- Con carácter previo deberá abonarse en el momento de la solicitud de este servicio un pago anticipado (su importe se indica en la página anterior), que no será objeto de devolución ni bonificación en caso de desistimiento por parte del estudiante. Este importe también será exigible a los reconocimientos entre estudios de la UNED, cuando se solicite un reconocimiento superior a los cuatro créditos ECTS, sin que tampoco sea objeto de devolución o bonificación.
- Para poder generar el recibo correspondiente para este abono, el estudiante lo podrá efectuar desde su Campus Virtual (consulte la página anterior para más detalles). Una vez realizado este abono y aportada la documentación correspondiente, podrá iniciarse la tramitación de su solicitud.
- En caso de que la solicitud presente **defecto de forma** el solicitante dispondrá de un plazo de 30 días naturales a partir de la fecha de comunicación para su subsanación.
- La Comisión de Reconocimiento de Créditos resolverá las solicitudes durante el curso académico en que fue solicitada.
- En el caso de no estar conforme con la resolución de la Comisión, el solicitante dispondrá de un plazo de 30 días naturales para realizar **una única solicitud de revisión**.
- Contra la resolución de reconocimientos cabe interponer recurso ante el Magnífico Sr. Rector

Impresos. Para acceder a **los impresos de solicitud de reconocimiento de créditos** entre en este enlace.

STRUCTURE

STUDY PLAN

ECTS –European Credit Transfer System

First year / total 60 ECTS

Basic Training: 48 ECTS –8 subjects of 6 ECTS

Compulsory subjects: 12 ECTS –2 subjects of 6 ECTS

Second year / total 60 ECTS

Basic Training: 12 ECTS –2 subjects of 6 ECTS

Compulsory subjects: 48 ECTS –3 subjects of 6 ECTS and 6 subjects of 5 ECTS

Third year / total 60 ECTS

Compulsory subjects: 40 ECTS –8 subjects of 5 ECTS

Mention-specific electives: 10 ECTS –2 subject of 5 ECTS

Electives: 10 ECTS –2 subject of 5 ECTS

Fourth year / total 60 ECTS

Compulsory subjects: 30 ECTS –2 subject of 5 ECTS, 2 subjects of 4 ECTS and 1 subject of 12 ECTS

Mention-specific electives: 30 ECTS –6 subjects of 5 ECTS

The degree offers three mentions: Renewable Energies; Energy Installations and Energy Efficiency; and Nuclear Energy. To obtain one of these mentions, students must take the corresponding mention-specific elective subjects listed in the tables below. It is also possible to complete the degree without obtaining a specific mention. In this case, students must choose seven subjects from among the mention-specific electives offered in the following tables.

MENTION-SPECIFIC

ELECTIVES IN RENEWABLE ENERGIES

	Year 3 / Semester 2	5
	Electricity Market and Transport with Integration of Renewable Energies	5
Year 4 / Semester 1	5 Year 4 / Semester 2	25
Thermal Equipment	5 Wind Energy	5
	Photovoltaic Systems	5
	Concentrated Solar Thermal Energy	5
	Solar Cooling	5

MENTION-SPECIFIC ELECTIVES IN ENERGY INSTALLATIONS AND ENERGY EFFICIENCY

	Year 3 / Semester 2	5
	Fundamentals of Air Conditioning	5
Year 4 / Semester 1	5 Year 4 / Semester 2	25
Thermal Equipment	Energy Efficiency and Renewable Energies in Buildings	5
	Refrigeration Technology	5
	Energy Certification, Auditing and Simulation in Buildings	5
	Environmental Impact, Insulation and Noise Control	5
	Lighting Technology and Home Automation	5

MENTION-SPECIFIC ELECTIVES IN NUCLEAR ENERGY

	Year 3 / Semester 2	5
	Nuclear Power Plant Safety	5
Year 4 / Semester 1	5 Year 4 / Semester 2	25
Structure of Matter and Effects of Radiation	Nuclear Technology for Electric Power Production	5

Radioactive Waste Management	5
Advanced Nuclear Fission Energy Systems	5
Radiological Protection	5
Introduction to Nuclear Fusion Energy	5

PROFILE

There is no limit on the number of places available for Bachelor's Degree studies at the UNED.

Guidance on the most suitable student profile. Students wishing to begin this degree should have a solid background in scientific and abstract subjects such as Mathematics, Physics and Chemistry. Basic knowledge of subjects such as Technical Drawing and Computer Science is also considered useful.

Teaching support to complete basic training. To help assess their prior level of knowledge, new students may consult the Pre-Enrolment Community: Arrancando Máquinas.

Personal characteristics of the student. Studying at the UNED may require new students to have a certain level of maturity, including the ability to organise their available time and to analyse and synthesise teaching materials, in order to make appropriate use of what is often limited study time. To support this process, the university provides students with various resources, such as the Virtual Welcome Community.

In addition, initiative, motivation, the ability to work both individually and as part of a team, responsibility, perseverance and leadership are particularly valued. Interest in the practical application of knowledge to the resolution of real problems is also considered important, as is skill in handling laboratory and workshop instruments and equipment.

Students are advised to consult the information on Admission to Bachelor's Degrees.

CAREER OPPORTUNITIES

In general, as in other fields of engineering, graduates in Energy Engineering will be highly sought-after professionals, since modern engineering increasingly requires professionals with a structured and solid scientific and technical background such as that provided by this Bachelor's Degree.

More specifically, given the current context of energy transition towards sustainable energy sources, an increase in employment opportunities is expected in the energy sector, particularly in relation to energy sources with a low impact on climate change. Within the

European context, this transition does not only include renewable energies, but also natural gas and nuclear energy. The current state of development of renewable energies, together with the low impact and technological maturity of these energy sources, means that they are currently considered by many countries as options to be taken into account in the transition towards sustainable energy.

By way of example, the following career opportunities may be highlighted:

- R&D&I departments.
- Technical departments of companies in the energy sector and in all industrial areas.
Engineering and consultancy firms.
- Management departments in companies in the energy sector and in industry in general.
- Teaching and research.

OFFICIAL DOCUMENTATION

De acuerdo con la legislación vigente, todas las Universidades han de someter sus títulos oficiales a un proceso de verificación, seguimiento y acreditación.

En el caso de la UNED, el Consejo de Universidades recibe la memoria del título y la remite a la ANECA para su evaluación y emisión del Informe de verificación. Si el informe es favorable, el Consejo de Universidades dicta la Resolución de verificación, y el Ministerio de Educación eleva al Gobierno la propuesta de carácter oficial del título, ordena su inclusión en el Registro de Universidades, Centros y Títulos (RUCT) y su posterior publicación en el Boletín Oficial del Estado.

Los títulos oficiales de grado han de renovar su acreditación antes de los seis años, desde la fecha de inicio de impartición del título o de renovación de la acreditación anterior, con el objetivo de comprobar si los resultados obtenidos son adecuados para garantizar la continuidad de su impartición. Si son adecuados, el Consejo de Universidades emite una Resolución de la acreditación del título.

Estas resoluciones e informes quedan recogidos en el Registro de Universidades, Centros y Títulos (RUCT).

VERIFICACIÓN / MODIFICACIÓN

- Memoria verificada
- Informe de verificación de la ANECA
- Resolución de verificación del Consejo de Universidades
- Inscripción del título en el RUCT
- Publicación del Plan de Estudios en el BOE
- Informe/s de modificación del Plan de Estudios

SEGUIMIENTO

- Informe/s de seguimiento de la ANECA
- Informe de seguimiento de la ANECA 2025

ACREDITACIÓN

- Informe de renovación de la acreditación de la ANECA
- Resolución de la acreditación del Consejo de Universidades

INTERNAL SYSTEM QUALITY ASSURANCE TITLE

La UNED dispone de un Sistema de Garantía Interna de Calidad (SGIC-U) que alcanza a todos sus títulos oficiales de grado, máster y doctorado, así como a los servicios que ofrece, cuyo diseño fue certificado por la ANECA.

El SGIC-U contempla todos los procesos necesarios para asegurar la calidad de su profesorado, de los recursos y de los servicios destinados a los estudiantes: el acceso, la admisión y la acogida, las prácticas externas, los programas de movilidad, la orientación académica e inserción laboral, el seguimiento y evaluación de los resultados de la formación, la atención de las sugerencias y reclamaciones y la adecuación del personal de apoyo, entre otros.

Los responsables del SGIC son:

- La Comisión Coordinadora del Título
- La Comisión de Garantía de Calidad del Centro
- El Equipo Decanal o de Dirección
- La Comisión de Garantía de Calidad de la UNED

A través del Portal estadístico, la UNED aporta información a toda la comunidad universitaria tanto de los resultados de la formación como de los resultados de satisfacción de los distintos colectivos implicados.

Documentos del SGIC del título:

Principales resultados de rendimiento

Resultados de satisfacción de los diferentes colectivos

Calidad en el Centro

RULES

- RD 822/2021, de 28 de septiembre, Organización de las Enseñanzas Universitarias
- Reglamento sobre Progreso y Permanencia en Estudios Conducentes a Títulos Oficiales de Grado y Máster
- Reglamento sobre la realización de los Trabajos de Fin de Grado
- Normativa reconocimiento de créditos (C.G. 23-10-2008, modif. C.G. 28-6-2011 y C.G. 4-10-2016 y actualizada en CG de 10 de octubre de 2017, y en CG de 5 de marzo de 2019)
- Criterios generales para el reconocimiento académico en créditos por la participación de los estudiantes en actividades universitarias culturales, deportivas, de representación estudiantil, solidarias y de cooperación (Aprobado en Consejo de Gobierno de 28 de abril de 2010 y modificado en C.G. de 4 de octubre de 2016)

- Reglamento del tribunal de compensación
- Normativa para la revisión de pruebas finales
- Procedimiento para la obtención de la nota media en el expediente académico (CG 26706/2012. modif. CG 25/06/2013 y CG 5/05/2015)
- Normativa matriculación de TFG cuatrimestrales (C. G. 30 de abril de 2019)
- La **normativa de interés** es variada y se encuentra en diversas páginas de la ETS de Ingenieros industriales:
- Normativa e información acerca del reconocimiento de créditos. Consulte la página de reconocimiento de créditos.
- Normativa e información acerca de las prácticas. Puede verse en el enlace a la página de prácticas.
- Normativa e información acerca del tribunal de compensación.
- Normativa e información acerca del Trabajo Fin de Grado.
- Resumen NORMAS DE PERMANENCIA** en estudios conducentes a títulos oficiales de la UNED

Número de convocatorias

Los estudiantes de enseñanzas oficiales de Grado de la UNED disponen de un número máximo de **seis convocatorias por asignatura**. Con su matrícula, el estudiante dispone en **cada curso académico de dos oportunidades de examen** para superar la asignatura (febrero/junio y septiembre), aunque, a efectos de limitación de convocatorias, en esta Universidad únicamente se computa la convocatoria de septiembre y la de los exámenes extraordinarios de fin de carrera.

El estudiante que tenga **agotadas seis o más convocatorias** de alguna/s asignatura/s, si desea continuar cursando el mismo título de Grado, podrá solicitar convocatoria adicional (de gracia) al Vicerrectorado correspondiente. En el caso de que le falten un máximo de 30 créditos para superar el título de Grado se podrá estudiar la concesión de alguna convocatoria más de gracia.

Número máximo y mínimo de créditos matriculados

El estudiante que se matricule, debe hacerlo en un **mínimo de 1 asignatura**, con independencia de los créditos que tenga, y en un **máximo de 90 créditos** en cada curso académico. No obstante, podrá superarse este límite, con autorización del Vicerrectorado correspondiente, previo informe favorable del Decanato de la Facultad o Dirección de la Escuela respectiva, en función del expediente académico del solicitante.

Tipología del estudiante en función de los créditos matriculados

Se considerará estudiante a tiempo parcial aquel que se matricule hasta un máximo de 39 créditos. Se considerará estudiante a tiempo completo el que se matricule en 40 créditos o más. En cualquier caso, el régimen de convocatorias establecido en el artículo 5.1 no se verá alterado por esta circunstancia.

Más información en página de la ETSI Industriales de la UNED.

PRACTICES

In the Bachelor's Degrees offered by the School of Industrial Engineering, there are different types of practical activities. These may be face-to-face or online, and compulsory or voluntary.

Experimental practical activities. Depending on the subject, students may find different types of practical activities:

- Face-to-face laboratory practicals:** these are carried out in the laboratories of the School of Industrial Engineering or at the Associated Centres, depending on the subject.
- Non-face-to-face practicals (online/simulation/remote laboratories):** these are carried out with the support of computer equipment, either from home or from the Associated Centres.

Firstly, before enrolling, it is essential that students consult the general information on “Face-to-face laboratory practicals” for the School's degrees at the following link, where the subjects with compulsory face-to-face practicals, as well as the relevant regulations and calendar, are detailed:

<https://www.uned.es/universidad/facultades/industriales/estudiantes/practicas-de-laboratorio.html>

In addition, the guide for each subject includes an item entitled “Laboratory Practical”, which specifies whether the subject includes practical activities and what type they are.

Secondly, once enrolled and after the start of the academic year, students must consult the information available in the virtual course of the subject they are taking, where the practical activity guidelines are published and the specific information relating to those practicals is provided.

Extracurricular internships. It is possible to undertake “extracurricular internships”, which may be recognised as professional experience. Please consult the procedure for applying for credit recognition.

Extracurricular internships are managed by the Internships Office.

Curricular internships. The study plan for this degree does not include curricular external internships in companies.

DATOS DE COORDINACION DEL TITULO

Coordinator of the Bachelor's Degree in Energy Engineering: Dr. Dr. D. Antonio Jesús López Revelles

Email: alopez@ind.uned.es

ATRIBUCIONES PROFESIONALES

The degree does not confer regulated professional competences. The aim of the Degree in Energy Engineering is to partially fill the gap left by the former specialisation in Energy Techniques, which formed part of the training of the previous Industrial Engineer qualification. The training provided by the Degree in Energy Engineering constitutes a solid foundation on which students can build the knowledge and skills associated with the training of Industrial Engineers in the field of energy.

PRE-MATRÍCULA: ARRANCANDO MÁQUINAS

OUR PRE-ENROLMENT COMMUNITY: ARRANCANDO MÁQUINAS

The School of Industrial Engineering at the UNED offers the pre-enrolment community Arrancando Máquinas: Industriales to help you begin your studies in the Bachelor's Degree in Industrial Engineering. Access to these tools is completely free of charge and enrolment is NOT required.

It consists of a comprehensive information, guidance and training plan designed to support an optimal adaptation to the university and its methodology. It mainly includes:

- A communication environment where you will receive important advice to help you both with enrolment and with the initial planning of your studies through a mentoring programme.
- Access to bridging courses, or “zero courses”, in subjects such as Mathematics, Physics, Chemistry and Technical Drawing, which will help you begin the degree under the best possible conditions.
- Information on how studying at the UNED works and on the resources that will be available to you once you enrol.

Further information is available in our “Pre-Enrolment: Arrancando Máquinas” community. In addition, the UNED has a Virtual Welcome Community (CAV) for new students, in which you will be automatically enrolled once you have completed your registration. In this community, you can even obtain your first ECTS credit. It becomes active from September onwards.

CURSOS CERO

CURSOS CERO DE NIVELACIÓN

Existen unos conocimientos básicos que el nuevo estudiante debería tener o que convendría que repasase al empezar el grado de ingeniería en nuestra Escuela. Para ayudar a conseguir este objetivo, en nuestra comunidad pre-matrícula: Arrancando Máquinas facilitamos el acceso a través de MOOC gratuitos o a materiales en abierto para Dibujo, Física, Matemáticas y Química.

Son totalmente gratuitos.

Se recomienda realizarlos antes de empezar el grado o al inicio del mismo.

Más información en nuestra comunidad pre-matrícula Arrancado máquinas.

GENDER EQUALITY

Consistent with the assumed value of gender equality, all the denominations that in this Guide refer to single-person, representative, or members of the university community and are made in the masculine gender, when they have not been replaced by terms generic, shall be understood as interchangeably in female or male gender, depending on the sex of the holder who performs them.