

## Course guide

# 240626 - 240626 - Albert Einstein and Science and the Technique of the 20th Century

Last modified: 16/05/2023

**Unit in charge:** Barcelona School of Industrial Engineering  
**Teaching unit:** 749 - MAT - Department of Mathematics.

**Degree:** BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

**Academic year:** 2023    **ECTS Credits:** 3.0    **Languages:** Catalan, Spanish

## LECTURER

**Coordinating lecturer:** Antoni Roca Rosell

**Others:** Antoni Roca Rosell

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

### Transversal:

1. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
3. SUSTAINABILITY AND SOCIAL COMMITMENT. Being aware of and understanding the complexity of social and economic phenomena that characterize the welfare society. Having the ability to relate welfare to globalization and sustainability. Being able to make a balanced use of techniques, technology, the economy and sustainability.
4. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
5. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
6. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

## TEACHING METHODOLOGY

The course will consist of lectures combined with the presentation by students of monographic topics, selected from a list proposed by either initiative. Also, be two readings of texts on Einstein and Einstein.

## LEARNING OBJECTIVES OF THE SUBJECT

This is to introduce the history of Albert Einstein, one of the leading scientists in history, from the historiographical sources that are available today. We believe that the 'greats' are held in a large and complex scientific community with experience and tradition. Einstein was a person committed his time, led the defense of minorities, peace and social justice.

## STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours large group	30,0	40.00

**Total learning time:** 75 h



## CONTENTS

### Lesson 1. Einstein, great figure. Childhood and youth

**Description:**

Presentation of the course. The 'greats' in the history of science. Einstein's family. Primary, secondary education. The Polytechnic School in Zurich. Early work.

**Full-or-part-time:** 10h

Theory classes: 4h 10m

Self study : 5h 50m

### Lesson 2. 1905 the marvelous year, the international projection

**Description:**

1905 the year of the great Einsteinian contributions. Review of Physics in 1900. Impact and first diffusion. University posts. International recognition. Travel around the world. The Nobel prize. Installing at the United States. The Manhattan Project. Patents of Einstein.

**Full-or-part-time:** 10h

Theory classes: 4h 10m

Self study : 5h 50m

### 3rd lesson. Recognition. From Berlin to Princeton. The patents

**Description:**

In 1913, Einstein was invited to supervise a new centre in Berlin, being elected member of the Prussian Academy of Sciences and professor of the University. In 1915, he presented his General Theory of Relativity. In 1919, after the study of the total solar eclipse that gave validity to his theory, Einstein became a public personage, and his myth began. He was invited to lecture over the world. After the Nazis took the power in 1933, Einstein took a post in the Institute of Advanced Studies, Princeton. In the period between the wars, Einstein signed several patents in Europe and America, most of them with Leo Szilard, on a new system of refrigerator.

**Full-or-part-time:** 10h

Theory classes: 4h 10m

Self study : 5h 50m

### Lesson 4. Last years

**Description:**

Einstein spent the last years of his life in the USA. During the WWII, he asked the president Roosevelt to promote the research on nuclear energy. After the atomic bombs over Japan, Einstein joined the movement against the arms race. One month before his death in 1955, he signed with Bertrand Russell a manifesto for the international dialogue.

**Full-or-part-time:** 10h

Theory classes: 4h 10m

Self study : 5h 50m



### 5th lesson. Einstein in Spain. The 1923 trip.

#### Description:

The work of Einstein was known in Spain by 1908. Terradas and Blas Cabrera diffused his theories after 1912. In 1920, Julio Rey Pastor invited Einstein to lecture in Spain. Finally, next year Einstein accepted a new invitation by Terradas. The course took place in February and March 1923. The lectures were received with interest, and Einstein visited several iconic places in Spain. In this lesson we follow the steps of Einstein in this trip and we try to evaluate its impact.

#### Full-or-part-time: 20h

Theory classes: 8h 20m

Self study : 11h 40m

## GRADING SYSTEM

Final note: \* 0.20 (average of readings) +0.20 \* (half year exercise) +0.30 \* class presentation +0.30 \* final exercise

## EXAMINATION RULES.

Students will be required to submit three readings, posted as "tasca" in Atenea. A half-semester exercise and a final exercise will also be done as "tasca". Student presentations are also posted at Atenea.

## BIBLIOGRAPHY

### Basic:

- Navarro Veguillas, Luis. Einstein, profeta y hereje. Barcelona: Tusquets, 1990. ISBN 8472231453.
- Sánchez Ron, J.M. ed. Einstein en España. Madrid: Residencia de Estudiantes, 2005. ISBN 8495078341.
- Bodanis, David. E=mc<sup>2</sup>. Barcelona: Planeta, 2002. ISBN 8408042092.
- Sallent Del colombo, E.; Roca Rosell, Antoni. "Sopar a Barcelona en honor d'Albert Einstein (1923)". Revista de Física [on line]. Número especial Any Mundial de la Física 2005, 57-64 [Consultation: 30/07/2014]. Available on: <http://www.raco.cat/index.php/RevistaFisica>.
- Stachel, J. i altres. Einstein 1905: un año milagroso: cinco artículos que cambiaron la física. Barcelona: Crítica, 2001. ISBN 8484322157.
- Sánchez Ron, J.M., ed. Albert Einstein. Madrid: Crítica, 2005. ISBN 8484326551.
- Seelig, Carl. Albert Einstein. Barcelona: Crítica, 2005. ISBN 8467018285.
- Sallent, E. i altres eds. 1905: el jove Einstein en català. Barcelona: Institut d'Estudis Catalans: Societat Catalana de Física: Societat Catalana d'Història de la Ciència i de la Tècnica, 2005. ISBN 8472838080.
- Einstein, Albert. La Teoria de la relativitat i altres textos. Barcelona, Vic: Institut d'Estudis Catalans-Eumo-Pòrtic, 2000. ISBN 847602598X.
- Einstein, Albert. Autobiografía y escritos científicos. Barcelona: Círculo de Lectores, 1995. ISBN 8422656248.
- Glick, Thomas F. Einstein y los españoles: ciencia y sociedad en la España de entreguerras. Madrid: Alianza editorial, 1986. ISBN 8420624667.
- Hermann, Armin. Einstein en privado. Madrid: Temas de Hoy, 1997. ISBN 8478807144.
- Jerome, Fred. El Expediente Einstein : el FBI contra el científico más famoso del siglo XX. Barcelona: Planeta, 2002. ISBN 8408046179.