

PHYSICAL, CHEMICAL AND INDUSTRIAL SCIENCES_FIELD

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Optics

Introducing

Description

Course Chapter Breakdown:

The course is divided into several key chapters to provide you with a comprehensive understanding of geometrical optics:

1- Introduction to Geometrical Optics

- °Definition and importance of geometrical optics.
- °Historical background and recent developments in the field.

2- Fundamental Laws of Geometrical Optics

- °Law of reflection.
- °Law of refraction (Snell's Law).
- °Fermat's Principle and its applications.

3- Propagation of Light in Homogeneous and Inhomogeneous Media

- °Study of the rectilinear propagation of light.
- °Analysis of homogeneous and inhomogeneous media.
- °Effects of variations in the refractive index.

4- Reflection and Refraction at Interfaces

- °Behavior of light rays at interfaces between different media.
- °Total internal reflection and its applications.
- °Study of prisms and lenses.

5- Simple Optical Systems

- °Plane and spherical mirrors.

- °Thin and thick lenses.
- °Image formation by simple optical systems.

6-Complex Optical Systems

- °Combination of lenses and mirrors.
- °Analysis of optical aberrations.
- °Design and optimization of complex optical systems.

7-Practical Applications of Geometrical Optics

- °Common optical instruments (microscopes, telescopes, cameras).
- °Applications in photonics and telecommunications.
- °Case studies and practical projects.

This course aims to provide you with a deep understanding of the fundamental concepts of geometrical optics and to develop your analytical and practical skills to solve complex problems in this field.

Objectives

Course Objectives:

By the end of this course, you will be able to:

- 1-Understand the fundamental principles of geometrical optics, including the laws of reflection and refraction.
- 2-Analyze the behavior of light rays through different media and interfaces.
- 3-Use mathematical tools to model and solve problems in geometrical optics.
- 4-Apply geometrical optics concepts to the design and analysis of simple and complex optical systems.
- 5-Interpret experimental and theoretical results to evaluate the performance of optical systems.

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Chemistry



ECTS
4 crédits



Hourly volume
63h

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Classical mechanics

Introducing

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Practical info

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Industrial sciences

Introducing

Description

- Industrial product lifecycle
- 3D computer modeling
- 2D and 3D drawing
- introduction to mechanical design

--> Time : 27,5 h.

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

Basic knowledge of mechanical design and manufacturing.

The student will be able to:

1) Module CSM (Mechanical Design):

- _ Identify parts of a mechanical system using a mechanical drawing
- _ Model simple parts and simple assemblies using CAD software
- _ Design a simple mechanical product, describe it using appropriate mechanical engineering wording

This is an introductory class to industrial design and manufacturing. Students are supposed to have a good knowledge of High School Maths and Physics.

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Necessary prerequisites

Electrical phenomena

Introducing

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Practical info

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Thermodynamics

Introducing

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Practical info

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Thinking Together the New Socio-Ecological Challenges and our Responsibility

Introducing

Description

The student is able to perceive changes in the way we inhabit the planet (history, anthropology)

The student is able to identify the nine thresholds of overshoot

The student understands the orders of magnitude of the impacts of human activities in the 20th and 21st centuries: carbon impact, atmospheric CO2 concentration, species extinction, biodiversity, environment, etc.

The student is able to identify the contribution of engineering to these impacts

The student is able to consider solutions, not just technical ones (avoiding techno-solutionism)

The student is able to develop a systemic vision of human impacts on the planet (climate fresco, systemic and complexity analysis)

The student is able to analyze and critically examine the use of numbers and figures relating to socio-ecological issues, and their various interpretations.

The student is made aware of the concept of environmental justice (climate fresco, ethics).

The student is able to question certain engineering activities and their uses.

Objectives

Thinking Together New Socio-Ecological Challenges and Our Responsibility:

Understanding the limits of the Anthropocene and its consequences for our present: socio-ecological issues

Develop critical thinking and demonstrate reflexivity

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