BRIEF DESCRIPTION OF THE COURSE:
This course is focused in the optical design process, covering the opto-mechanical aspects, starting in the concept and finishing just before manufacture. The course also covers the constraints in the design process produced by mechanical, detectors, emitters and materials. The influence in the optical system is linked through the merit function. Related topics like testing are introduced only from the point of view of the proper election in the system design. Knowledge from ISO norm and optical software are also provided.

BIBLIOGRAPHY:
The course will include only parts of these references, at an appropriate level
230571 - OPTOMECH - Building Optomechanical Systems

- S. Baumer, Handbook of plastic optics, Wiley 2005

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 75h</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
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<tr>
<td></td>
<td>22h 30m</td>
<td>0h</td>
<td>0h</td>
<td>2h 15m</td>
<td>50h 15m</td>
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<td></td>
<td>30.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>3.00%</td>
<td>67.00%</td>
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</tbody>
</table>
Content

1. Optical design.

**Degree competences to which the content contributes:**

**Description:**

1.1. Conceptual design and paraxial approach. Starting from geometrical optics (considered in the course "Beam propagation & Fourier Optics") the two first stages of the design are introduced; Conceptual design & paraxial approach. Four examples of imaging optical systems are used to fix troubles.
1.2. Photometric, pupils and field apertures as design elements are introduced. Once the general design basis is fixed, the photometric weight is considered; the same four examples are updated.
1.3. Design aberration base. Seidel aberration are developed (taking as starting point course "Beam propagation & Fourier Optics") and the requirement of the Merit function concept is introduced.

2. Mechanical and building constrains.

**Degree competences to which the content contributes:**

**Description:**

2.1. Material constrains. Introduction of the material used to build lenses. Chromatic aberration is used to explain how to select the right material, prior merit function is updated with the new constrains.
2.2. Manufacturing and testing constrains. The manufacturing process and the testing process, itself, force to skip a large number of solutions, the course is stopped in the building process at this level.
2.3. Emitters and receivers constrains. Emitters and receivers, also, introduces restrictions in the performances that can be achieved, these constrains must be interpreted as changes in the merit function.

3. Detailed Opto-mechanical design.

**Degree competences to which the content contributes:**

**Description:**

3.1. Redesign process. A full optimization process of the optical system is carried out,
3.2. Fitting the optical design with the manufacturer availability surface test plates.
3.3. Tolerance analysis and assembling. Index of manufacturing processes. Uses of compensators

4. Delivering ready to print opto-mechanical design.

**Degree competences to which the content contributes:**

**Description:**

4.1. ISO 10110 norm. The international drawing norm for optical designs
4.2. Additional information required
5.- Optical software.

Degree competences to which the content contributes:

Description:

5.1.- Optical software. Optical software capabilities are explained along all the course. Software is not provided by the course.

Qualification system

- Homework (set of 4 exercises to be delivered) 40%
- Exam 60%

To pass the course will require a quite accessible level of knowledge but high final grades will be obtained only by demonstrating enough proficiency.

Bibliography