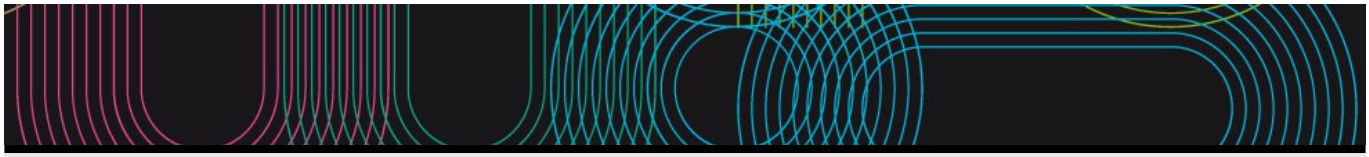

| IDENTIFYING DATA | | | | |
|---|---|---|---|---|
| **(*)Técnicas avanzadas no invasivas en enxeñaría biomédica: Aplicación do láser en medicina** | | | | |
| Subject | (*)Técnicas avanzadas no invasivas en enxeñaría biomédica: Aplicación do láser en medicina | | | |
| Code | V04M192V01208 | | | |
| Study programme | Máster Universitario en Ingeniería Biomédica | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 4.5 | Optional | 1st | 2nd |
| Teaching language | Spanish | | | |
| Department | | | | |
| Coordinator | Pou Saracho, Juan María | | | |
| Lecturers | Pou Saracho, Juan María | | | |
| E-mail | jpou@uvigo.es | | | |
| Web | | | | |
| General description | This matter offers to the future biomedcial engineers a vision of the paper of the non-invasive techniques and the laser in modern medicine. | | | |

| Training and Learning Results | |
|---|---|
| Code | |
| A3 | That students are able to integrate knowledge and handle complexity and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments. |
| B6 | Capacity for handling specifications, regulations and mandatory standards. |

| Expected results from this subject | |
|---|---|
| Expected results from this subject | Training and Learning Results |
| To know advanced non-invasive techniques in the field of biomedical engineering | B6 |
| To know applications of lasers in medicine | B6 |
| To apply knowledge of non-invasive techniques and laser techniques in the field of biomedical engineering | A3<br>B6 |

| Contents | |
|---|---|
| Topic | |
| SUBJECT 1.- INTRODUCTION | Introduction to advanced non-invasive techniques in biomedical engineering<br><br>Analysis of advanced non-invasive techniques<br><br>Introduction to the laser |
| SUBJECT 2.- BASIC PRINCIPLES | Functioning of a laser source<br><br>Main parts of a laser source<br><br>Guiding and focalizing a laser beam |

| | |
|---|---|
| SUBJECT 3.- TYPES OF LASERS USED IN MEDICINE | Gas lasers |
| | Solid state lasers |
| | Diode lasers |
| | Other lasers |
| SUBJECT 4.- SAFETY | Security in the utilisation of laser sources laser in medicine |
| | Potential ocular damages |
| | Potential damages in the skin |
| | Safety regulations |
| | Measures of control and prevention |
| SUBJECT 5.- MAIN APPLICATIONS OF THE LASER IN MEDICINE | Applications of the laser in ophthalmology |
| | Applications of the laser in dermatology |
| | Applications of the laser in otorhinolaryngology |
| | Applications of the laser in urology |

**Planning**

| | Class hours | Hours outside the classroom | Total hours |
|---|---|---|---|
| Lecturing | 24 | 48 | 72 |
| Laboratory practical | 12 | 24 | 36 |
| Objective questions exam | 1.5 | 0 | 1.5 |
| Report of practices, practicum and external practices | 3 | 0 | 3 |

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

**Methodologies**

| | Description |
|---|---|
| Lecturing | Presentation of the contents on the matter object of study by the professors of the subject. Presentation of real cases of application of the laser technology in medicine. |
| Laboratory practical | Activities of application of the knowledge to specific situations and of acquisition of basic and practical skills related to the matter object of study. They will be developped in the premises of the University Hospital Complex of Vigo. |

**Personalized assistance**

| Methodologies | Description |
|---|---|
| Lecturing | The professor, during the exhibition of the theoretical classes, will clarify in individual form and/or collectively all the doubts that can have the student on the matter object of study. |
| Laboratory practical | The professor, during the development of the practical class of laboratory, will solve the doubts that the student may have realted to the matter under study. |

**Assessment**

| | Description | Qualification | Training and Learning Results | |
|---|---|---|---|---|
| Objective questions exam | The exam will consist in an individual examination. | 60 | A3 | B6 |
| Report of practices, practicum and external practices | Work made in team but evaluated individually. | 40 | | |

**Other comments on the Evaluation**

To pass the subject, a minimum note of 2 points out of 10 must be achieved. This applies in the individual exams as well as in the team work report.

In the second opportunity, only the students that fail to pass the subject will be evaluated.

Ethical commitment

It is expected that the students conduct theirselves in a suitable ethical manner. In the case to detect a non ethioal

behaviour (copy, plagiarism, utilisation of unauthorised electronic devices, and others) it will be considered that the student does not achieve the necessary requirements to pass the subject. In this case the global qualification in the present academic year will be of fail (0.0). During the evaluation exam any electronic device will be allowed, with the exception that explicit permission is given by the professor in charge. The fact to enter an unauthorised electronic device in the classroom of examination will be considered reason of failing the subject in the present academic course and the global qualification will be fail (0.0).

## Sources of information

### Basic Bibliography

Jeff Hecht, **Understanding Lasers: An Entry-Level Guide, 4th Edition**, Wiley, 2018

Markolf H. Niemz, **Laser-Tissue Interactions Fundamentals and Applications**, Springer, 2007

### Complementary Bibliography

Helena Jelínková, **Lasers for Medical Applications Diagnostics, Therapy and Surgery**, Woodhead Publishing, 2013

## Recommendations

### Other comments

To enrol in this subject it is suggested to compare the schedules of this subject with others, with the objectiv to avoid lecturing overlap. The continuos evaluation will not be applied if the students can not follow the lectures due to overlapping with other subjects.

Likewise the sending of electronic messages or the utilisation of the mobile telephone during the development of the lectures implies the expulsion from the classroom.

The student that does not abide with that established in the previous paragraph not only will be expulsed from the classroom, but he/she will lose his/her posibility to follow the continuous evaluation.

The original learning guide is that written in Spanish. In case of discrepancies, the spanish version of this learning guide will prevail.