Universidad de Navarra

Applied Biomedical Instrumentation (Ing.Gr.)
Guía docente 2026-27

PRESENTACIÓN

Breve descripción: In this course we will perform experiments based on the theoretical principles of biomedical instrumentation.

Titulación (Módulo/Materia):

- Ingeniería Biomédica (Biomedicina/Instrumentación)

Detalles:

- **ECTS**: 4 ECTS
- **Curso, semestre**: 4.º curso, 2.º semestre
- **Carácter**: Obligatorio
- **Idioma**: English

Profesores de la asignatura:

- Díaz Dorronsoro, Javier / Profesor Titular
- Fernández Seara, María Asunción / Profesor colaborador

RESULTADOS DE APRENDIZAJE (Competencias)

INGENIERÍA EN INGENIERÍA BIOMÉDICA

CG1 - La formación debe proporcionar al egresado una base científica sólida que permita abordar con rigor los retos profesionales del sector biomédico.

CG3 - Proporcionar al egresado los conocimientos tecnológicos necesarios que permitan al egresado abordar problemas del campo de la Ingeniería Biomédica.

CG8 - Saber utilizar los instrumentos clínicos y biomédicos para obtener, organizar e interpretar la información científica y sanitaria.

CE4 - Ser capaz de identificar los conceptos de la ingeniería que se pueden aplicar en el campo de la biología y de la salud.

CE5 - Conocer y saber utilizar los instrumentos clínicos y biomédicos para obtener, organizar e interpretar la información científica y sanitaria.

PROGRAMA

- In this course there are no theoretical classes, but the theory learned in the "Biomedical Instrumentation" course of the previous semester is assumed. Only laboratory practices will be done.

These are the practices that are going to be performed:

Title: **EEG**. Objective: *Measure PEV using the Brain Vision system*

Title: **ECG** Objective: *Measure ECG with the GoCardio system*

Universidad de Navarra

Title: **Pulseoximetry** Objective: *Detect SpO2 level*

Title: **X Ray** Objective: *Measure X-ray absorption and estimate internal structures*

Title: **Magnetic resonance image** Objective: *Analyze and process nuclear magnetic resonance signals*

Title: **Ultrasound** Objective: *Analyze and process ultrasound signals*

Title: **Balance** Objective: *Prepare an instrumentation amplifier and an ADC to meassure weight*

Title: **Impedance pneumography** Objective: *Measure respiratory rate with the Respimetrics system*

EDUCATIONAL ACTIVITIES

The company Dragër will give a session on machines for patient monitoring during anesthesia.

In addition, 8 laboratory practices will be carried out in which the knowledge acquired in the theoretical course entitled "Biomedical Instrumentation" will be experimented with.

The formation of the groups is specified below:

1. The groups must be made up of 3 students

2. There must be a leader

3. The leader sends an email to jdiaz@tecnun.es indicating who the group members are.

4. **After the practice is done, the leader uploads to ADI the report of the practices before performing the following practice**. The route for ADi is the following: Area Interna - > Lab Reports - > (Select the practice to report)

EVALUATION

ORDINARY EVALUATION

In this course, the assessment **(10 points)** is based on the evaluation of the laboratory reports **(7 points)** and a final exam **(3 points).** The final exam covers the theoretical part about ***Magnetic Resonance Imaging*** and ***Ultrasound***.

In order to pass the course, a minimun of 4 points out of 10 points will be required for the final exam. In case this minimun is not reached in the ordinary call, the final score will correponds with the final exam.

The rubrics to be used to evaluate the reports are specified below:

1. ***Presentation*** of the report: The report will be evaluated on the external presentation of the content, such as the punctuality in the delivery, index and pagination of the contents, name of the authors, etc. The report must be uploaded to ADI within the following 7 natural days after performing the practice. **(1 point)**

2. Clear, concise and accurate presentation of the ***learning objectives*** to be achieved during the practice. **(3 points)**

3. ***Results*** obtained during the elaboration of the practice, which are required in the documentation delivered in the practice and which are summarized in the Reports section. **(3 points)**

4. ***Analysis and conclusions*** of the practice: This section should include a reflection on what has been done and an assessment of the results obtained. **(3 points)**

EXTRAORDINARY EVALUATION

For the extraordinary evaluation, another exam about ***Magnetic Resonance Imaging*** and ***Ultrasound*** will be carried out. The final score will corresponds with the best estimation of the mark obtained by just using the final exam or the mark obtained when including the laboratory reports.

HORARIOS DE ATENCIÓN

Dr María Fernandez Seara (mfseara@unav.es)

- Despacho 218 Edificio Miramón. Planta 2
- Horario de tutoria: concretar con el profesor

Dr Javier Díaz Dorronsoro (jdiaz@unav.es)

- Despacho 218 Edificio Miramón. Planta 2
- Horario de tutoria: concretar con el profesor

BIBLIOGRAFÍA

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- Bentley, John P. Principles of Measurement Systems. 2005. Localízalo en la Biblioteca
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