Universidad Zaragoza

Year : 2020/21

69324 - Scientific visualization and representation techniques

Syllabus Information

Academic Year: 2020/21
Subject: 69324 - Scientific visualization and representation techniques
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 547 - Master's in Biomedical Engineering
ECTS: 3.0
Year: 1
Semester: Second semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

The course and its intended results aim to the following objectives:

Approacches:

- To define what is Data Visualization.
- Introduce some neede bases of Conputer Graphics.
- Analyze the different structures of data representations, at topological and geomtrical levels.
- Describe widely and with several examples the algorithmic bases of visualization.

Objectives:

- That the student knows basic concepts enumrated above.
- That the student knows how to analyze, state and solve a given visualization problem.
- That the student exercises the development of both individual and team activities.

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

There is no requirements on previous matters in the Master, that should be needed to follow this course.

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

Students should prove they have achived the planned learning objectives by means of the following evaluation activities:

E1: Final exam (30%)

Written exam, common for all groups in the course. The test will consist of some theorical and practical questions, and its duration will be of about 1h.

E2: Tutored application work (30%)

Application work done by students as homework along the course. Evaluation of the work will be based on the work itself, results achieved, and proposed solution.

E3: Lab work (40%)

Evaluation of the work will be based on the work itself and reports generated about the exercises in lab sessions.

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, student participation, computer lab sessions for data visualization, autonomous and continuous work, practical tasks and research assignments, usually related with the student's PhD work.

4.2.Learning tasks

The course includes the following learning tasks:

- **A01 Lectures** (16 hours). The main course contents are presented and discussed, always using example problems related to Bio-Engineering. Student participation is encouraged.
- **A03 Computer lab sessions** (10 hours). Lab sessions are carried out in between lectures, in the same classroom. The students develop the theoretical concepts with the use of computer applications specifically designed for data visualization. Students use their own computers/laptops with software supplied by the theacher. Only free or public sofware is used.
- **A05 Assignment**. Development of a practical assignment, more complex than the ones done lab sessions that students can solve individually or in pairs. Ir requires a written report and a public presentation.
- **A06 Tutorials**. Students may ask any questions they have about unclear contents of the course, lab sessions or assignments.
- **A08 Assessment**. The students will take an exam, and submit several reports derived from the computer lab sessions and from the practical assignment.

4.3.Syllabus

The course will address the following topics:

Theory

1. What is really Data Visualization?
2. What are Computer Graphics?
3. Basic Data representation and modelling
4. Data Visualization Algorithms
5. Visualization in Biomedic Engineering

Practice

1. Three-dimensional data processing
2. Interactive applications for scientific data visualization: Paraview
3. Interactive applications for medical data visualization: 3DSlicer
4. Intro to specific application development: VTK

4.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

4.5.Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=69324