COURSE SYLLABUS 2019-20

Basic information on the course

Course:	Multimedia Technologies		
Course code:	40154321	Plan:	Grado en Ingeniería Informática (Plan 2015)
Academic Year:	2019-20	Undergraduate/Graduate:	Undergraduate
Degree Year:	4	Type:	Optative
Duration:	First semester		

TIME DISTRIBUTION ACCORDING TO REGULATIONS

Credits:	6
Total time:	150

USE OF LEARNING PLATFORM:

TEACHERS

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OTHER IMPORTANT INFORMATION

Content justification

The generation, storage, processing, transmission and reproduction of multimedia content are increasingly frequent processes in many information systems. In this context, the creation of multimedia content manipulation tools is a key aspect in the preparation of the computer engineer. For these reasons, in the subject of Multimedia Technologies students study a set of contents that merge aspects related to the transmission of data over packet switching networks (Internet generally) and the capture / encoding / reproduction of audio and video.
in real time.

Courses related in Study Plan

* Servicios en las Tecnologías de la Información (Tecnologías Web y Tecnologías Multimedia).
* Tecnologías de comunicación y seguridad (Transmisión de Datos y Redes de Computadores, y Seguridad Informática).
* Teoría de códigos y criptografía (Teoría de Códigos y Criptografía).
* Sistemas operativos, Sistemas distribuidos y redes y arquitectura de computadores (Sistemas Operativos, Fundamentos de Redes de Computadores, y Arquitectura de Computadores).
* Tecnologías de acceso a la información (Periféricos e Interfaces, Tecnologías de Acceso a Red).

Pre-required knowledge

None

COMPETENCES

General competences

Key competences University of Almeria

- UAL3: Ability to solve problems.

Basic competences

- RD2: Application of knowledge. Students should be able to apply acquired knowledge and problem solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.

Specific competences

- TI1: Ability to understand the environment of an organization and its needs in the field of information technologies and communications. In real time.

- TI6: Ability to conceive systems, applications and services based on network technologies, including Internet, web, e-commerce, multimedia, interactive services and mobile computing.

LEARNING OUTCOMES

1. Socket programming.
2. Formats and multimedia streaming.
3. Collaborative application development.

COMPETENCY ASSESSMENT
Criteria and assessment tools

Multimedia Technologies is evaluated following the philosophy ABP (Project Based Learning). In theory the theoretical concepts are studied and in practice the project is developed. Students must apply the acquired knowledge and be able to solve problems by themselves, to carry out the project (competences CB2: Application of knowledge and UAL3: Ability to solve problems).

Each year the project is different, or is a continuation of the project developed up to the previous year. The project is hosted on GitHub and the methodology based on PRs (Pull Requests) is used. This year the project developed is [* Real-time multimedia intercom *] (https://github.com/Tecnologias-multimedia/intercom). Students need to apply their knowledge about networks and multimedia, within a dynamic process that does not repeat itself over time (IT skills: Ability to understand the environment of an organization and its needs in the field of information technology and communications , and TI6: Ability to conceive systems, applications and services based on network technologies, including Internet, web, e-commerce, multimedia, interactive services and mobile computing).

Each PR must solve one of the problems defined in the project site, using the methodology described in the [* Fork & Branch Git * Workflow Manual] (https://github.com/vicente-gonzalez-ruiz/ fork_and_branch_git_workflow). The problems will be defined during the course, according to the evolution of the project. Both students and tutors can define problems that should always be discussed and agreed upon. In a week of the course, all students will work to solve the same * major * problem. Minor problems (characteristic, with their corresponding public relations) among the main * problems are also encouraged.

Each week, in the classroom, (1) the class (including the tutor) will choose the best solution for the main number of that week, (2) the corresponding group will make a PR for the project of the tutor and (3) the tutor will will accept After that, (4) all groups must synchronize their projects with the tutor (although this is optional). The best solution will be scored with 10 points, and the rest of solutions with 9, 8, 7 ... points. The tutor will write, in a log, the reasons for the order of the solutions. The students should help in this task.

The grade for each group will be the average of each of the solutions.

Follow-Up Mechanisms

- Attendance to tutorials.
- Participation in communication tools (discussion forums, emails).
- Others:
    - Periodic interviews.
    - Activity recorded in the collaborative development platforms:
        - Tecnologías multimedia at GitHub: https://github.com/Tecnologías-Multimedia.
        - Tecnologías multimedia at Gitter: https://gitter.im/Tecnologias-multimedia/community.

COURSE MATERIALS

Recommended course materials

1. Background.
    a. The fork and branch git workflow.
    b. Yet another Python tutorial.
    c. Pyramids and wavelets.
    d. Advanced Linux Sound Architecture (ALSA).
    e. JACK (JACK Audio Connection Kit).
    f. MilkyTracker.
    g. FFMPEG.
    h. Blender.
    i. LaTeX.
    j. Audacity.
    k. Pure Data.
2. Audio-visual perception.
    a. The sound.
    b. The human auditory system.
    c. Human sound perception.
    d. The light.
    e. The human visual system.
    f. Human light perception.
3. Audio-visual transduction.
    a. Audio transduction systems.
    b. Video transduction systems.
4. Signal digitization.
    a. Harmonic analysis.
    b. Sampling.
    c. Quantization.
5. Encoding.
    a. Probabilistic models.
    b. Huffman coding.
    c. Arithmetic coding.

d. Differential coding.
e. Transform coding.
f. Media encoding models.

6. Transmission.
   a. Multimedia transmission.
   b. Business model on the Internet.
   c. Data delivery models.
   d. Media streaming models.
   e. Quality of Service. Icecast.

Course materials available in UAL's library

1. Behrouz A. Forouzan and Firouz Mosharraf. Computer networks: a top-down approach. McGraw-Hill. 2012.
2. K.R. Rao, J.J. Hwang. Techniques and standards for image, video, and audio coding. Prentice Hall. 1996.
3. Wesley Hales. HTML5 and JavaScript Web Apps. O'Reilly Media. 2012.
4. Xiph. Org Foundation. Xiph Org Projects: Vorbis, Ogg, Free Lossless Audio Codec, Speex, Theora, Use of Ogg Formats in Html5. Books LLC (General Books). 2010.
5. Books, LLC. Audio Codecs: MP3, MPEG-4, MPEG-1, MPEG-2, Vorbis, Windows Media Audio, Audio Codec, Linear Predictive Coding, MPEG-3, Adaptive Transform Acoustic Coding, Dolby Digital, Speex, LAME, RealAudio, G.711, Mu-law Algorithm, G.723.1, A-law Algorithm. Books LLC (General Books). 2011.
6. Rafael C. González, Richard E. Woods, Upper Saddle River. Digital image processing. Prentice Hall. 2008.
7. Turnquist, Greg Lee. Spring Python 1.1 create powerful and versatile Spring Python applications using pragmatic librarie. Birmingham, U.K. : Packt Open Source. 2010.
8. Christopher Schmitt, Kyle Simpson,. HTML5 Cookbook. O'Reilly Media. 2011.
9. Steve Fulton, Jeff Fulton. HTML5 Canvas. O'Reilly Media. 2013.
10. Banerji, A. Multimedia Technologies. McGraw-Hill Education (India) Pvt Limited. 2010. Ninad Sathaye. Python Multimedia. PACKT Publishing. 2010.
11. Dusty Phillips. Python 3 Object Oriented Programming. PACKT Publishing. 2010.

WEBSITE

- https://tecnologias-multimedia.github.io