Assistive Photonics

Academic Year: (2019 / 2020) **Review date: 30/04/2019 12:15:58**

Department assigned to the subject:

Coordinating teacher: SANCHEZ PENA, JOSE MANUEL

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

The students are expected to have attended the mandatory courses of the Master. It is also highly recommended to have skills in analogue and digital electronics and optics.

OBJECTIVES

Basic Skills
CB6 . Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.
CB7 . That the students can apply their knowledge and ability to solve problems in new or unfamiliar in wider or multidisciplinary environments related to their field of study.
CB8 . That the students can integrate their knowledge, as well as handle the complexity of making judgements from an incomplete or limited information, but which could include
reflections about the social and ethic responsibilities that could be linked to the application of their judgements and knowledge.
CB10. That the students possess learning skills that allow them following their long-life learning in a self-conducted and self-sufficient way.

General Skills
CG2. Ability to propose, design, implement and maintain a system with photonic components for a specific application

Specific Skills
CE2 . Handling of tools aiming to design photonic devices and systems.
CE3 . To be aware of the current trends in different applications of photonic technologies and learned experiences from real cases.
CE5 . Capacity of selecting novel photonic components, technologies and subsystems.
CE7 . Capacity of analyzing and designing photonic systems for applications in communications and sensing.
CE8 . Capacity of effectively searching information, as well of identifying the state of the art in a technological problem in the field of photonic devices and systems.

LEARNING RESULTS

Identify, from a practical and theoretical point of view, both scientific and technological main challenges in aided photonic systems for disabled people, as well as their use and integration.

DESCRIPTION OF CONTENTS: PROGRAMME

M1: Overview of Disability: Current Status and Challenges
-1.1 Definitions of impairment / disability.
-1.2 Geographical distribution of disability in the World / Spain. Guidelines and rules
-1.3 accessible / universal design. Description of the principles of design for all. Example of practical application

M2: Evaluation of support products: standards and best practices
- 2,1: Classification of PAs
- 2.2: Classic Technology vs Current Technology

M3: Products supporting the visually impaired.
- 3.1: Anatomy of the eye.
- 3.2: Low vision and color blindness
- 3.3: Assistive photonic products for eye diseases

M4: Motor Disability
-4.1: Introduction and motor disability issues
-4.2: Photonic Aids for motor disability

M5: Intellectual Disability.
-5.1: Causes of intellectual disability
-5.2 AAC Systems based on photonic technologies

M6: Hearing impairment
-6.1: Ear anatomy
-6.2: Causes of hearing impairment
-6.3 Technical products based on optoelectronic systems

M7. Use of displays in rehabilitation technologies.
-7.1 Head up displays, 3D, e-readers
-7.2 AR and VR. Basic concepts
-7.3 AR and VR as tools for rehabilitation in cognitive disability.

M8. Audiovisual Accessibility
- 8.1 Scenarios: TDT, museums, cinemas, theatres, scenic arts,...
- 8.2 Optoelectronic aids for AV accessibility

M9. Design of assistive products for different kind of disabilities
-9.1 Conceptual design
-9.2 Simulation
-9.3 Implementation
-9.4 Demonstration & presentation in classroom

LEARNING ACTIVITIES AND METHODOLOGY

Learning activities:

- Lectures
- Work using numerical tools, demonstration of experiments in the lab.
- Individual work developing a specific project that will be presented in class and discussed in group.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

- The attendance and class participation will be evaluated by solving specific problems and participating in forums, chats, etc. related to assistive photonic systems (15%).
- The student will develop a work during the course. The results will be presented in class and discussed by all the students (45%).
- At the end of the course the students will have to pass an exam about the topics of the course (40%).

BASIC BIBLIOGRAPHY

- - Eds.: M. A. Hersh and M. Johnson. Assistive Technology for Visually Impaired and Blind People, Springer. ISBN 978-1-84628-867-8. , 2008

- ¿ A. Mittal and S. Sofat Sensors and Displays for Electronic Travel Aids: A Survey, International Journal of Image Processing, 5, 1-14., 2010

- ¿ Eds.: M. A. Hersh and M. Johnson. Assistive Technology for Visually Impaired and Blind People, Springer. ISBN 978-1-84628-867-8. , 2008

- ¿ Eds.: W.Barfield and T.Caudell Fundamentals of Wearable Computers and Augmented Reality.. , Mahway, NJ, US.: Lawrence Erlbaum Associate. , 2001

- ¿ Eds.:Maria Manuela Cruz-Cunha, Isabel Maria Miranda and Patricia Gonçalves. Handbook of Research on ICTs for Human-Centered Healthcare and Social Care Services (2 Volumes) . , DOIGI Global. DOI: 10.4018/978-1-4666-3986-7,ISBN13:9781466639867, ISBN10: 1466639865, EISBN13: 9781466639874. , 2014