UNIVERSIDAD DEL BIO-BIO
La Libertad del Conocimiento

UNIVERSIDAD DEL BIO-BIO
VICERRECTORIA ACADEMICA – DIRECCION DE DOCENCIA

ASIGNATURA : WIRELESS SENSOR NETWORKS AND COMPUTER VISION
CODIGO : 634332

I. IDENTIFICACION

1.1 CAMPUS : CHILLÁN

1.2 FACULTAD : Ciencias Empresariales

1.3 UNIDAD (Departamento o Escuela): Ciencias de la computación y TI

1.4 CARRERA : INGENIERÍA CIVIL EN INFORMÁTICA

1.5 Nº Créditos:

1.6 TOTAL DE HORAS: 4 HT: 2 HP: 2 HL:

1.7 PREQUISITOS DE LA ASIGNATURA (Señale Nombre y código de la asignatura/s):

1.7.1 no hay

II. DESCRIPCION

Theoretical-practical course in which we discuss the conceptual principles, issues involved, and recent techniques in the implementation of applications based on wireless sensor networks (WSNs) and computer vision (CV). The concepts studied include the industrial problems, but they focus on the problems imposed to the scientific community mainly in some particular cases. We describe the existing technologies, trends, best known algorithms and protocols for sensor networks and computer vision, giving a general analysis of each one.

III. OBJETIVOS

a) Generals:

To provide basic knowledge and skills related to wireless sensor networks and computer vision domains, enabling the students to understand the main issues involved, technologies, protocols, and research trends currently developed by the scientific community.

b) Specifics

1. To provide kwnowledge about different problems in the implementation of wireless sensor networks and computer vision, and their applications in different environments.
2. To provide understanding and the capability to analyze main techniques and protocols found in the literature and the standards used in sensor networks and computer vision.
3. To provide kwnowledge on theoretical and practical issues in order to handle research on the areas and to propose pertinent solutions.

IV. UNIDADES PROGRAMATICAS

UNIDADES	HORAS
Unidad 1: Introduction to WSNs	6
Unidad 2: Communication protocols for WSNs	8
Unidad 3: Particular problems for WSNs	8
Unidad 4: WSNs project	8
Unidad 5: Introduction to Computer Vision	6
Unidad 6: Image Processing technics	8
Unidad 7: Classifications	8
Unidad 8: Computer Vision Project	8

V. CONTENIDO UNIDADES PROGRAMÁTICAS

UNIDADES	CONTENIDO
Unidad 1: Introduction to WSNs	1. General concepts in communication networks 2. Wireless networks 3. Embedded systems 4. Principles of WSNs 5. Applications 6. Scientific problems 7. WSNs architectures 8. Particular cases
Unidad 2: Communication protocols for WSNs	1. Particular features of communication protocols in WSNs 2. Link layer protocols 3. Network level protocols 4. Other 5. WSNs simulation
Unidad 3: Particular problems for WSNs	1. Particular cases of WSNs 2. Analysis of particular cases: a) Multimedia sensor networks b) Localization in WSNs c) Other
Unidad 4: Projects en WSNs	Development of research works in WSNs
Unidad 5: Introduction to Computer Vision	1. Principles of WSNs 2. Cameras of Vision 3. Computer Vision Systems
Unidad 6: Image Processing technics	1. Detection 2. Recognitions 3. Representation 4. Metrics
Unidad 7: Classifications	1. Classifications basic 2. Neural Networks 3. Support Vector Machines 4. Others
Unidad 8:Computer Vision Project	Development of research works in CV

VI. METODOLOGÍA

Knowledge and skills provided in this course will be acquired through various sessions that will integrate lectures, theoretical exercises and the development of practical experiences, along with a concurrent review of the related technical and scientific literature in order to complement and deep the acquired knowledge, and to get a current overview of each area's development.

VII. TIPOS DE EVALUACIÓN (PROCESO Y PRODUCTO)

- Periodic works with technical and scientific literature, simulation, implementation and classroom presentations.
- A research project at the end of each topic.

VIII. BIBLIOGRAFIA: La bibliografía debe formularse de acuerdo a las normas estipuladas por la Biblioteca de nuestra Universidad. Para ello ir a la página de la UBB , pinchar donde dice ***"red de bibliotecas",*** luego pinchar "***Web Biblioteca Werken UBB",*** se abrirá la página y al costado izquierdo en Temas de Interés podrá encontrar la GUÍA DE REDACCIÓN REFERENCIAS BIBLIOGRÁFICAS, en la cual aparece claramente estipulada la forma de presentar la bibliografía. Es importante destacar que debe estar claramente diferenciada al bibliografía básica de la complementaria.

- **Básica**

In wireless sensor networks:

1. Willig, Karl, Protocols and architectures for wireless sensor networks.

2. I.F. Akyildiz and W. Su and Y. Sankarasubramaniam and E. Cayirci, Wireless Sensor Networks: A Survey, Computer Networks, 2002, nº38, pages 393-422.

In computer vision:

3. Gonzáles, R., Woods, S., "Tratamiento Digital de Imágenes".

4. Davies, E. R., "Machine Vision".

- **Complementaria**

In wireless sensor networks:

1. Rappaport, Theodore S., Wireless communications: principles and practice, Prentice-Hall, 2002

2. Shorey, Rajeev, Mobile, wireless, and sensor networks: technology, applications, and future directions, John Willey, 2006

3. Tanenbaum, A, Redes de Computadores, Prentice-Hall, 2001

4. Standares publicados en Internet y publicaciones recientes.

In computer vision:

5. Proakis, M., “Digital Signal Processing”.

6. Oppenheim, M., Willsky, L., “Procesamiento de Señales”.

7. Standares publicados en Internet y publicaciones recientes.