

Course guide

270739 - AIHC - Artificial Intelligence in Health Care

Last modified: 21/07/2022

Unit in charge: Barcelona School of Informatics
Teaching unit: 1042 - URV - Universitat Rovira i Virgili.

Degree: MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE (Syllabus 2017). (Optional subject).

Academic year: 2022 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: ANTONIO MORENO RIBAS

Others: Primer quadrimestre:
DAVID RIAÑO RAMOS - 10

PRIOR SKILLS

Basic concepts of AI.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.

CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.

CEP6. Capability to assimilate and integrate the changing economic, social and technological environment to the objectives and procedures of informatic work in intelligent systems.

Generical:

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

Transversal:

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

Basic:

CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.

CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

TEACHING METHODOLOGY

The entire course will be worked in groups. A topic of AI applied to health care will be presented to all the groups, an article and a list of questions related to the topic presented will be released. Each group will have two weeks to prepare an oral presentation of 15 minutes which will outline the important issues of the article and his response to the questions. After the presentation of all groups, there will be an open discussion among all groups about topic. This methodology will be repeated five times throughout the course, each with a different topic of IA applied to medicine.



LEARNING OBJECTIVES OF THE SUBJECT

- 1.Capacity to read, understand, and relate the information contained in scientific & technological documents
- 2.Train the synthesis, preparation, exposition, and defense of scientific topics in public
- 3.Ability to connect and complement own ideas with other's and also with AI technologies explained in other courses

STUDY LOAD

Type	Hours	Percentage
Self study	48,0	64.00
Hours large group	27,0	36.00

Total learning time: 75 h

CONTENTS

Artificial intelligence in health care

Description:

A review of the state of AI in health care will be analyzed

Grand challenges in clinical decision support

Description:

A review of the pending reseach and development CDS open problems will be analyzed

Data mining in health care

Description:

A review of important AI data mining technologies and their application to medicine will be analyzed

Big data analytics in health care

Description:

A description of BDA and its application to health care will be analyzed

IBM Watson

Description:

The use of IBM Watson and technology underneath when applied to health care will be analyzed

Ethical challenges and recommendations in AIHC

Description:

Ethical framework of AI when applied to medicine



ACTIVITIES

Introduction of the course

Description:

The professor will expose the relevant issues related to the subject: Content; Material; Calendar; Evaluation; Bibliography

Full-or-part-time: 2h

Theory classes: 2h

Preparation of 5 topics by the students

Description:

The five topics of the subject are prepared by the students in groups, every other week.

Specific objectives:

1

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.

CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

Full-or-part-time: 40h

Self study: 40h



Exposition & questions 1

Description:

Students expose and answer questions about topic 1 (in group).

Specific objectives:

2

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.

CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

Full-or-part-time: 5h

Guided activities: 3h

Self study: 2h

Exposition & questions 2

Description:

Students expose and answer questions about topic 2 (in group).

Specific objectives:

2

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.

CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

Full-or-part-time: 5h

Guided activities: 3h

Self study: 2h



Exposition & questions 3

Description:

Students expose and answer questions about topic 3 (in group).

Specific objectives:

2

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.

CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

Full-or-part-time: 5h

Guided activities: 3h

Self study: 2h

Exposition & questions 4

Description:

Students expose and answer questions about topic 4 (in group).

Full-or-part-time: 5h

Guided activities: 3h

Self study: 2h

Exposition & questions 5

Description:

Students expose and answer questions about topic 5 (in group).

Full-or-part-time: 5h

Guided activities: 3h

Self study: 2h



Conclusions I by the professor

Description:

The conclusions of the course are exposed.

Specific objectives:

3

Related competencies :

CEP6. Capability to assimilate and integrate the changing economic, social and technological environment to the objectives and procedures of informatic work in intelligent systems.

CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Full-or-part-time: 3h

Theory classes: 3h

GRADING SYSTEM

Presentations (60%)

Participation in discussions of other's presentations (40%)

BIBLIOGRAPHY

Basic:

- Patel, V.L.; [i 6 més]. "The coming of age of artificial intelligence in medicine". Artificial Intelligence in Medicine [on line]. vol. 46, Issue 1, 2009, pp.5-17 [Consultation: 27/07/2020]. Available on: <https://www.sciencedirect.com/science/journal/09333657>.- Sittig, D.F.; [i 7 més]. "Grand challenges in clinical decision support". Journal of Biomedical Informatics [on line]. Vol. 41, Issue 2, 2008, pp. 387-392 [Consultation: 27/07/2020]. Available on: <https://www.sciencedirect.com/science/journal/15320464>.- Tomar, D.; Agarwal, S. "A survey on data mining approaches to healthcare". International Journal of Bio-Science and Bio-Technology [on line]. Vol. 5, No. 5, 2013, pp. 241-266 [Consultation: 27/07/2020]. Available on: <https://doi.org/10.14257/ijbsbt.2013.5.5.25>.- Raghupathi, W.; Raghupathi, V. "Big data analytics in healthcare: promise and potential". Health Information Science and Systems [on line]. Vol. 2, Article 3, 2014 [Consultation: 27/07/2020]. Available on: <https://www.ncbi.nlm.nih.gov/pmc/journals/2692>.- Chen, Y.; Argentinis, E.; Weber, G. "IBM Watson: how cognitive computing can be applied to big data challenges in life sciences research". Clinical therapeutics [on line]. Vol. 38, No. 4, Apr. 2016, pp. 688-701 [Consultation: 27/07/2020]. Available on: <https://search.proquest.com/publication/1226358>.

Complementary:

- Peek, N.; Combi, C.; Marín, R.; Bellazi, R.. "Thirty years of artificial intelligence in medicine (AIME) conferences: A review of research themes". Artificial intelligence in medicine [on line]. [Consultation: 29/09/2021]. Available on: <https://pubmed.ncbi.nlm.nih.gov/26265491/>.- Noorbakhsh-Sabet, N.; Zand, R.; Zhang, Y.; Abedi, V.. "Artificial Intelligence transforms the future of health care". American journal of medicine [on line]. Available on: <https://pubmed.ncbi.nlm.nih.gov/30710543/>.

RESOURCES

Hyperlink:

- <https://campusvirtual.urv.cat/course/view.php?id=87557>