270721 - IDSS - Intelligent Decision Support Systems

Coordinating unit: 270 - FIB - Barcelona School of Informatics
Teaching unit: 715 - EIO - Department of Statistics and Operations Research
723 - CS - Department of Computer Science

Academic year: 2019
Degree: MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE (Syllabus 2012). (Teaching unit Optional)
MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE (Syllabus 2017). (Teaching unit Optional)
ECTS credits: 4.5

Prior skills

Fundamentals on Machine Learning and Artificial Intelligence.

Teaching methodology

The contents of the course will be exposed with the support of several case studies along the course. In the laboratory classes, the homework of the students (practical works) will be supervised by the teacher.

Learning objectives of the subject

1. To provide students with the basic and necessary knowledge, in order that they could identify when a given domain is really a complex one
2. To identify how many and of which nature are the decisions involved in complex domains management
3. To know how to analyse, to design, to implement and to validate an Intelligent Decision Support Systems (IDSS), emphasising the integration of Artificial Intelligence models and Statistical/Numerical models, and the knowledge discovery from data.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group: 25h</th>
<th>22.22%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group: 12h 30m</td>
<td>11.11%</td>
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<tr>
<td></td>
<td>Guided activities: 3h</td>
<td>2.67%</td>
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<tr>
<td></td>
<td>Self study: 72h</td>
<td>64.00%</td>
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</tbody>
</table>
### Introduction

**Degree competences to which the content contributes:**

**Description:**
- Complexity of real-world systems or domains
- The need of decision support tools

### Decisions

**Degree competences to which the content contributes:**

**Description:**
- Decision Theory
- Modelling of Decision Process

### Evolution of Decision Support Systems

**Degree competences to which the content contributes:**

**Description:**
- Historical perspective of Management Information Systems
- Decision Support Systems (DSS)
- Advanced Decision Support Systems (ADSS)
- Intelligent Decision Support Systems (IDSS)

### Intelligent Decision Support Systems (IDSS)

**Degree competences to which the content contributes:**

**Description:**
- IDSS Architecture
- IDSS Analysis and Design
- Requirements, advantages and drawbacks of IDSS
- IDSS Validation
- Implementation of an IDSS in a computer

### Knowledge Discovery in a IDSS: from Data to Models

**Degree competences to which the content contributes:**
### Description:
- Introduction
- Data Structure
- Data Filtering
- Knowledge Models
  - Descriptive models
  - Associative models
  - DiscriminANT Models
  - Predictive models
- Uncertainty Models
  - Probabilistic models
  - Fuzzy models

### Post-Processing and Model Validation

**Degree competences to which the content contributes:**

**Description:**
- Post-processing techniques
- Validation
- Statistical Methods for Hypotheses Verification

### Tools and Applications

**Degree competences to which the content contributes:**

**Description:**
- Software Tools for IDSS Development
- Application of IDSS to real-world problems

### Future Trends in IDSS and Conclusions

**Degree competences to which the content contributes:**
### Planning of activities

<table>
<thead>
<tr>
<th>Specific objectives</th>
<th>Hours</th>
<th>Theory classes</th>
<th>Practical classes</th>
<th>Laboratory classes</th>
<th>Guided activities</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO THE COURSE:</strong> General view, Contents, Web page, Racó, Evaluation, Practical works, etc.</td>
<td>1h</td>
<td>1h</td>
<td>0h</td>
<td>0h</td>
<td>0h</td>
<td>0h</td>
</tr>
<tr>
<td><strong>INTRODUCTION TO THE IDSS:</strong> Complexity of Real-world Systems, Decision Theory.</td>
<td>2h</td>
<td>2h</td>
<td>0h</td>
<td>0h</td>
<td>0h</td>
<td>0h</td>
</tr>
<tr>
<td><strong>PRESENTATION OF INDIVIDUAL PRACTICAL WORK 1 (PW1) and OF INDIVIDUAL PRACTICAL WORK 2 (PW2)</strong></td>
<td>1h</td>
<td>0h</td>
<td>0h</td>
<td>1h</td>
<td>0h</td>
<td>0h</td>
</tr>
<tr>
<td><strong>PRESENTATION OF GROUP PRACTICAL WORK 3 (PW3). INTRODUCTION TOGESCONDA TOOL.</strong></td>
<td>2h</td>
<td>0h</td>
<td>0h</td>
<td>2h</td>
<td>0h</td>
<td>0h</td>
</tr>
<tr>
<td><strong>EVOLUTION OF DECISION SUPPORT SYSTEMS:</strong> Decision Support Systems (DSS) and Advanced Decision Support Systems (ADSS)</td>
<td>1h</td>
<td>1h</td>
<td>0h</td>
<td>0h</td>
<td>0h</td>
<td>0h</td>
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</table>
**270721 - IDSS - Intelligent Decision Support Systems**

### Specific objectives:

1. 2. 3

### INTELLIGENT DECISION SUPPORT SYSTEMS (IDSS): architecture, analysis and design, implementation

<table>
<thead>
<tr>
<th>Hours</th>
<th>Theory classes: 1h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 0h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>3</td>
<td></td>
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### Presentation of several Case Studies showing the design and development of IDSS

<table>
<thead>
<tr>
<th>Hours</th>
<th>Theory classes: 15h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 0h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>1, 2, 3</td>
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</table>

### THE USE OF INTELLIGENT MODELS: Knowledge Discovery process.

<table>
<thead>
<tr>
<th>Hours</th>
<th>Theory classes: 4h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 0h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>3</td>
<td></td>
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### PW3 supervision

<table>
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<tr>
<th>Hours</th>
<th>Theory classes: 0h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 8h</th>
<th>Guided activities: 0h</th>
<th>Self study: 0h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>1, 2, 3</td>
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</table>
Evaluation of the knowledge and skills obtained by the students will be assessed through the 3 Practical Works. The final grade will be the weighted mean of the grade of each practical work. Each practical work will have the following weights:

- PW1 -> 25%
- PW2 -> 25%
- PW3 -> 50%

Thus, the final grade will be computed as follows:

\[
\text{FinalGrade} = 0.25 \times \text{PW1Grade} + 0.25 \times \text{PW2Grade} + 0.5 \times \text{PW3Grade} \times WFstud, \quad \text{where } 0 \leq WFstud \leq 1.2
\]

WFstud is a Working Factor evaluating the work of a particular student within his/her teamwork in PW3. It will be obtained by observing and assessing the load of work and degree of participation of each student throughout the PW3. In normal conditions, the WFstud = 1.

The PW1 will be evaluated by means of its quality and its justified explanation in the document. The PW2 will be evaluated according to its accuracy and completeness. The PW3 will be evaluated through:

- The quality of the methodology and work done (0.4)
- The documentation delivered (0.2),
- The quality of the oral exposition (both presentation and content assessed, as well as the ability to answer questions) (0.2)
- The planification, coordination and management of the team (0.05)
- The individual valuation of each student, including her/his integration level within the teamgroup (0.15)
Bibliography

Basic:


