270655 - ASM - Advanced Statistical Modelling

Coordinating unit: 270 - FIB - Barcelona School of Informatics
Teaching unit: 715 - EIO - Department of Statistics and Operations Research
Academic year: 2018
Degree: MASTER'S DEGREE IN INNOVATION AND RESEARCH IN INFORMATICS (Syllabus 2012). (Teaching unit Optional)
ECTS credits: 6  Teaching languages: Catalan

Prior skills
Not specified

Degree competences to which the subject contributes

Specific:
CEC2. Capacity for mathematical modelling, calculation and experimental design in engineering technology centres and business, particularly in research and innovation in all areas of Computer Science.

Generical:
CG3. Capacity for mathematical modeling, calculation and experimental designing in technology and companies engineering centers, particularly in research and innovation in all areas of Computer Science.

Transversal:
CTR4. INFORMATION LITERACY: Capability to manage the acquisition, structuring, analysis and visualization of data and information in the area of informatics engineering, and critically assess the results of this effort.
CTR5. APPROPRIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Teaching methodology

There is a weekly 3 hours session. The first two hours are devoted to the exposition of the theoretical subjects by the teacher. The last hour is dedicated to implement these contents: Each student has his laptop in class and he or she performs the tasks proposed by the teacher. Each session ends with an assignment to students who must be delivered the following session.

Learning objectives of the subject

1. At the end of the course the student will be able to propose and estimate simple and multiple linear regression models. She will also be able to interpret and validate the estimated models.
2. At the end of the course the student will be able to propose, estimate, interpret and validate generalized linear models.
3. At the end of the course the student will be able to propose, estimate, interpret and validate non-parametric versions of linear regression models and generalized linear models.
4. At the end of the course the student will know properly how to choose the smoothing parameters which in nonparametric regression models control the trade-off between good fit to the observed sample and good generalization.
5. At the end of the course the student, facing a real problem of modeling and/or prediction, will know to choose the most suitable regression model (parametric, non-parametric and semi-parametric).
## Study load

<table>
<thead>
<tr>
<th></th>
<th>Total learning time: 150h</th>
<th>Theory classes: 24h</th>
<th>16.00%</th>
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<tbody>
<tr>
<td></td>
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<td>Practical classes: 12h</td>
<td>8.00%</td>
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<tr>
<td></td>
<td></td>
<td>Laboratory classes: 12h</td>
<td>8.00%</td>
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<td></td>
<td></td>
<td>Guided activities: 6h</td>
<td>4.00%</td>
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<tr>
<td>Self study:</td>
<td></td>
<td>96h</td>
<td>64.00%</td>
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Parametric Modelling

Degree competences to which the content contributes:

Description:

Nonparametric Modelling

Degree competences to which the content contributes:

Description:


# Planning of activities

| **Presentation of Theme 1 (parametric regression models) in class** | **Hours:** 75h  
Theory classes: 22h 30m  
Practical classes: 0h  
Laboratory classes: 0h  
Guided activities: 0h  
Self study: 52h 30m |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Presentation of Theme 1 (parametric regression models) in class</td>
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<tr>
<td><strong>Specific objectives:</strong></td>
<td>1, 2, 5</td>
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| **Presentation of Theme 2 (non-parametric regression models) in class** | **Hours:** 75h  
Theory classes: 22h 30m  
Practical classes: 0h  
Laboratory classes: 0h  
Guided activities: 0h  
Self study: 52h 30m |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Presentation of Theme 2 (non-parametric regression models) in class</td>
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<tr>
<td><strong>Specific objectives:</strong></td>
<td>3, 4, 5</td>
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# Qualification system

Homework will be assigned at the end of each session and it will be due the following session. Homework grades will be worth 50% of your course grade. The other 50% of your course grade will come from a final exam.

Course Grade = 0.5 * Hwk Grade + 0.5 * Exam Grade
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Bibliography

Basic: