BRIEF DESCRIPTION AND JUSTIFICATION
(The meaning of the course in relation to the program. Between 100 and 200 words.)
Chemometrics is the science of extracting information from chemical systems by treating the data they provide. These treatments use mathematical and statistical techniques, both for the design of the experiments that will give rise to the data, and for its process with the objective of obtaining information. One of the areas where chemometrics has special application is in Analytical Chemistry, given the amount of data that is generated.

COMPETENCES
(Of course you put in relation to the skills pre-assigned in the field.)

Basic competences
CB6 - Have and understand knowledge which provides the ground or opportunity to be innovative in the development and/or application of ideas, often in a research context
CB7 - Apply their knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study
CB8 - Integrate knowledge and deal with the complexity of formulating judgments based on information which, being incomplete or limited, includes reflections on social and ethical responsibilities related to the application of their knowledge and judgments
CB9 - Communicate conclusions, and the reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.

General competences
CG2 - Ability to perform a responsible practice of the profession

Specific competences
E7- Demonstrate advanced knowledge of statistical techniques, design of experiments and process optimization for designing and developing analytical methods.
E8 - Ability to interpret the results obtained applying statistical techniques, design of experiments and process optimization methods to experimental data obtained in an analytical chemistry laboratory

* These features should not be modified without the approval of the bodies responsible for academic higher-level structures (field, module and / or system).
Transversal competences
T3 - Ability to assess the impact of the use of chemistry in the sustainable development of the society

PREREQUISITES * (Modules, materials, disciplines or expertise needed to track the subject. Contain subjects that must have been completed can be made.)

Students who have accessed the master's degree from bachelor's degrees in chemistry will not need any additional training complement. For the other degrees, they must have previously studied subjects that included basic contents of instrumental analytical chemistry and structural elucidation (including mass spectrometry) and statistics.

CONTENTS (Sections that make up the syllabus, to a second level of detail.)

1. Historical evolution of Chemometrics and its applications in Analytical Chemistry.
2. Data processing in the analysis laboratories
   a. Comparison and transfer of methods
   b. Intermediate precision
   c. Linearity
   d. Control charts and trend analysis
   e. Analysis of data of sensory origin
3. Design and optimization of methods
   a. Experimental designs
   b. Sequential optimization methods
   c. Adjustment of response surfaces.
4. Multivariate Analysis:
   a. Cluster analysis
   b. Principal component analysis. Regression
   c. Partial least squares.
TRAINING ACTIVITIES * (Complete the table relating activities, workload in ECTS credits, and skills.)

<table>
<thead>
<tr>
<th>Training Activities</th>
<th>ECTS</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions of exposition of concepts</td>
<td>25 / 0,93</td>
<td>E7, E8, T3, CG2</td>
</tr>
<tr>
<td>Sessions solving exercises, problems and cases</td>
<td>9 / 0,33</td>
<td>E7, E8, T3, CG2</td>
</tr>
<tr>
<td>Seminars</td>
<td>3 / 0,11</td>
<td></td>
</tr>
<tr>
<td>Presentations</td>
<td>4 / 0,15</td>
<td>E7, E8, T3, CG2</td>
</tr>
<tr>
<td>Activities of personal study by students</td>
<td>90 / 3,33</td>
<td>E7, E8</td>
</tr>
<tr>
<td>Evaluation activities (exams, monitoring controls …)</td>
<td>4 / 0,15</td>
<td>E7, E8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>135 / 5</strong></td>
<td></td>
</tr>
</tbody>
</table>

TEACHING METHODOLOGY (Justifying the teaching methods used in relation to the competences and contents of the course. Between 100 and 200 words.)

- Sessions of exposition of concepts: Exposition of contents through presentation or explanation (possibly including demonstrations) by a professor.
- Sessions solving exercises, problems and cases: Solving exercises, approach / problem solving and presentation / discussion of cases by a professor with the active participation of students.
- Seminars: Statement made by a teacher in order to review, discuss and answer questions about materials and topics presented in the sessions of exposure sessions concepts and solving exercises, problems and cases.
- Practical work / laboratory: Performing laboratory activities or similar (practices with computer, projects, workshops, etc.) by the student, under the direct supervision of a professor.
- Presentations: Oral presentation to a professor and possibly other students by a student. It can be a paper prepared by the student by searching the published literature or a summary of a practical or project undertaken by the student.
- Activities of personal study by students: Personal work required of the student to acquire the competences of each subject and assimilate the knowledge presented in the sessions of exposition of concepts and of solving exercises, problems and cases, using, when necessary, the consultation recommended material.
- Evaluation activities: Oral and/or written statements made during a semester or after it.

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EVALUATION

ASSESSMENT SYSTEM * (Complete the table relating evaluation methods, competences and weight in the course grade.)

<table>
<thead>
<tr>
<th>Evaluation Methods</th>
<th>%</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>30%</td>
<td>E5, E6, T3, CG2</td>
</tr>
<tr>
<td>Monitoring activities</td>
<td>40%</td>
<td>E5, E6, T3, CG2</td>
</tr>
<tr>
<td>Projects and presentations</td>
<td>20%</td>
<td>E5, E6, T3, CG2</td>
</tr>
<tr>
<td>Participation</td>
<td>10%</td>
<td>E5, E6, T3, CG2</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES (Explanation of the embodiments that allow the student skills assessment, relating them to the skills and methods of assessment.)

- The student must demonstrate his knowledge in the application of statistical techniques in the field of Analytical Chemistry. (E7, E8)
- The student must demonstrate his knowledge to design the program of experiences that allows to extract the maximum information with the minimum number of experiments depending on the specific problem. (E7, E8)
- The student must demonstrate sufficient statistical sense in order to analyze and interpret the results obtained from a series of experiences and design complementary tests if it is necessary. (E7, E8)
- The student must demonstrate sufficient knowledge and ability to optimize an analytical procedure and characterize it by defining the appropriate parameters. (E7, E8)
- The student must demonstrate knowledge of the repercussions derived from the incorrect use of statistical techniques and the results obtained. (CG2, T3)

QUALIFICATION (Explanation of the computer system of the course grade.)

First call
If the individual qualifications of the final exam, monitoring activities and projects and presentations are equal or greater than 3.0, the grade of this course is obtained:

- Final exam 30%
- Monitoring activities 30%
- Projects and presentations 30%
- Participation -

If the individual qualifications of the final exam, monitoring activities and projects and presentations are less than 3.0, the grade of this course will be the minimum qualification obtained in these evaluation methods.

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Second call
The grade of this course is obtained:

<table>
<thead>
<tr>
<th>Final exam</th>
<th>60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring activities</td>
<td>40%</td>
</tr>
</tbody>
</table>

In subsequent calls, the grade of the course will be the qualification obtained in the exam.

ASSESSMENT OF THE COMPETENCES (Define calculation expressions for each competence and the relevant evaluation methods.)

The qualification of the competences will be the same as the final exam grade.

BIBLIOGRAPHY (Recommended and accessible to students.)

Basic:

Complementary:

DOCUMENT HISTORY

PREVIOUS CHANGES (You set the date and author / s, the most recent first)
28/02/2015 Lucinio González Sabaté
01/09/2014 Lucinio González Sabaté

LAST REVISION (Indicate date and author / s.)
29/09/2016 Lucinio González Sabaté

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