



Academic year	2015-16
Subject	20305 - Mathematics III - Statistics
Group	Group 95, 2S, GEEI, GEIN, GIN2, GMAT, GMIT
Teaching guide	S
Language	English

**Subject identification**

<b>Subject</b>	20305 - Mathematics III - Statistics
<b>Credits</b>	2.4 de presencials (60 hours) 3.6 de no presencials (90 hours) 6 de totals (150 hours).
<b>Group</b>	Group 95, 2S, GEEI, GEIN, GIN2, GMAT, GMIT (Campus Extens)
<b>Teaching period</b>	Second semester
<b>Teaching language</b>	English

**Professors**

Lecturers	Horari d'atenció als alumnes					
	Starting time	Finishing time	Day	Start date	Finish date	Office
Margarita María Lourdes Miró	10:30	11:30	Thursday	08/02/2016	03/06/2016	Anselm
Julia <a href="mailto:margaret.miro@uib.es">margaret.miro@uib.es</a>						Turmeda 164

**Contextualisation**

The course Mathematics III - Statistics is a basic course taught in the second semester of the freshman year. This course provides an introduction to probabilistic and statistical thinking, and its technical content is considered as a basic level to introductory probability and statistics. This course aims to provide mathematical training and a greater maturity in the reasoning ability of the student, enhancing their capacity for abstraction. This course is focused on the development of a set of skills and learning strategies that will enable the student to analyze a problem, search and find a mathematical model to describe it, solve it and analyze the solution obtained.

In the Mathematics Bachelor Degree it is part of the Probability, Statistics, Inference and Operational Research module.

In the Computer Engineering Bachelor Degree and the Industrial Engineering Bachelor Degree it is part of the Basic Training module.

**Requirements**

Since this is an introductory course, there are no requirements other than those required for university access.



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### Recommendable

It is highly recommended to have completed successfully High School Mathematics (Math I and Math II). Knowledge in these subjects will be expected and will not be part of the curriculum.

### Skills

#### Specific

- \* To develop the capacity for the resolution of the mathematical problems that arise in engineering and the ability for applying statistical knowledge (GEIN: CBF01; GEEI: E1; GMAT: E44, E45, E47, E48).

#### Generic

- \* To develop skills in analysis and synthesis (GEIN: CTR01; GEEI: T1; GMAT: TG2).
- \* To have the ability to acquire new knowledge autonomously (GEIN CTR03; GEEI T5).
- \* To convey the ability to work with multidisciplinary and multilingual teams. (GEIN CTR05; GEEI T7; GMAT: TG6).

#### Basic

- \* You may consult the basic competencies students will have to achieve by the end of the degree at the following address: <http://www.uib.eu/study/grau/Basic-Competences-In-Bachelors-Degree-Studies/>

### Content

#### Part A

Descriptive statistics is the discipline of quantitatively describing the main features of a collection of information. The aim of descriptive statistics is to summarize the data either quantitatively or with a graph. Univariate analysis involves describing the distribution of a single variable, whereas bivariate analysis describes relationships between variables.

#### Part B

Probability theory is the analysis of random phenomena and the mathematical foundation for statistics. It is essential in the quantitative analysis of large sets of data. The central ideas behind probability theory are random variables and probability distributions. Through them patterns exhibited by the data can be studied and predicted.

#### Part C

Statistical inference makes propositions about a population, using data drawn from the population via some form of sampling. With inferential statistics, you are trying to draw conclusions that extend beyond the immediate data. Inferential statistical analysis includes testing hypothesis and deriving estimates, analysis of variance and quality control.

### Theme content

#### A. Descriptive Statistics



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1. Univariate and Bivariate Statistics
- B. Probability Theory
2. Probability
  3. Random Variables and their Distributions
- III. Inferential Statistics
4. Estimates and Hypothesis Testing
  5. Analysis of Variance
  6. Linear regression
  7. Quality control

### Teaching methodology

Following below are the different types of activities to be performed by the students, both in the classroom and at home.

With the purpose of making easier the student's personal work, it has been requested that the course be part of the Campus Extens project that allows for flexibility in distance teaching. Through this platform students will have at their disposal online communication with the teachers, a calendar with news of interest, electronic documents, proposed problems or assignments for both individual and group work, as well as a suitable environment for submitting assignments and access to their grades.

Important dates are available at the beginning of the semester through the UIB digital platform, these dates are tentative, except the dates of the final exam which is set by the Polytechnical School. The due dates of the final project and proposed assignments will be notified to the students in class and by announcements through Campus Extens.

The distribution of on-site classroom work is illustrative and represents the planning made by the teachers without taking into account any contingencies that might arise during the semester.

The distribution of non-classroom work, which is also indicative, represents the ideal distribution planned by the teachers. The different activities are planned for the average student, for each hour of classroom work, the student should work an additional hour and a half in an autonomous manner (individual study, resolution of exercises, ...). Without a non-classroom work load of this magnitude it will be difficult to reach a sufficient level of knowledge and obtain the desired competencies.

### In-class work activities

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Lecture	Large group (G)	Concepts, procedures and their application to exercises and problems are introduced at master classes, where the lecturer will describe the theoretical and practical foundations of the different topics covered in the course. The achievement of competency CBF01 is part of this activity.	39
Seminars and workshops	Quiz	Medium group (M)	Quizzes and short tests will be taken periodically as part of the continuous evaluation process. The achievement of competency CBF01 is part of this activity.	1

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Modality	Name	Typ. Grp.	Description	Hours
Seminars and workshops	Workshop	Medium group (M)	In the workshop sessions, proposed problems will be solved individually or in small groups with or without the support of the professor. These problems will be submitted and/or presented in class. The achievement of competencies CBF01, CTR01 and CTR05 are part of this activity.	13
Assessment	Final exam	Large group (G)	The final comprehensive exam evaluates the acquisition of the topics and competencies of the course.	3
Other	Final project	Large group (G)	The final project will be completed using statistical software and tools specially designed for the treatment of data and its application to the resolution of statistical problems. The achievement of competencies CBF01, CTR01, CTR03 and CTR05 are part of this activity.	4

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Campus Extens platform.

### Distance education work activities

Modality	Name	Description	Hours
Individual self-study		Individual self-study to assimilate the contents presented in the master classes or to review autonomously proposed assignments. The achievement of competencies CTR01, CTR03 are part of this activity.	30
Group or individual self-study		Individual or group study focused on consolidating what has been assimilated in the individual self-study through the resolution of exercises and problems, and exam preparation. The achievement of competencies CBF01, CTR01 and CTR05 are part of this activity.	30
Group or individual self-study		Individually or in small groups, the student will be required to complete the final project using specialized statistical software. The achievement of competencies CBF01, CTR01, CTR03 and CTR05 are part of this activity.	30

### Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

### Student learning assessment

The assessment of the course will be carried out using the following elements:

\* FINAL EXAM: it consists in a comprehensive exam of the entire course, it may have questions on theoretical concepts and will always have a part consisting in the resolution of problems.

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\* **QUIZZES:** throughout the course, in order to ensure the acquisition of knowledge and skills, students will complete quizzes or short tests.

\* **WORKSHOPS:** throughout the course, students will complete proposed assignments in small groups or individually. These assignments may consist in the submission of problems solved in class, problems proposed by professor and resolved autonomously, proposed questionnaires,...

\* **FINAL PROJECT:** the final project of the course integrates the knowledge acquired throughout the semester, it will consist in the resolution of a problem using the R software environment for statistical computing and graphics.

\* **OTHER:** the teachers may propose other activities to assess student's learning, scoring details will be explained in the proposal.

**Comments:**

\* By default, all students will be evaluated using itinerary A.

\* Those students who wish to be evaluated by itinerary B must request it at the beginning of the semester.

\* The submission of assignments proposed through itinerary B will take place at a seminar where the students will discuss the work carried out.

\* Make ups are not available for the evaluation elements marked as "non-retrievable" ("no recuperable"); all assessment elements will have submission deadlines that must be respected by the students. Assignments turned in late will be penalized.

\* In order to pass the course it is necessary to obtain a minimum score of 4 (over 10) in the final exam. If the minimum score is not reached, the final grade will be the minimum between 4.5 and the weighted average of all assessment elements.

\* Workshop and quiz' grades will be published through Campus Extens. All grade reviews must be completed within 7 days from publication date.

\* In the individual grade of group activities, the professor may take into account (to raise or lower the grade) the contribution of the student to the group's performance.

**Statement on Academic Misconduct**

The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations.

For additional information, see <https://seu.uib.cat/fou/acord/109/10959.html> (In particular, *article 33 del Reglament Acadèmic de la UIB respecte al frau.*)

**Quiz**

Modality	Seminars and workshops
Technique	Objective tests ( <b>non-retrievable</b> )
Description	Quizzes and short tests will be taken periodically as part of the continuous evaluation process. The achievement of competency CBF01 is part of this activity.
Assessment criteria	Correctness of the approach used, the mathematical solution of the problem, the clarity of the explanation and the rigor in the reasoning.  Assessed skills: CBF01.
Final grade percentage:	15% for the training plan A 0% for the training plan B



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### Workshop

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Modality	Seminars and workshops
Technique	Other methods ( <b>non-retrievable</b> )
Description	In the workshop sessions, proposed problems will be solved individually or in small groups with or without the support of the professor. These problems will be submitted and/or presented in class. The achievement of competencies CBF01, CTR01 and CTR05 are part of this activity.
Assessment criteria	Correctness of the approach used, the justified mathematical solution of the problem, the clarity of the explanation and the rigor in the reasoning, the ability to express and defend concepts learned throughout the course.  Assessed skills: CBF01, CTR01 and CTR05

Final grade percentage: 20% for the training plan A  
Final grade percentage: 25% for the training plan B

### Final exam

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Modality	Assessment
Technique	Objective tests ( <b>retrievable</b> )
Description	The final comprehensive exam evaluates the acquisition of the topics and competencies of the course.
Assessment criteria	Correctness of the approach used, the justified mathematical solution of the problem, the clarity of the explanation and the rigor in the reasoning, the ability to express and defend concepts learned throughout the course.  Assessed skills: CBF01 and CTR01.

Final grade percentage: 40% for the training plan A  
Final grade percentage: 50% for the training plan B

### Final project

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Modality	Other
Technique	Papers and projects ( <b>non-retrievable</b> )
Description	The final project will be completed using statistical software and tools specially designed for the treatment of data and its application to the resolution of statistical problems. The achievement of competencies CBF01, CTR01, CTR03 and CTR05 are part of this activity.
Assessment criteria	Correctness of the strategy used, the ability to express and defend concepts learned throughout the course, the quality of the submitted report or documentation, and the student's opinion of the problem solving process.  Assessed skills: CBF01, CTR01 CTR03 and CTR05.

Final grade percentage: 25% for the training plan A  
Final grade percentage: 25% for the training plan B

## Resources, bibliography and additional documentation

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The books recommended in the basic bibliography are publically available to UIB students

### Basic bibliography

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Introductory Statistics (3rd Edition)  
Sheldon M. Ross





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Elsevier, 2010.

Introduction to Probability and Statistics for Engineers and Scientists (4th Edition)

Sheldon M. Ross

Elsevier, 2009.

### Complementary bibliography

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Using R for Introductory Statistics (2nd Edition)

John Verzani

CRC Press, 2014.

Coping with Hitchhikers and Couch Potatoes on Teams

Turning Student Groups into Effective Teams

B. Oakley, R.M. Felder, R. Brent y I. Elhajj

Journal of Student Centered Learning

Vol. 2, No. 1, 2004/9

McGraw Hill, 1996.

Chance Encounters. A First Course in Data Analysis and Inference.

Christopher J. Wild; George A.F.

Seber. John Wiley & Sons Inc., 2000.

### Other resources

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Course handouts with a summary of the key facts.

