



## IDENTIFYING DATA

### Mathematics: Mathematical basics for IT

Subject	Mathematics: Mathematical basics for IT			
Code	O06G151V01101			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	#EnglishFriendly Galician			
Department				
Coordinator	García Martínez, Xabier			
Lecturers	García Martínez, Xabier			
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**General description** This subject is part of the area Mathematics and is taught in the first semester of the first year. The other subjects of the area of Mathematics are: Mathematical Analysis for Computer Science, in the first semester of the first year, Linear Algebra for Computer Science, in the second semester of the first year, and Statistics, in the first semester of the second year. In the subject Mathematical Foundations for Computer Science, students acquire skills in discrete mathematics and logic, many of which are fundamental for the other subjects in the course.

The subject has a basic training character. It provides the mathematical basis for many of the disciplines of computer engineering, including data structure, algorithms, programming, database theory, automata theory, formal languages, compiler theory, computer security and operating systems.

English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

## Training and Learning Results

Code	
A1	Students will have shown they have sufficient knowledge and understanding of an area of study, starting after completion of general secondary education, and normally reaching a level of proficiency that, being mostly based on advanced textbooks, will also include familiarity with some cutting-edge developments within the relevant field of study.
A2	Students will be able to apply their knowledge and skills in their professional practice or vocation and they will show they have the required expertise through the construction and discussion of arguments and the resolution of problems within the relevant area of study.
B8	Knowledge of the essential subjects and technologies that will allow students to learn and develop new methods and technologies, as well as those that will endow them with versatility to adapt to new situations.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
C3	Ability to understand and master the essential concepts of discrete mathematics, mathematical logic, algorithmic mathematics and computational complexity, and their application to the resolution of engineering problems.
C4	Essential knowledge of use and programming of computers, operating systems, data bases and computer programs with application in engineering.
D4	Analysis, synthesis and evaluation capacity
D5	Organizational and planning skills
D6	Ability to abstract: ability to create and use models that reflect real situations
D9	Ability to quickly integrate and work efficiently in unidisciplinary teams and to collaborate in a multidisciplinary environment
D11	Critical thinking

**Expected results from this subject**

Expected results from this subject

Training and Learning Results

New	A1	B8	C3	D4 D5 D6 D9 D11
New	A2	B9	C3	D4 D5 D6 D9 D11
New	A1	B8	C3	D4 D5 D6 D9 D11
New	A2	B8	C3	D4 D6 D9 D11
New	A1	B8	C3	D4 D6 D9 D11
New	A2	B9	C3 C4	D4 D5 D6 D9 D11
New	A2	B9	C3 C4	D4 D5 D6 D9 D11
New	A2	B9	C3	D4 D6 D9 D11
New	A2	B9	C3	D4 D6 D9 D11
New	A1	B8	C3	D4 D6 D9 D11
New	A1	B8 B9	C3 C4	D4 D5 D6 D9 D11
New		B9	C4	D9 D11
New	A2	B9	C3	D4 D5 D6 D9 D11
New	A1	B8	C3	D5 D11
New			C3	D4 D11
New	A2	B9	C3	D6 D11

New		B8	C3	D4 D5 D6 D9 D11
New	A2	B9	C3	D11

### Contents

Topic	
1.- Introduction to the mathematical logic. Set theory and applications. Theory of numbers.	.
2.- Induction and Recursion. Recount and Combinatorics.	.
3.- Binary relations. Boolean Algebras	.
4.- Graphs. Trees.	.

### Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0.5	1.5
Lecturing	10	15	25
Problem solving	25.5	36	61.5
Autonomous problem solving	4	19	23
Mentored work	1.5	6	7.5
Laboratory practical	1.5	6	7.5
Essay questions exam	4	20	24

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

### Methodologies

	Description
Introductory activities	Activities aimed at making contact with and gathering information about students, as well as introducing the subject.
Lecturing	Presentation of the contents of the subject by the teacher, illustrated with numerous examples and applications.
Problem solving	Presentation, analysis, resolution and discussion of problems or exercises related to the subject taught.
Autonomous problem solving	Exercises and problems related to the subject taught will be proposed and the students will have to solve them (in groups) autonomously.
Mentored work	Collaborative learning will be used as an integrated methodology in the activity. Elaboration of a work (in group) on an application of Recursion Theory/Number Theory/Graph Theory in computer science.
Laboratory practical	Collaborative learning will be used as an integrated methodology in the activity. CONTINUOUS EVALUATION Character: No mandatory Assistance: No mandatory GLOBAL EVALUATION Character: No mandatory

### Personalized assistance

Methodologies	Description
Lecturing	Attention and resolution of doubts to students in relation to the different activities of the subject. Tutoring sessions may be carried out by telematic means (e-mail, videoconference, FAITIC forums, etc.) by prior arrangement.
Problem solving	Attention and resolution of doubts to students in relation to the different activities of the subject. Tutoring sessions may be carried out by telematic means (e-mail, videoconference, FAITIC forums, ...) by prior arrangement.
Autonomous problem solving	Attention and resolution of doubts to students in relation to the different activities of the subject. Tutoring sessions may be carried out by telematic means (e-mail, videoconference, FAITIC forums, ...) by prior arrangement.

### Assessment

	Description	Qualification	Training and Learning Results			
Problem solving	Realisation (in group) and defence of a collection of basic problems of each block. It is evaluated among pairs.  Results of learning: FROG1, FROG2, FROG3, FROG4, FROG5, FROG6, FROG8, FROG9, FROG10, FROG15, FROG17, FROG18.	20	A1	B8	C3	D6 D9 D11
Mentored work	Realisation of one work (in group) about the applications of Recursion Theory, Number Theory or Graph Theory in the framework of computer science.  Results of learning: FROG1, FROG2, FROG3, FROG7, FROG11, FROG12, FROG13, FROG14, FROG15, FROG16, FROG17, FROG18.	10	A1	B8	C3 C4	D4 D5 D6 D9 D11
Laboratory practical	Realisation (in group) of a collection of problems employing Software of symbolic calculation.  Results of learning: FROG1, FROG2, FROG3, FROG4, FROG5, FROG6, FROG8, FROG9, FROG10, FROG15, FROG17, FROG18.	10	A1	B8	C3	D9 D11
Essay questions exam	Realisation of a partial exam about the contents correspondents to the sessions and problem solving.  Results of learning: FROG1, FROG2, FROG3, FROG4, FROG5, FROG6, FROG8, FROG9, FROG10, FROG15, FROG18.	60	A1 A2	B8 B9	C3	D6 D11

### **Other comments on the Evaluation**

#### **CONTINUOUS EVALUATION SYSTEM**

**TEST 1:** Theoretical evaluation.

**Description:** *Objective test that will include evaluation of theoretical concepts and resolution of exercises.*

**Applied methodology(s):** *Examination of development questions.*

**% Rating:** 30%.

**% Minimum:** *2.5 out of 10. In addition, the average of Test 1 with Test 2 must reach 4 out of 10.*

**Competences evaluated:** *A1, B8, C3, D6, D9, D11.*

**Learning outcomes assessed:** *RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10, RA15, RA18.*

**TEST 2:** Theoretical evaluation.

**Description:** *Objective test that will include evaluation of theoretical concepts and resolution of exercises.*

**Applied methodology(s):** *Examination of development questions.*

**% Rating:** 30%.

**% Minimum:** *2.5 out of 10. In addition, the average of Test 1 with Test 2 must reach 4 out of 10.*

**Competences evaluated:** *A1, B8, C3, D6, D9, D11.*

**Learning outcomes assessed:** *RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10, RA15, RA18.*

**TEST 3:** Deliveries of exercises.

**Description:** *Delivery and presentation of two group exercise bulletins.*

**Applied methodology(s):** *Problem solving.*

**% Rating:** 20%

**% Minimum:** *4 out of 10.*

**Competences evaluated:** *A1, B8, C3, D6, D9, D11.*

**Learning outcomes assessed:** RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10, RA15, RA17, RA18.

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**TEST 4:** Delivery of practices.

**Description:** *Delivery*

**Applied methodology(s):** *Problem solving using the computer.*

**% Rating:** 10%

**% Minimum:** 0 out of 10.

**Competences evaluated:** A1, B8, C3, D6, D9, D11.

**Learning outcomes assessed:** RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10, RA15, RA17, RA18.

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**TEST 5:** Final work

**Description:** *Exhibition of a group work.*

**Applied methodology(s):** *Supervised work*

**% Rating:** 10%

**% Minimum:** 0 out of 10.

**Competences evaluated:** A1, B8, C3, C4, D4, D5, D6, D9, D11.

**Learning outcomes assessed:** RA1, RA2, RA3, RA7, RA11, RA12, RA13, RA14, RA15, RA16, RA17, RA18.

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*If a student does not sit any of the tests, they will be assigned a grade of 0 in it.*

*Attendance to classes or exams is not mandatory, but the student should take into account that in some cases, minimum scores must be achieved in the exams to pass the subject.*

By default all students will start the course in the continuous evaluation system.

## **GLOBAL ASSESSMENT SYSTEM**

**Procedure for the choice of the global evaluation modality:** *On the day of the exam set by the School, each student will be given to choose what he prefers, whether to take test 2 or the final exam. If a student chooses the test, he will be evaluated under the continuous evaluation system. If, on the other hand, you choose to take the final exam, you will be evaluated under the global evaluation system.*

**TEST 1:** Theoretical evaluation.

**Description:** *Objective test that will include evaluation of theoretical concepts and resolution of exercises.*

**Applied methodology(s):** *Examination of development questions.*

**% Rating:** 80%.

**% Minimum:** 4 out of 10.

**Competences evaluated:** A1, B8, C3, D6, D9, D11.

**Learning outcomes assessed:** RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10, RA15, RA18.

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**TEST 2:** Delivery of practices.

**Description:** *Delivery*

**Applied methodology(s):** *Problem solving using the computer.*

**% Rating:** 10%

**% Minimum:** 0 out of 10.

**Competences evaluated:** A1, B8, C3, D6, D9, D11.

**Learning outcomes assessed:** RA1, RA2, RA3, RA4, RA5, RA6, RA8, RA9, RA10, RA15, RA17, RA18.

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**TEST 3:** Final work

**Description:** Exhibition of a group work.

**Applied methodology(s):** Supervised work

**% Rating:** 10%

**% Minimum:** 0 out of 10.

**Competences evaluated:** A1, B8, C3, C4, D4, D5, D6, D9, D11.

**Learning outcomes assessed:** RA1, RA2, RA3, RA7, RA11, RA12, RA13, RA14, RA15, RA16, RA17, RA18.

In case of not having taken tests 2 and 3 during the course, a period will be enabled to carry them out on the day of the final exam.

## **EVALUATION CRITERIA FOR EXTRAORDINARY CALL AND END OF CAREER**

*The global evaluation system set out above will be used.*

## **QUALIFICATION PROCESS**

*In case of not exceeding the minimum score in any of the tests, the final grade in the subject can never exceed 4.*

## **EVALUATION DATES**

The dates of the tests corresponding to the continuous evaluation system will be published in the calendar of activities, available on the ESEI website <https://esei.uvigo.es/docencia/horarios/>

The official examination dates of the different calls, officially approved by the Xunta de Centro de la ESEI, are published on the ESEI website <https://esei.uvigo.es/docencia/horarios/>

## **USE OF MOBILE DEVICES**

All students are reminded of the prohibition of the use of mobile devices in exercises and practices, in compliance with article 13.2.d) of the University Student Statute, regarding the duties of university students, which establishes the duty to "Refrain from the use or cooperation in fraudulent procedures in the evaluation tests, in the works carried out or in official documents of the university."

## **CONSULTATION/REQUEST FOR TUTORIALS**

The tutorials can be consulted through the personal page of the teaching staff, accessible through <https://esei.uvigo.es/docencia/profesorado/>

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## **Sources of information**

### **Basic Bibliography**

Rosen, K., **Matemática Discreta y sus Aplicaciones**, 9788448140731, 5, McGraw Hill., 2005

Kolman, B., **Estructuras de Matemáticas Discretas para la Ciencia de la Computación**, 9789688807996, Prentice Hall Hispanoamericana,

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., **Manual de Maxima,**

Rosen, K, **Discrete Mathematics and Its Applications**, 125967651X, 8, McGraw-Hill, 2018

**Complementary Bibliography**

Caballero Roldán R. y otros, **Matemática Discreta para Informáticos. Ejercicios resueltos**, 849732210X, 1, Pearson/Prentice Hall, 2007

Epp S. S., **Discrete Mathematics with Applications**, 0495391328, 4, International Thomson Publishing, 2010

García Merayo, F, **Matemática discreta**, 3, Thomson, 2015

García Merayo, F.; Hernández Peñalver, G.; Nevot Luna, A., **Problemas resueltos de Matemática discreta**, 9788497322102, 2, Thomson,

García, C.; López, J. M.; Puigjaner, D., **Matemática Discreta. Problemas y ejercicios resueltos**, 9788420534398, 1, Prentice Hall, 2002

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**Recommendations**

**Subjects that continue the syllabus**

Mathematics: Linear algebra/O06G151V01106

**Subjects that are recommended to be taken simultaneously**

Mathematics: Mathematical analysis/O06G151V01102