



Universidad
de Navarra

Programming and numerical methods (GEA)

Teaching guide 2023-24

PRESENTATION

SUMMARY: The aim of this course is to introduce the student to the concepts of computer programming and fundamentals of numerical methods. These techniques will help the student tackle and solve problems commonly encountered in the technical and professional world. The theory and practice developed in this course will allow the student to analyze and synthesize different problems and help him in the decision making process. Excel and Visual Basic are used as the programming and learning environment for this course. Knowledge of Excel and programming techniques are highly valued in the professional world.

- **Titulación:** Grado estudios de arquitectura
- **Módulo/Materia:** Menciones / Gestión del Proyecto Técnico
- **ECTS:** 4.5
- **Curso, semestre:** 5º, First Semester
- **Carácter:** Elective
- **Profesorado:** Eduardo Bayo (Catedrático) and Rufino Goñi (Contratado Doctor)
- **Idioma:** English
- **Aula, Horario:** Aula 6, Tuesdays from 11:00 a.m. to 2:00 p.m

COMPETENCES

BASIC COMPETENCES

BC02: Students must know how to apply their knowledge professionally to their job or career and have the skills that usually demonstrated by writing and supporting their arguments, and problem-solving within their area of study.

BC04: Students are able to convey information, ideas, problems and solutions to specialist and non-specialist audiences.

BC05: Students have developed the learning skills necessary to undertake further studies with a high degree of autonomy.

GENERAL COMPETENCES

GC04: Understand the structural, construction and engineering design problems associated with building design as well as the techniques for solving them.

SPECIFIC COMPETENCES

SC17: Ability to conceive, calculate, design, integrate into buildings and urban complexes, and execute building structures (T).

SC67: Use of English, level B2, to a sufficient level for the scientific and academic terminology typically used in architecture.

PROGRAM

0. Introduction and description of the class.

1. Use of Microsoft Excel



- 1.1. Description of the screen, menus and ribbon.
- 1.2. Basic use of the spread sheet.
- 1.3. How to introduce data: general, text, numbers, dates, scientific, currency.
- 1.4. References and names.
- 1.5. Formula and functions: mathematical, logical, finance, statistical, etc.
- 1.6. Definition of views and tables.
- 1.7. Insert of tables and graphics.
- 1.8. Lists and databases. Lookup and reference operations.
- 1.9. Forms: combo-box, scroll-var, option-button, check-box, etc.

2. Programming and numerical analysis

- 2.1. Finacial analysis.
- 2.2. Numerical integration and differentiation.
- 2.3. Data series: interpolation and regression analysis.
- 2.4. Solution of equations systems of equations. Matrix analysis and functions.
- 2.5. Solution of nonlinear equations.
- 2.6. Optimization methods. Numerical solutions and use of Solver.
- 2.7. Programming techniques: variables, mathematical equations, loops, conditional functions, etc.
- 2.8. Introduction to VBA: development of functions and subroutines (macros).

EDUCATIONAL ACTIVITIES

EDUCATIONAL ACTIVITIES	Total number of hours: 112.5		
AF1	Attendance and participation in theoretical classes	X	25 hours



AF2	Attendance and participation in practical classes	X	20 hours
AF3	Dedication to individual and/or group assignments	X	15 hours
AF5	Participation in seminars	X	10 hours
AF6	Personal study and work	X	42.5 hours

ASSESSMENT

NORMAL EVALUATION PROCESS

The final grade in this class will be determined by the professors based on the student performance in the following activities and according to the following criteria:

Assignments and Project

Biweekly programming assignments will be given and the student will have to solve them either individually or in group. During the practical classes the student will have the opportunity to work and raise issues concerning the solution of the assignments.

A programming project may be assigned either individually or in group, and its presentation in front of the class will be compulsory.

Attendance to lectures

The attendance to lectures is compulsory and required to pass the class. The student is only allowed to miss a maximum of 2 lectures. Active class participation will be also graded (see Table below).

Exams

There will be no exams for the normal evaluation process.

Final Grade

The final grade will be given based on the following activities and weighted average:



Attendance and active participation in both theoretical and practical classes	20%
Individual and/or group assignments and project	80%
Exams (partial and/or final)	0%

EVALUATION IN JUNE

Those students who do not pass the class under the normal evaluation process will have a recuperation exam during the month of June. The 100% of the grade will be based on the exam.

- **Contents:** Complete program (syllabus) of the class.
- **Procedure:** The student will have to solve a series of exercises using the computer, and will be allowed to use the class notes.

EXAMEN EXTRAORDINARIO POR ADELANTO DE CONVOCATORIA

- **Contenidos:**
 - Programa completo de la asignatura.
 - **Modo:** Por determinar. Podrá constar de una prueba oral y otra escrita con uso de ordenador.
- **Material** a llevar:
 - Material de escritura y calculadora.
 - Apuntes de clase y manuales de programación.
- **Porcentaje** de la nota total del curso: 100 %.

OFFICE HOURS

Prof. Eduardo Bayo: .

Prof. Rufino Goñi:

BIBLIOGRAFY

Bibliography:

Class notes.

Excel 2016 Bible. John Walkenbach. Wiley, 2015

Excel 2019 Bible. Michael Alexander, Dick Kusleika (previously by John Walkenbach) Wiley, 2018. [Find it in the Library](#)

Excel VBA programming for dummies. John Walkenbach. Wiley, 2013. [Find it in the Library](#)



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Excel 2010: curso práctico. Teaching Soft Group (Madrid), 2011. [Find it in the Library](#)

Numerical analysis. R. Burder, J. Faires. Brooks, 2001. [Find it in the Library](#)

Tutorials and Information in Internet :

www.excel-easy.com

www.excelmadeeasy.com

www.exceltotal.com

To translate function names from English to Spanish

<https://www.perfectxl.com/excel-glossary/what-is-excel-function/translations-english-spanish/>

@X@buscador_unika.obtener@X@