Università degli Studi della Basilicata
Dipartimento di Culture Europee e del Mediterraneo:
Architettura, Ambiente, Patrimoni Culturali
(DiCEM)

**Allegato 2**

**Scheda insegnamento**

| | | | |
|---|---|---|---|
| **ACADEMIC YEAR: 2021-2022** | | | |
| **COURSE: GEOGRAPHICAL INFORMATION SYSTEMS** | | | |
| **TYPE OF EDUCATION ACTIVITY**: **Course characterizing the Curriculum** | | | |
| **TEACHER**: **Prof. Pietro PICUNO** | | | |
| e-mail: pietro.picuno@unibas.it | | website: http://docenti.unibas.it/site/home/docente.html?m=000198 | |
| phone: ++39 0971 20.5437 | | mobile (optional): ++39 329 3606235 | |
| Language: Italian | | | |
| ECTS: **6** of which:<br>5 ECTS lectures +<br>1 ECTS training | n. of hours: **60** of which:<br>40 hours lectures +<br>20 hours training | Campus: **Matera**<br>Department: **DICEM**<br>Program: **PAVU** | Semester: **II** |

**EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES**

- **Knowledge and comprehension**: the student must demonstrate to know and understand the problems related to the methods of detection and representation of the built system, tools for the analysis, planning and management of the built environment and agro-forestry systems, with particular focus on those of advanced technology, such as the Geographical Information Systems (GIS).
- **Ability to apply knowledge and understanding**: The student must demonstrate that he/she is able to correctly use the tools for the analysis, planning and management of the built environment and agro-forestry systems, through the use of Geographical Information Systems and relevant cartographic tools.
- **Autonomy of judgement**: The student must be able to evaluate autonomously the processes of survey, representation and management of the territory through information systems, as well as to indicate the main methodologies for identifying and representing the relationships of farm buildings with the surrounding rural territory, as a basis for the planning of the built environment and agro-forestry systems.
- **Communication skills**: The student must have the ability to communicate the information acquired, organizing it in a logical way, using correct language and implementing appropriate mathematical and graphic tools.
- **Learning skills**: The student must be able to collect and organize in a functional way the information received during the frontal lesson hours, or searched for on the recommended texts, on the available literature and on the *Web*.

**PRE-REQUIREMENTS**

The student must have acquired and assimilated the following knowledge provided by the courses in "Mathematics" and "Physics":
o knowledge of the basic concepts of mathematical analysis, in particular those relating to analytical geometry, as well as derivative and integral mathematics and their use as computational tools;
o knowledge of geometric and physical optics, and their practical application.

**SYLLABUS**

Chapter 1: Principles of Cartography (20 hours of Frontal Lesson)

Cartographic representations. Maps and scales of representation. Solutions to the cartographic problem. Prospective, cylindrical and conical projections. Mercator and Gauss maps. Stereographic projection. Main cartographic systems available in Italy. I.G.M. maps, cadastral maps, technical regional maps (CTR). Orthophotos. Metric and thematic cartography. Numerical cartography.

Chapter 2: Principles of Photogrammetry and Photo-interpretation (20 hours of Frontal Lesson)

Techniques for remote sensing of agricultural and forestry land. Photogrammetry, photo-interpretation, remote sensing. Stereoscopy. Terrestrial photogrammetry and aerial photogrammetry. Photogrammetric restitution and production of numerical cartography.

Chapter 3: Geographical Information Systems for planning Landscape, Environment and Urban Greening (4 hours of Frontal Lesson)

Principles and use of a Geographical Information System (GIS) for the analysis, planning and management of agro-forestry systems. GIS data-base. Raster and vector data. Use of numerical cartography as a data-base for GIS. Applications in planning and management of protected areas, energy systems, agricultural and forestry landscape, agricultural activities and Smart Communities.

Chapter 4: Practical use of GIS techniques. (16 hours of Laboratory Training)

Software for the implementation and management of GIS projects. Basic functionalities and methods of use of the Open Source "QGIS" Program. Conversion between reference systems and coordinates. Georeferencing of raster models. Geographic data: Characteristics and differences. Spatial data (Geographic Primitives). Concepts of Topology (connectivity, area definition and contiguity; adjacency). Georeferencing in vector models. Creation of a Shapefile. Shapefile import and export function. Import of georeferenced data into a GIS. Construction and management of geographical data. Creation and management of attribute tables. Link external data tables to elements (join and relate). Selection of objects based on spatial criteria. Selection of objects by attributes. Table and spatial selection. Selection on attributes (Query). Selection based on spatial relationships. Overlay concept. Types of overlays. Thematic layers. Implementation of thematic cartography of analysis-synthesis through overlay of basic themes.

**TEACHING METHODS**

The course includes 60 hours of teaching, distributed between lectures and training. In particular, there will be 40 hours of frontal-classroom theoretical lessons + 20 hours of guided computer-lab training exercises, with guided examples/Laboratory tutorials on setting up and using a GIS. During these exercises, students will have the opportunity to use the programs independently, starting from the most basic commands and arriving to the preparation of a Project Work (GIS application) on a theme of their choice, agreed with the teachers, to be presented and discussed during the final exam.

**EVALUATION METHODS**

The final exam, intended to ascertain the level of achievement of the knowledge and skills acquired by the student, is held in a single session in the presence of the Examination Committee. The exam is based on an oral examination, usually covering the following phases:

1) Discussion by the student of the Project work (GIS application) personally prepared, individually or in groups. Subsequent discussion with the Examination Committee.

2) questions at the discretion of the Commission on the four chapters on which the Course is structured, as described above;

3) Final discussion about the operation in the use of advanced technologies for the analysis, planning and management of the agro-forestry systems.

The final vote results from the average of the votes cast by each of the members of the Commission, rounded to the nearest whole number. In the presence of unanimous judgement on the part of the members of the Commission, an extra "*cum laude*" may be granted. If even one of the three phases is insufficient, or if the total score is less than 18, the entire examination must be repeated. There are no intermediate verification tests.

**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

Textbooks

*) Handouts provided by the teacher, available at:
http://docenti.unibas.it/site/home/docente/materiali-e-risorse.html?m=000198

In-depth texts

*) Teti M.A. (2004) (a cura), I Sistemi Informativi Geografici. Manuali casi studio e territorio, Franco Angeli, Milano.

*) Biallo G., (2005), Introduzione ai Sistemi Informativi Geografici", Edizioni MondoGIS, Roma.

*) Graci G, Pilieri P., Sedazzari M. (2009), GIS e ambiente. Guida all'uso di ArcGis per l'analisi del territorio e la valutazione ambientale, Dario Flaccovio editore, Palermo.

*) Migani M., Salerno G. (2008), Manuale ArcGis. Guida pratica all'utilizzo con esercizi svolti, Dario Flaccovio editore, Palermo.

*) Maciocco, G., Pittaluga, P. (2003). Immagini spaziali e progetto del territorio. Franco Angeli, Milano.

*) Paolillo L. (2010), Sistemi informativi e costruzione del piano. Metodi e tecniche per il trattamento dei dati ambientali, Maggioli editore.

*) Aronoff S. (1991) Geographic Information Systems: a Management Perspective - WDL Publications.

*) Burroughs P. A., McDonald R. (1988) Principles of Geographical Information Systems (Spatial Information Systems and Geostatistics), 2nd Edition - Oxford University Press.

On-line documents

*) Handouts available at : http://docenti.unibas.it/site/home/docente/materiali-e-risorse.html?m=000198.

*) www.landcity.it

*) https://www.rivistageomedia.it/

*) Guides/ *tutorials* freely available in the Internet.

**INTERACTIONS WITH STUDENTS**

**Meeting hours**:

| Day | Hours | Location |
|---|---|---|
| Monday | 9:00 – 10:00 | Headquarter of the University of Basilicata in Matera |

Beyond the weekly reception time, the teacher can be contacted by e-mail, at: pietro.picuno@unibas.it and/or by mobile phone, at: ++39 329 3606235, also to agree any personal appointment.

At the beginning of the course, after describing the objectives, program and methods of verification, the teacher informs the students about the recommended teaching material and how to find it. At the same time, the list of students who intend to participate in the training activities of the course is collected, including their name, surname, enrollment serial number and e-mail.

**EXAMINATION SESSIONS (*Forecasted*)**[1]

**17/02/2022, 7/03/2022, 21/04/2022, 12/05/2022, 16/06/2022, 14/07/2022, 15/09/2022 13/10/2022, 17/11/2022, 15/12/2022**

**SEMINARS BY EXTERNAL EXPERTS** YES **X** NO □

FURTHER INFORMATION

[1] Potrebbero subire variazioni: consultare la pagina web del docente o del Dipartimento/Scuola per eventuali aggiornamenti