Universidad de Alcalá

COURSE DESCRIPTION

GEOLOGY

Degree on Environmental Sciences
University of Alcalá

Academic year 2021/22
1st year – 2nd semester

COURSE DESCRIPTION

Course:	**Geology**
Code:	**670005**
Degree:	**Environmental Sciences**
Department and Area:	**Department of Geology, Geography and Environment. External Geodynamics Area.**
Type:	**Mandatory**
ECTS credits:	**8 credits**
Year and semester:	**1st year / 2nd semester**
Lecturer:	**D. Miguel Ángel de Pablo Hernández**
Tutoring schedule:	**by appointment with the lecturer (miguelangel.depablo@uah.es)**
Language of instruction:	**English**

1. INTRODUCTION

Environmental Sciences is a multidisciplinary subject, as it is the study of both the environment (biotic and abiotic) and human environmental use. Understanding this complex natural system requires a thorough knowledge of each of the topics, one of which is abiotic physical environment: The Earth, its features and characteristics. Geology is the science that deals with the study of Earth, and the characteristics of its materials, the processes occurring both on the surface and inside the planet, and landforms resulting from these processes.

Environmental Sciences requires an extensive understanding of the processes occurring inside the Earth, and of the models that explain them; the internal dynamics which can explain the current configuration of continents and their evolution over geologic time; the processes leading to the formation of mountain ranges and sedimentary basins; the water cycle and fluvial, coastal, and glacial processes and the landforms they generate; natural resources that can be used, or the processes that may be dangerous to humans or their infrastructures. Having a detailed knowledge of these aspects is the main objective of this course, as they are necessary to develop the necessary skills of environmental analysis and planning.

This course also aims to facilitate a detailed knowledge of geological techniques, that are beneficial when applying for jobs in a laboratory and/or the field, and that are necessary to analyze and understand the characteristics of the relief, of the constituent materials and processes occurring in the surface of the planet or inside it, based on the concepts described above. Knowledge provided by Geology is fundamental in order to learn about other issues of the Environmental Sciences such

as Edafology, Botanic, Ecosystems, Hydrology and Hydrogeology, Land management, among many others.

Prerequisites: None
Recommendations: None
Limitations: 20 students

NOTE: The use of laptops, tablets and mobile phones is not allowed in the classroom and laboratory for this course.

2. SKILLS

Generic skills:

Instrumental:

1. Capacity for analysis and synthesis
2. Basic general knowledge
3. Knowledge of a foreign language
4. Ability of manage information Ability to solve problems

Interpersonal:

5. Criticism and Self-criticism
6. Ability to develop teamwork
7. Ability to work in an interdisciplinary team
8. Skills in interpersonal relations
9. Understanding and respecting the views of others

Systemics:

10. Ability to practically apply knowledge
11. Research skills
12. Ability to generate new ideas
13. Ability to self-employment
14. Production of quality work
15. Initiative and entrepreneurship
16. Awareness of environmental issues

Specific skills:

1. An understanding of the concepts, principles, processes and general geological theories.
2. Identification and assessment of the geological characteristics of the physical environment.
3. Evaluation, interpretation and synthesis basic geological information from the field and on geological maps.
4. Analysis and interpretation of geomorphological information from the field on geomorphological mapping and vertical aerial photographs.
5. Diagnosis of the role of geology in environmental science and land uses.
6. Identification of environmental problems and natural hazards related to geology.
7. Catalogue and evaluate geological resources.

3. SYLLABUS

Syllabus		Total of hours
Lectures (Classroom)	**Section I: Introduction to Geology** 1. Introduction to Geology **Section II: Materials of the Earth** 2. Matter and minerals 3. Igneous Rocks and intrusive activity 4. Volcanism and volcanic materials 5. Metamorphism and metamorphic rocks 6. Sedimentary rocks and sedimentary environments **Section III: Structure and inner dynamics** 7. Earth's interior 8. Earth's inner dynamics 9. Seafloor spreading 10. Crustal deformation **Section IV: Earth history** 11. Geological time 12. Geological history of the Earth **Section V: Surface dynamics** 13. Weathering and soils 14. Mass wasting 15. Water cycle 16. Fluvial dynamics 17. Glacial and periglacial processes and landforms 18. Aeolian processes and landforms 19. Coast and coastal processes and landforms 20. Landscape evolution	• 20 hours
Seminars (Classroom)	1. Minerals identification 2. Igneous rocks identification 3. Metamorphic rocks identification 4. Sedimentary materials identification 5. Topographic maps and profiles 6. Geological maps 7. Geological sections I 8.Geological sections II 9. Geological sections III 10. Geological sections IV 11: Geology of Spain I 12. Geology of Spain II	• 12 hours
Practices (Laboratory)	1. Minerals identification 2. Igneous and volcanic rocks identification 3. Metamorphic rocks identification 4. Sedimentary rocks identification 5. Geological section I 6. Geological sections II 7. Physiographical map 8. Geomorphological map	• 24 hours
Fieldtrip	Geological study of Uceda-Patones-Cabanillas area, Madrid	• 8 hours

Schedule (indicative)

Week	Contents					Group tutorials	Exams (test)
	Lectures	Seminars	Practices	Fieldtrip	Exercises		
1st	Presentation						
2nd	1 & 2	1			1 & 2		
3rd	3 & 4	2			3 & 4		Section I
4th	5 & 6	3	1		5 & 6		
5th	7 & 8	4	2		7 & 8		Section II
6th	9 & 10	5	3		9 & 10		
7th	11 & 12	6 & 11 & 12	4		11 & 12	1	Section III
8th	13 & 14	7	5		13 & 14		Section IV
9th	15 & 16	8	6		15 & 16		
10th	17 & 18	9	7	Fieldtrip	17 & 18		
11th	19 & 20	10	8		19 & 20	2	Section V

4. TEACHING-LEARNING-FORMATIVE ACTIVITIES METHODS

4.1. Credits distribution (on hours)

Hours of attendance:	64 hours distributed on: • Lectures: 20 h • Seminars: 12 h • Practices: 24 h • Fieldtrip: 8 h
Hours of personal study:	125 hours dedicated by the student: • To study the theoretical contents • To solve exercises • To prepare and write reports • To complete on-line activities
Exams	8 hours divided into: • Test exams: 2 h • Practical exam: 3 h • Final exam: 3 h
Group tutorials	3 hours (2 sessions of 1.5 h)
Individual tutorials	All required by the student
Total hours	200 hours

4.2. Methodological strategies, materials and didactic resources

Methodological strategies	• **Lectures**. Explanation of the most important concepts, theories, and models of the Geology and their relation to the Environmental Sciences. • **Seminars**. Explanation of the basic geological methodologies applied to Environmental Sciences. • **Exercises**. Activities to be solved by the student in order to apply and complete their theoretical knowledge of the Geology and the geological methods. • **Practices**. Laboratory exercises to learn the geological methods, and to identify different rock-forming minerals and rock types. • **Fieldtrip**. Visit to a field area to apply the theoretical and practical knowledge as well as to practice the different geological methodologies focuses on recovery geological information in the field to recognize materials, landforms and the geological history of the studied area. • **Report**. To write a short scientific report based on the analysis of the data acquired during the fieldtrip, which should include the application of the methods applied in the laboratory, practices and seminars, and the theoretical concepts explained in the lectures.
Materials	• **Basic and complimentary manuals**. Lectures, seminars and practices must be accompanied, at least, by the reading of those technical manuals what include the most important concepts (see bibliography section of this Teaching Guide). • **Complimentary readings.** Articles, books chapters, and other documents provided for the students to complete the topics explained in the lectures, seminars and practices, as well as the base for on-line activities (for example, discussions). • **Problems and exercises.** Documents with practical cases to be solved in order to learn and compliment the topics explained in lectures and seminars. • **Mineral and rock samples, topographic and geological maps, and aerial photographs**. Samples of geological materials that must be identified by the students, and maps and aerial photographs which students must learn.
Didactic resources	• **Virtual Campus web tool.** Blackboard platform and institutional e-mails of lecturer and students used to interchange of documents, reports, exercises and information, among others. • **Videos, animations, documentary films, free books, etc.** Resources to help to the students to understand the geological processes. • **Web Links**. Web pages with additional information and resources of Geology, examples of Geology applied to the Environmental Sciences, news, Research Centers, etc.

5. ASSESSMENT: Procedures, evaluation and rate criteria

*The **assessment** of knowledge and generic and specific skills and competences acquired by students throughout the course will be a **continuous assessment**. For that reason, a minimum attendance of 80% of all the classes is required. Students who do not meet this minimum attendance will appear as "no show" in the ordinary examination session. This assessment applies to all registered students of the course, according to the rules governing the assessment processes of learning, approved by the Governing Council of 24 March 2011, except for those that have been granted explicitly the possibility of the occurrence in the form of final evaluation.*

*The **tools and methods** to conduct the assessment (which will account for 100% of the final grade of the course) will depend on participation in the activities of the subject, and the completion and delivery of work and theoretical and practical exercises, which break down as follows:*

Test exams at the end of each section (15%)
Exercises and problems (10%)
Practical exams (25%)
Scientific report (10%)
Final exam (40%)

The criteria for qualification will be a full knowledge (geological concept, theories, and models) as well as a command of the most basic geological techniques applied to the Environmental Sciences. Other criteria are; a successful application of this knowledge to problem solving, skills and competences, knowledge transfer, correct oral and written, and the ability to synthesize.

Students should remember that copying and plagiarism is strictly prohibited, whether in the report, exercises, or assessment tests. Students caught copying or plagiarizing will be failed, and other disciplinary actions will also be considered. Furthermore, proper citation of resources is necessary. On top of that, the Plots, graphics, diagrams, maps and topographic sections and geological sections should be presented in a clean with neatness and precision and is required in order for the examiners to assess the exercises, problems and exams.

To pass the subject in the ordinary examination session students whose attendance is less than previously mentioned, or that do not achieve a minimum score of 5.0 in each assessed activity will be failed in the ordinary *examination session. To acquire the sum of the partial qualifications, students must have passed, independently, the final exam, the practical exam, the geological report as well as the other activities. If any of the parties not reach its average value, the student will be failed, even if the total sum of the scores for the various activities reaches a value of 5.0.*

Both for students who have been granted explicitly the possibility of the occurrence in the form of final evaluation, and for those who need to attend the ***extraordinary examination session****, students must pass a theoretical exam (50% of the final mark) as well as a practical exam (50% of the final mark) which will be worth 100% of the final grade. This test will include theoretical and practical content of the whole subject (lectures, seminars, and practices).*

6. RECOMMENDED READING

Core reading

- **Lutgens, F.K., Tarbuck, E.J., Tasa, D. 2012. Essentials in Geology (11th Edition). *Prentice Hall*. ISBN: 978-0321689573**
- **Weijermars, R. 1997. Structural geology and map interpretation. *Alboran Science Publishing*. ISBN: 90-5674-001-6**
- **Kadur 2005. Advanced Photogeology. Lecture notes.** Available online: http://yunus.hacettepe.edu.tr/~kdirik/advanced_photogeology1.htm

Further reading

- Busch, R,M. 2011. Laboratory manual in physical geology (9th Edition). *American Geological Institute*. ISBN: 978-0321689573
- Dixon, D. 1992. The practical geologist: The introductory guide to the basics of Geology and to collecting and identifying rocks. *Firesite*. ISBN: 978-0671746971
- Lisle, R.J., Brabham, P., Barnes, J.W. 2011. Basic geological mapping (5th Edition). *Willey*. ISBN: 0470686340.
- Perkins, D. 2011. Mineralogy (3rd Edition). *Prentice Hall*. ISBN: 978-0321663061
- Fry, N. 1991. The field description of metamorphic rocks. *Wiley*. ISBN: 978-0471932215
- Jerram, D. 2011. The field description of igneous rocks (2nd Edition). *Wiley.* ISBN: 978-0470022368
- Tucker, M.E. 1991. The field description of sedimentary rocks. *Wiley*. ISBN: 978-0471932819
- Smith, M.J., Paron, P., Griffiths, J.S. 2011. Geomorphological mapping, Volume 15: Methods and applications (Developments in Earth surface Processes). *Elsevier Science*. ISBN: 978-0444534460
- Kehew, A.E. 2006. Geology for Engineers and Environmental Scientists (3rd Edition). *Prentice Hall*. ISBN: 978-013145730
- Foley, D.D., McKenzie, G.D., Utgard, R.O. 2009. Investigations in Environmental Geology. *Prentice Hall*. ISBN: 978-0131420649
- Copeland, P. 2011. Communicating rocks: Writing, speaking, and thinking about Geology. *Prentice Hall*. ISBN: 978-0321689672

La Universidad de Alcalá garantiza a sus estudiantes que, si por exigencias sanitarias las autoridades competentes impidieran la presencialidad total o parcial de la actividad docente, los planes docentes alcanzarían sus objetivos a través de una metodología de enseñanza-aprendizaje y evaluación en formato online, que retornaría a la modalidad presencial en cuanto cesaran dichos impedimentos.