The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name: Environmental Geophysics

1	Course title	Environmental Geophysics
2	Course number	0305482
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3 meetings/week, 1 hour each
4	Prerequisites/corequisites	Principles of Geophysics 0305271
5	Program title	Environmental and Applied Geology
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Science
9	Department	Geology
10	Level of course	3rd year students
11	Year of study and semester (s)	4 years, 8 semesters
12	Final Qualification	B. Sc.
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English/Arabic
15	Date of production/revision	September 2017

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

305 Geology, Sunday, Monday & Wednesday 14-15; elisaz@ju.edu.jo

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. Course Description:

As stated in the approved study plan.

Importance of geophysics in environmental studies, geological and geophysical characteristics of some environmental problems: Landslides, cavities and sinkholes, groundwater pollution, dam problems, different geophysical techniques and field applications.

19. Course aims and outcomes:

Aims:
Having completed this course, students should be able to:
Learn on the development of Engineering and Environmental Geophysics and its importance in solving many environmental problems
Know the geophysical and geological characteristics of some environmental problems, namely: landslides, subsurface cavities and sinkholes, contamination of groundwater, water seepage from dams and water reservoirs, buried objects, natural radiation.
Study shallow seismic surveys and their role in solving environmental problems. Mapping horizontal and deformed layers and locating geological structures. Field applications.
Study electrical and electromagnetic surveys and their role in delineating contamination plumes, subsurface cavities and odd bodies. Field applications.
Understand the importance of electrical and electromagnetic methods in locating water seepage from dams and water reservoirs.
Learn shallow magnetic and gravity surveys and their role in environmental studies.
Understand reduction of gravity and magnetic data. Qualitative and quantitative interpretation. Field applications.
Learn the Ground Penetrating Radar technique and its importance. Field applications

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

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Differentiate between Environmental Geophysics and Applied Geophysics and their main applications
Learn the main geological and geophysical characteristics of some selected environmental problems, particularly landslides, contamination of groundwater, seepage from dams and water reservoirs, subsurface cavities and sinkholes.

Understand the importance of some geophysical methods in solving the above-mentioned environmental problems.

Learn how shallow seismic refraction is designed and executed to evaluate the hazard of landslides, subsurface cavities and other problems
Travel time equations for horizontal and deformed layers and mapping geological structures

Conduct shallow seismic surveys and analyse and evaluate the obtained seismic data

1. Get to know the importance of electrical and electromagnetic methods in solving environmental problems, and the assessment of their hazard, particularly contamination of underground water, subsurface cavities and sinkholes, landslides and water seepage.
2. Learn the importance of both electrical trenching and sounding in solving the different problems and evaluating their hazard.
3. Conduct field applications and quantitative evaluation of the obtained electrical & electromagnetic data.
4. Know the importance of gravity and magnetic techniques in solving some environmental problems
5. Reduction and interpretation of gravity and magnetic data.
6. Conduct some gravity and magnetic surveys and train on the qualitative and quantitative interpretations of the collected data.
7. Learn the importance of ground penetrating radar in solving some environmental problems, radar propagation parameters, data acquisition and processing.

Conduct field surveys and analysis and interpretation of the radar data

20. Topic Outline and Schedule:

Topic	Week	Achieved ILOs	Reference
Introduction	1	1	Chapter 1
Geological & geophysical characteristics of some environmental problems	1	2	Chapter 2
Importance of Environmental Geophysics	1	3	Chapter 2
Shallow seismic refraction and its role in environmental studies	1	4	Chapter 4
Travel time equations for horizontal and deformed layers. Field applications	2	5 & 6	Chapter 4
Electrical & electromagnetic studies and their importance in studies of water seepage and contamination	2	7 & 8	Chapters 6 & 7
Electrical and electromagnetic field applications	1	9	Chapter 7
Gravity and magnetic methods and their role in environmental studies	1	10	Chapters 2 & 3
Reduction and interpretation of gravity and magnetic data	1	11	Chapters 2 & 3
Gravity and magnetic field applications	1	12	Chapters 2 & 3
Ground penetration radar, propagation parameters	1	13	Chapter 8
Radar data acquisition, processing and interpretation and field applications	1	14	Chapter 8

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

Detailed lectures are presented on each subject. PowerPoint is utilized when needed. Weekly exercises are given on the interpretation of geophysical data. Geophysical field surveys are conducted at some selected environmental sites. Students are trained on the processing and interpretation of the collected data.

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

First Exam 20%; second Exam 20%, Practical Exam 10%; Final Exam 50%; Total = 100%

23. Course Policies:

A- Attendance policies:

B- Absences from exams and handing in assignments on time:

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior:

E- Grading policy:

F- Available university services that support achievement in the course:

24. Required equipment:

A Multi-channel seismograph and all accessories

A Resistivity meter

A Gravimeter

A Magnetometer

A Ground Penetration Radar

Computers

25. References:

A- Required book (s), assigned reading and audio-visuals:

Sharma, P. V., 1997, Environmental and engineering geophysics, Cambridge University Press, Cambridge.

B- Recommended books, materials, and media:

Dobrin, M. B. and Savit, C. H., 1988, Introduction to Geophysical Prospecting, McGraw-Hill, New York.

26. Additional information:

Name of Course Coordinator: -Zuhair Hasan El-Isa----------Signature: ----------

Date: -September, 22, 2017---------- Head of curriculum committee/Department: ----------

---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

Dean: ---------- -Signature: ----------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File