

## COURSE OUTLINE

### (1) GENERAL

|   |   |                              |                |
|---|---|------------------------------|----------------|
| <b>SCHOOL</b>   | ENGINEERING                                 |                              |                |
| <b>ACADEMIC UNIT</b>  | DEPARTMENT OF MINERAL RESOURCES ENGINEERING |                              |                |
| <b>LEVEL OF STUDIES</b>   | UNDERGRADUATE                               |                              |                |
| <b>COURSE CODE</b>  | MRE703                                      | <b>SEMESTER</b>              | 7              |
| <b>COURSE TITLE</b>   | MINING AND THE ENVIRONMENT                  |                              |                |
| <b>INDEPENDENT TEACHING ACTIVITIES</b><br><i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i> |   | <b>WEEKLY TEACHING HOURS</b> | <b>CREDITS</b> |
| Lectures  |   | 3                            | 4              |
| Labs  |   | 1                            | 1              |
| Total   |   | 4                            | 5              |
| <i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>  |   |                              |                |
| <b>COURSE TYPE</b><br><i>general background, special background, specialised general knowledge, skills development</i>  | Required, general background                |                              |                |
| <b>PREREQUISITE COURSES:</b>  | There are no prerequisite courses           |                              |                |
| <b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>  | Greek                                       |                              |                |
| <b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>  | No  |                              |                |
| <b>COURSE WEBSITE (URL)</b>   |   |                              |                |

### (2) LEARNING OUTCOMES

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|---|--|--|
| <p><b>Learning outcomes</b></p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p>Consult Appendix A</p> <ul style="list-style-type: none"> <li>• Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</li> <li>• Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</li> <li>• Guidelines for writing Learning Outcomes</li> </ul>   |  |  |
| <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>• Assess the mechanism for land protection in mining areas</li> <li>• Use of selective plantation that is drought resistant and has greater survival time along with the native plant species to maintain ecosystem integrity.</li> <li>• Incorporate people's participatory approach to restore mine degraded lands that provide social, economic, and environmental benefits to large populations</li> </ul>   |  |  |
| <p><b>General Competences</b></p> <p><i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i><br/> <i>Adapting to new situations</i><br/> <i>Decision-making</i><br/> <i>Working independently</i><br/> <i>Team work</i> </td> <td style="width: 50%; border: none;"> <i>Project planning and management</i><br/> <i>Respect for difference and multiculturalism</i><br/> <i>Respect for the natural environment</i><br/> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i><br/> <i>Criticism and self-criticism</i> </td> </tr> </table> | <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i><br><i>Adapting to new situations</i><br><i>Decision-making</i><br><i>Working independently</i><br><i>Team work</i>   | <i>Project planning and management</i><br><i>Respect for difference and multiculturalism</i><br><i>Respect for the natural environment</i><br><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i><br><i>Criticism and self-criticism</i> |
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|--|--|
| <i>Working in an international environment</i>     | <i>Production of free, creative and inductive thinking</i> |
| <i>Working in an interdisciplinary environment</i> | .....  |
| <i>Production of new research ideas</i>            | <i>Others...</i>   |
|  | .....  |

- Search for, mining environmental projects, with the use of the necessary information technology
- Understanding that the unregulated mining has the potential to release harmful substances into the soil, air and water.
- Accepting that open pit mining, where material is excavated from mines, is one of the most complicated problem in mining treatment
- Giving guidelines for investigating and documenting geological, hydrological, soil, vegetation, meteorological, economic and social conditions;
- Create technical and social conditions conducive to environmental protection such as: planning and designing of environmental efforts
- Analyzing legal, administrative and financial aspects of mining environmental policy
- Training students in mining and the environment
- Showing social, professional and ethical responsibility

### (3) SYLLABUS

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| <p><b>INTRODUCTION</b></p> <p>Mineral resources and environment, Social and economic impacts of mining activity. Human, environment and mining activity, impacts on human health. Factors affecting the magnitude and the intensity of mining environmental problems.</p> <p>a) Visual Pollution: Introduction, theoretical background, Quality assessment of landscape, Design of mining projects aiming the minimizing and visual alteration of landscape,</p> <p>b) Soil vibrations in the mining activity and air pressure (airblast): Introduction, theoretical background, monitoring and techniques for measuring vibrations from blasts, measures for reducing vibration and air pressure, vibration and human nuisance.</p> <p>c) noise pollution: Introduction, theoretical background, sources of noise in mining, Monitoring and measurement systems, forecast models, Greek, European and International limits in mining activities.</p> <p>d) Air pollution: sources of air pollution in quarries and mines, monitoring and measuring techniques, simulation models.</p> <p>Environmental impacts of mining activity on ecosystems: air, water, soil and biodiversity pressures. Mining exploitation aiming the optimal environmental protection, management and reuse of tailings, management of by-products, acid mine drainage, mining wastes and utilization of quarry by-products.</p> |
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### TEACHING and LEARNING METHODS - EVALUATION

| <p><b>DELIVERY</b></p> <p><i>Face-to-face, Distance learning, etc.</i></p>   | Face-to-face, Distance learning, Lectures, Lab demonstration, Tutorials   |                          |                          |          |    |     |    |           |    |            |    |
|--|---|--------------------------|--------------------------|----------|----|-----|----|-----------|----|------------|----|
| <p><b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b></p> <p><i>Use of ICT in teaching, laboratory education, communication with students</i></p>   | E-Class, electronic communication, video demonstrations, intermediate exams via e-Class tools   |                          |                          |          |    |     |    |           |    |            |    |
| <p><b>TEACHING METHODS</b></p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational</i></p> | <table border="1"> <thead> <tr> <th><i>Activity</i></th> <th><i>Semester workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>36</td> </tr> <tr> <td>Lab</td> <td>12</td> </tr> <tr> <td>Tutorials</td> <td>32</td> </tr> <tr> <td>Self-study</td> <td>20</td> </tr> </tbody> </table> | <i>Activity</i>          | <i>Semester workload</i> | Lectures | 36 | Lab | 12 | Tutorials | 32 | Self-study | 20 |
|  | <i>Activity</i>   | <i>Semester workload</i> |                          |          |    |     |    |           |    |            |    |
|  | Lectures  | 36                       |                          |          |    |     |    |           |    |            |    |
|  | Lab   | 12                       |                          |          |    |     |    |           |    |            |    |
|  | Tutorials   | 32                       |                          |          |    |     |    |           |    |            |    |
| Self-study   | 20  |                          |                          |          |    |     |    |           |    |            |    |

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| visits, project, essay writing, artistic creativity, etc.<br><br>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS  |  |            |
|   |  |            |
|   |  |            |
|   |  |            |
|   |  |            |
|   | Course total   | <b>100</b> |
| <p align="center"><b>STUDENT PERFORMANCE EVALUATION</b></p> <p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p> | Final exam (60%, minimum required grade = 4/10),<br>Multiple choice intermediate exam (20%),<br>Homework (20%) |            |

#### (4) SUGGESTED BIBLIOGRAPHY

- Suggested bibliography:

- Καλιαμπάκος, Δ. 1996. Περιβαλλοντική μεταλλευτική και λατομική τεχνολογία. Εκδόσεις ΕΜΠ. Αθήνα.
- Καλιαμπάκος, Δ. 1996. Περιβάλλον II- Προστασία περιβάλλοντος στη μεταλλευτική δραστηριότητα. Εκδόσεις ΕΜΠ. Αθήνα. ·
- Φραγκίσκος, Α. 2012. Το περιβάλλον και η μεταλλευτική – μεταλλουργική βιομηχανία. Έκδοση 1η Εκδόσεις κάτοπτρο, Αλ. ΜΑΜΑΛΗΣ σελ. 256. Εύδοξος: 32997480 ·
- Κουϊμτζής, Θ., Σαμαρά, Κ. 1994. Έλεγχος ρύπανσης περιβάλλοντος. Εκδόσεις Ζήτη Εύδοξος: 11276 ·
- Κουϊμτζής Θ., Φυτιάνος Κ., Σαμαρά Κ. 2004 Έλεγχος ρύπανσης περιβάλλοντος. Εκδόσεις University Studio Press. Θεσσαλονίκη Εύδοξος: 17239 ·
- Α. Ανδρεαδάκης, Μ. Πανταζίδου, Α. Σταθόπουλος 2008. Περιβαλλοντική Τεχνολογία, Εκδόσεις Συμμετρία, Αθήνα. Εύδοξος: 45237 ·
- Μαρκαντωνάτος Γ. 1990. Επεξεργασία και διάθεση υγρών αποβλήτων: αστικά λύματα, βιομηχανικά απόβλητα, ζωικά απορρίμματα,
- Βασιλικιώτης Γ.Σ., Φυτιάνος Κ. 1986. Μέθοδοι ελέγχου ρύπανσης περιβάλλοντος, -Χριστούλας Δ. 1991. Ρύπανση των υδάτων και αντιρρυπαντική τεχνολογία. ·
- Spitz, K., Trudinger, J. 2008. Mining and the Environment: From Ore to Metal. Kindle Edition CRC press. NY
- Amy Larkin 2013. Environmental Debt: The Hidden Costs of a Changing Global Economy. Kindle Edition.
- Younger, P.L., Banwart, S.A., Hedin R. S., 2002. Mine Water: Hydrology, Pollution, Remediation. Kluwer Academic publisher.
- Amy Larkin 2013. Environmental Debt: The Hidden Costs of a Changing Global Economy. Kindle Edition.
- Younger, P.L., Banwart, S.A., Hedin R. S., 2002. Mine Water: Hydrology, Pollution, Remediation. Kluwer Academic publisher.

- Related academic journals:

- Mining and the Environment: Challenges and Opportunities
- Mine Water and the Environment
- International Journal of Mining, Reclamation and Environment
- Journal of Mining and Environmental Technology