**GEOLOGICAL ENGINEERING PhD PROGRAMME**

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| **First Year** | | | | | | | | |
| **I. Semester** | | | | | | | | |
| Code | | Course Title | ECTS | | T+P | Credit | C/E | Language |
| 501011101 | | [THE SCIENTIFIC RESEARCH METHODS AND ITS ETHICS](#EN42) | 7.5 | | 3+0 | 3 | **C** | Turkish |
| 503412601 | [CLAY GEOLOGY](#EN23) | | 7.5 | 3+0 | | 3 | **C** | Turkish |
|  | | Elective Course-1 | 7.5 | | 3+0 | 3 | E | Turkish |
|  | | Elective Course-2 | 7.5 | | 3+0 | 3 | E | Turkish |
|  | | Total of I. Semester | 30 | |  | 12 |  |  |
| **II. Semester** | | | | | | | | |
| Code | | Course Title | ECTS | | T+P | Credit | C/E | Language |
|  | | Elective Course-3 | 7.5 | | 3+0 | 3 | E | Turkish |
|  | | Elective Course-4 | 7.5 | | 3+0 | 3 | E | Turkish |
|  | | Elective Course-5 | 7.5 | | 3+0 | 3 | E | Turkish |
| 503412001 | | PhD Seminar | 7.5 | | 0+1 | - | **C** | Turkish |
|  | | Total of II. Semester | 30 | |  | 9 |  |  |
|  | | TOTAL OF FIRST YEAR | 60 | |  | 21 |  |  |

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| **Second Year** | | | | | | |
| **III. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 503411801 | PhD PROFICIENCY | 30 | 0+1 | **-** | **C** | Turkish |
|  | Total of III. Semester | 30 |  |  |  |  |
| **IV. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501011102 | THESIS PROPOSAL | 30 | 0+1 | **-** | **C** | Turkish |
|  | Total of IV. Semester | 30 |  |  |  |  |
|  | TOTAL OF SECOND YEAR | 60 |  |  |  |  |

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| **Third Year** | | | | | | |
| **V. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 503411802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 503411803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | **-** | **C** | Turkish |
|  | Total of V. Semester | 30 |  |  |  |  |
| **VI. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 503411802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 503411803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | Total of VI. Semester | 30 |  |  |  |  |
|  | TOTAL OF THIRD YEAR | 60 |  |  |  |  |

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| **Fourth Year** | | | | | | |
| **VII. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 503411802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 503411803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | **-** | **C** | Turkish |
|  | Total of VII. Semester | 30 |  |  |  |  |
| **VIII. Semester** | | | | | | |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 503411802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 503411803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | Total of VIII. Semester | 30 |  |  |  |  |
|  | TOTAL OF FOURTH YEAR | 60 |  |  |  |  |

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| **Elective Courses** | | | | | | | |
| Code | Course Title | ECTS | T+P | | Credit | C/E | Language |
| 503412605 | [ACTIVE STRIKE-SLIP FAULTS](#EN3) | 7.5 | 3+0 | | 3 | E | Turkish |
| 503411604 | [ADVANCED QUATERNARY](#EN41) | 7.5 | | 3+0 | 3 | E | Turkish |
| 503411603 | [COMPUTER APPLICATIONS IN GEOCHEMISTRY](#EN20) | 7.5 | 3+0 | | 3 | E | Turkish |
| 503411602 | [ISOTOPE GEOLOGY](#EN19) | 7.5 | 3+0 | | 3 | E | Turkish |
| 503412607 | [PALYNOLOGICAL APPLICATIONS](#EN26) | 7.5 | 3+0 | | 3 | E | Turkish |
| 503412610 | [PLATE TECTONICS AND MAGMATISM](#EN43) | 7.5 | | 3+0 | 3 | E | Turkish |
| 503412606 | [QUATERNARY II](#EN32) | 7.5 | 3+0 | | 3 | E | Turkish |
| 503412603 | [SEQUENCE STRATIGRAPHY IN DEEP SEA SYSTEMS](#EN35) | 7.5 | 3+0 | | 3 | E | Turkish |
| 503412609 | [SHALLOW GEOPHYSICAL METHODS IN ACTIVE TECTONIC INVESTIGATIONS](#EN45) | 7.5 | | 3+0 | 3 | E | Turkish |
| 503411606 | [VOLCANOCLASTIC ENVIRONMENTS](#EN47) | 7.5 | 3+0 | | 3 | E | Turkish |
| 503412608 | [VOLCANOSEDIMENTARY ENVIRONMENTS](#EN46) | 7.5 | | 3+0 | 3 | E | Turkish |
| 503412608 | [VOLCANOSEDIMENTARY ENVIRONMENTS](#EN40) | 7.5 | 3+0 | | 3 | E | Turkish |

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503402601 | **TITLE** | Active strike-slip faults |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | | 1 | | 40 |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Active strike-slip fault zones;  -general surface features  -geometrical features like position, extension and width ,  -characteristic features like earthquake magnitude, recurrence time, slip rate and offset. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To gain knowledge about general features of active strike-slip fault, to introduce active strike-slip fault around the world and our country | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The person who wants to take a proficiency about seismicity of Turkey are going to be a knowledge of this subject. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. design and conduct experiments as well as to analyze and interpret data  2. identify, formulate, and solve engineering problems  3. understand the broad education necessary to understand the impact of engineering solutions in a global and societal context  4. use techniques, skills, and modern engineering tools necessary for engineering practic | | | | | | | |
| **TEXTBOOK** | | | | |  | | | | | | | |
| **OTHER REFERENCES** | | | | | 1. Active Tectonics2. Continental strike-slip faults (Hancock)3. Tectonic Geomorphology (Burbank and Anderson, 2001)4. Paleoseismology (McCalpin) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction |
| 2 | Strike-slip faults |
| 3 | Active faults and parameters |
| 4 | Active strike-slip faults |
| 5 | Surface and offset physiographic features |
| 6 | Midterm Examination 1 |
| 7 | Pull-apart basins |
| 8 | Triple junctions and general features |
| 9 | Geomorphological studies on active strike-slip faults |
| 10 | Paleoseismological studies on active strike-slip faults |
| 11 | Midterm Examination 2 |
| 12 | Archeoseismological studies on active strike-slip faults |
| 13 | Important active strike-slip faults around the world |
| 14 | Active strike-slip faults from Turkey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Doç. Dr. Volkan KARABACAK | **Date:** | 29.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503411602 | **TITLE** | Isotope Geology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 35 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (Seminar) | | | | | 1 | | 25 |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | The isotope definition and classification of isotopes, dating of magmatic rocks and minerals with various dating methods such as : K-Ar, Rb-Sr, Nd-Sm, U, Th-Pb and 14C techniques, discussion on crust-mantle evolution on the basis of radiogenic isotope ratios in magmatic rocks. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The use of radiogenic isotopes in petrology and geochemical applications. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Modeling of mantle-crust interactions with the use of various radiogenic isotopes and trace elements | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas, Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area. | | | | | | | |
| **TEXTBOOK** | | | | | Faure, G. (1986). Principles of Isotope Geology, 2nd Edition, John Wiley and Sons, New York | | | | | | | |
| **OTHER REFERENCES** | | | | | Recent articles on the subject. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | What are isotopes? Classicisation of isotopes |
| 2 | The use of radiogenic isotopes for the understanding of the evolution of earth |
| 3 | Dating with K-Ar method |
| 4 | Dating with Rb-Sr method |
| 5 | Dating Nd-Sm method |
| 6 | Midterm Examination 1 |
| 7 | U-Th-Pb dating method |
| 8 | 14C dating method |
| 9 | Modeling of crust-mantle interaction |
| 10 | Article discussion |
| 11 | Midterm Examination 2 |
| 12 | Article discussion |
| 13 | Article discussion |
| 14 | Article discussion |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Asst. Prof. Hüseyin SENDİR | **Date:** | 30.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503411603 | **TITLE** | Computer Applications in Geochemistry |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 35 |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 25 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | | 1 | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Introduction and detailed package of programs used to evaluate the use of geochemical analysis (Igpet, Grapher, Surfer, Minpet and the others) | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Using a variety of software packages to analyze data, interpret and report writing. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | 1.Data analysis and evaluation  2. Defining and solving problems  3. to follow the current issues of professional | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Use Igpet program, 2. Use Surfer program, 3. Use Grapher program, 4. Use Minpet and Newpet programs | | | | | | | |
| **TEXTBOOK** | | | | | Program related books | | | | | | | |
| **OTHER REFERENCES** | | | | | Program related books | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Overview of programs |
| 2 | Igpet program and use |
| 3 | Igpet program and use |
| 4 | Igpet program and use |
| 5 | Grapher program and use |
| 6 | Midterm Examination 1 |
| 7 | Grapher program and use |
| 8 | Surfer program and use |
| 9 | Surfer program and use |
| 10 | Minpet program and use |
| 11 | Midterm Examination 2 |
| 12 | Minpet program and use |
| 13 | Newpet program and use |
| 14 | Newpet program and use |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Yrd. Doç. Dr. Hüseyin SENDİR | **Date:** | 04.03.2016 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503412601 | **TITLE** | Clay Geology |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | | x | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (seminar) | | | | |  | | 30 |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | | - | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Soil clays in the geochemical cycle. A brief review of silicate hydrolysis. Geology of clays in continental sediments and marine sediment from point of view of environmental factors. Comparison of ancient and modern clay deposits. Clay mineral genesis by inheritance and transformation, neoformation, and diagenesis. Brief consideration of clay mineral synthesis, hydrothermal origin and low grade metamorphism of layer silicates. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Investigation of the geochemical origin of clay minerals | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | To understand the formation process and environments of clay minerals. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Soil clays in the geochemical cycle.  A brief review of silicate hydrolysis.  Geology of clays in continental sediments and marine sediment from point of view of environmental factors.  Comparison of ancient and modern clay deposits. Clay mineral genesis by inheritance and transformation, neoformation, and diagenesis.  Brief consideration of clay mineral synthesis, hydrothermal origin and low grade metamorphism of layer silicates. | | | | | | | |
| **TEXTBOOK** | | | | | Millot, G. (1970) Geology of Clays. Chapman & Hall, London, 429 s. | | | | | | | |
| **OTHER REFERENCES** | | | | | Clays and Clay MineralsClay MineralsCanadian MineralogistNues Jahrbuch für Mineralogie, Monatshfte ve AbhandlungenMineralium DepositaCarbonate and EvaporiteSedimentary Geology … etc. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Geological environments |
| 2 | Origin and occurrence of Clay Minerals |
| 3 | Development of Clay Minerals by Rock Weathering and Soil Formation |
| 4 | Relation of paleoclimatical conditions on development of alteration processes |
| 5 | Mechanical Inheritance (erosion and detrital clay sediments) |
| 6 | Midterm Examination 1 |
| 7 | Transformation, compaction and diagenesis |
| 8 | Hydtrothermal clay minerals and hydrothermal environment |
| 9 | Deep-sea alteration and hydrothermal activity |
| 10 | Wall Rock Alteration of Kuroko type massive sulfide deposit |
| 11 | Midterm Examination 2 |
| 12 | Weathering of volcanic ash and pyroclastic materials |
| 13 | Cation and anion exchange reactions |
| 14 | Specific adsorption of heavy metals in sesquioxide clays |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Prof. Dr. Selahattin KADİR | **Date:** | 15.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503412607 | **TITLE** | Palynological Applications |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 0 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 40 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Definition and a brief history of Palynology, sedimentary organic matter, concept of palynofacies and palynomacerals and their use in coal, oil and gas exploration, use of palynomorphs in thermal maturation index studies, application of palynology in biostratigraphical, paleogeographical, paleoenvironmental and paleoclimatological studies, and in other fields such as atmospheric, archeological and forensic studies and melissapalynology. Correlation of marine and terrestrial sequences by means of palynomorphs and construction of paleo-vegetation by palynomorphs. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | To introduce application fields of palynology to students and apply this knowledge in solving geological problems. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Contribute to the exploration of energy sources such as coal, oil, and gas and to the evaluation of biostratigraphical, paleoenvironmental and paleoclimatological studies. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Student will have 1. knowledge of palynological science, 2. learn application areas of spore, polen, dinoflagellates, acritarchs, chitinozoa and non-pollen palynomorphs in geological researches, 3. will understand contribution of palynomorphs in biostratigraphical, paleoenvironmental and paleoclimatological studies, 4. understand the importance of palynology in coal, oil and gas exploration. | | | | | | | |
| **TEXTBOOK** | | | | | Paleopalynology. Traverse, A., 2007. (eds. D.S. Jones and N.H. Landman). Springer. 813 p. | | | | | | | |
| **OTHER REFERENCES** | | | | | Plankton Stratigraphy. 1989. (eds.H.M.Bolli, J.B.Saunders, and K. Perch-Nelsen) Cambride University Pres,1032 p.Periyodik dergilerde yayınlanmış çeşitli makaleler | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Definition of Palynology and a brief history of palynological studies |
| 2 | Sedimentary organic matter, concept of palynofacies and palynomacerals |
| 3 | Palynomorphs and palynofacies in coal, oil and gas exploration |
| 4 | Use of palynomorphs in thermal maturation index studies |
| 5 | Article discussion |
| 6 | Midterm Examination 1 |
| 7 | Application of palynology in biostratigraphical studies |
| 8 | Application of palynology in paleogeographical studies |
| 9 | Application of palynology in paleoenvironmental and paleoclimatic studies |
| 10 | Application of palynology in atmospheric, archeological and forensic studies and melissapalynology |
| 11 | Midterm Examination 2 |
| 12 | Correlation of marine and terrestrial sequences by means of palynomorphs |
| 13 | Construction of paleo-vegetation by means of palynomorphs |
| 14 | Article discussion |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Asst.Prof. Dr. Hatice Kutluk | **Date:** | 25 April, 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503412606 | **TITLE** | Quaternary II |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 40 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Quaternary stratigraphy, oxygene isotope techniques in the evaluation of paleo-temperature, dating methods used in Quaternary,  correlation between marine and terrestrial records. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Evaluation of the effects of environmental changes in Quaternary period in various parts of the World, assessment of the cause of changes and learning the techniques in this period. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will learn the ability to apply these knowledge into geological past by understanding and evaluating the changes during the Quaternary period. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students will be acquainted with 1. theory, principals, and methods in Quaternary, 2. will understand the importance of Quaternary in geological time, 3. will assess the causes of various changes and their duration during Quaternary period, 4. will develope the skill of evaluating the present-day and future. | | | | | | | |
| **TEXTBOOK** | | | | | Reconstructing Quaternary Environments. Lowe,J.J. and Walker, M.J.K., 1984. Longman Press, London, 389 s. | | | | | | | |
| **OTHER REFERENCES** | | | | | Various articles published in periodicals | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | A brief introduction to the ‘Quaternary Period’, character and duration of the Quaternary |
| 2 | A brief summary of the Quaternary stratigraphical schemes in northern hemisphere |
| 3 | Paleotemperature curves and subdivision of Quaternary by oxygene isotope stages |
| 4 | Radiometric dating techniques in Quaternary |
| 5 | Radiocarbon dating, Potassium/Argon (40K/40Ar) dating, Thermoluminescens dating |
| 6 | Midterm Examination 1 |
| 7 | Incremental dating methods in Quaternary |
| 8 | Dendrochronology, dendroclimatology |
| 9 | Varve chronology, tephra chronology |
| 10 | Plant microfossil analysis |
| 11 | Midterm Examination 2 |
| 12 | Pollen zones, interpretation of pollen diagrams, reconstruction of paleo-vegetation |
| 13 | Correlation between marine and terrestrial records |
| 14 | Article discussion |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Asst.Prof. Dr. Hatice Kutluk | **Date:** | 25 April, 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503412603 | **TITLE** | Sequence Stratigraphy in Deep Sea Systems |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | | x | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 2 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Scope of deep sea sytems, facies and processes, and impact of sea level changes on deep marine sediments | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The course is supposed to be important since it will provide an insight in the issues such as depositional processes, geometry, distribution of reservoir and host rocks of petroleum. I will help on the petroleum prospection in deep sea depositional systems. Throughout the course, after the reminiscence of the outlines of sequence stratigraphy, it will be provided a comprehension of stratigraphic and geometric pecularities caused by relative sea level changes For this aim, fisrt various facies models of deep sea environments will be evaluated, afterward, the impact of sea level changes on these facies will be discussed . | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The course will provide significant insights in terms of petroleum exploration, spatial distribution of source and reservoir rocks. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Reconnaisance of deep marine depositional environments and impact of sea level changes on it; grasping the importance of this upon petroleum exploration. | | | | | | | |
| **TEXTBOOK** | | | | | • Sequence Stratigraphy and Facies Associations, Posamentieer et al., 1993. International Association of Sedimentologists. Special Publ. No: 18.• Depositional Sedimentary Environments, Reineck, H.E., Singh, I.B., 1980.• Facies Models, Walker, R.G., 1984. | | | | | | | |
| **OTHER REFERENCES** | | | | | Aşağıda listelenen makaleler:• Ten turbidite myths, Earth science Reviews, 58 (2002), 311-341.• Distributary Channel Meandering and Bifurcation…• Submarine fan deposition within a sequence stratigraphiv framework…• Submarine fans: characteristics, models, classification and reservoir potential.• Turbidite systems and their relation to depositional sequences…• Timing of turbidite deposition on the Missisipi fan..• Turbidite systems: state of art and future directions. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Factors governing the sea level changes |
| 2 | Historical development of sequence stratigraphy |
| 3 | Principles of Sequence Stratigraphy |
| 4 | Deep Marine depositional Environments |
| 5 | Submarine Fan facies models |
| 6 | Midterm Examination 1 |
| 7 | Submarine Fan facies models |
| 8 | Submarine Fan facies models |
| 9 | Impact of relative sea level changes upon deep marine sediments |
| 10 | Impact of relative sea level changes upon deep marine sediments |
| 11 | Midterm Examination 2 |
| 12 | Impact of relative sea level changes upon deep marine sediments |
| 13 | Impact of relative sea level changes upon deep marine sediments |
| 14 | General Remarks, examples from Turkey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Prof. Dr. Faruk Ocakoğlu | **Date:** | 22.05.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503412608 | **TITLE** | Volcanosedimentary environments |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Relationships between basin development and coeval volcanism | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Giving information for methodology about reworked and reworked volcanosedimentary rocks following to volcanic activity and their applications in earth sciences | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The participants learn the volcano-sedimentary basin evolution which is very crucial as economically in terms of the geological view | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Classification and origin of the volcaniclastic rocks  2. Volcanosedimentary environments  3. Classification and introduction of the volcanic edifices  4. Erosional processes on the volcanic regions  5. Facies concept for volcanosedimentary environments | | | | | | | |
| **TEXTBOOK** | | | | | Volcaniclastic Rocks From Magmas to Tephras (H. LEYRIT & C. MONTENAT) | | | | | | | |
| **OTHER REFERENCES** | | | | | Pyroclastic Rocks (R. FISHER) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Classification and origin of the volcaniclastic rocks |
| 2 | Erosion and transportation processes at the volcanosedimentary environments |
| 3 | Classification of the volcanic edifices as morphological and genetic aspects |
| 4 | The main agents controlling the erosional processes of the volcanic edifices |
| 5 | Facies discriminations between subaerial and submarine environments |
| 6 | Midterm Examination 1 |
| 7 | Textures of the volcaniclastic rocks |
| 8 | Mapping training on the volcanosedimentary environments |
| 9 | Facies concept for volcanosedimentary environments |
| 10 | Volcaniclastic rocks in lacustrine settings |
| 11 | Midterm Examination 2 |
| 12 | Hydrothermal fluid circulation and alteration in the volcanosedimentary environments |
| 13 | Techniques for scaled-stratigraphical sections in volcanosedimentary environments |
| 14 | Texture and fabric relations in volcanosedimentary environments |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Yrd. Doç. Dr. Özgür KARAOĞLU | **Date:** | 29.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Advanced Quaternary |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | | 1 | | 40 |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Quaternary stratigraphy, oxygene isotope techniques in the evaluation of paleo-temperature, dating methods used in Quaternary,  correlation between marine and terrestrial records. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Evaluation of the effects of environmental changes in Quaternary period in various parts of the World, assessment of the cause of changes and learning the techniques in this period. | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Students will learn the ability to apply these knowledge into geological past by understanding and evaluating the changes during the Quaternary period. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Students will be acquainted with 1. theory, principals, and methods in Quaternary, 2. will understand the importance of Quaternary in geological time, 3. will assess the causes of various changes and their duration during Quaternary period, 4. will develope the skill of evaluating the present-day and future. | | | | | | | |
| **TEXTBOOK** | | | | | Reconstructing Quaternary Environments. Lowe,J.J. and Walker, M.J.K., 1984. Longman Press, London, 389 s. | | | | | | | |
| **OTHER REFERENCES** | | | | | Various articles published in periodicals | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | A brief introduction to the ‘Quaternary Period’, character and duration of the Quaternary |
| 2 | A brief summary of the Quaternary stratigraphical schemes in northern hemisphere |
| 3 | Paleotemperature curves and subdivision of Quaternary by oxygene isotope stages |
| 4 | Radiometric dating techniques in Quaternary |
| 5 | Radiocarbon dating, Potassium/Argon (40K/40Ar) dating, Thermoluminescens dating |
| 6 | Midterm Examination 1 |
| 7 | Incremental dating methods in Quaternary |
| 8 | Dendrochronology, dendroclimatology |
| 9 | Varve chronology, tephra chronology |
| 10 | Plant microfossil analysis |
| 11 | Midterm Examination 2 |
| 12 | Pollen zones, interpretation of pollen diagrams, reconstruction of paleo-vegetation |
| 13 | Correlation between marine and terrestrial records |
| 14 | Article discussion |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Asst.Prof. Dr. Hatice Kutluk | **Date:** | June 22, 2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | Joint Course for the Institute | **SEMESTER** | Fall-Spring |

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| **COURSE** | | | |
| **CODE** | 501011101 | **TITLE** | The Scientific Research Methods and Its Ethics |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| MSc-  Ph.D | 3 | | 0 | 0 | | | 3+0 | 7,5 | COMPULSORY  ( X ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| 1,5 | | 1,5 | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Seminar | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | | None | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Science, the scientific thought and other fundamental concepts, the scientific research process and its techniques, Methodology: Data Collecting-Analysis-Interpretation, Reporting the scientific research (Preparation of a thesis, oral presentation, article, project), Ethics, Ethics of scientific research and publication. | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The main objectives are: To examine the foundations of scientific research and the scientific research methods, to teach the principles of both the methodology and the ethics, to realize the process on a scientific research and to evaluate the results of research, to teach reporting the results of research (on a thesis, presentation, article). | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | Applying the scientific research methods and the ethical rules in their professional life. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Gaining awareness on ethical principles at basic research methods, becoming skillful at analyzing and reporting the data obtained in scientific researches, being able to have researcher qualification with occupational sense of responsibility, having the scientific and vocational ethics’ understanding and being able to defend this understanding in every medium. | | | | | | | |
| **TEXTBOOK (Turkish)** | | | | | Karasar, N. (2015). Bilimsel Araştırma Yöntemi. Nobel Akademi Yayıncılık, Ankara. | | | | | | | |
| **OTHER REFERENCES** | | | | | **1-**Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş., Demirel, F. (2012). Bilimsel Araştırma Yöntemleri. Pegem Akademi Yayınevi, Ankara.  **2-**Tanrıöğen, A. (Editör). (2014). Bilimsel Araştırma Yöntemleri. Anı Yayıncılık, Ankara.  **3-**Türkiye Bilimler Akademisi Bilim Etiği Komitesi. Bilimsel Araştırmada Etik ve Sorunları, Ankara: TÜBA Yayınları, (2002).  **4-**Ekiz, D. (2009). Bilimsel Araştırma Yöntemleri: Yaklaşım, Yöntem ve Teknikler. Anı Yayıncılık, Ankara.  **5-**Day, Robert A. (Çeviri: G. Aşkay Altay). (1996). Bilimsel Makale Nasıl Yazılır ve Nasıl Yayımlanır?, TÜBİTAK Yayınları, Ankara.  **6-**Özdamar, K. (2003). Modern Bilimsel Araştırma Yöntemleri. Kaan Kitabevi, Eskişehir.  **7-**Cebeci, S. (1997). Bilimsel Araştırma ve Yazma Teknikleri. Alfa Basım Yayım Dağıtım, İstanbul.  **8-**Wilson, E. B. (1990). An Introduction to Scientific Research. Dover Pub. Inc., New York.  **9-**Çömlekçi, N. (2001). Bilimsel Araştırma Yöntemi ve İstatistiksel Anlamlılık Sınamaları. Bilim Teknik Kitabevi, Eskişehir. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Science, scientific thought and other basic concepts (University, history of university, higher education, science, scientific thought and other related concepts) |
| 2 | Science, scientific thought and other basic concepts (University, history of university, higher education, science, scientific thought and other related concepts) |
| 3 | The scientific research and its types (Importance of the scientific research, types of science, scientific approach) |
| 4 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning) |
| 5 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning) |
| 6 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning) |
| 7 | The method and the approach: Collecting, analysis and interpretation of the data (Data, data types, measurement and measurement tools, collecting data, organizing data, summarizing data, analysis and the interpretation of data) |
| 8 | The method and the approach: Collecting, analysis and interpretation of the data (Data, data types, measurement and measurement tools, collecting data, organizing data, summarizing data, analysis and the interpretation of data) |
| 9 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 10 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 11 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 12 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 13 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 14 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 15,16 | Mid-term exam, Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE INSTITUTE’S GRADUATE PROGRAMME’S LEARNING OUTCOMES** | | | | **CONTRIBUTION LEVEL** | | | |
| **NO** | **LEARNING OUTCOMES (M.Sc.-Ph.D.)** | | | **3**  High | | **2**  Mid | **1**  Low |
| **LO 1** | Having the scientific and vocational ethics’ understanding and being able to defend this understanding in every medium. | | |  | |  |  |
| **LO 2** | Being able to have researcher qualification with occupational sense of responsibility. | | |  | |  |  |
| **LO 3** | Becoming skillful at analyzing and reporting the data obtained in scientific researches. | | |  | |  |  |
| **LO 4** | Gaining awareness on ethical principles at basic research methods. | | |  | |  |  |
| **Prepared by :** | | |  | **Date:** | | 14.06.2016 | | | |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** | 503412608 | **TITLE** | Volcanosedimentary environments |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | |  |  | | | 3 | 7.5 | COMPULSORY  ( x ) | | ELECTIVE  (   ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 40 |
| Quiz | | | | |  | |  |
| Homework | | | | |  | |  |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Relationships between basin development and coeval volcanism | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Giving information for methodology about reworked and reworked volcanosedimentary rocks following to volcanic activity and their applications in earth sciences | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | The participants learn the volcano-sedimentary basin evolution which is very crucial as economically in terms of the geological view | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | 1. Classification and origin of the volcaniclastic rocks  2. Volcanosedimentary environments  3. Classification and introduction of the volcanic edifices  4. Erosional processes on the volcanic regions  5. Facies concept for volcanosedimentary environments | | | | | | | |
| **TEXTBOOK** | | | | | Volcaniclastic Rocks From Magmas to Tephras (H. LEYRIT & C. MONTENAT) | | | | | | | |
| **OTHER REFERENCES** | | | | | Pyroclastic Rocks (R. FISHER) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Classification and origin of the volcaniclastic rocks |
| 2 | Erosion and transportation processes at the volcanosedimentary environments |
| 3 | Classification of the volcanic edifices as morphological and genetic aspects |
| 4 | The main agents controlling the erosional processes of the volcanic edifices |
| 5 | Facies discriminations between subaerial and submarine environments |
| 6 | Midterm Examination 1 |
| 7 | Textures of the volcaniclastic rocks |
| 8 | Mapping training on the volcanosedimentary environments |
| 9 | Facies concept for volcanosedimentary environments |
| 10 | Volcaniclastic rocks in lacustrine settings |
| 11 | Midterm Examination 2 |
| 12 | Hydrothermal fluid circulation and alteration in the volcanosedimentary environments |
| 13 | Techniques for scaled-stratigraphical sections in volcanosedimentary environments |
| 14 | Texture and fabric relations in volcanosedimentary environments |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Yrd. Doç. Dr. Özgür KARAOĞLU | **Date:** | 29.04.2015 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Shallow Geophysical Methods in Active Tectonic Investigations |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  (   ) | | ELECTIVE  ( X ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
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| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | |  | |  |
| Quiz | | | | |  | |  |
| Homework | | | | | 1 | | 40 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 60 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Investigation of active tectonic zones using high resolution shallow geophysical methods | | | | | | | |
| **COURSE OBJECTIVES** | | | | | Investigation of active faults with geological observaitons and geophysical data | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | |  | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Please write minimum four learning outcomes for the course. | | | | | | | |
| **TEXTBOOK** | | | | | There is no specific textbook | | | | | | | |
| **OTHER REFERENCES** | | | | | All published materials related with the topic. | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Introduction |
| 2 | Overview of active tectonic structures |
| 3 | Overview of shallow geophysical methods |
| 4 | Significance of shallow geophysical methods in active tectonic studies |
| 5 | Significance of shallow geophysical methods in active tectonic studies |
| 6 | Midterm Examination 1 |
| 7 | Application of shallow geophysical methods in strike-slip faults |
| 8 | Application of shallow geophysical methods in normal faults |
| 9 | Application of shallow geophysical methods in reverse faults |
| 10 | Application of shallow geophysical methods in other structures |
| 11 | Midterm Examination 2 |
| 12 | Application of shallow geophysical methods in archaeoseismology |
| 13 | Application in the field |
| 14 | Application in the field |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Prof. Dr. Erhan Altunel | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | Plate Tectonics and Magmatism |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7.5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
| x | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 30 |
| Quiz | | | | |  | |  |
| Homework | | | | | 3 | | 30 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Investigation of magma formation processes by giving the theory of plate tectonics | | | | | | | |
| **COURSE OBJECTIVES** | | | | |  | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | In the process of different plate tectonics, it is aimed to teach all the processes related to magma formation, settlement, lithospheric movement and ultimately volcanic eruption from the lower mantle to the upper crust conditions in the conclusion of all geodynamic and physicochemical conditions leading to formation of the magma. | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Please write minimum four learning outcomes for the course. | | | | | | | |
| **TEXTBOOK** | | | | | Igneous Petrogenesis (M. Wilson, 1989) | | | | | | | |
| **OTHER REFERENCES** | | | | | Magmatic Processes and Plate Tectonics (in eds Prichard et al., 1993) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Magmatism and global tectonic proceses |
| 2 | What is plate tectonics? |
| 3 | Geochemistry of Igneous rocks |
| 4 | Partial melting processes in the Earth's upper mantle |
| 5 | Magmatism at constructive plate margins |
| 6 | Midterm Examination 1 |
| 7 | Magmatism at destructive margins |
| 8 | Student presentations ve discussion |
| 9 | Active continental margins, continental rift zones, and magmtism within plates |
| 10 | Back-arc margns, oceanic ridges and magmatism |
| 11 | Midterm Examination 2 |
| 12 | Student presentations ve discussion |
| 13 | Student presentations ve discussion |
| 14 | potassic magmatism within continental plates |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
| **LO 5** | Ability of written, oral and visual communication, in advanced level, in at least one foreign language |  |  |  |
| **LO 6** | Ability to analyze, synthesize, evaluate and criticize the arisen, suggested and/or submitted ideas in the study area |  |  |  |
| **LO 7** | Ability to analyze recent scientific, technologic, social, culturel and environmental improvements; and to have scientific impartiality, ethic and responsibility |  |  |  |

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| **Prepared by :** | Assoc. Prof. Dr. Özgür KARAOĞLU | **Date:** | 21.11.2017 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **GEOLOGICAL ENGINEERING (PhD)** | **SEMESTER** |  |

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| **COURSE** | | | |
| **CODE** |  | **TITLE** | VOLCANOCLASTIC ENVIRONMENTS |

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| **LEVEL** | **HOUR/WEEK** | | | | | | **Credit** | **ECTS** | **TYPE** | | | **LANGUAGE** |
| **Theory** | | **Practice** | **Laboratory** | | |
| **PhD** | 3 | | 0 | 0 | | | 3 | 7,5 | COMPULSORY  (   ) | | ELECTIVE  ( x ) | Turkish |
| **CREDIT DISTRIBUTION** | | | | | | | | | | | | |
| **Basic Science** | | **Basic Engineering** | | | | **Knowledge in the discipline**  **[if it contains considerable design content, mark with (√)]** | | | | | | |
|  | |  | | | |  | | | | | | |
| **ASSESSMENT CRITERIA** | | | | | | | | | | | | |
| **SEMESTER ACTIVITIES** | | | | | **Evaluation Type** | | | | | **Number** | | **Contribution**  **( % )** |
| Midterm | | | | | 1 | | 20 |
| Quiz | | | | | 1 | | 20 |
| Homework | | | | | 1 | | 20 |
| Project | | | | |  | |  |
| Report | | | | |  | |  |
| Other (     ) | | | | |  | |  |
| **Final Examination** | | | | | | | 40 |
| **PREREQUISITE(S)** | | | | |  | | | | | | | |
| **SHORT COURSE CONTENT** | | | | | Giving information for methodology about reworked and reworked volcanosedimentary rocks following to volcanic activity and their applications in earth sciences | | | | | | | |
| **COURSE OBJECTIVES** | | | | | The participants learn the volcano-sedimentary basin evolution which is very crucial as economically in terms of the geological view | | | | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | | | | | 1) Classification and origin of the volcaniclastic rocks  2) Volcanosedimentary environments  3) Classification and introduction of the volcanic edifices  4) Erosional processes on the volcanic regions  5) Facies concept for volcanosedimentary environments | | | | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | | | Please write minimum four learning outcomes for the course. | | | | | | | |
| **TEXTBOOK** | | | | | Volcaniclastic Rocks From Magmas to Tephras (H. LEYRIT & C. MONTENAT) | | | | | | | |
| **OTHER REFERENCES** | | | | | Pyroclastic Rocks (R. FISHER) | | | | | | | |

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| **COURSE SCHEDULE (Weekly)** | |
| **WEEK** | **TOPICS** |
| 1 | Classification and origin of the volcaniclastic rocks |
| 2 | Erosion and transportation processes at the volcanosedimentary environments |
| 3 | Classification of the volcanic edifices as morphological and genetic aspects |
| 4 | The main agents controlling the erosional processes of the volcanic edifices |
| 5 | Facies discriminations between subaerial and submarine environments |
| 6 | Textures of the volcaniclastic rocks |
| 7 | Mapping training on the volcanosedimentary environments |
| 8 | Mid term exam |
| 9 | Facies concept for volcanosedimentary environments |
| 10 | Volcaniclastic rocks in lacustrine settings |
| 11 | Hydrothermal fluid circulation and alteration in the volcanosedimentary environments |
| 12 | Techniques for scaled-stratigraphical sections in volcanosedimentary environments |
| 13 | Texture and fabric relations in volcanosedimentary environments |
| 14 | General comments and look over some specific papers about this topic in Turkey |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE GEOLOGICAL ENGINEERING PhD PROGRAM LEARNING OUTCOMES** | | **CONTRIBUTION LEVEL** | | |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**  High | **2**  Mid | **1**  Low |
| **LO 1** | Ability to understand and apply the most advanced levels of mathematics, science and engineering knowledge in chemical engineering and other related areas |  |  |  |
| **LO 2** | Ability to design, plan, supervise, conduct, conclude and apply the original research and investigation processes for innovative scientific and technological studies, by obtaining the up-to-date knowledge, in chemical engineering and other related areas |  |  |  |
| **LO 3** | Ability to design, plan, supervise, conduct, conclude and apply the innovative multi-disciplinary studies |  |  |  |
| **LO 4** | Ability to submit and publish the outcomes of academic studies in all kinds of respectable academic media |  |  |  |
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| **Prepared by :** | Assoc. Prof. Özgür KARAOĞLU | **Date:** | 07.10.2020 |

**Signature**: