



COURSE CURRICULUM

Course Title: Earth and Environment

Course Code:

Credit Units: 4

Course Level : PG

| L | T | P/ S | SW/F W | TOTAL CREDIT UNITS |
|---|---|---------|-----------|--------------------------|
| 3 | 1 | - | - | 4 |

Course Objectives: The course is designed to acquaint students with a basic survey of geology and the physical environment. Subjects covered include: formation of the solar system and the Earth, plate tectonics, formation and classification of minerals and rocks, geologic time, external and internal Earth processes, such as earthquakes, volcanoes.

Pre-requisites: B.Sc. in any discipline

Student Learning Outcomes: After completing this course, students should be able to apply their knowledge of the Earth Sciences to 1) solve problem associated with environmental component through scientific principles; 2) Apply scientific knowledge to understand natural process occurring over the earth surface; 3) evaluate scientific statements; and 4) able to understand future changes in environmental variables through past historic experiences.

Course Contents/Syllabus:

| | Weightage (%) |
|----------|---------------|
| Module I | 15 |

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| <p>Introduction:</p> <p>Concept of Minerals and Rocks; Rock types – igneous, metamorphic and sedimentary; Origin and evolution of the earth; Geological time scale; Primary differentiation and formation of core, mantle, crust, atmosphere and hydrosphere and elemental abundance in each constituent.</p> | |
| <p>Module II</p> | <p>25</p> |
| <p>Earth's Surface Processes:</p> <p>Soil -formation, composition, and classification; Soil profile, Mineral deposits – formation and classification; Environmental problems associated with extraction of mineral deposits; Transportation and deposition of earth's materials by running water, wind and glaciers. Glaciers: Physical and chemical aspects, Mass balance, Recession of Himalayan glaciers, Glaciers as index of climate change.</p> | |
| <p>Module III</p> | <p>15</p> |
| <p>Earth's Geodynamic Processes: Concept of stress and strain; Mechanics and classification of folds and faults; Recognition and genesis of minor structural elements - foliation, lineation, drag folds, cleavage and joints; Earthquakes, Volcanoes and Tsunamis - Environmental changes Concept of plate tectonics, nature and types of plate margins and Sea floor spreading, continental drift and mountain building.</p> | |
| <p>Module IV</p> | <p>30</p> |
| <p>Fundamentals of Environmental Geochemistry: Concept of major, minor and trace elements. Elements mobility and geo-chemical cycles. Geo-indicators. Resources and reserves, radioactivity, decay of parent and growth of daughter nuclides and methods of radiometric dating such as Relative dating - cultural affiliation, pollen analysis, varve analysis, rate of accumulation; Absolute dating - dendrochronology, recimization, oxidized carbon ratio, archeomagnetism; Potassium-Argon dating.; stable Isotopes in Biogeochemistry and their application to various environmental problems</p> | |

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| Module V | 15 |
| Global Environmental Changes: Time scales of global changes in the ecosystem and climate; Major icehouse and greenhouse periods; Impact of oceanic and atmospheric circulation on climate and rain fall; Methodologies for estimation of present and past atmospheric carbon-dioxides; CO ₂ increase and global warming in the present and past atmospheres | |

Pedagogy for Course Delivery: Course will be delivered through both power point presentation and black board teaching. Students will be provided with reference materials in form of handouts or PPTs. Regular internal assessment will be done through class seminar and class test for evaluating the continuous progress of students.

Lab/ Practicals details, if applicable:NA

Assessment/ Examination Scheme:

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|-----------------------|---------------------------------|-----------------------------|
| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
| 30 | - | 70 |

Theory Assessment (L&T):

| Continuous Assessment/Internal Assessment | | | | | End Term Examination |
|--|-----------|-------------|-----------|--------------|-----------------------------|
| Components (Drop down) | CT | Att. | HA | S/V/Q | |
| Weightage (%) | 10 | 5 | 5 | 10 | 70 |

Text & References:

- Valdiya, K.S. (1987): Environmental Geology – Indian Context, Tata McGraw Hill.
- Keller, E.A. (1978): Environmental Geology, Bell and Howell, USA.
- Subramaniam, V. (2001): Textbook in Environmental Science, Narosa International.
- Mason, B. and Moore, C.B. (1991): Introduction to Geochemistry, Wiley Eastern
- Hoefs, J. (1980): Stable Isotope Geochemistry, Springer-Verlag.
- Braddy, N.C. (2002): Nature and Properties of Soils.
- Gass I.G. (1982): Understanding the Earth. Artemis Press (Pvt) Ltd. U.K
- Ramsay, J.G. (1967): Folding and fracturing of rocks, McGraw Hill.
- Holmes, Arthur (1992): Principles of Physical Geology, Vol. 1, Chapman and Hall, London.