



MANGALORE UNIVERSITY
DEPARTMENT OF MARINE GEOLOGY

MGH 401: MINEROLOGY AND GEOCHEMISTRY

Course Outcome:

CO1: Chemical, physical, electrical, magnetic and thermal properties of minerals are understood.

CO2: Helps to identifying mineral resources for sustainable development.

CO3: Important in understanding cycling of elements and minerals in different compartments of the earth and helps to understand the origin of elements and their abundance in the universe.

CO4: Can describe the chemical and geochemical classification of elements and able to explain the composition of planets and earth's interior.

Mineralogy

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| Unit 1 | Introduction to crystallography: Crystal systems and Elements of symmetry (32 classes). Principles of X-ray diffraction and its applications. | 4 hrs |
| Unit 2 | Introduction and Principles of Mineralogy: Definition and importance of minerals for sustainable development. Properties of minerals: chemical, physical, electrical, magnetic and thermal. | 4 hrs |
| Unit 3 | Principles of optical mineralogy: Introduction to optical mineralogy, polarized light and crossed nicols. Behaviour of isotropic and anisotropic minerals, refractive index, double refraction, birefringence, sign of elongation, interference figures, 2V, dispersion in minerals. Classification of minerals based on optical properties. Ore and ore forming minerals. | 8 hrs |
| Unit 4 | Descriptive Mineralogy: Silicates-Structural classifications. Description of major rock forming minerals of the following groups; Olivine, Pyroxene, Amphibole, Garnet, Mica, Feldspar, Quartz, Aluminosilicate, Zeolites, Clay minerals. | 10 hrs |
| Geochemistry | | |

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| Unit 5 | Introduction to geochemistry and cosmochemistry: Origin of elements and their abundance in the universe. Structure and atomic properties of elements, Periodic Table. Chemical and geochemical classification of elements. Meteorites and their applications. Composition of planets and earth's interior. | 6 hrs |
| Unit 6 | Distribution of elements in igneous, sedimentary and metamorphic processes with an importance of magmatic and weathering and sedimentary processes. Factors regulating the composition of aerosols, soil and sediments. | 6 hrs |
| Unit 7 | Biogeochemistry: Introduction and the current relevance of biogeochemistry. Principles of geochemical cycle including human activity in altering the earth system. Bio-geochemical cycles of carbon, nitrogen and phosphorous. | 6 hrs |
| Unit 8 | Isotope geochemistry and principles of geochronology. Radioactive, stable isotopes and fission products; and their classifications and applications in different fields of the earth science. Stable isotopes, their fractionation and their applications in different fields of the earth science with special reference to paleoclimate. | 8 hrs |

List of References:

1. Rock Forming Minerals – Deer, Howie and Zussman: Longman Publishers (1983).
2. Text Book of Mineralogy – J. D. Dana, E. S. Asia Publ House (1985).
3. Elements of X-ray Crystallography – Azaraoff
4. Elements of Mineralogy – Rutley – CBS Publications
5. Elements of Optical Mineralogy – Winchell, Wiley eastern Limited (1937).
6. Mineralogy – Berry I. G. and Masson, B. Freeman and Co. (1959).
7. Introduction to Geochemistry – Krauskopf, E. B. McGraw Hill (1979).
8. Principles of Geochemistry – Brain Massan, Wiley eastern limited (1958).
9. Inorganic Geochemistry – Henderson P (1982) – Oxford – Pergamon.
10. Geochemistry – Goldchmidt, B. M. (1958).
11. Geochemistry – Hammer Fmiza (2008).