AG-204: IGNEOUS & METAMORPHIC PETROLOGY

(03 Credit hrs)

Prerequisite: AG-103

Learning Outcomes

This course is designed to acquire the knowledge about the origin of magma and the role of magmatic and metamorphic process in the formation of igneous rocks. This will help the students in understanding the classification of various igneous rocks and metamorphic rocks and their genesis in different tectonic settings.

Course Contents

- Composition, origin, differentiation and evolution of magma. Mineralogical and chemical characteristics, Textures and Classification of Rocks. Origin, emplacement, and modification of igneous rocks. Oceanic and continental rocks and their characterization, Petrography and occurrence of the following series: Tholeiitic and alkali-olivine basalt. Basalt – andesite series. Study of granites, granodiorite, syenite, carbonatite mafic and ultramafic rocks. Lamprophyres. Facies analysis of volcanic rocks. Tectonomagmatic environments, Magmatic differentiation --- Granites. Characteristics of ophiolites. Modes of common igneous rocks.
- Introduction to phase diagrams. Metamorphic rocks; Metamorphism and grades of metamorphism, Metamorphic Facies Regional and Thermal Metamorphism. Metamorphic diffusion and differentiation. Study of thermal and regional metamorphism of argillaceous, calcareous and arenaceous rocks. ACF and AKF diagrams. Metamorphism in relation to plate tectonics. Development of textures and structures.

Lab.

Megascopic and microscopic identification and description of ubiquitous igneous and metamorphic rocks.

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Books Recommended

1. Igneous and metamorphic petrology by Best, M.G., 2002, Black Well.
2. Petrology of Igneous and Metamorophic rocks, By Hyndmann, D.W., 1995, McGraw Hill.
3. Igneous Petrogenesis by Wilson, M. 1989, Unwin Hyman.
4. Petrology: Igneous, sedimentary & metamorphic by Blat, H. Tracy, R. & Owens, D., 2005, W.H. Freeman & Co.
5. Introduction to Igneous and metamorphic Petrology, Winter, J.K., 2001, Prentice Hall.
6. Igneous Rocks: A Classification and Glossary : Recommendations of the IUGS sub commission, Maitre, R.W., Le Bas, M.J., Streckeisen, A., Zanettin, B & Bonin, B. (eds), 2005.
7. Igneous, Sedimentary, and Metamorphic Petrology by Blatt, H., Tracy, R., & Owens, B., 2005, W.H. Freeman & Co.
8. Metamorphism and Plate Tectonic Regimes by Ernst, W.G., 1975, Hutchison & Ross, Inc.
9. Metamorphic Petrology by Turner, F.J. 1981 , McGraw Hill.