Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NGLD510	Radiogenic and Stable Isotope Geology	3	0	0	3

Course Objective
The students will learn about the various isotopic systematics that are applicable to geological studies.
Learning Outcomes
Upon completion of the course, students will be able to: • Understand the importance of isotope geology as a fundamental branch of geology • Learn about different dating methods and principles of geochronology • Learn about the time bound evolution of the Earth from the perspective of isotope geochemistry

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Nucleosynthesis, Radioactivity and radioactive decay, Growth and decay mechanisms (α β γ decay); Decay units and dosage. Neutron activation.	5	Learn the fundamentals of nucleosynthesis and radioactive decay.
2.	Mass spectrometry. Geochronology: Dating methods: K-Ar and Ar-Ar methods, Rb-Sr, Sm-Nd and Lu-Hf methods, Re-Os method.	5	Learn about the fundamentals of mass spectrometry and different geochronological methods.
3.	U-Pb and Pb-Pb methods, Fission track; U-Series Disequilibrium.	5	Learn about U, Th and Pb isotopic systematics
4.	Application of Sr, Nd, Pb and Hf isotopes in petrogenetic studies.	5	Learn about applications of isotopes in petrogenetic studies.
5.	Cosmogenic Radionuclides and their applications in geological studies.	5	Learn about cosmogenic isotopes and their applications.
6.	Stable isotopes: Fractionation mechanisms, Oxygen and hydrogen in hydrosphere and atmosphere. Oxygen/hydrogen isotopes in igneous, metamorphic & sedimentary rocks.	5	Learn about stable isotopes and their applications in geosciences.
7.	Carbon and its stable isotopes in biosphere, fossil fuels, igneous and metamorphic rocks.	4	Learn about applications of stable isotopes in understanding geological processes.
8.	Sulphur isotopes, Fractionation mechanisms, Nontraditional stable isotope geochemistry.	4	Learn about sulphur and unconventional isotopes.
9.	Applications of stable isotopes in climate studies, ore genesis and petrogenesis. Non-traditional stable isotopes and their applications in geological studies.	4	Learn about applications of stable and unconventional isotopes in geosciences.
	Total Classes	42	

Text Books:

1.Faure, G. (1977). Principles of Isotope Geology. Wiley, 464 pp.

Reference Books:

1. Dickin, A.P. (2005). Radiogenic Isotope Geology. Cambridge University Press.
2. Allègre, C.J. (2008). Isotope Geology. Cambridge University Press.
3. Hoefs, J. (2015). Stable Isotope Geochemistry. Springer.

TextBooks:

1. Means,W.D.(1976)StressandStrain.Springer-Verlag.
2. Ramsay,J.G.(1967)FoldingandFracturingofRocks.McGraw-Hill.

ReferenceBooks/papers:

1. Passchier,C.W.,andTrouw,R.A.J.(1996).Microtectonics,Springer.
2. Ramsay,J.G.&Huber,M.I.(1983).The Techniques of Modern Structural Geology.Vol.1.Academic Press.
3. Twiss,R.J.&Moores, E.M.(1992) Structural Geology.W.H.Freeman & Company.
4. VanderPluijm,B.A.&Marshak,S.(2004).EarthStructure:AnIntroductiontoStructuralGeolgyand Tectonics(2nd Edition). WW Norton &Company.