## NPTEL SYLLABUS

NATIONAL PROGRAMME ON TECHNOLOGY ENCHANCED LEARNING



Fluid Inclusions in Minerals: Principles, Methodology, Practice and Applications Civil Engineering

**Instructor Name:** M. K. Panigrahi **Institute:** IIT Kharagpur **Department:** Others

**Course Intro:** : This course will be useful to Masters level students in Earth Sciences as it is an important tool of Research and will also be extremely useful for Research Scholars who want to use Fluid Inclusion techniques:  $\hat{a} \in \phi$  Basic concepts of what fluid inclusions are and their mechanism of entrapment in minerals  $\hat{a} \in \phi$  types of fluid inclusions, fluid inclusion petrography  $\hat{a} \in \phi$  Phase relations in various fluid mixtures (H2O + salt; H2O + gases) air thermodynamic analysis in relation to entrapment of different types inclusions in diverse geological environment  $\hat{a} \in \phi$  Basic principles of fluid inclusion microthermometry, retrieval of temperature-pressure data from fluid inclusion microthermometric data on diverse inclusion studies in the following environments: ore formation, metamorphism and progressive deformation of rocks.  $\hat{a} \in \phi$  Microanalytical techniques such as IR and Raman Spectrometry, LA ICP MS and other microbeam techniques

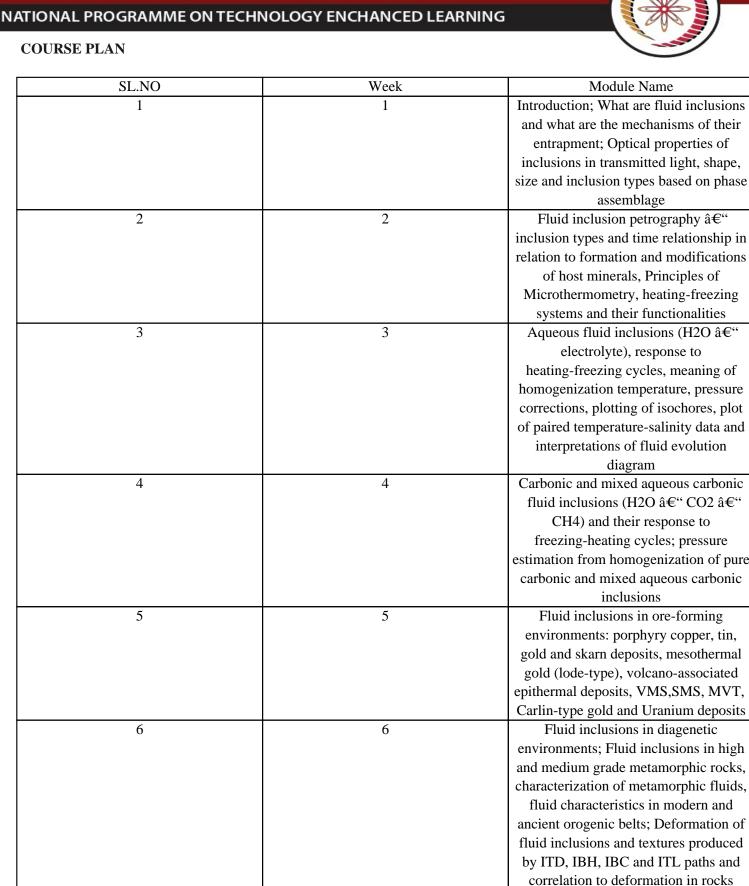
**Pre Requisites:** : B. Sc./ M. Sc. in Geology **Core/Elective:** : Core **UG/PG:** : PG **Industry Support** : Exploration Companies

**Reference** : 1.Practical Guide to Fluid Inclusion Studies by Shephered, Rankin and Elderton, (1985), Blackie 2.Roedder E (1984) Fluid Inclusions. Reviews in Mineralogy, Mineralogical Society of America, Vol. 12 3.Materials will be mostly from Research Papers and Special Publications

**About Instructor:** I am well known in the Indian earth science circle as an expert in Fluid Inclusion Research and have contributed significantly in this field. I have developed Fluid Inclusion Laboratory at IIT Kharagpur and have been working on different types of apparatus for nearly three decades. My work on base and precious metal deposits in India involve a significant component of fluid inclusion work. I am one of the founder members of the biennial meeting of Asian Current Research on Fluid Inclusions (ACROFI) that started in 2006 and have been in the Scientific Committee of all the meetings so far. I have been a part of a DST sponsored short course on this subject and have been imparting training to Scientists in the Geological Survey of India and Atomic Minerals Directorate of Exploration and Research in India.

## PTEL SYLLABUS





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7	7	Analysis of fluid inclusions –
		nondestructive and destructive methods
		: crush leach method of bulk analysis
		and laser ablation masspectrometric
		methods for destructive analysis; Laser
		Raman, FTIR and other microbeam
		techniques of analysis of individual
		inclusions
8	8	Computer modeling for Fluid Inclusion
		data analysis and interpretations