

Semester	AUG 2022
Open to semester	5,7,21
Course code	EC3164/EC6174
Course title	Earth and Planetary Materials
Credits	4 /4
Course Coordinator & participating faculty (if any)	Shreyas Managave
Nature of Course	Lectures and Lab
Pre-requisites	None
Objectives (goals, type of students for whom useful, outcome etc)	<p>This course intends to introduce the students to various earth and planetary materials. Emphasis is given to the physical and chemical characterization of minerals and rocks.</p> <p>After attending the course, the students would appreciate the inter-relations between chemistry, structure, and physical properties of minerals. It will also enable the students to identify various minerals and rocks.</p> <p>This is a mandatory course for getting a major in ECS</p>
Course contents (details of topics /sections with no. of lectures for each)	<p>Introduction. Different types of earth and planetary materials (2 lectures).</p> <p>Internal Structure of Minerals and Crystallography (13 lectures): Structure of minerals: ionic radii, coordination, Pauling's rules. Internal order in minerals: two and three-dimensional lattices, motif, symmetry of motif and lattices, point group, and space groups. Crystal classes and their symmetry. Use of stereographic projections to represent symmetry elements and point groups.</p> <p>Physical properties of minerals and their relation with internal structure (2 lectures).</p> <p>Analytical methods in mineral sciences (8 lectures): Optical microscopy: petrological microscopes; optical properties of minerals.</p>

	<p>XRD: powder method to identify minerals and analyze simple structures.</p> <p>XRF, ICPAES and EPMA analysis to determine the chemical composition of minerals.</p> <p>Chemistry and systematic description of selected mineral groups: carbonates, silicates, sulfides (6 lectures).</p> <p>Different ways of formations of minerals (3 lectures): crystallization, precipitation, solid-solid reactions and weathering.</p> <p>Rocks types and their classifications (10 lectures).</p> <p>Meteorites and their compositional variations (3 lectures).</p>
<p>Evaluation /assessment</p>	<p>End-Sem Examination-40%</p> <p>Mid-Sem Examination-30%</p> <p>Others-Quiz+Journal=30%</p>
<p>Suggested readings (with full list of authors, publisher, year, edn etc.)</p>	<ol style="list-style-type: none"> 1. Earth Materials: Introduction to Mineralogy and Petrology by C. Klein and A. R. Philpotts, Cambridge University Press, 2nd Edition, 2012. 2. An Introduction to Rock Forming Minerals by W. A. Deer, R. A. Howei, and J. Zussman, Mineralogical Society of Great Britain and Ireland, 3rd Edition, 2013. 3. An introduction to Igneous and Metamorphic Petrology by J. D. Winter, Prentice Hall, 2nd Edition, 2009. 4. Manual of Mineral Science by C. Klein and B. Dutrow, John Wiley and Sons, 23rd Edition, 2008. 5. Atlas of rock forming minerals in thin section by W. S. McKenzie and Guilford C., Routledge, 2014.