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| Semester | AUG 2022 |
| Open to semester | 7,21 |
| Course code | **EC4164/EC6344** |
| Course title | **Igneous and Metamorphic Petrology** |
| Credits | 4 /4 |
| Course Coordinator & participating faculty (if any) | Shreyas Managave,Raymond Duraiswamy (SPPU Pune) |
| Nature of Course | Lectures and Tutorials |
| Pre-requisites | Earth and Planetary Materials, Geo and Cosmochemistry |
| Objectives (goals, type of students for whom useful, outcome etc) | This course aims at training the students to use chemical and mineralogical data of rocks for understanding the petrogenesis of igneous and metamorphic rocks.<br>This course deals with practical and theoretical aspects of the formation of igneous and metamorphic rocks. Students will be able to explain why certain types of magmas are associated with different crust-forming processes. It will further help students to appreciate textural and mineralogical changes of a rock when exposed to different pressure-temperature conditions. |
| Course contents (details of topics /sections with no. of lectures for each) | Significance of the chemical variations of rock-forming minerals: olivine, spinel, pyroxene, amphibole, garnet and feldspars.<br>Solid-melt and solid-solid partition coefficients of important elements and their applications. Modelling of trace element distribution among coexisting phases to understand the origin and evolution of igneous rocks.<br>Thermodynamics and kinetics of magma generation in different tectonic settings.<br>Emplacement and crystallization of magmas. Extrusive basaltic volcanism on earth and other planetary bodies.<br>Phase rule, mineral assemblages and metamorphic reactions. Phase transformations during different paths of pressure, temperature and time changes (P-T-t paths) and their tectonic relevance. |
| Evaluation /assessment | End-Sem Examination-40%<br>Mid-Sem Examination-30%<br>Others-30% |
| Suggested readings (with full | 1. An introduction to Igneous and Metamorphic Petrology, |

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| list of authors, publisher, year, edn etc.) | 2nd Edition (2009), by J. D. Winter, Prentice Hall.<br>2. An Introduction to Rock Forming Minerals, 3rd Edition (2013), by W. A. Deer, R. A. Howei, and J. Zussman, Mineralogical Society of Great Britain and Ireland.<br>3. Igneous Rocks and Processes: A Practical Guide, (2010), by Robin Gill, Willey Blackwell.<br>4. Igneous and Metamorphic Petrology, 2nd Edition (2003), by M. G. Best, Blackwell Publishing.<br>5. Igneous Petrology, 2nd Edition (1996), by A. Hall, Longman.<br>6. Principles of Igneous and Metamorphic Petrology, 2nd Edition (2009), by A. Philpotts and J. Ague, Cambridge University Press.<br>7. Metamorphic Phase Equilibria and Pressure-Temperature-Time Paths, (1994), by F. S. Spear, Mineralogical Society of America.<br>8. Petrogenesis of Metamorphic Rocks, (2011), by K. Bucher and R. Grapes, Springer. |