Semester	AUG 2022
Open to semester	5,7,21
Course code	**EC3144/EC6154**
Course title	**Introduction to Geophysics**
Credits	4 /4
Course Coordinator & participating faculty (if any)	Arjun Datta
Nature of Course	Lectures and Tutorials
Pre-requisites	Classical mechanics, Electricity and Magnetism, Calculus I & II, Linear Algebra, The Solid Earth (desirable)
Objectives (goals, type of students for whom useful, outcome etc)	This is meant to be an introductory course in seismology, one of the major branches within the discipline of geophysics. In the current semester, it may also include elements of another branch of geophysics, namely geomagnetism. Required for all students who wish to major in ECS. Useful for all physics and math students interested in seeing how concepts of classical physics and applied math are used in the science of earthquakes.
Course contents (details of topics /sections with no. of lectures for each)	A) Seismology 1: basic seismic wave theory i. Wave propagation concept (string example); stress-strain relationship for an elastic solid; equation of motion & seismic wave equation in isotropic media ii. P and S waves, plane wave solution in isotropic media, plane waves in a layered medium, Snell's law, reflection and transmission of plane waves iii. Surface Waves – Rayleigh waves in a homogeneous halfspace, Love waves in a layer over a halfspace, Dispersion, Phase and group velocity iv. Normal modes of the Earth – modes of a sphere, spherical harmonics, torsional and spheroidal modes, modes and propagating waves. B) Seismology 2: earthquakes and source theory i. Focal mechanisms, waveform modeling, radiation patterns,

	Green's function and the moment tensor, source parameters. ii. Earthquakes – recording, location, statistical behaviour. C) Seismology 3: Earth structure Seismic waves in the spherical Earth, ray paths and travel times, travel time curve inversion, introduction to tomography. D) The Earth's magnetic field (tentative) Potential field theory, Earth's internal and external fields, power spectrum of the field, introduction to the geodynamo (source of the internal field), magnetization and rock magnetism.
Evaluation /assessment	End-Sem Examination-40% Mid-Sem Examination-30% Others-30 % (quizzes and assignments)%
Suggested readings (with full list of authors, publisher, year, edn etc.)	1. Shearer, P. M. (2009). Introduction to Seismology. Cambridge University Press. 2. Stein, S., & Wysession, M. (2009). An introduction to Seismology, Earthquakes, and Earth Structure. John Wiley & Sons. 3. Lowrie, W. and Fichtner, A. (2020). Fundamentals of Geophysics (3rd ed.). Cambridge University Press.