

Semester	AUG 2022
Open to semester	7,21
Course code	EC4133/EC6184
Course title	Exploration Seismology
Credits	4 /4
Course Coordinator & participating faculty (if any)	Rahul Dehiya
Nature of Course	Lectures
Pre-requisites	Introduction to Geophysics Some prior background in digital signal analysis will be useful but not mandatory.
Objectives (goals, type of students for whom useful, outcome etc)	<p>Objectives:</p> <ul style="list-style-type: none"> • Introduction to seismic methods used in near surface exploration with special emphasis on data acquisition and processing. <p>Outcomes:</p> <p>At the end of this course, a student would:</p> <ul style="list-style-type: none"> • Learn basics of seismic methods used in near surface imaging. • Learn different data acquisition techniques for both onshore and offshore environments. • Learn basic seismic data processing workflow.
Course contents (details of topics /sections with no. of lectures for each)	<ol style="list-style-type: none"> 1. Introduction to theory of seismic waves, seismic velocity of minerals and rocks. Application areas (real life problems in industry, water, engineering) 2. Reflection and refraction of seismic waves in flat and dipping layer earth, use of intercept-slowness, analysis of travel time curve, primary and multiple reflection. 3. Onshore and offshore data acquisition, Seismic data acquisition system, seismic sources and their characteristics. 4. 2-D and 3-D survey design, multichannel data, signal enhancement (CMP, CDP), advantage of 3-D acquisition 5. Data processing workflow- Pre-processing techniques such as reformatting, editing, muting and geometrical spreading correction; Noise filtering; velocity analysis and normal move out correction; multiple reflection elimination techniques such

	<p>as deconvolution, data stacking and Radon transform; migration of post stack and pre-stack data</p> <p>6. Application of seismic data to hydrocarbon exploration.</p> <p>7. Brief discussion on borehole seismology (Vertical Seismic Profiling).</p>
Evaluation /assessment	<p>End-Sem Examination-40%</p> <p>Mid-Sem Examination-30%</p> <p>Others-30%</p>
Suggested readings (with full list of authors, publisher, year, edn etc.)	<ol style="list-style-type: none"> 1. C.L. Liner, Elements of 3D Seismology, Pennwell Corporation, U.S. (2004) 2. Yilmaz, O., "Seismic Data Analysis Processing, Inversion and Interpretation of Seismic Data", Society of Exploration Geophysicists (2001) 3. Sheriff, R.E. and Geldart, L.P., "Exploration Seismology", Cambridge Univ. Press. (1995) 4. Telford, W.M., Geldart, L.P. and Sheriff, R.E., "Applied Geophysics", Cambridge Univ. Press. (1990) 5. Dobrin, M.B. and Savit, C.H., "Introduction to Geophysical Prospecting", McGraw Hill. (1988) 6. Robinson, E.A., Durrani, T.S. and Peardon, L.G., "Geophysical Signal Processing", Prentice-Hall International (1986) (2004).