Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NGPD510	**Seismological Data Analysis**	3	0	0	3

Course Objective

- This course offers hands-on experience with a variety of seismological analysis techniques using Linux/Bash Shell Scripting/Fortran/MatLab/Python etc.
- One expected outcome is an improved understanding of these techniques, the theory that support them, and how they are applied in practice.
- Another outcome will be the acquisition of skills in handling digital data on a computer: acquiring, editing, manipulating, and filtering, etc.
- The goal is to give each of you a working knowledge of techniques and programs that are commonly used in seismology. It should prove helpful both forthose of you who will carry out research using these techniques and for those of you who use the productsof these analyses (e.g., earthquake locations, receiver functions, tomographic models).
- Also, this course would equip yourself with various computational tools in MatLab, Linux, Bash Scripting, Python etc.

Learning Outcomes

- This course will provide students some experience on various tools in seismology using linux.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Introduction to Unix/Linux, Bash Shell Scripting, Introduction to MatLab	**04**	Introduction Linux/unix, shell scripting and MatLab
2.	Seismic data formats (e.g., SEED, SEGY, etc.), Processing digital seismogram	**04**	Understanding types of seismic data formats
3.	Removal of instrument response	**04**	Removing the effect of instrument from seismogram
4.	Spectral analysis, Filtering seismogram, Seismograph Transfer Functions (RESP files, dataless SEED),	**04**	Working with types of filtering, files etc
5.	Accessing data from the IRIS Data Management Center, Intro to Seismic Analysis Code (SAC)	**05**	Data request formats and associated tools
6.	Data quality assessment/Station noise characterization (PQLX), Earthquake locations, Focal mechanism determination	**05**	Working with PQLX
7.	Estimating surface wave dispersion from ambient noise, Phase and group velocity dispersion from earthquake data.	**04**	Extracting surface wave dispersion from noise and earthquake events
8.	Seismic tomography, Receiver function computation, H-κ stacking, CCP stacking	**04**	Receiver functions and finding subsurface properties
9.	Velocity analysis, Processing and measuring SsPmP arrivals, Computer programs in Seismology, Ray Tracing using TauP	**06**	Ray tracing, Bob Herrmann codes and finding arrival times of phases using TauP
10.	Revision of the entire course	**01**	Revision
Total		42	

Text books

1. Herrmann, R. B., 2013. Computer programs in seismology: An evolving tool for instruction and research, Seism. Res. Lettr. 84, 1081-1088, doi:10.1785/0220110096.
2. Agustin, U., 2000. Principles of Seismology, Cambridge: Cambridge University

Reference books

1. Shearer, P., 1999. Introduction to Seismology, Cambridge: Cambridge University
2. Lowrie, W., 2007. Fundamental of Geophysics, Cambridge: Cambridge University Press.
3. Gubins D., 1990. Seismology and Plate Tectonics, Cambridge University Press, 348pp.