Research Specific Elective (RSE)

Name of Programme: M. Sc. Applied Geology
Course Code: GEO-600
Title of the Course: Microtectonics
No of Credits: 03
Effective from AY: 2023-24

Prerequisites for the course:	Students should have undergone course in structural geology at MSc part I.	
Objective:	To impart knowledge of deformed rock fabrics and textures on microscales to reconstruct tectonic events.	
Content:	**Module 1** Introduction to microtectonics: Introduction to flow and deformation; progressive and finite deformation, rheology; deformation mechanisms: intracrystalline deformation, recovery, recrystallisation, grain-boundary-area reduction (GBAR), and static recrystallisation; deformation of rock-forming minerals-quartz, calcite and dolomite, feldspars, micas, olivine, pyroxenes, garnet, amphiboles. Foliation, lineation and lattice preferred orientation (LPO). **Module 2** Shear zones, microscopic shear sense indicators in mylonites, shear sense indicators in brittle regime, dilatational sites- veins, strain shadows, fringes and boundins. Primary structures in rocks. **Module 3** Nucleation and growth of porphyroblasts, porphyroblast-matrix relations, problematic porphyroblast microstructures, reaction rims, natural microgauges, special techniques and instruments used in microstructural studies. Qualitative and quantitative interpretation of microstructures and fabric elements – to deduce the tectono metamorphic history of a rock.	15 hours 15 hours 15 hours
Pedagogy	Lectures/ tutorials/ assignments/ self-study	
References/ Readings	1. Philpotts, A. R., and Ague, J. J. (2022). *Principles of igneous and metamorphic petrology*. Cambridge University Press. 2. Kornprobst, J. (2006). *Metamorphic rocks and their geodynamic significance: a petrological handbook (Vol. 12).* Springer Science & Business Media. 3. Passchier, C. W., and Trouw, R. A. (2005). *Microtectonics*. Springer Science & Business Media. 4. Trouw, R. A., Passchier, C. W., and Wiersma, D. J. (2009). *Atlas of Mylonites-*	

	and related microstructures. Springer Science & Business Media. 5. Vernon, R. H., Vernon, R. H., and Clarke, G. L. (2008). *Principles of metamorphic petrology*. Cambridge University Press. 6. Vernon, R. H. (2018). *A practical guide to rock microstructure*. Cambridge university press.
Course outcomes	1. The student will be able to recognize microstructures and understand the process of formation of each. 2. The student will be able to interpret the kinematic and tectonometamorphic significance of each microstructure. 3. The student will be aware of quantitative measurements of temperature/pressure/stress undergone by rocks based on microstructures. 4. The student can apply the knowledge to understand the tectonic evolution of their own samples.