Name of Programme: M. Sc. Applied Geology
Course Code: GEO-504
Title of the Course: Igneous Petrology
No of Credits: 03
Effective from AY: 2022-23

Prerequisites for the course:	Degree of Bachelor of Science in Geology from any UGC recognized University or an equivalent examination.	
Objective:	The main objective of this course is to get students acquainted with a wide range of igneous rocks and their corresponding geological settings.	
Content:	**Module 1:** Introduction to Magmas and Magmatic Processes; Process of formation and description of Textures and Structures of volcanic and plutonic rocks; Classification of igneous rocks: modal, chemical, quasi-chemical-schemes: their merits and demerits. Working principles of XRF, EPMA. **Module 2:** Composition of the mantle; Enriched- and Depleted-mantle and their characteristics; Magma generation: Heat source and the factors responsible to bring about melting, Fractional melting, Batch melting and Zone melting; Magmatic Evolution; Magmatic differentiation: crystal fractionation, gravitational differentiation, flowage differentiation, filter pressing, liquid immiscibility; Magmatic assimilation, Magma Mixing and contamination. **Module 3:** Magma Associations in relation to Plate Tectonics: continental flood basalts such as the Deccan Traps, Paranas, Karoo; Mid Ocean Ridge Basalts, Ocean Island basalts, Continental as well as ocean Arc magmatism; Alpine type intrusions and Ophiolites; Alkaline rocks- Nephelinites and Ijolites, Lamprophyres and Lamproites, Carbonatites and Kimberlites; Granites and Granitic rocks, I-type, S-type, A-type and M-type granites, anatexis and Granitization; Anorthosites. Continental Layered Intrusions: Mineralogical and Petrological characteristics with special reference to the Bushveld, Skaergaard, Stillwater Complexes.	15 hours 15 hours 15 hours
Pedagogy:	Lectures/ tutorials/ assignments/ self-study	
References/ Readings	1. Barker, F. (Ed.). (2013). *Trondhjemites, dacites, and related rocks*. Elsevier 2. Best and Christainsen (2002). *Igneous Petrology Daly: Petrology of Igneous Rocks*. 3. Dawson, J. B. (2012). *Kimberlites and their xenoliths* (Vol. 15). Springer Science and Business Media. 4. Middlemost, E. A. (1986). *Magmas and magmatic rocks: an introduction to igneous petrology*. 5. Moorhouse, W. W. (1959). *The study of rocks in thin sections: by WW Moorhouse*. Harper. 6. Philpotts, A. R., and Ague, J. J. (2022). *Principles of igneous and*	

	metamorphic petrology. Cambridge University Press. 7. Rock, N. M. (2013). *Lamprophyres*. Springer Science and Business Media. 8. Wager, L. R., and Brown, G. M. (1967). *Layered igneous rocks*. WH Freeman. 9. Williams, T., and Turner, F. J. Gilbert (1954): *Petrography*. 10. Wilson, M. (Ed.). (1989). *Igneous petrogenesis*. Dordrecht: Springer Netherlands. 11. Winter, J. D. (2013). *Principles of igneous and metamorphic petrology*. Pearson education. 12. Woolley, A. R. (2019, September). *Alkaline Rocks and Carbonatites of the World, Part 4: Antarctica, Asia and Europe (excluding the former USSR), Australasia and Oceanic Islands*. Geological Society of London.	
Course outcomes	1. The students will develop skills, to identifying a wide range of igneous rocks 2. The students will understand the processes of formation of the rocks. 3. The students will learn to identify the corresponding geological settings. 4. The student can apply the knowledge to understand the magmatic evolution	