

INSTITUTE OF GEOSCIENCES, UNIVERSITY OF SÃO PAULO (IGc-USP)**Official Public IGc-USP Notice N° 01/2023**Date: January 17th, 2023

APPLICATIONS ARE NOW OPEN FOR THE SELECTION PROCESS FOR A DOCTOR PROFESSOR POSITION AT THE DEPARTMENT OF MINERALOGY AND GEOTECTONICS OF THE INSTITUTE OF GEOSCIENCES OF THE UNIVERSITY OF SÃO PAULO.

The Directorate of the Institute of Geosciences of the University of São Paulo (IGc-USP) hereby informs all interested persons that, per the decision reached at the Regular Meeting of the Congregation held on 12/16/2022, applications are open for 90 (ninety) days, beginning at 8:00 am (Brasília time, BRT) on 02/02/2023 and ending at 5:00 pm (Brasília time, BRT) on 05/02/2023, for the selection process of titles and examinations to fill one (1) position of Ph.D. Professor, in Full-Time Dedication to Teaching and Research (RDIDP in the Portuguese acronym), position N° 1005898, with a salary of R\$ 13,357.25 (thirteen thousand, three hundred and fifty-seven reais and twenty-five cents), within the subject area of Experimental Petrology at the Department of Mineralogy and Geotectonics, under the terms of article 125, § 1 of the General Regulations of USP and the following programmatic themes:

GMG5875 – EXPERIMENTAL METHODS IN PETROLOGY AND GEOCHEMISTRY:

1. Introduction and history of experimental petrology and geochemistry; 2. Fundamentals of thermodynamics (systems, variables, properties of state, laws of thermodynamics, phase rules, phase equilibrium, chemical potential, activity coefficients, fugacity, equilibrium constants and phase diagrams); 3. Starting materials for experiments: types and preparation methods; 4. Experimental methods under room pressure (1 bar) and high temperature (up to 1500 °C) in vertical tubular furnace and gas control system. Calibration of the furnace, samples insertion, temperature measurement with thermocouples and oxygen fugacity control using gas species; 5. Experimental methods under high pressure and high temperature (up to 35 kbar and 1600 °C) in end-loaded piston cylinder. Procedures for preparation of experimental capsule assembly, sample insertion, pressure control. Buffers; 6. Perform short duration experiment in furnace and piston cylinder, interpretation and quantification of experimental results.

GMG5850 – THERMODYNAMICS APPLIED TO MINERAL ASSEMBLAGES:

1. Principles of thermodynamics; 2. Systems with constant composition – one component. Polymorphs of C, Al₂SiO₅ and others; 3. Systems with constant composition – two components. Systems with Qz, Ab, Jd, Ne. 4. Systems with constant composition – three components (CaO, MgO, SiO₂) or more: ACF, AKF diagrams and others; 5. Systems of solid phases in the presence of a fluid phase. Isobaric diagrams (log K x 1/T) and (Xi x T);

6. Chemical potential and heterogeneous systems with phases of variable composition. Korchinski diagrams; 7. Geothermometry and geobarometry based on the distribution of elements (major, traces) among coexisting phases; 8. Equilibrium "mineral-solution-partial pressure of gases". Practical activities, study of specific problems.

GMG0331 – IGNEOUS PETROLOGY:

THEORETICAL CLASSES: 1. Current igneous activity on the Planet; 2. Magmatism and tectonic environment; 3. Volcanism and Plutonism; 4. Physical properties of magmas; 5. Phase diagrams; 6. Geochemistry of igneous rocks. Trace element modeling. Applications of isotopic geochemistry; 7. Magmatic evolution. Magmatic series. Fractionation, magma mixing and contamination processes; 8. Structure and composition of the Earth's crust and mantle; 9. The generation of magmas in the mantle: basalts and komatiites; 10. Alkaline rocks, carbonatites and kimberlites; 11. The generation of magmas in the continental crust: granites and rhyolites; 12. Applications of igneous petrology: geotectonics, metallogenesis, environmental geology. Metallogenesis associated with igneous processes. **PRACTICAL CLASSES:** 13. Classification of igneous rocks. IUGS nomenclature. Modal analysis; 14. Volcanic and plutonic rock textures; 15. Order of crystallization. Magmatic and post-magmatic stages. Syn-post-magmatic deformation; 16. Texture diversity of basic rocks: glass, basalt, diabase, gabbro; 17. Phase diagrams: basalt tetrahedron; tholeiitic, alkaline and calc-alkaline series; 18. Mineralogical and chemical diversity of basalts. Geochemical modeling: fractionation of basaltic liquids; 19. Petrology of ultramafic rocks: ultramafic lavas (komatiites) and cumulative rocks; 20. Petrology of alkaline rocks: nepheline syenites, phonolites, carbonatites, ultrapotassic rocks, kimberlites; 21. Haplogranitic system and granitic tetrahedron. Hypersolvus and subsolvus granites. Texture diversity of granites. Mineralogical and chemical diversity of granites: granites I, S, A, M. Evolution of granitic magmas: geochemical modelling. **FIELD CLASSES:** Recognition and description in the field of the main types of igneous rocks and their structures. Petrogenetic aspects.

GMG0332 – METAMORPHIC PETROLOGY:

1. Definition of metamorphism and physical conditions; temperature; lithostatic, directed and fluid pressure; 2. Metamorphic structures and textures; 3. Nomenclature of metamorphic rocks; 4. Types of metamorphism; 5. Concept of index mineral, metamorphic facies, paragenesis, isograd, metamorphic zone, metamorphic grade, metamorphic facial series and field metamorphic gradient; 6. Metamorphic reactions, fluid phases, blastesis versus deformation events; 7. Metamorphism of pelitic, ultramafic, mafic, pure and impure carbonate rocks; formation of migmatites, granulites, cataclasites and mylonites; 8. Chemiography and topology of petrogenetic grids in the main chemical systems; compatibility diagrams; 9. Influence of the fluid phase (aqueous and carbonic) on metamorphism and control of paragenesis; 10. Metallogenesis associated with metamorphic processes; 11. Metamorphism, crustal evolution and plate tectonics; P-T-t trajectories. Practical activities: 12. Macro and microscopic descriptions of metamorphic rocks, with applications of theoretical concepts and use of phase and compatibility

diagrams. Fieldwork in low- to medium-grade metavolcanosedimentary sequences (Barrowian-type) and in high-grade units, including metapelites, metacarbonate, metamafic, metaultramafic and calciosilicate rocks, iron formations, gneisses, migmatites and granulites, as well as cataclastic rocks and mylonites.

1. The selection process will be governed by constitutional principles, notably that of impersonality, as well as the provisions of the Statute and the General Rules of the University of São Paulo and the Rules of the Institute of Geosciences of the University of São Paulo.

2. The selection process will be carried out according to objective criteria, in two stages, through the attribution of scores in exams, divided as follows:

1st stage (eliminary) – written exam (weight 2)

2nd stage:

I) evaluation of the Memorial with public proof of argumentation (weight 4)

II) didactic exam (weight 4)

§ 1º - The call for applicants to take the exams will be published in the Official State Gazette.

§ 2º - Candidates who present themselves after the established time will not be able to take the exams.

§ 3º - The exams mentioned above will be obligatorily carried out in Portuguese.

3. Further information, as well as the full notice, are available in the link <https://uspdigital.usp.br/gr/admissao>, or in the website of the Institute of Geosciences of the University of São Paulo: <https://igc.usp.br/institucional/concursos-publicos/>.