**INSTITUTE OF GEOSCIENCES, UNIVERSITY OF SÃO PAULO (IGc-USP)**
**Official Public IGc-USP Notice Nº 03/2025**
Date: February 25, 2025

Applications are now open for the Selection Process for a Doctor Assistant Professor Position at the Department of Sedimentary and Environmental Geology 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 February 2, 2025, applications are open for 90 (ninety) days, beginning at 8:00 am (Brasília time, BRT) on March 12, 2025 and ending at 5:00 pm (Brasília time, BRT) on June 9, 2025, 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), with a salary of R$ 15,498.97 (fifteen thousand, four hundred and ninety-eight reais and ninety-seven cents) within the subject area of **Energy and Energy Transition** under the terms of article 25, § 1 of the General Statute of USP and the following programmatic themes:

**GSA0103 – MINERAL RESOURCES AND SOCIO-ECONOMIC DEVELOPMENT:**

1) Main concepts and terms used in the mineral industry. 2) The mineral industry: a journey from the mine to the final product. 3) The economic factors that define a mineral. 4) The economic importance of mineral commodities, their distribution in the crust and their geopolitical role. 5) Production and consumption of mineral goods. 6) Strategic and critical minerals. 7) Mineral commodities and their use for the development of social well-being. 8) The mineral exploitation and the environment. 9) The importance of recycling for the mineral industry and environment. 10) The generation of value and jobs in the mineral industry: production chain and its participation in the nations' Gross Domestic Product. 11) Modern society and its relations with the expansion and diversification of mineral consumption. 12) Mineral commodities used in the generation of clean energy. 13) Practical identification of the main minerals in ore and gangue, especially in the sulfide and oxide classes. 14) Exercises on the use of minerals, from the mine to technological products.

**GSA0418 – ECONOMIC GEOLOGY:**

1. Concepts: utilitarian classification and economic, social and political significance of mineral resources. Abundance, scarcity and depletion of mineral resources: problems related to medium and long-term supply and demand for mineral resources. 2. Notions of Mineral Economics. 3. Types of minerals, applications and specifications, geoeconomic parameters related to mineral goods for the steel industry, base metals, rare and precious metals, industrial, chemical, agricultural and construction industries.

4. The mineral and mineral processing industry. Primary mineral goods and industrialized mineral goods. Recycling. International reserves and demands. 5. Brazilian mineral panorama: reserves, production, consumption, export and import of mineral raw materials and their derivatives. National mineral production and its share in the gross domestic product. Projected national and international demands. Development prospects. 6. Geological potential of the main geotectonic provinces of Brazil. Assessment of regional mineral potential: integration of geological information, mineral occurrence maps and forecast maps. Study of ores and rocks associated with the main mineral deposits.

**GSA0417 – GENESIS OF MINERAL DEPOSITS:**

1. Fundamental concepts. Mineral deposits: geological characteristics and classification. Descriptive and genetic models. 2. Mineral deposits formed by magmatic processes: fractional crystallization, segregation, immiscibility, and magma mixing. Deposits associated with mafic-ultramafic rocks (Cr, V, Ni-Cu, EGP), alkaline rocks and carbonatites (Nb-Ta, ETR, Zr, U-Th, Fe-Ti-V, F, P), kimberlites (diamond) and pegmatites. 3. Mineral deposits formed by hydrothermal processes. Hydrothermal fluids (seawater, meteoric, formational, connate, magmatic, metamorphic). Application of stable isotopes and fluid inclusions in characterizing the main hydrothermal fluid reservoirs. Mechanisms of fluid-rock interaction and hydrothermal alteration. Transport and deposition of metals. 3.1. Magmatic-hydrothermal deposits: skarns, porphyry-type deposits of base and precious metals, epithermal deposits of precious and base metals, Au deposits associated with felsic intrusive rocks (IRGS), and greisens. 3.2. Iron oxide-copper-gold deposits (IOCG): tectonic setting, hydrothermal alteration and zoning, the origin of fluids and metals, typology and end-members. 3.3. Cu-Au-(Zn)-(Pb)-(Ag) and precious metal volcano-exhalative (VHMS) deposits. Exhalative sedimentary Pb-Zn-(Ag) deposits (SEDEX) and deposits hosted in carbonate rocks (MVT and non-sulfide). 3.4. Orogenic gold deposits: metamorphic fluids in shear zones. Metamorphosed deposits. 4. Mineral deposits associated with sedimentary processes. Continental and marine detrital deposits. Chemical, biochemical and authigenic sedimentary deposits. 5. Deposits associated with weathering processes. Lateritic and residual deposits (Al, Ni, Fe, Mn, Au, P). Supergene oxidation and enrichment deposits. 6. Metallogenesis and global tectonics. Geotectonic environments and main associated mineral deposits. Metallogenetic epochs. 7. Field classes: study of the main characteristics of selected mineral deposits.

**GSA0204 – HYDROTHERMAL PROCESSES IN CARBONATIC RESERVOIRS:**

- Concepts on geofluids and hydrothermal processes; - Characterization of sources and origins of hydrothermal fluids; - Hydrothermal processes in sedimentary basins: extension, structural controls and relationships with magmatism; - Fluid/host rock interaction: physical, chemical and mineralogical modifications in carbonate rocks; -

Characterization and genesis of mineral deposits linked to hydrothermal processes in sedimentary basins; - Hydrocarbon generation, migration and quality of carbonate reservoirs; - Hydrothermal processes in carbonate reservoirs: examples and case studies; - Techniques applied to the study of Geofluids (microthermometry, RAMAN spectroscopy, stable isotopes).

**GSA0252 – SEDIMENTOLOGY: SEDIMENTARY PROCESSES - PARTICLES IN MOTION.**

1. Introduction. 1A. Basic concepts: sediment; source area, sedimentary basin and base level; sedimentation processes and products; sedimentary facies. 1B. Sedimentary particles. 1B1. Descriptive types of sedimentary particles. 1B2. Genetic types of sedimentary particles: concepts of allochthonous (clastic), autochthonous, terrigenous and allobiochemical. 1B3. Physical properties of sedimentary particles (textural properties). 2. The transport medium. 2A. Basic properties of fluids. 2B. Types of forces acting on a grain. 3. Transport and deposition by low-viscosity fluids. 3A. Individualized grain transport modalities. 3A1. Suspension. 3A2. Traction. 3B. Deposition in stationary liquid. 3C. Deposition in moving liquid. 3C1. Critical velocities. 3C2. Flow regimes. 3C3. Primary or syngenetic structures produced by traction. 3C3A. Syndepositional (constructive) tensile structures. 3C3B. Penecontemporaneous (destructive) structures. 3C4. Primary or syngenetic structures produced by oscillation (waves). 4. Transport and deposition by high-viscosity mixtures: gravitational flows. 4A. Rheologies of fluid-and-grain mixtures. 4B. Mechanisms of grain/grain interaction. 4C. Types of gravitational flows. 4D. Postdepositional and deformational diagenetic structures. Sedimentary Products - Rocks and Deposits. 1. Chemical properties of sedimentary particles. 1A. Composition of terrigenous sedimentary particles. 2. Aggregates of sedimentary particles. 2A. General classification of sedimentary rocks. 2B. Components of sedimentary rocks. 2B1. Depositional components. 2B2. Diagenetic components. 2C. Formation of sedimentary rocks. 2C1. Diagenesis. 2C2. Diagenetic stages or zones: eo, meso and telogenesis. 2C3. Diagenetic processes and products. 2C4. Models of diagenetic evolution. 2C5. Diagenetic or secondary sedimentary structures. 2D. Classifications of sedimentary rocks. 2D1. Classification of terrigenous rocks. 2D1A. Classification of arenaceous rocks. 2D1B. Classification of rudaceous rocks. 2D1C. Classification of lutaceous rocks. 2D2. Classification of biochemical rocks (emphasis on carbonate rocks). Practical field exercise 1: Coastal Quaternary: introduction to the concepts of facies and process-product links; description of bedforms and tensile structures on depositional surfaces and in trenches. Practical field exercise 2: Phanerozoic basin: introduction to facies analysis in traction and free-suspension deposits; preparation of geological sections in sedimentary successions. Practical field exercise 3: Phanerozoic basin: geomorphological compartmentalization of the State of São Paulo; facies analysis in gravitational flow deposits; analysis of facies associations as a subsidy for the interpretation of depositional systems; preparation of columnar and geological sections in sedimentary successions.

**GSA0301 – ENERGY RESOURCES:**

1. The global energy matrix. 2. The Brazilian energy matrix. 3. Fossil energy resources: 3.1. Coal; 3.2. Oil; 3.3. Natural gas. 4. Nuclear energy resources. 5. Renewable energy resources: 5.1. Geothermal energy; Hydroelectric energy; 5.2. Wind energy; 5.3. Biofuels; 5.4. Solar energy. 6. Energy resources and climate change. 7. Carbon sequestration and storage.

**GSA0463 – PETROLEUM GEOLOGY:**

Definitions of bedrock, maturation (conversion of organic matter into oil) and reservoir rock. Origin and accumulation of organic matter: generation and migration of hydrocarbons, stratigraphic and structural traps. Prospecting methods: organic geochemistry, geophysics (reflection seismic and well logging), stratigraphic analysis. Petroleum systems. Temporal and spatial evolution of different types of basins associated with the generation, migration and accumulation of hydrocarbons. Geology of reservoir exploitation. Study of oil fields with integrated application of information obtained from seismic and log interpretation; preparation of pore thickness maps with oil, gas, structural contour, isothickness, facies; preparation of stratigraphic and structural sections based on wells and seismic. Use of production data to define reservoir zoning (pressure, production history, etc.).

**GSA0101 – INTRODUCTION TO ENVIRONMENTAL EDUCATION WITH EMPHASIS ON GEOSCIENCES**:

I. Introduction. Conceptions about the environment. The different faces of the environmental issue. Rethinking the relationship between society and nature. II. History and contextualization of Environmental Education. History of The Environmental Movement And Main Conferences. Environmental Movement: historical framework and social practices. Main documents related to environmental issues. III. Modalities of Environmental Education - Principles, Foundations and Pedagogical Practices. The Plurality of Concepts In Environmental Education. Modalities of Environmental Education: formal, non-formal and informal. Mapping of currents of Environmental Education. IV. Epistemological, Political and Pedagogical Challenges of Environmental Education. Epistemology of Environmental Education. Approaches to environmental education - critical transformative approach. Main laws and documents related to environmental education. National Environmental Education Policy (Law Nº. 9,795, of April 27, 1999 and Law Nº. 14,926, of July 17, 2024). DCNEA, BNCC and ODS. V. New ways of Seeing the world - Environmental education and decoloniality. Vi. Geosciences and environmental education. The challenges of training environmental educators in the field of dialogue with Geosciences: multiple possibilities.

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, and the determinations below:

1. Candidates are required to apply online exclusively through the link https://uspdigital.usp.br/gr/admissao within the period indicated above. The candidate must fill in the requested personal data and attach the following documents:

I – detailed Memorial and proof of the published papers, the relevant activities carried out related to the selection process and other information that allows the evaluation of merits, in digital format;
II – proof that the candidate holds a Doctoral degree, granted or acknowledged by USP, or nationally acknowledged;
III – proof of discharge from military service for male candidates;
IV – voter registration card, electoral discharge certificate or detailed certificate issued by the Electoral Justice less than 30 days before the beginning of the enrollment period.
V – Official identity document.

2. The Congregation of the IGc-USP will evaluate applications in their formal characteristics and publish the final decision in an official notice.

Single Paragraph – The selection process will take place after the application is accepted, within a period of 30 (thirty) to 120 (one hundred and twenty) days from the date of publication in the Official State Gazette of the approval of applications, per Article 134, single paragraph, of the General Statute of USP.

3. 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 (eliminatory) – written exam (weight 2)
- 2nd stage:
– I) Evaluation of the Memorial with public proof of argumentation (weight 4)
- II) Didactic exam (weight 4)

§ 1 - The call for applicants to take the exams will be published in the Official State Gazette.
§ 2 - Candidates who present themselves after the established time will not be able to take the exams.
§ 3 – In evaluating the tests by the judging committee, the external purpose for creating the vacancy (granting the teaching position) for which this competition is intended, available in the annex to this notice, will be considered.

**I – First stage: WRITTEN EXAM – Eliminatory Character**

The written exam will deal with matters of general and doctrinal order and will be carried out in accordance with the provisions of art. 139, and its single paragraph of the General Regulations of USP.

Candidates who obtain a minimum score of seven from the majority of the members of the judging committee will be considered qualified for the 2nd stage;

Only candidates approved in the first stage will participate in the second stage.

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**II - Second stage: PUBLIC ARGUMENTATION EXAM AND EVALUATION OF THE MEMORIAL AND DIDACTIC EXAM**

**JUDGMENT OF THE MEMORIAL**

The judgment of the Memorial, expressed by a global grade, including judgment and evaluation, shall reflect the merits of the candidate.

During the analysis of the Memorial, the commission shall appreciate:

I - scientific, literary, philosophical, or artistic production;

II - university didactic activity;

III - activities related to the provision of services to the community;

IV - professional or other activities, when applicable;

V - diplomas and other university dignitaries.

**DIDACTIC EXAM**

The didactic exam will be public, with a minimum duration of forty and a maximum of sixty minutes, and will deal with the program of the aforementioned area of knowledge under the terms of Article 137 of the General Regulations of USP.

**JUDGMENT OF THE 2nd STAGE**

At the end of the assessment of the exams, each candidate will receive a final score from each examiner, which will be the weighted average of the grades awarded by her/him in both phases.

The exam scores may vary from zero to ten, with an approximation to the first decimal place.

The judging commission will announce the result of the selection process immediately after its conclusion in a public session.

Candidates who obtain a minimum final grade of seven from most examiners will be considered qualified.

The nomination of candidates will be made by an examiner, according to the grades given by him/her.

The candidate who obtains the highest number of nominations from the judging committee will be proposed for appointment.

The tenure of the nominated candidate will be subject to approval in a medical examination carried out by the Department of Medical Expertise of the State – DPME, according to Article 47, VI, of Law No. 10,261/68.
The selection process will be valid immediately, and only the candidate nominated for the post in the selection process will be proposed for appointment.
The candidate will be called to assume the position by an official publication in the Official Gazette of the State (Diário Oficial do Estado).

4. Further information, as well as the rules relevant to the selection process, are available to those interested in the Academic Technical Assistance of the Institute of Geosciences of the University of São Paulo, at Rua do Lago, 562 - sala 306 - Butantã, São Paulo – SP, email: atacigc@usp.br.

**ANNEX – JUSTIFICATION FOR GRANTING OF THE TEACHER POSITION**

**General Objective of the Assistant Professor Hiring**

With the emergence of climate change, the 21st Conference of the Parties (COP), in 2015, requested that nations take measures to reduce their greenhouse gas emissions to prevent the Earth's average temperature from rising above 2 °C by the end of the century. To this end, in addition to reducing the consumption of fossil fuels, significant investments in low-carbon energy generation are necessary. However, according to the International Energy Agency (IEA), the energy transition will depend on a set of critical minerals (e.g., mineral resources essential to the economy with high risks of supply interruption due to geological, socioeconomic and political factors) that allow the generation of green energy (e.g., wind, photovoltaic and hydrogen) and its distribution. For this energy transition to occur, it will also be essential to use Blue Hydrogen, produced from natural gas by the SMR or ATR processes and with capture and storage of the generated $CO_2$ (CCS). Therefore, Brazil needs to use better the natural gas reserves of the Pre- and Post-Salt systems of the Brazilian coastal sedimentary basins, which depends on innovative geological studies.

Although Brazil stands out in the global context for its clean energy matrix and the strategic role of its mineral reserves in the various regions of the country, it will still be necessary to intensify efforts in developing teaching and research lines in Energy and Energy Transition. This line is necessary for the IGc to keep up with the current international evolution of geological sciences and contribute to the training of students in the Geology and LIGEA courses focused on sustainability and the demands of society.

**Individualized Plan**

**Teaching – Goals**

In the short term, the new professor will be able to contribute to reforming the Energy Resources discipline. In the medium term, the teacher should seek to integrate the different areas of Geosciences, combining solid knowledge in traditional areas (e.g., Sedimentology, Energy Resources, Mineral Resources, Geotechnologies, and Environmental Education) and propose the creation of innovative optional courses in the area of Energy and Energy Transition. In the long term, the teacher is expected to propose including this topic in other mandatory courses, providing complementary and interdisciplinary training for students in the Geology and LIGEA courses, focusing on tackling climate change and the search for sustainability. The teacher's performance should be aligned with the goals of significant structural changes in the structure of the Geology course curriculum and the valorization of the undergraduate degree.

**Research and Innovation**

Regarding research, in the short and medium term, the teacher is expected to be included in national and international research groups, and participate in and propose research projects to funding agencies and the private sector, aligned with the Sustainable Development Goals advocated by the United Nations. Their performance must be aligned with the goal of conducting research with a positive impact on society, and the results will be evaluated based on qualified scientific production and analysis of the social, environmental, and economic impact of GSA research.

**Culture and Outreach**

In culture and outreach, the professor to be hired is expected to participate in disseminating the needs of the energy transition to a low-carbon economy and the sustainable use of natural resources by proposing university outreach activities that enable the curricularization of Outreach (AEX with activities aimed at external communities, lectures, outreach courses, workshops).

**Expected Impact of Hiring**

The proposal for the Energy and Energy Transition area at IGc-USP will promote greater involvement of Geosciences with the demands of society, from the search for critical and strategic minerals for the production of green energy to the sustainable use of natural gas, aiming at reducing carbon emissions. Additionally, the line can contribute to research on geothermal energy, natural hydrogen, and carbon storage (CCS) in various geological systems. Thus, it hopes to expand the potential for proposing solutions for the industry, support the formulation of public policies, generation of economic benefits and innovative teaching and research focused on sustainability.