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CONCURSO ESPECIAL DE ACESSO E INGRESSO PARA ESTUDANTES INTERNACIONAIS

HISTORY

Syllabus

1. General notions of the History of Pre-Classical Civilizations and Classical Antiquity in the political, economic, social and cultural aspects.
2. General notions of the History of Europe from the High Middle Ages to the Contemporary Era, in a political, economic and socio-cultural context.
3. General notions of the History of Portugal in the aspects mentioned above.

Maria Teresa Desterro
(Professora Adjunta)

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HISTORY OF CULTURE AND ARTS

Syllabus

1. General notions of the History of Art of Classical Antiquity Civilizations
2. General notions of Art History in Europe from the High Middle Ages to the Contemporary Age
3. General notions of Portuguese Art History, from the Middle Ages to the 20th century.

Maria Teresa Desterro
(Professora Adjunta)

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GEOGRAPHY

Syllabus

1. Portugal's position in Europe and in the World
2. Population as user of resources and as places organizer
3. Population: evolution and regional differences
4. Available natural resources: use, limits and potential
5. Population organized places
6. Population's movement and communication
7. Portugal's integration into the European Union: new challenges, new opportunities

Cláudia Pires da Silva
(Professora Adjunta)

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ECONOMY

Syllabus

1. Economic Activity and the Economic Science
2. Fundamental Aspects of Economic Activity
   2.1. Needs and consumption
   2.2. Production of goods and services´
   2.3. Trade and currency
   2.4. Prices and markets
   2.5. Income and income distribution
   2.6. Savings and investment
3. The Economic Activity Accounting
   3.1. Economic agents and economic circuit
   3.2. National accounting
4. 4 – The Economic Organization of Societies
   4.1. Economic relations with the Rest of the World
   4.2. State's intervention in the economy
   4.3. The Portuguese economics in the context of the European Union

Cláudia Pires da Silva
(Professora Adjunta)

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DRAWING

Syllabus

The exam will focus on:

1. Analysis capability
2. Representation capability
3. Development of creative solutions
4. Capability of applying syntheses
5. Exploiting expressive procedures in plastic language
6. Master the means of registration and exploit its potential

João Costa Rosa
(Professor Adjunto)

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DESCRIPTIVE GEOMETRY

Syllabus

Monge's method of double orthogonal projection system

1. Point projection
2. Line representation and its trace
3. Plane representation and its trace
4. Plane intersection defined by its trace

Jorge Mascarenhas
(Professor Coordenador)

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MATHEMATICS

Syllabus

1. Basic geometry concepts
   1.1. Distance between two points
   1.2. Cartesian equation of lines
2. Algebraic calculus
   2.1. The number systems and operations of arithmetic
   2.2. Arithmetic with polynomials and rational expressions
   2.3. Equations and inequalities
   2.4. Systems of linear equations
3. Functions and differential calculus
   3.1. Concepts of function, domain, range, zeros, monotony and graphic representation
   3.2. Linear and quadratic functions
   3.3. Exponential and logarithmic functions
   3.4. Average and instantaneous rates of change. The derivative
   3.5. Geometric interpretation of the derivative. Equation of the tangent line
   3.6. Applications of differentiation: monotonicity and extrema, concavity and inflection points
4. Combinatorial analysis and probabilities
   4.1. Combinatorial analysis: combinations, arrangements, permutations and Newton binomial formula
   4.2. Probabilities: Laplace's rule, laws of probability, conditional probability, independent events, total probability rule and Bayes' theorem

Ana Nata

(Professora Adjunta)

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PHYSICS AND CHEMISTRY

Syllabus

Physics

1. Mechanics of particle and systems of particles
   1.1. Kinematics and particle dynamics in motions in more than one dimension: referential; vectors position, displacement; vectors velocity and acceleration (mean and instantaneous); normal and tangential components of the acceleration and radius of curvature; motion description; law of velocity; law of motion.
   1.2. Motions under the action of a constant resulting force: initial conditions of motion and types of trajectory; parametric equations of motion and trajectory of motions subject to the action of a constant resulting force with direction different from the initial velocity, projectiles.
   1.3. Motions of bodies subject to bonding: applied forces and bonding forces, frictional forces; static and kinetic friction between solids; applications of Newton's Second Law in bonded bodies; gravity pendulum; motion of a particle in a circular path in a vertical plane.
   1.4. Oscillatory motions: Hooke's law and simple harmonic motion equation; Characteristics of a simple harmonic oscillator: period, frequency and angular frequency; elongation and amplitude; Speed and acceleration of a simple harmonic oscillator; Energy of a simple harmonic oscillator.
   1.5. Center of mass and linear momentum of a particle system: Particle systems and rigid body; Center of mass; Velocity and acceleration of the center of mass; Linear moment of a particle and a system of particles; Fundamental law of the dynamics for a system of particles; Law of conservation of linear momentum; Elastic and inelastic collisions
2. Gravitational field and electrostatic field
   2.1. Law of Universal Gravitation; Cavendish's experience and his interest; gravitational mass and inertial mass;
   2.2. Principle of the conservation of electric charge; Electrostatic Act or Coulomb Act; Permeability of the environment;
   2.3. Similarities and differences between the laws of the Coulomb force and the Newtonian force; Field strength field concept; Gravity field and electrostatic field magnitudes; Gravitational / electrostatic fields created by a stationary mass / stationary charge; Field lines - their properties; Gravitational /

electrostatic uniform field; Gravitational / electric force work; Gravitational / electrostatic fields as conservative fields; Expression of potential energy corresponding to gravitational field / mass and electric field / charge systems; Gravitational / electrical potential; Analytical expression of the function V = V (R) for a radial gravitational / electrostatic field; Equipotential surfaces; Relationship between the modulus of the electric field vector and the potential difference, in a uniform electrostatic field; Unit S.I. of electric field greatness.

Rosa Brígida Almeida de Quadros Fernandes

(Professora Adjunta)

Chemistry

1. Structure of matter
   1.1. Atomic structure and electronic configuration. Periodic table and the variation of the periodical properties of the elements.
   1.2. Chemical bonding and molecular structure. Ionic and covalent bonds. Lewis structures. Molecular geometry.
   1.3. States of matter. The gaseous state. Intermolecular forces, liquids and solids. Changes of state. The physical properties of solutions.
   1.4. Hydrocarbons unsaturated and aromatic. Functional groups.
2. Chemical reactions
   2.1. Chemical equations and stoichiometry of chemical reactions.
   2.2. Chemical equilibrium. The equilibrium constant.
   2.3. Acid-base reactions. Ionization constants of acids and bases. The pH scale.
   2.4. Redox reactions. Spontaneity of redox reactions.
   2.5. Reactions and solubility of ionic compounds.

Valentim Nunes

(Professor Adjunto)

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BIOLOGY AND GEOLOGY

Syllabus

Biology

1. The cell
   1.1. Cellular organization
   1.2. Function and pathways of cellular organelles
2. Living systems and energy
   2.1. Energy origin, production, and ATP pathways
   2.2. Energy flow through the ecosystem
3. Biological information
   3.1. Genetic information and transfer
   3.2. Hereditary
4. Diversity and the origin of species
   4.1. Fixism e Evolutionism
   4.2. Populational evolution and new species
5. Diversity of life – evolutionary perspective
   5.1. Classification and systematics
   5.2. Prokaryotes and Eukaryotes
6. Plant Biology
   6.1. Growth and development
   6.2. Transport
7. Animal Biology
   7.1. Growth and development
   7.2. Transport
8. Environmental Biology
   8.1. Ecosystems and population Ecology
   8.2. Ecosystems and human environment

Luís Filipe Neves Carreira dos Santos
(Professor Adjunto)

Geology

1. Seismology and the Internal Structure of the Earth
   Origin of Earthquakes. Seismic waves and discontinuities. Location of epicenters. Magnitude. Earthquake prediction. Location of seismic zones in different parts of the world. Minimization of seismic risks. Structure and composition of the Earth. Physical properties of the Earth's interior.

2. Dynamics of the lithosphere – Plate tectonics
   Manifestations of the Earth's internal heat. Wegener and continental drift. Seafloor spreading. Theory of Plate Tectonics. Divergent margins. Paleomagnetism and plate velocities. Topography of the ocean floor. Convergent margins. Transform faults.

3. Genesis and composition of rocks
   3.1. Minerals that make up rocks. Composition and internal structure. Physical properties.
   3.2. Igneous rocks. Origin and evolution of magma. Properties of magmas. Texture and types of deposit. Classification. Volcanism. Types of volcanism and landscapes.
   3.3. Metamorphic rocks. Factors and types of metamorphism. Textures and structures of metamorphic rocks. Classification of metamorphic rocks.
   3.4. Sedimentary rocks. Weathering. Susceptibility of rocks to weathering. Transport. Deposition. Diagenesis. Classification of sedimentary rocks. Sedimentary structures.
   3.5. Rock cycle.

4. Structure and deformation of rock masses
   Deformability of the masses. Stress/strain relationships. Main types of Folds. Failures. Joints.

5. Measurement of geological time and History of the Earth.
   Concept of time. Relative dating. Geological time scale. Radiometric dates and absolute age.

6. External geodynamics
   6.1. Hydrographic basins. Main characteristics of river systems. Basin and hydrographic network. Dynamics of river flow. Longitudinal profile and Transverse profile. Sediment transport and deposition.
   6.2. Coastal areas. Coast: cliffs and beaches. Morphology and processes. Morpho dynamics of sandy beaches. Coastal risks. Coastline stability: natural and anthropogenic factors.
   6.3. Slope areas. Factors and types of mass movements.
   6.4. Geological risk. Human occupation and territorial planning. Contribution of Geology in the prevention of geological risk.

7. Man as an agent of environmental change

Global warming. Sustainable exploitation of natural resources. Soil and water contamination.

8. Geological mapping
   Reading and interpreting geological maps.

Ana Paula Gerardo Machado

(Professora Adjunta)

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PHILOSOPHY

Syllabus

1. Concept of myth, being and rhetoric
2. Socrates' model: the irony, the maieutic, the sensitive world versus intelligible
3. Nietzsche's theory of the superman
4. Confrontation between Science, Philosophy and Religion in Galileo Galilei
5. Sartre's existentialism

Silvio Manuel Brito
(Professor Adjunto)

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PORTUGUESE

Syllabus

PART 1

- Articles (Definite and Indefinite)
- Nouns
- Adjectives and Adverbs
- Demonstrative Adjectives and Pronouns
- Object Pronouns
- Relative Pronouns
- Possessive Pronouns and Possessive Adjectives
- Negative, interrogative and Exclamative sentences
- *Todo* and *Tudo*; *Ambos* and *Cada*
- Prepositions
- *Por* and *Para*
- Suffixes
- Numerals
- Idioms

PART 2

- Regular verbs – Indicative Tenses
- Perfect (Compound Tenses)
- Progressive Tenses
- Reflexive Verbs
- Formation of the Subjunctive
- Uses of the Subjunctive
- Irregular Verbs
- Ser, Estar, Ficar
- Ter and Haver
- Radical-Changing Verbs
- Orthographic-Changing Verbs
- Commands (The Imperative)
- The Passive Voice
- The Personal Infinitive
- Verbs Followed by a Preposition
- Idiomatic Verbs

PART 3

- The Portuguese language and the cultures of the Portuguese-Speaking World.

NOTE: The language level under examination will be B2 according to the Common European Framework of Reference for Languages.

Herminia Sol

(Professora Coordenadora)

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CONCURSO ESPECIAL DE ACESSO E INGRESSO PARA ESTUDANTES INTERNACIONAIS

MATHEMATICS APPLIED TO SOCIAL SCIENCES

Syllabus

1. Algebraic calculus
   1.1. The number systems and operations of arithmetic
   1.2. Arithmetic with polynomials and rational expressions
   1.3. Equations and inequalities
   1.4. Systems of linear equations
2. Mathematical models
   2.1. Linear and nonlinear models for human population growth
   2.2. Financial Models
3. Descriptive statistics
   3.1. Characterization data
   3.2. Frequency distributions
   3.3. Measures of descriptive statistics: measures of location and measures of position; measures of dispersion; measures of skewness and measures of kurtosis
4. Combinatorial analysis and probabilities
   4.1. Combinatorial analysis: combinations, arrangements, permutations and Newton binomial formula
   4.2. Random experiments. Finding probabilities. Laplace's rule
   4.3. Discrete random variables. Probability mass function. Discrete models
   4.4. Conditional probability and tree diagrams. Independent events
   4.5. Total probability rule and Bayes' theorem

Ana Nata
(Professora Adjunta)