

Annex A

Programmes associated with the questions on the admission test to the single-cycle English language Master's Degree programme in Medicine and Surgery and in Dentistry and Dental Prosthodontics

Admission to the programme requires general knowledge, with particular regard to the literary, historical, philosophical, social and institutional fields, as well as the ability to analyse written texts of various kinds, and with logical/mathematical reasoning.

Furthermore, the knowledge and skills required are linked to the type of instruction promoted by the educational institutions that organise educational and instructional activities consistent with the Ministerial Programmes, especially in view of the State Examinations, and that also involve the scientific disciplines of Biology, Chemistry, Physics and Mathematics.

General knowledge and logical reasoning

Assessment of the ability to properly use the English language and to complete a line of reasoning logically, in a manner that is consistent with the premises, which are expressed in symbolic or verbal form using multiple choice questions, even formulated in short sentences, discarding the incorrect, arbitrary or less likely conclusions.

The questions will focus upon scientific or narrative essays by classical or contemporary authors, or texts on current events that have appeared in newspapers or general or specialised magazines; they will also focus upon cases or problems, even of an abstract nature, whose solutions require different forms of logical reasoning to be adopted.

The scope of this evaluation is completed by a series of general knowledge questions, on topics addressed during the course of one's studies.

Biology

The Chemistry of Living Things.

The biological importance of weak interactions.

The organic molecules present in organisms and their functions. The role of

enzymes.

The cell as the basis of life.

Cell theory. Cell size. The prokaryotic and eukaryotic cell, plant and animal. Viruses.

The cell membrane: structure and functions - transport through the membrane.

Cell structures and their specific functions.

Cell cycle and cell reproduction: mitosis and meiosis - chromosomes and chromosome maps.

Bioenergetics.

The energy currency of cells: ATP.

Redox reactions in living things.

Energy processes: photosynthesis, glycolysis, aerobic respiration and fermentation.

Reproduction and Inheritance.

Life cycles. Sexual and asexual reproduction.

Mendelian genetics: Mendel's laws and their applications.

Classical genetics: chromosomal theory of inheritance - inheritance patterns.

Molecular genetics: DNA structure and duplication, the genetic code, protein synthesis. The DNA of prokaryotes. The structure of the eukaryotic chromosome.

Genes and the regulation of gene expression.

Human genetics: transmission of mono- and multifactorial characteristics; autosomal hereditary diseases and diseases related to the X chromosome.

Biotechnology: recombinant DNA technology and its applications.

Inheritance and environment.

Mutations. Natural and artificial selection. Evolutionary theories. The genetic basis of evolution. Anatomy and Physiology of animals and humans.

Animal tissues.

Anatomy and physiology of systems and apparatus in humans and their interactions.

Homeostasis.

Chemistry

The constitution of matter: the aggregate states of matter; heterogeneous and homogeneous systems; compounds and elements.

Ideal gas laws

The structure of the atom: elementary particles; atomic number and mass number,

isotopes, electronic structure of the atoms of the various elements.

The periodic system of the elements: groups and periods; transition elements.

Periodic properties of the elements: atomic radius, ionization potential, electron affinity, metallic character. Relationships between electronic structure, location in the periodic system, and element properties.

Chemical bonding: ionic, covalent and metallic bonds. Binding energy. Polarity of bonds. Electronegativity. Intermolecular bonds.

Fundamentals of inorganic chemistry: nomenclature and main properties of inorganic compounds: oxides, hydroxides, acids, salts.

Chemical reactions and stoichiometry: atomic and molecular mass, Avogadro's number, the mole concept and its application, basic stoichiometric calculations, balancing simple reactions, the different types of chemical reactions.

Solutions: solvent properties of water, solubility, the main ways of expressing the concentration of solutions.

Equilibria in aqueous solutions.

Elements of chemical kinetics and catalysis.

Oxidation and reduction: oxidation number, oxidizing and reducing concept.

Balancing simple reactions.

Acids and bases: the concept of acid and base. Acidity, neutrality and basicity of aqueous solutions. pH. Hydrolysis. Buffer solutions.

Fundamentals of organic chemistry: bonds between carbon atoms, gross and structural formulas, concept of isomerism. Aliphatic, alicyclic and aromatic hydrocarbons. Functional groups: alcohols, ethers, amines, aldehydes, ketones, carboxylic acids, esters, amides. Elements of nomenclature.

Physics

Measures: direct and indirect measures, fundamental and derived quantities, physical dimensions of magnitudes, knowledge of the metric system and the CGS, Technical (or Practical) (ST) and International (SI) Unit of Measure Systems (names and relationships between fundamental and derived units), multiples and submultiples (names and values).

Kinematics: kinematic variables, various motions with particular regard to uniform rectilinear and uniformly accelerated motion; uniform circular motion; harmonic

motion (for all motions: definition and relationships between the associated kinematic variables).

Dynamics: vectors and vector operations. Forces, moments of force in relation to a point. Moment of a pair of forces. Vector addition of forces. Definitions of mass and weight. Acceleration due to gravity. Density and specific weight. Law of universal gravitation, 1st, 2nd and 3rd principle of dynamics. Work, kinetic energy, potential energy. Law of energy conservation. Impulse and momentum. Principle of conservation of momentum.

Fluid mechanics: pressure and its units of measurement (not just in the SI system). Archimedes' principle. Pascal's principle. Stevin's Law.

Thermology, thermodynamics: thermometry and calorimetry. Specific heat, heat capacity. Mechanisms of heat propagation. State changes and latent heat. Ideal gas laws First and second law of thermodynamics.

Electrostatics and electrodynamics: Coulomb's law. Electric field and potential. Dielectric constant. Capacitors. Capacitors in series and in parallel. Direct current. Ohm's law. Kirchhoff's principles. Electrical resistance and resistivity, electrical resistors in series and in parallel. Work, power, Joule effect. Generators. Electromagnetic induction and alternating currents. Effects of electric currents (thermal, chemical and magnetic).

Mathematics

Numeric sets and algebra: natural, integer, rational, real numbers. Sorting and comparison; magnitude and scientific notation. Operations and their properties. Proportions and percentages. Powers with integer exponents (rational) and their properties. Radicals and their properties. Logarithms (with base 10 and base e) and their properties. Introduction to combinatorics. Algebraic expressions, polynomials. Notable products, nth power of a binomial, prime factorization of polynomials. Algebraic fractions. Algebraic equations and inequalities of first and second order. Systems of equations.

Functions: basic notions of functions and their graphical representations (domain, codomain, sign, maxima and minima, growth and decay, etc.). Elementary functions: algebraic with whole number and fractions, exponential, logarithmic, trigonometric. Composite functions and inverse functions. Trigonometric equations and inequalities.

Geometry: polygons and their properties. Circumference and circle. Measurements of lengths, areas and volumes. Isometries, similarities and equivalents of a plane. Geometric locations. Measurement of angles in degrees and radians. Sine, cosine, tangent of an angle and their notable values. Trigonometric formulas Solving triangles. Cartesian coordinate system for a plane. Distance between two points and the midpoint of a segment. Equation of a line. Conditions of parallelism and perpendicularity. Distance of a point from a line. Equation of the circumference, the parable, the hyperbola, the ellipse, and their portrayal in the Cartesian plane. Pythagorean theorem. Euclid's theorems (first and second).

Probability and statistics: distributions of frequencies depending on the type of characteristic and main graphical representations. The concept of random experiment and event. Probability and frequency.