SYLLABUS FOR THE ENTRANCE EXAMINATION FOR UNDERGRADUATE COURSES

Academic Year 2026/2027

(translation of the IUSS Italian version):

Italian

Candidates are required to have a general understanding of the historical development of Italian literature from its origins to the present day, with particular emphasis on the major authors and literary movements of the modern and contemporary periods. Candidates may choose a shortlist of five authors on whom they will preferably be examined. A good command of textual analysis is required, which will be assessed through the reading of texts proposed by the examiner, taking into account the choices indicated by the candidate during the oral examination. The candidate must also be able to comment on at least nine cantos from Dante's *Divine Comedy* of their choice and demonstrate in-depth knowledge of at least two authors or topics covered in the Italian curriculum of the final year of upper secondary school.

Latin

A general understanding of the historical development of Latin literature from its origins to late antiquity is required, with particular emphasis on the major authors studied in upper secondary school. During the oral examination, the candidate will be required to demonstrate in-depth knowledge of a shortlist of five authors. Linguistic knowledge – covering phonetic, phonological, morphological, syntactic, semantic and lexical aspects – will be assessed through the translation and interpretation of texts set by an examiner.

Greek

Candidates are expected to have a general understanding of the historical development of Greek literature from the Homeric epics to the Imperial period, with particular emphasis on the major authors studied at high school. Candidates sitting the oral examination will be required to demonstrate in-depth knowledge of a shortlist of five authors. Linguistic knowledge – covering phonetic, phonological, morphological, syntactic, semantic and lexical aspects – will be assessed through the translation and interpretation of texts set by an examiner.

History

Candidates are expected to have knowledge of the most significant periods in Western history from the Middle Ages to the present day. During the oral examination, the candidate may specify the chronological period of their choice (medieval, modern or contemporary) from which to begin the examination, including, if desired and upon request, elements of Greek and Roman history.

Philosophy

A general understanding of the development of Western philosophy from the classical period to the contemporary era is required. Furthermore, during the oral examination, the candidate will select a shortlist of eight classical philosophical authors and topics, including, by way of example: aesthetics, metaphysics,

ethics, epistemology, ontology, and the philosophy of language and mathematics. Of these authors and topics, at least one must relate to ancient or medieval philosophy, one to modern philosophy and one to contemporary philosophy.

Mathematics

Candidates are expected to have a good understanding of and be familiar with the following topics:

- Elements of arithmetic (divisibility, prime numbers, etc.).

- Equations and systems of equations. Algebraic inequalities and systems of algebraic inequalities.

- Elements of trigonometry: definition and proof of fundamental theorems.

- Elements of synthetic and analytical geometry, including fundamental theorems. Equations of the main curves. Plane geometric transformations.

- The concept of a function and types of functions. Qualitative analysis of the following functions: powers, exponential, logarithmic, trigonometric and their inverses; solving equations and inequalities involving them.

- The concept of limits for numerical sequences and limits of functions. Study of the following notable limits

$$\lim_{n\to\infty}(1+a/n)^n,\ \ \lim_{x\to 0}\{(sinx)/x\},\ \lim_{x\to 0}\{(e^x-1)/x\},$$

$$\lim_{x\to 0}\{(\log(x+1))/x\}$$

- Continuity of functions and main theorems on continuous functions. Definitions, geometric and physical interpretation, and calculation of derivatives with proof.

During the oral examination, the candidate may choose at least one topic from the following: (a) Theorems on differentiable functions, with proof; (b) The integral and its properties. The fundamental theorem of calculus, with proof; (c) Elements of probability theory and combinatorics; (d) Elements of computer science: representation of alphanumeric information, principles of Boolean algebra, general structure of computers, basic knowledge of computer hardware and software, human–computer interaction, networking and the Internet, programming and computer languages, algorithms, and data and text processing.

Biology

An understanding of and familiarity with the following topics is required:

- Prokaryotes and eukaryotes. Structure and function of the eukaryotic cell (animal and plant).

- Biological inheritance (Mendel’s laws; chromosomes and genes; the genetic code; RNA and protein synthesis).

- The question of evolution and its mechanisms. The origin of life on Earth. An introduction to the classification of living organisms.

- Nutrition in the animal and plant kingdoms and in humans (photosynthesis, food chains, cellular respiration).

- Cell reproduction: mitosis. Formation of gametes: meiosis.

- Structure and function of certain human systems: for energy utilisation (digestive, respiratory, circulatory); for regulation, coordination and motor planning (endocrine, nervous, musculoskeletal).

Chemistry

Candidates are expected to understand the following topics and to be able to discuss them, using the periodic table of elements where appropriate:

- The meaning of chemical formulas. Weight ratios in chemical equations. The mole. The ideal gas law.

- The structure of the atom. Quantum numbers and energy levels in the hydrogen atom. Atomic orbitals. The electronic configuration of atoms. The periodic table of elements.

- Ionic bonding. Covalent bonding. Molecular geometry, isomerism and stereoisomerism. Intermolecular bonds. States of matter.

- Chemical reactions. Reaction rate. Energetic aspects of chemical reactions.

- Chemical equilibrium: general aspects. Acids and bases: strong and weak. pH and its calculation, at least in the simplest cases. Oxidation-reduction reactions. The electrochemical potential series. Galvanic cells, electrolysis.

- The main compounds (oxides, anhydrides, acids and bases) of at least the elements in the first two rows of the periodic table.

- The structure and main reactions of hydrocarbons (saturated, unsaturated, aromatic), alcohols, aldehydes and ketones, alkyl halides, amines, carboxylic acids with esters and amides, amino acids and peptides.

Physics

Candidates are expected to demonstrate an understanding of and familiarity with the following topics:

- Dimensions of physical quantities; units of measurement.

- Point motion; forces and static equilibrium. Principles of dynamics. Kinematics and rotational dynamics.

- Work, power and energy. Conservation of mechanical energy and friction. Dynamics of collisions.

- Law of universal gravitation. Kepler’s laws. Gravitational potential.

- Pressure in fluids. Pascal’s and Archimedes’ principles. Viscous friction. Heat, temperature and specific heat. Equation of state for ideal gases. Changes of state. Principles of thermodynamics.

- Elements of acoustics. The Doppler effect.

- Electricity and magnetism. Coulomb’s law. Conductors, insulators and semiconductors. Magnetic fields and magnets.

- Electric current and electric circuits. The electric cell. Ohm’s law. Heat produced by an electric current.

- Magnetic field produced by a current. Electromagnetic induction.

- Maxwell’s equations. Electromagnetic waves. Energy of the electromagnetic field.

- Optics. Light and its propagation. Reflection. Refraction and lenses. Interference. Electromagnetic spectrum.

During the oral examination, the candidate may choose at least one topic from the following: (a) Relativity; (b) The crisis in classical physics and the emergence of quantum mechanics: the black body, the photoelectric effect, the Bohr atom, the Compton effect, the double-slit experiment; (c) Particle physics; (d) Cosmology and astrophysics; (e) Climate physics.