TOLC-AV syllabus

Biology

- **Chemistry of life**
  The structure and function of biological macromolecules: carbohydrates, lipids, amino acids and proteins, nucleotides and nucleic acids.
- **The role of enzymes**
  The cell
  Common characteristics and fundamental differences of prokaryotic and eukaryotic cells.
  Cellular structures and their main functions: cell membranes, cell wall, cytoplasm, ribosomes, endoplasmic reticulum, Golgi apparatus, mitochondria, plastids, vacuole, lysosomes, nucleus, chromosomes
- **Genetics, reproduction and evolution**
  Cellular divisions: mitosis and meiosis / reproduction mechanisms.
  Heredity. DNA and genes. Genetic code, protein synthesis / principles and foundations of evolution
- **General concepts on the energy processes of the cell**
  Respiration, photosynthesis, transport
  Diversity among living
  Viruses, bacteria, protists, fungi, plants, animals.

Chemistry

- **The constitution of matter**
  States and transformations of matter. Properties of the different states of aggregation of matter (solid, liquid, gas). Base quantities (the International System of Units)
- **The structure of the atom**
  The structure of the atom: elementary particles; atomic number and mass number. Isotopes
- **The periodic system of elements**
  Periodic table of elements. Periodic properties of elements: Atomic radius, ionization potential, electron affinity; metals and non-metals
- **Chemical bonds**
  Ionic and covalent bonds; polarity of bonds; electronegativity. Chemical formulas

- **The basics of inorganic chemistry**
  Nomenclature of inorganic compounds: oxides, hydroxides, acids, salts

- **Chemical reactions**
  Chemical reactions and stoichiometry: atomic and molecular weight number, mole concept, grams to moles conversion and vice versa, simple stoichiometric calculations, balance of simple reactions, various types of chemical reactions. Oxidation and reduction: number of oxidation, notion of oxidant and reducing agent

- **Solutions**
  Molarity. Dilutions of solutions. Acids and bases: concepts and definitions; acidity, neutrality, basicity of aqueous solutions; pH

- **Organic chemistry**
  The basics of organic chemistry: single and multiple bonds between carbon atoms; concept of isomerism; aliphatic and aromatic hydrocarbons with basic IUPAC nomenclature rules. Concept of functional group (functional groups of alcohols, amines, carboxylic acids, with basic IUPAC nomenclature rules).

Physics

- **Physical quantities and units of measurement**
  Fundamental and derived physical quantities in the International System. Conversion between units of measurement. Orders of magnitude and scientific notation. Dimensional analysis. Scalar and vector quantities.

- **Mechanics**
  Velocity and acceleration. Uniform linear motion and uniformly accelerated motion Circular motion.
  Concept of force. Fundamental laws of dynamics. Weight and acceleration of gravity.
  Work of a force. Kinetic and potential energy. Conservation of energy.

- **Fluid mechanics and thermodynamics**
  Density and pressure. Simple considerations of fluid statics and dynamics. Temperature. Celsius and Kelvin scales. Heat. Specific heat and heat capacity. Thermal expansion. Change of status. Perfect gases.

- **Electromagnetism**
  Electric charge. Coulomb's force and electric field. Fundamental characteristics of an electromagnetic wave: frequency, period, wavelength.
  Voltage and electrical current. Electrical resistance and Ohm's Law.

Mathematics

- **Set theory**
  Sets and main set operations (union, intersection, difference, complement and Cartesian product); combinatorial calculus (combinations, permutations and variations).
- **Arithmetic**
  Numerical sets and main arithmetic operations. Decimal numbers and rounding off; greatest common divisor, least common multiple; arithmetic mean. Divisibility, prime numbers and decomposition into prime factors.
- **Algebra**
  Monomials and polynomials; algebraic expressions, fractions and simplification of expressions; powers with integer and fractional exponent. Algebraic equations and inequalities; systems of equations and inequalities.
- **Exponents and logarithm**
  Algebraic operations with exponents and logarithms; basic changes; simple exponential and logarithmic equations and inequalities.
- **Analytic geometry**
  Cartesian coordinates of the plane; line equation from two points; slope of a straight line; equation of a line from one point and parallel or perpendicular to a given line. Distance between two points of the plane; geometric loci.
- **Plane geometry**
  Plane figures and their fundamental properties. Pythagoras' theorem; properties of similar triangles; perimeter and area of the most common plane figures. Goniometry and trigonometry.
- **Solid geometry**
  Three-dimensional solids and their fundamental properties; surfaces and volumes of major solids.
- **Mathematical modeling**
  Percentage and proportions; calculation of the probability of an event in simple situations; unit of measure; reduction of a concrete problem to a mathematical one.

Logic and reading comprehension

The Logic and reading comprehension questions aim to test in particular the candidate's aptitude rather than the skills acquired in secondary school. They do not therefore require specific preliminary preparation.

English section

Depending on the result obtained in the test, the grid below shows the initial preparation level and how to improve your results, if necessary.

POINTS	RECOMMENDED ENGLISH COURSE
≤ 6	Take a beginner English course (A1)
7 – 16	Take a first level English course (A2)
17 – 23	Take an intermediate English course (B1)
24 – 30	Take the B1 level English exam with no need to take a course