

Requirements and Recommended Literature for Entrance Procedure

[Basic Human Anatomy and Physiology](#)

[Biology](#)

[Chemistry](#)

[Physics](#)

[Mathematics](#)

BASIC HUMAN ANATOMY AND PHYSIOLOGY

Mader, Windelspecht: Human biology

16th edition, 2019, McGraw-Hill

Or any other secondary school textbook including the following topics:

Digestive system

Organs of digestion- gastrointestinal tract (GIT)

Physiology and regulation of digestive processes

Major enzymes of digestion

Respiratory system

Organs of respiration – upper and lower airways

Physiology of breathing

Regulation of respiratory functions

Cardiovascular system

Composition and functions of blood

Blood clotting and blood group system

Structure and functions of heart and blood vessels

Regulation of cardiovascular activity

Immune system

Passive (innate) immunity – mechanisms, organs, cells and molecules

involved Active immunity – mechanisms, organs, cells and molecules

involved

Excretory system

Organs of excretion

Structure and function of kidneys

Mechanisms of osmoregulation

Skin and temperature control

Structure of skin

Functions of skin

Mechanisms of temperature regulation

Nervous system

Major types of nervous system (CNS and PNS)

Neurons and associated cells – structure and function

Generation and propagation of nerve impulses

Structure and function of brain and spinal cord

Regulation of nervous functions

Sensory system

Types of receptors
Perception of a signal
Major senses in man – sight, hearing, touch, smell and taste

Endocrine system

Major endocrine glands
Types of hormones
Physiology and regulation of endocrine functions

Skeletal system

Major types of bones
Names of the most representative human bones
Major types of muscles
Structure and physiology of bones
Structure and physiology of muscles
Regulation of muscle contraction

Reproductive system

Structure of reproductive system in males and females
Female reproductive cycles
Conception and intrauterine development

BIOLOGY

Reece et al: Campbell Biology 12th edition, 2021, Pearson

Or any other secondary school textbook including the following topics:

Variety of life Classification and taxonomy
Prokaryotes and eukaryotes
Viruses
Bacteria
Fungi

Chemical composition of the cell

Proteins
Carbohydrates
Lipids
Nucleic acids
Small molecules (vitamins, minerals)

Cells

Structure and function of prokaryotic cells
Medical importance of prokaryotes
Structure and function of eukaryotic cells

Animal and plant cells

Transport across biological membranes

Passive movement – simple and facilitated diffusion

Active movements – active transport

Osmosis

Fundamentals of cellular communication

Cell signaling pathways

Enzymes

Principles of enzymatic catalysis

Classification of enzymes

Enzymatic reactions

Energy utilization

Glycolysis

Oxidative phosphorylation

ATP synthesis Photosynthesis

Cell cycle and reproduction

Mitosis

Meiosis

Fundamentals of histology

Epithelial tissues

Connective tissues

Muscle tissue

Nervous tissue

Expression of genetic information

DNA replication

Transcription

Translation (photosynthesis)

Genetics

Nature of genes

Chromosomes

Mendelian genetics

Morgan laws

Gene linkage

Mutations

Classification

Origin

Examples of diseases

Monogenic and multifactorial inheritance

Population genetics

Biotechnology

Basic procedures and techniques

Evolution

Theories of the origin of life

Theories of evolution

Natural selection

Human evolution

Zoonoses

Examples of important zoonoses in humans

CHEMISTRY

Caret, R. L., Denniston, K. J., Topping, J. J.:

Principles and Applications of Inorganic, Organic and Biological Chemistry. Wm. C. Brown Publ., 1993

ISBN: 0-697-12001-5

Or any other secondary school textbook (A-level) including the following topics:

Atoms, molecules, and ions

the electronic structure of atoms

Chemical periodicity

the periodic law, periodic system of the elements, characterization of periodic table

Chemical bonds

ionic bond, covalent bond (configuration, multiple bonds, coordinate covalent bonds), metallic bond

Intermolecular forces

dipole-dipole forces, hydrogen bond, hydrophobic forces

Chemical thermodynamics, thermochemistry

·the laws of thermodynamics, exothermic and endothermic reactions

Chemical kinetics

reaction rates, activation energy, catalysis

Chemical equilibrium

the law of chemical equilibrium, factors that influence equilibria

Acids and bases

Bronsted-Lowry acids and bases, conjugate pairs, amphoterism, polyprotic acids and bases, ionization equilibrium of water, pH and pK definitions

Ions and ionic equilibria

reactions of ions with water, pH of salt solutions, reactions of acids with bases, buffer solutions

Oxidation and reduction

defining oxidation and reduction, strengths of oxidizing and reducing agents, balancing oxidation-reduction reactions

Calculations

concentration of solutions, dilution of solutions, pH values of strong and weak acids and bases

and buffers, balancing chemical reactions, acid-base titration

Inorganic chemistry

characterization of representative elements and transition elements, nomenclature of inorganic compounds

Organic chemistry

structure of organic compounds, nomenclature, isomerism, reactions of organic compounds mentioned below

straight-chain and branched hydrocarbons (saturated and unsaturated), cyclic hydrocarbons, aromatic system

derivatives of hydrocarbons - halogen derivatives, nitrogen derivatives (nitrocompounds, amines), alcohols, phenols, quinones, ethers, thioalcohols, disulphides, aldehydes, ketones, carboxylic acids and their derivatives (esters, amides, halogenides, anhydrides and derivatives formed by replacing of hydrogen in hydrocarbon skeleton)

heterocyclic compounds - O-, S-, N-containing heterocycles

Carbohydrates

D- and L-configurations, optical activity, hemiacetal formation, anomerism, structure formulas, O-glycosidic bond, disaccharides and polysaccharides

Lipids and steroids

saturated and unsaturated fatty acids, fats and waxes, phospholipids, steroid nucleus, "boat" and "chair" conformation

Peptides and proteins

formulas of amino acids, peptide bond, structure and classification of proteins

Nucleic acids

pyrimidine and purine bases, ribose and deoxyribose, N-glycosidic bond, nucleotides, base pairing, structure of DNA and RNAs

Biochemistry

citric acid cycle, ATP

enzymes - general properties, mechanisms of action

vitamins

PHYSICS

Muncaster, R.: A-Level Physics Stanley Thornes (publishers) Ltd., 4th ed., 1994 ISBN 0-7487-0050-1

Breithaupt, J.: AQA Physics A Level Student Book 2, OUP Oxford; 2 edition 2015 ISBN-10: 0198351879 ISBN-13: 978-0198351870

Or any other secondary school textbook (A-level) including the following topics:

Physical quantities and their units

Vectors, scalars. SI system, basic and derived units, prefixes.

Mechanics

Motion; circular and harmonic motion

Work, energy, power

Fluids at rest and in flow.

Thermal properties of matter

Thermometry and calorimetry

Thermal expansion of solids and liquids

Gases and vapours

Thermodynamics

Waves

Mechanical and electromagnetic waves

Interference, diffraction, polarization

Resonance

Standing waves

Doppler effect

Geometrical optics

Reflection and refraction

Lenses Magnifying glass. Microscope.

Electricity

Electrostatics

Charge, current, voltage, resistance, capacitance

Direct and alternating currents. Electrolysis.

Atomistics

Structure of the atom

X-rays. Radioactivity. Fission and fusion.

MATHEMATICS

Recommended Literature: Any high school mathematics textbook.

The Princeton Companion to Mathematics

by Timothy Gowers, June Barrow-Green, Imre Leader

The SAT Math Prep Book for Students Who Have Forgotten a Lot of Their High School Math

by Robert Gerver

Requirements:

Number sets:

integer, natural, rational, real, and complex numbers.

Algebraic expressions:

polynomials, rational functions, exponentiation by an exponent that is a rational number.

Equations and Inequations:

linear and quadratic equations, power equations (rational powers), logarithmic, exponential, and goniometric equations, equations with an absolute value, system of equations.

Functions:

linear, quadratic, goniometric, exponential, logarithmic, and power functions. Domain of functions and basic properties (periodicity, monotonicity, maximum, minimum, inflection point etc.).

Arithmetic and geometric sequences and their sums.

Analytic geometry:

coordinate systems, points, vectors, equations of planes and lines, curves, angles, intersections, distances, scalar products.

Combinatorics and basic probability:

permutations and combinations, binomial theorem.

Mathematical logic:

validity of declarative statements, deductive reasoning.