Syllabus Blueberry PreMed-course

Teachers

Biology -Veronika Åsman
Veronika has long experience of teaching and of research work in biology.

Chemistry – Armin Aminy
Armin also teaches medicine at Karolinska Institutet in Stockholm, one of the world's foremost medical universities.

Course overview

The course provides cutting-edge knowledge and theoretical premedical skills for students to meet the academic requirements for medicine programmes. It focuses on understanding biology and chemistry needed to study medicine at European universities.

Literature

Campbell Essential Biology, with Physiology, Global Edition - 6th ed.
Eric J. Simon & Jean Dickey
ISBN: 9781292307282
780 SEK (Included in the course fee)

Basic Chemistry, Global Edition, e-book.
Karen C. Timberlake & Bill Timberlake
ISBN: 9781292170428
825 SEK (Included in the course fee)

Core content
The following information is just an example of the content, and it may be adjusted

Chemistry
Materials and chemical bonding

- Models and theories of the structure and classification of matter
- Chemical bonding and its impact on the occurrence, properties and application areas of organic and inorganic substances

Reactions and changes

- Acid-base reactions, including the concept of pH and buffer effects
- Redox reactions, including electrochemistry
- Precipitation reactions
- Energy transformations in phase transitions and chemical reactions

Stoichiometry

- Understanding and writing formulae for chemical compounds and reactions
- Substance relationships, concentration limiting reactants & exchanges in chemical reactions

Reaction speed and chemical equilibrium

- Reaction speed, e.g., the effect of catalysts and concentrations on how quickly chemical reactions take place
- Factors affecting equilibrium and equilibrium constants

- Calculations of and reasoning about equilibrium systems in different environments e.g., in oceans, in the human body and in industrial processes

Organic chemistry

- Different categories of organic substances, their properties & structure and reactivity
- Reaction mechanisms, including qualitative reasoning about how and why reactions take place, and about the rate of use of energy in different kinds of organic reactions.

Biochemistry

- The genetic flow of information, including the main elements of the replication of biochemical processes, transcription and translation
- The main features of human metabolism at the molecular level
- Structure and function of proteins, with special focus on enzymes

Analytical chemistry

- Qualitative and quantitative methods of chemical analysis e.g., mass spectrometry and spectrophotometry

Biology

Cellular biology

- Different types of cells and their structure
- Function of some organelles e.g. mitochondria
- Structure and function of the plasma membrane
- Function of proteins, especially enzymes
- Understanding of cellular respiration and the importance of ATP.

Genetics

- Structure of chromosomes, genes and alleles
- Process of replication, transcription and translation
- Cell division, process and differences between mitosis and meiosis
- Genetic diversity and heritability of traits
- How mutations arise and affect organisms
- Uses and principles of gene technology in medicine

Human and animal physiology

- Understanding physiological processes in humans and some animals e.g., respiration, blood circulation, digestion, excretion and osmoregulation
- The different parts of the nervous system and how they function
- Reproduction, including the menstruation cycle
- Homeostasis in human and animals, e.g. thermoregulation.

Plant physiology

- Photosynthesis, chemical reaction and biological systems involved e.g. photosystems
- Transport in plants, plant specific structures and nutrient flow
- Plant reproduction

Evolution and systematics

- The process of evolution and selection
- Formation and definition of species
- Systematics and phylogeny, understanding phylogenetic trees

- Characteristics of some animal phyla e.g., Annelida, Arthropoda and Chordata

Ecology

- Understanding relations between communities, organisms and habitats
- Ecosystems and their flow of nutrients, materials and energy e.g., food webs, nitrogen, carbon and oxygen cycles
- Role of producers, consumers and decomposers
- Succession within an ecosystem using examples
- Population dynamics e.g., birth rates/mortality, immigration/emigration, predator prey interactions.
- Difference between abiotic and biotic factors and it's effect on populations
- Human impact on ecosystems e.g. climate change and pollution
- Species endangerment and protection measures

Human Health

- The effect of different lifestyles on the human body and its vital organs
- Diseases and human body defense against diseases
- Nutrient and energy needs