

BSCI103 Chemicals of Life

ECTS Value: 5 ECTS

Module Description

The study of chemicals of life, has become the foundation for understanding biological processes and has provided explanations for the causes of many diseases in humans, plants and animals. Biochemistry uses the methods of other disciplines of science, chemistry, physics, molecular biology, immunology to study the structure and behaviour of the complex molecules found in biological material and the ways these molecules interact to form cells, tissues and whole organisms.

This unit focuses on the basic biochemicals of life, including the unique properties of water and carbon compounds essential in life processes. It reviews the structure and biological role of carbohydrates, lipids, proteins, enzymes, energy, energy-storage compounds and nucleic acids. It offers a study opportunity to understand basic concepts of energy, reactions in the living cells and the biological significance of gene expression and protein synthesis.

As a unit within a teacher education programme, the unit looks at various contexts of biochemical studies. Exploring the developments in scientific techniques used to study biochemicals, biochemical processes and cell structures is an important aspect in this study of chemicals of life. Further to this, an appreciation of the significance of biochemical scientific studies within the wider fields and contexts of e.g. medicine, pharmaceuticals, food, forensic studies, sport and the study of biodiversity and evolution is included in this unit. It also gives space for discussion on the ethical dilemmas and the scientific significance of DNA technology.

Overall Objectives and Outcomes

By the end of this module, the learner will be able to:

Competences

- Develop an understanding of the foundations of biochemistry.
- Develop a scientific approach towards acquiring and interpreting information.
- Develop a contextualised subject content mind-set.
- Develop practical responses towards the context of the teaching of biochemistry.
- Engage critically with literature.

Knowledge

- Describe the major concepts in biology: from molecules, to cells to the biosphere.
- Discuss the scientific method as a process of obtaining scientific knowledge.
- Explain basic biochemistry principles related to structure and function of living bodies.

- d. Identify macromolecules in living bodies.
- e. Relate the structure to function of macromolecules in living bodies.
- f. Outline the scientific techniques and experiments used to study biochemicals, biochemical processes and cell structures.
- g. Examine the basic concepts of energy and reactions in the living organisms.
- h. Explain the role of enzymes in biochemical reactions and process in the living organism.
- i. Explain the process of gene expression and protein synthesis in relation to the development and functions of the living body.
- j. Describe types of mutations.
- k. Review various biochemicals in context including some examples from:
 - i. The science of food.
 - ii. Medicine and health, disease and disorders.
 - iii. Ecological balance.
 - iv. Agriculture studies.
 - v. Forensic applications.
 - vi. Industry e.g. pharmaceutical developments.
 - vii. The biochemistry in sports.
 - viii. Identify key points of the legislation on the subject of ethics related to DNA technology.
 - ix. Describe the use of biochemistry in the study of biodiversity and evolution.

Skills

- a. Use biochemistry as the foundation for understanding biological processes.
- b. Explain the biochemical causes of diseases in the living world.
- c. Relate the structure of biochemicals to their function in cells and organisms.
- d. Relate the structure, function and behaviour of complex molecules in biological materials to the ways they interact to form cells, tissues and whole organisms.
- e. Interpret the process of gene expression and protein synthesis in relation to the development and functions of the living body.
- f. Interpret events at higher levels of biological organisations using the foundations of biochemistry.
- g. Interpret the significance of chemicals in different contexts of life.
- h. Interpret the significance of mutations in the development of living bodies and in evolution.
- i. Use biochemistry to interpret and make informed societal choices.
- j. Apply the scientific method to problem-solving situations.
- k. Employ simple and basic school laboratory tests related to the subject in context.

Mode of Delivery

This module adopts a blended approach to teaching and learning. Information related to the structure and delivery of the module may be accessed through the IfE Portal. For further details, kindly refer to the Teaching, Learning and Assessment Policy and Procedures found on the Institute for Education's website.

Assessment Methods

This module will be assessed through: Research Assignment and Online Tasks/Reflections.

Suggested Readings

Core Reading List

1. Urry L., Cain M.L., Wasserman S., Minorsky P.V., Reece J.B., (2017) Campbell Biology. Pearson.
2. Tortora, G.J. and Bryan D.(2018) Essentials of Anatomy and Physiology. Pearson.
3. Fox S. and Rompolski K. (2016) Human Physiology. 15th Edition McGraw Hill Education

Supplementary Reading List

1. Marieb E.N. and Hoehn K.N. (2014) Human Anatomy & Physiology. Pearson New International Edition (9th Edition)
2. Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P., (2015) Molecular Biology of the Cell. 5th Edition. Garland Science Publishing.
3. Berg, J. M. (2006). Biochemistry. W. H. Freeman. 6th Edition. W. H. Freeman
4. Cooper, G. M and Hausman, R. E., (2016) The Cell: A Molecular Approach, 5th Edition, Sinauer Associates Inc. Associates Inc.
5. .
6. Stryer, L (2002) 5th Ed. Biochemistry. W.H. Freeman and Co.
7. Pratt, C.W. and Cornely, K.(2004) Essential Biochemistry J.WilMarieb E.N. and Hoehn K.N. (2014) Human Anatomy & Physiology. Pearson New International Edition (9th Edition)