CCNM
CANADIAN COLLEGE OF NATUROPATHIC MEDICINE

COURSE OUTLINE 2022

Course:	Biology
Course Code:	SBI100
Times & Location:	Mondays 20h00/8 p.m. - 21h00/9 p.m. EST; online
Instructor:	Philippe D'Onofrio, PhD, MSc
E-mail:	pdonofrio@ccnm.edu

Required Texts:
Goodenough, Judith, McGuire,Betty. Biology of Humans; Concepts, Applications and Issues. (online edition)

Recommended Texts and other readings:
Any first year university or introductory biology or physiology text will prove to be a useful reference. Lecture slides, supplementary resources, and assignments will be posted in Moodle.

Course Description:
Human Biology (SBI100) is a 3-credit, 14 week introductory course that will provide students with a solid core foundation in basic and applied human biology. Through on-line self-study modules, tutorials, quizzes, exercises, and assignments, students will learn to use relevant terminology and concepts in a biological context. The course will emphasize the molecular and cellular basis of life, biochemical processes, cellular structure and function.

Students will have complete weekly on-line self-study modules and will interact online with the course instructor one evening a week in an on-line tutorial session. Students are expected to be prepared for these tutorial sessions (i.e. have completed the on-line modules).

The application of biology fundamentals to naturopathic medicine is integrated throughout the course, providing students with a unique opportunity to learn biology within the context of naturopathic medicine.

Prerequisites:
There are no prerequisites required for this course.

Course Format:

The course is delivered in a **blended learning style** which combines online self-study modules with weekly live interactive **online tutorial sessions from 20h00 (8p.m.) - 21h00 (9 p.m.) EST** on Monday evenings with the course instructor. The passing grade is 60%,

and **evaluations/assessments** will consist of **one quiz per module (10%), assignments (15%), one midterm test (35%), and a final exam (40%)**. Both the midterm test and the final exam are delivered via Examity and invigilated via Zoom by the CCNM.

Course Outcomes:

This course is designed to:

• A core foundation for their knowledge of cellular and molecular biology
• The basis for applying biological concepts to the human body
• Use the relevant vocabulary and concepts correctly in a biological and clinical context
• Acquire an understanding of the known mechanisms by which the cells and organisms function and achieve homeostasis
• Challenge and engage the student where he/she may independently work t enrich their learning.
• Equip students with the necessary knowledge to enter the ND program. Where applicable, apply human biology to Naturopathic principles.

Evaluations

Assignments	15%
Quizzes	10%
Midterm exam	35%
Final exam	40%

Plagiarism and cheating are academic offenses and will be treated seriously by the College. Students should refer to the College's policies on academic misconduct posted on in the Academic Calendar.

Biology (SBI101) Schedule

Week	Topics	Activities	Date	Resources
1	Chemistry comes to Life	Quiz 1	5-Sept	Chapter 2
2	The Cell	Quiz 2	12-Sept	Chapter 3
3	Chromosomes and Cell Division	Quiz 3	19-Sept	Chapter 19
4	Body Organization and Homeostasis	Quiz 4	26-Sept	Chapter 4
5	The Skeletal System	Quiz 5	3-Oct	Chapter 5
6	The Muscular System	Quiz 6	10-Oct	Chapter 6

7	**MIDTERM EXAM**			
8	Neurons and the Nervous System	Quizzes 7, 8	24-Oct	Chapters 7 and 8
9	The Endocrine System	Quiz 9	31-Oct	Chapter 10
10	Blood	Quiz 10	7-Nov	Chapter 11
11	The Cardiovascular and Lymphatic Systems	Quiz 11	14-Nov	Chapter 12
12	The Respiratory System	Quiz 12	21-Nov	Chapter 14
13	The Digestive and Urinary Systems	Quizzes 13, 14	28-Nov	Chapters 15 and 16
14	**FINAL EXAM**			

The Academic Department reserves the right to make schedule changes.

Biology (SBI100) Learning Outcomes
Chemistry Comes to Life (Chapter 2)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:

· Describe the characteristics of the subatomic particles (protons, neutrons, and electrons) and explain the structure of an isotope.
· Differentiate between covalent, ionic, and hydrogen bonds in terms of strength and the actions of the electrons.
· List the unique properties of water that make it valuable to biological systems.
· Predict what happens when an acid or a base is added to water.
· DefinepH,explain the range of the pH scale, and tell which values indicate acid and which values indicate base.
· Describe the structure of a polymer, including its formation through dehydration synthesis and its breakdown through hydrolysis.
· Describe the structure and biological purpose of carbohydrates, lipids, proteins, and nucleotides and give an example of each.
· Describe ATP as the energy currency of the cell.

The Cell (Chapter 3)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Compare prokaryotic and eukaryotic cells.
· Relate the surface-to-volume ratio to maximum cell size.
· Provide examples that show the relationship between the structure and function of a cell.
· Explain how the structure of the plasma membrane regulates the movement of materials in and out of the cell.
· Describe the function and structural features of each of the following organelles: nucleus, endoplasmic reticulum, Golgi complex, lysosomes, and mitochondria.
· Compare the structure and function of the three fibers that make up the cytoskeleton.
· Summarize the efficiency of cellular respiration and fermentation as methods to harvest cellular energy from the food we eat.

Chromosomes and Cell Division (Chapter 19)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Compare the role of meiosis and mitosis in the cell cycle.
· Differentiate between chromosomes and genes, autosomes and sex chromosomes, and diploid and haploid cells.
· Draw the cell cycle, label each phase of mitosis and interphase, and describe the events and significance of each phase.
· List the events of interphase, prophase, metaphase, anaphase, and telophase as completed in mitosis.
· Define cytokinesis and explain its role in cell division.
· Explain the diagnostic uses of karyotypes.
· Diagram and describe how haploid cells result from meiosis and highlight the opportunities for crossing over and the independent assortment of chromosomes.
· Describe how nondisjunction results in an abnormal number of chromosomes in the daughter cells resulting in Down, Turner, and Klinefelter syndromes.

Focus on: Stem Cells

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Define stem cells and explain how they are different from other cells.

· Differentiate the characteristics of adult, umbilical cord, placental, and embryonic stem cells.
· Describe possible therapeutic uses of stem cells.

Body Organization and Homeostasis (Chapter 4)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Develop a table to show the function and location of epithelial, connective, muscle, and nervous tissue.
· Describe the three types of cell junctions.
· Identify the major body cavities and list the organs and systems they house.
· List the four types of membranes, their locations, and their functions.
· Relate the structure of the skin to its ability to carry out the various functions.
· Define homeostasis and explain its importance to life.
· Describe and exemplify a negative feedback system.

The Skeletal System (Chapter 5)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· List the functions of bone.
· Compare the structure of compact and spongy bone.
· Explain the process of bone growth and development, including the influence of hormones.
· Describe how bones heal after a fracture or break.
· Explain what is meant by the continual remodeling of bone.
· List the components of the axial skeleton.
· List the components of the appendicular skeleton.
· Compare the three types of joints in terms of structure and motion.

The Muscular System (Chapter 6)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· State the four traits common to all muscles.
· Demonstrate and explain the movement of antagonistic muscles.
· Explain muscle contraction at the molecular level of the actin and myosin filaments.

· Differentiate between a single muscle twitch, summation, tetanus, and fatigue.
· List the sources of ATP for muscle contraction and describe in detail where and how the ATP is generated.
· Compare and contrast slow-twitch and fast-twitch muscles, including where they are located in the body and when they are utilized in different physical activities.
· Describe the best way to build muscle endurance and the requirements for building larger muscle mass.

Neurons: The Matter of the Mind (Chapter 7)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Differentiate between a neuron and neuroglial cells.
· Explain the role each of the following plays in the conduction of a nerve impulse: cell body, dendrite, axon, myelin sheath, Schwann cell, and node of Ranvier.
· Describe how a nerve cell maintains a resting potential using the sodium-potassium pump and changes that occur as an action potential moves along the axon.
· Summarize the events that occur at the synapse as an impulse is transmitted from one neuron to the next.

The Nervous System (Chapter 8)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Compare the functions of the central and peripheral, somatic and autonomic, and parasympathetic and sympathetic divisions of the nervous system.
· Identify the location and list the function of each component of the central nervous system.
· Describe the function of the somatic and autonomic nervous systems and the sympathetic and parasympathetic nervous systems.
· Explain the cause and seriousness of common health problems and injuries of the nervous system.

Focus on: Drugs and the Mind

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Describe the mechanism of psychoactive drugs.

· Differentiate between tolerance, cross-tolerance, and physical tolerance.
· List the effects of alcohol on the various body systems, nutrition, cancer, and fetal development.
· Explain the effects of THC and the long-term effects of marijuana on the body.
· List the stimulants described in the chapter and describe how each of these stimulants acts on the CNS.
· Describe the danger of hallucinogenic drugs.
· Compare the positive and negative aspects of opiates.

The Endocrine System (Chapter 10)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Explain the role of hormones as chemical messengers and give an example of hormone regulation.
· List the effect of each of the six anterior pituitary hormones and the two posterior pituitary hormones.
· Describe the effect of thyroid hormone, including oversecretion and undersecretion.
· Explain the regulation of blood calcium by calcitonin and parathyroid hormone.
· Name and describe the effects of the hormones produced by the adrenal gland.
· Compare the effects of the two pancreatic hormones, glucagon and insulin, on the regulation of glucose blood level.
· Describe the effect of the thymus gland on the health of the immune system.
· Relate the production of melatonin to seasonal affective disorder and name the gland that is involved.
· Define prostaglandins and describe their mechanism of action as compared with endocrine hormones.

Focus on: Diabetes mellitus

Learning Objectives
After reading the textbook and studying the material in this chapter, the student should be able to:
· List the four types of diabetes, their characteristics, and their prevalence.
· Distinguish between type 1 and type 2 diabetes in terms of their symptoms, diagnosis, treatment, and prognosis.
· Summarize the symptoms, diagnosis, and treatment of gestational diabetes, emphasizing the unique characteristics.

Blood (Chapter 11)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· List the functions of blood.
· Describe the composition of blood and the function of platelets, red blood cells, and each type of white blood cell.
· Explain the cause and treatment of the various types of anemia and leukemia.
· Explain how antibodies and antigens determine blood type and transfusion relationships.
· Sequence the steps leading to a blood clot.

The Cardiovascular and Lymphatic Systems (Chapter 12)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· List the functions of the cardiovascular system.
· Compare the structure of arteries, veins, and capillaries and explain how the structure facilitates the function of each type of vessel.
· Contrast the exchange of gas in the pulmonary and systemic circuits.
· Describe the internal conduction system of the heart and the resulting cardiac cycle.
· Define blood pressure and differentiate between systolic and diastolic pressure.

Focus on: Cardiovascular Diseases

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Answer the question: Why is cardiovascular disease important to understand?
· Distinguish between a thrombus and an embolism and explain their dangers and treatment.
· Describe hypertension and atherosclerosis, explain why they are life-threatening, and present treatment options including lifestyle changes.
· Differentiate between a heart attack and progressive heart failure.
· Provide specific data on the impact of cigarette smoking on cardiovascular disease.
· List heart-healthy lifestyle habits.

The Respiratory System (Chapter 14)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· List the four functions of the respiratory system. List the organs/structures of the respiratory system, and explain their role in gas exchange.
· Explain how inhalation and exhalation are accomplished, including the muscles that are involved and the changes in air pressure.
· Describe how oxygen and carbon dioxide are carried in the blood and exchanged within the tissues.
· Discuss the respiratory control centers in the brain and how the level of blood gases affects breathing rate.
· Identify various disorders of the respiratory system, including their symptoms and treatment.

The Digestive and Urinary Systems (Chapter 15, 16)

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Describe the passage of food through the gastrointestinal tract from the mouth to the anus.
· Explain the function of each organ and accessory organ of the digestive system and describe any specialized structural features.
· Compare neural and hormonal control of digestion and give examples of each.
· Describe a well-balanced diet as represented by MyPlate.
· State the dietary value of lipids, carbohydrates, proteins, vitamins, minerals, and water.
· List the information found on a food label and explain how that information can help you make healthy choices.
· Explain how the body uses energy and what happens to excess food calories.
· Define the Body Mass Index (BMI), explain how it can be used to determine a desirable weight, and then explain the risks of being overweight.
· Describe the characteristics of successful weight-loss programs.
· Compare obesity, anorexia nervosa, and bulimia and explain how they are serious health risks.

Focus on: The Obesity Epidemic

Learning Objectives

After reading the textbook and studying the material in this chapter, the student should be able to:
· Describe obesity, including an explanation of the Body Mass Index (BMI).

· Discuss the health risks of obesity, including possible cardiovascular problems, the incidence and implications of Type 2 Diabetes, and cancer.
· Describe the regulation of food intake as governed by the hypothalamus, hormones, and epigenics.
· Explain the components of weight management and the yo-yo effect of weight loss and gain.