

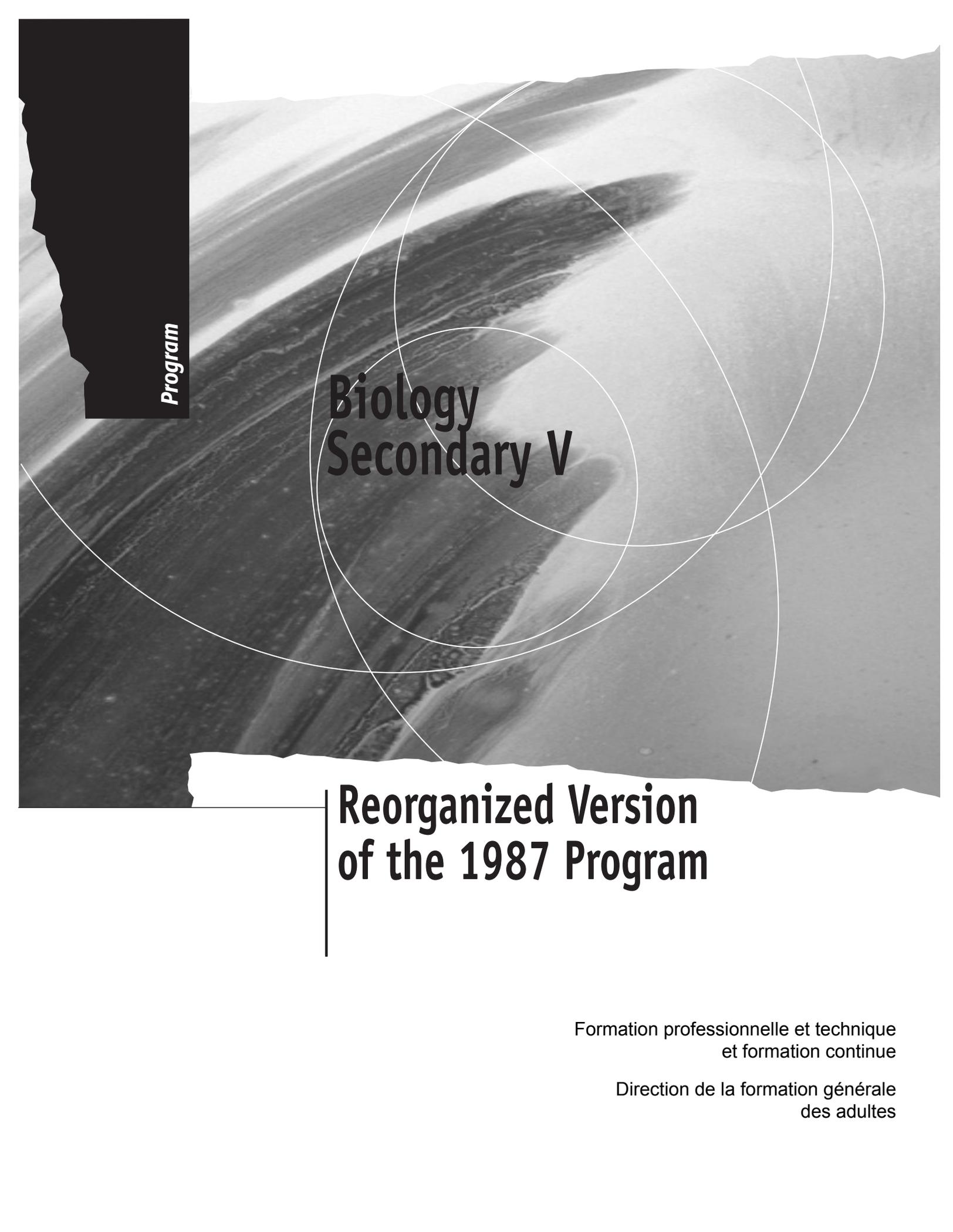
Program

Biology Secondary V

Reorganized Version
of the 1987 Program

Reach for
your **Dreams**

Québec 



Program

Biology Secondary V

Reorganized Version of the 1987 Program

Formation professionnelle et technique
et formation continue

Direction de la formation générale
des adultes

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Table of Contents

Introduction	1
1. Description	3
1.1 Background to Program Reorganization	3
1.2 Prerequisites	4
1.3 Program Goals	4
1.4 Relationship With Other Programs	5
1.4.1 Adult Sector Programs	5
1.4.2 Youth Sector Programs	6
2. Structure of the Program and Learning Content	7
2.1 Relationship Between the Courses	7
2.2 Brief Description of Each Course	7
2.3 Learning Objectives	12
3. Evaluation of Learning	13
Program Content by Course	15
Course 1: The Human Respiratory System	17
Course 2: The Human Reproductive System and the Perinatal Period	23

Course 3: The Human Digestive System	33
Course 4: The Anatomy and Physiology of Cells	39
Course 5: The Transmission of Hereditary Characteristics	45
Course 6: The Human Skeletal and Muscular System	53
Course 7: The Human Endocrine System	61
Course 8: The Human Nervous System	67
Course 9: Ecology	77

INTRODUCTION

1. Description

The *Biology* program is intended for adult education students in Québec. It is an optional subject of Secondary Cycle Two and, as such, the credits earned for each course count towards the Secondary School Diploma.

1.1 Background to Program Reorganization

The Biology program presented in this document is a reorganization of the French version of the adult education program published in April 1987 (document 38-0721). Reorganization was necessary to make the program consistent with the Basic Adult General Education Regulation (Régime pédagogique), in terms of pass mark and the number of hours of learning equivalent to one credit.

In the spring of 2002, a statistical analysis of course attendance and a survey of some fifteen school boards highlighted the relevance of maintaining a certain number of courses. Some courses were therefore terminated and others consolidated in order to conform to the Basic regulation.

In the reorganized version of the program:

- four courses have been eliminated: The Human Environment, Organic Gardening, Tissues and Les poissons[†]
- two courses have been combined: Human Reproductive System and La périnatalité[†]
- the remaining courses are now eight single-module courses

The reorganized program therefore contains the following nine courses; five correspond to 50 hours of learning, and four to 25 hours of learning.

BLG-5061-1	The Human Respiratory System	BLG-5066-1	The Human Skeletal and Muscular System
BLG-5062-2	The Human Reproductive System and the Perinatal Period	BLG-5067-1	The Human Endocrine System
BLG-5063-2	The Human Digestive System	BLG-5068-2	The Human Nervous System
BLG-5064-2	The Anatomy and Physiology of Cells	BLG-5069-1	Ecology
BLG-5065-2	The Transmission of Hereditary Characteristics		

[†] Available in French only.

1.2 Prerequisites

No prerequisites are required for these courses. Any adult with good reading and writing skills may take them.

1.3 Program Goals

Reorganizing the April 1987 version has resulted in little change with regard to program goals:

- To interest adults in human biology.
- To encourage adults to maintain a healthy body, with a view to wellness and lifestyle improvement.
- To help adults understand how humans influence the environment.
- To help adults become familiar with the animal and plant kingdoms.
- To show the interrelationships between humans, the animal kingdom and the plant kingdom.

1.4 Relationship With Other Programs

1.4.1 Adult Sector Programs

The following table illustrates the relationship between the courses of the reorganized *Biology* program and those of the April 1987 version.

REORGANIZED PROGRAM JULY 2003	OLD PROGRAM APRIL 1987
BLG-5061-1 The Human Respiratory System	Human Respiratory System GBA-251 (BLG-5021-1) GBA-252 (BLG-5022-1)
BLG-5062-2 The Human Reproductive System and the Perinatal Period	La périnatalité [†] GBC-141 (BIO-4005-1) GBC-142 (BIO-4006-1) Human Reproductive System GBD-251 (BLG-5023-1) GBD-252 (BLG-5024-1) GBD-153 (BIO-5025-1)
BLG-5063-2 The Human Digestive System	Nutrition GBE-241 (BLG-4007-1) GBE-242 (BLG-4008-1) GBE-243 (BLG-4009-1)
BLG-5064-2 The Anatomy and Physiology of Cells	The Cell GBF-251 (BLG-5026-1) GBF-252 (BLG-5027-1) GBF-253 (BLG-5028-1) GBF-254 (BLG-5029-1) GBF-255 (BLG-5030-1)
BLG-5065-2 The Transmission of Hereditary Characteristics	Heredity GBH-251 (BLG-5035-1) GBH-252 (BLG-5036-1) GBH-253 (BLG-5037-1)
BLG-5066-1 The Human Skeletal and Muscular System	The Human Skeletal and Muscular System GBJ-241 (BLG-4023-1) GBJ-242 (BLG-4024-1)
BLG-5067-1 The Human Endocrine System	Human Chemical Messages GBL-251 (BLG-5046-1)
BLG-5068-2 The Human Nervous System	Le système nerveux chez l'humain [†] GBM-151 (BIO-5047-1) GBM-152 (BIO-5048-1)
BLG-5069-1 Ecology	Ecology GBB-241 (BLG-4032-1) GBB-242 (BLG-4033-1)

[†] Available in French only.

LIST OF COURSE CODES TO BE DELETED ONCE THE REORGANIZED PROGRAM IS IMPLEMENTED

COURSE	COURSE CODES
The Human Environment	GBG-241 (BLG-4010-1) GBG-242 (BLG-4011-1) GBG-252 (BLG-5032-1) GBG-253 (BLG-5033-1) GBG-254 (BLG-5034-1)
Organic Gardening	GBI-242 (BLG-4016-1) GBI-243 (BLG-4017-1) GBI-244 (BLG-4018-1) GBI-245 (BLG-4019-1)
Les Poissons[†]	GBK-141 (BIO-4025-1) GBK-142 (BIO-4026-1) GBK-143 (BIO-4027-1)
Tissues	GBM-241 (BLG-4031-1)

[†] Available in French only.

1.4.2 Youth Sector Programs

Although some aspects of the *Biology* program are also covered in *Ecology 114*, *Biology 314* and *Biology 534* of the youth sector, no equivalence can be established between the adult and youth programs.

2. Structure of the Program and Learning Content

2.1 Relationship Between the Courses

The *Biology* program is composed of nine courses that are similar in structure and philosophy. While they are complementary, they are also completely independent of each other. The courses may be taken in any order, at the student's discretion.

2.2 Brief Description of Each Course

BLG-5061-1 The Human Respiratory System

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human respiratory system and the health problems associated with it.

This course covers:

- anatomical structures of the respiratory system
- pulmonary inhalation and exhalation mechanisms
- gas exchanges in lungs and cells
- health problems related to the respiratory system

This course is a combination of GBA-251 and GBA-252. The study of resuscitation techniques has been deleted.

BLG-5062-2 The Human Reproductive System and the Perinatal Period

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human reproductive system and the perinatal period, and the health problems associated with them.

This course covers:

- anatomical structures of the human male and female reproductive systems
- the onset of puberty in adolescent boys and girls
- the menstrual cycle and its relationship to female fertility
- physiological aspects of sexual relations
- stages of pregnancy and childbirth
- breast-feeding and bottle-feeding
- methods of contraception
- abortion techniques
- sexually transmitted diseases

This course is a combination of GBD-251, GBD-252 and GBD-153 as well as certain components of GBC-141 and GBC-142. Some objectives have been reformulated and updated (abortion techniques, methods of contraception, sexually transmitted diseases).

BLG-5063-2 The Human Digestive System

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human digestive system and the health problems associated with it.

This course covers:

- the human digestive tract and digestive glands
- physical and chemical digestive processes
- human nutritional needs
- health problems related to the digestive system

This course is a combination of GBE-241, GBE-242 and GBE-243. Carbohydrate, lipid and protein biochemistry, the study of different diets and the terminal objective regarding food additives have been deleted.

BLG-5064-2 The Anatomy and Physiology of Cells

By learning concepts of anatomy and physiology, adults will gain a better understanding of the function of cells, the basic units of life.

This course covers:

- plant and animal cell structures
- cell nutrition and excretion
- cell reproduction
- cellular respiration
- deoxyribonucleic (DNA) and ribonucleic (RNA) acids

This course is a combination of GBF-251, GBF-252, GBF-253, GBF-254 and GBF-255, with less emphasis on the biochemistry of cellular respiration.

BLG-5065-2 The Transmission of Hereditary Characteristics

By learning concepts of anatomy and physiology, adults will gain a better understanding of the transmission of human hereditary characteristics, and the health problems associated with it.

This course covers:

- the transmission of hereditary characteristics
- problems associated with the transmission of hereditary characteristics

This course is a combination of GBH-251, GBH-252 and GBH-253. The intermediate objectives dealing with meiosis have been deleted, and those dealing with hereditary characteristics in relation to blood groups and mutations are treated in less detail. The order in which the terminal objectives are presented has also been reviewed.

BLG-5066-1 The Human Skeletal and Muscular System

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human skeletal and muscular system and the health problems associated with it.

This course covers:

- long bone structure, formation and growth
- structure and function of joints
- the human skeleton
- skeletal muscle structure and contraction
- movements performed by the muscle-bone complex and the benefits of muscular exercise
- health problems related to the skeletal and muscular system

This course is a combination of GBJ-241 and GBJ-242. The objective dealing with muscular contraction has been reorganized.

BLG-5067-1 The Human Endocrine System

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human endocrine system and the health problems associated with it.

This course covers:

- the secretion of hormones and their role in the human body
- disorders that may affect endocrine glands

This course is almost identical to GBL-251. Two additions have been made: a terminal objective that describes the anatomy of the endocrine system and two intermediate objectives related to reproductive hormones.

BLG-5068-2 The Human Nervous System

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human nervous system and the health problems associated with it.

This course covers:

- the organization of the nervous system
- nerve cells
- the propagation of nerve impulses
- the central and peripheral nervous systems
- the reflex arc
- the regulatory function of the autonomic nervous system
- the effect of alcohol, drugs and heavy metals on the nervous system

This course is a combination of GBM-151 and a part of GBM-152 (effects of alcohol and drugs on the nervous system). The content of GBM-151 has been subdivided into seven terminal objectives, but no content has been added.

BLG-5069-1 Ecology

By learning concepts of ecology, adults will gain a better understanding of the dynamics that exist among the elements of an environment and the problems caused by environmental imbalance.

This course covers:

- photosynthesis
- the relationship among the elements in an ecosystem
- the structure of an aquatic ecosystem and its food web
- artificial eutrophication

This course is a combination of GBB-241 and GBB-242. Some intermediate objectives dealing with lake eutrophication were taken from GBK-143 and added to the new course.

2.3 Learning Objectives

Each course is described by a general objective and a series of terminal and intermediate objectives. A table at the beginning of each course sets out the general and terminal objectives.

The general objective is a statement of the intention of the course. It specifies the relationship to be established among the terminal objectives.

All of the terminal objectives are prescriptive. They are formulated as learning objectives. They indicate the significance to be given to learning and the target to be attained through the intermediate objectives, which describe more precisely the scope of the terminal objectives.

All of the intermediate objectives are prescriptive. The order in which they are presented in no way indicates their relative importance or a fixed learning sequence.

Additional information is provided for most of the intermediate objectives. This information is not prescriptive, limiting, or exhaustive. It is intended to assist eventual users of the program and includes additional information on content, limits, possible paths to explore, and so on.

3. Evaluation of Learning

Evaluation of learning is designed, on the one hand, to help students learn and, on the other, to provide the data required for the certification of studies.

Formative evaluation is part of the teaching and learning process. It influences decisions concerning the choice of learning situations, learning materials and teaching method. Teachers are responsible for carrying out formative evaluation and school boards and private schools have policies to this effect. The Ministère de l'Éducation may suggest conceptual frameworks or examples of formative evaluation instruments, if necessary.

Summative evaluation is performed at the end of the learning process. The Ministère provides a *Definition of the Domain for Summative Evaluation* for each course in this program. These documents are prescriptive and must be adhered to when designing summative examinations. Following summative evaluation, a judgment is made on the student's attainment of the learning objectives, after which learning may be certified.

Information on the evaluation of learning and the certification of studies can generally be found in official documents such as the *Definition of the Domain for Summative Evaluation* and the *Administrative Manual for the Certification of Studies in General Education for Adults and in Vocational Education*. These documents provide specific information on these subjects.

PROGRAM CONTENT BY COURSE

BLG-5061 The Human Respiratory System
1 credit (25 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human respiratory system and the health problems associated with it.

TERMINAL OBJECTIVES

1. Describe the human respiratory system.
2. Describe the inhalation and exhalation mechanisms of the lungs.
3. Describe the gas exchanges that occur between air and blood in the lungs, and between blood and cells in the tissues.
4. Describe the principal health problems associated with the respiratory system, and the factors that contribute to its health.

TERMINAL OBJECTIVE 1

Describe the human respiratory system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

1.1 Name the organs of the human respiratory system.	Organs of the respiratory system:
1.2 Identify, on a diagram, the different organs of the human respiratory system.	- Nasal cavity: conchae, hair and mucus glands
1.3 Describe briefly the organs of the human respiratory system.	- Pharynx
	- Larynx: vocal cords and epiglottis
	- Trachea: cilia and mucus glands
	- Bronchi: cartilage rings, cilia and mucus glands
	- Lungs: bronchioles, lobes, pulmonary vesicles and alveoli, and pleura
1.4 Specify the role of each organ of the human respiratory system.	Role of respiratory system organs:
	- Filtering, moistening and warming of air
	- Phonation
	- Junction of the respiratory and digestive systems
	- Gas exchange

TERMINAL OBJECTIVE 2
Describe the inhalation and exhalation mechanisms of the lungs.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

2.1 Describe the pathway followed by oxygen and carbon dioxide molecules during respiration.	Air pathway during inhalation and exhalation
2.2 Name the structures involved in normal inhalation and exhalation.	Normal inhalation and exhalation: - Diaphragm, external and internal intercostal muscles
2.3 Specify the role of structures in normal inhalation and exhalation.	
2.4 Name the structures involved in forced inhalation and exhalation.	Forced inhalation: - As for normal inhalation + pectoralis major + pectoralis minor + serratus anterior
2.5 Specify the role of structures involved in forced inhalation and exhalation.	Forced exhalation: - As for forced inhalation + rectus abdominis
2.6 Compare the volume of air associated with normal inhalation or exhalation with that associated with forced inhalation and exhalation.	
2.7 Associate the respiratory bellows with the different types of pulmonary ventilation.	Vital capacity: - Tidal volume + inspiratory reserve volume + expiratory reserve volume Total capacity: - Vital capacity + residual volume

TERMINAL OBJECTIVE 3

Describe the gas exchanges that occur between air and blood in the lungs, and between blood and cells in the tissues.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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- | | |
|--|--|
| 3.1 Specify the ideal composition of ambient air. | Nitrogen: 79% – buffer
Oxygen: 21% – essential for combustion (respiration) |
| 3.2 Specify the role of the principal air components in respiration. | Carbon dioxide: traces – respiratory waste
Water: variable – facilitates respiration |
| 3.3 Compare the composition and temperature of inhaled and exhaled air. | |
| 3.4 Describe the gas exchanges between air and blood in the lungs. | O ₂ : from air in lungs to blood
CO ₂ : from blood to air in lungs |
| 3.5 Explain how oxygen binds in the blood. | Hemoglobin + oxygen ⇌ oxyhemoglobin |
| 3.6 Describe the gas exchanges between blood and cells in the tissues. | O ₂ : from blood to cells
CO ₂ : from cells to blood |
| 3.7 Explain carbon dioxide transport. | Dissolution in plasma
Hemoglobin + carbon dioxide ⇌ carbohemoglobin
Carbonate + carbon dioxide ⇌ bicarbonate |
| 3.8 Describe the effects on the human body of variations in the composition or temperature of ambient air. | |

TERMINAL OBJECTIVE 4
Describe the principal health problems associated with the respiratory system, and the factors that contribute to its health.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

4.1 Describe briefly the principal infectious diseases of the respiratory system.	Common respiratory diseases: - Asthma, bronchitis, bronchial pneumonia, bronchopulmonary cancer, whooping cough, emphysema, laryngitis, pleuritis, pneumonia, tuberculosis
4.2 Associate the principal infectious diseases of the respiratory system with its various parts.	
4.3 Specify the possible causes and effects of the principal infectious diseases of the respiratory system.	Origin of respiratory diseases: - Viral or bacterial infection (e.g. laryngitis, pneumonia) - Pollutants or allergens (e.g. asthma, emphysema, asbestosis)
4.4 Associate certain respiratory disorders with the appropriate air pollutants or allergens.	- Hereditary factors (e.g. cystic fibrosis)
4.5 Describe the effects of gas pollutants on the respiratory system.	Examples of gas pollutants: - Sulphur dioxide, carbon monoxide, household pollutants
4.6 Describe the lungs' defence mechanism against particle inhalation.	
4.7 Describe the effects of particle inhalation and deposition on the mucous membrane of the lungs.	Examples of particles: - Asbestos fibres, mould, pollen
4.8 Explain the type of lifestyle that helps maintain a healthy respiratory system.	Examples: exercise, avoid smoking

BLG-5062 The Human Reproductive System and the Perinatal Period
2 credits (50 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human reproductive system and the perinatal period, and the health problems associated with them.

TERMINAL OBJECTIVES

1. Describe the human male and female reproductive systems.
2. Explain the onset of puberty and the formation of sexual gametes in adolescent boys and girls.
3. Explain the physical, physiological and hormonal aspects of the menstrual cycle, and possible menstrual disorders.
4. Describe the physiological process leading to the formation and development of the embryo and fetus.
5. Explain the events related to childbirth.
6. Describe the characteristics of breast-feeding.
7. Differentiate between the various methods of contraception and sterilization, based on their characteristics and action.
8. Describe different abortion techniques.
9. Explain the health problems related to sexually transmitted diseases.

TERMINAL OBJECTIVE 1

Describe the human male and female reproductive systems.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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- | | |
|--|---|
| 1.1 Name the principal anatomical structures of the male reproductive system. | Principal anatomical structures of the male reproductive system: |
| 1.2 Identify, on a diagram, the principal anatomical structures of the male reproductive system. | - testicles: scrotum, seminiferous tubules, straight tubules and efferent ducts |
| 1.3 Describe briefly the principal anatomical structures of the male reproductive system. | - epididymis |
| 1.4 Specify the role of the principal anatomical structures of the male reproductive system. | - vas deferens |
| | - seminal vesicles |
| | - prostate |
| | - Cowper's gland |
| | - penis: glans, prepuce, corpus spongiosum, corpus cavernosum and urethra |
| 1.5 Name the principal anatomical structures of the female reproductive system. | Principal anatomical structures of the female reproductive system: |
| 1.6 Identify, on a diagram, the principal anatomical structures of the female reproductive system. | - ovaries |
| 1.7 Describe briefly the principal anatomical structures of the female reproductive system. | - fallopian tubes: infundibulum, ampulla, fimbriae |
| 1.8 Specify the role of the principal anatomical structures of the female reproductive system. | - uterus: endometrium |
| | - vagina |
| | - vulva: labia majora, labia minora, clitoris |
| | - Bartholin's and paraurethral glands |

TERMINAL OBJECTIVE 2

Explain the onset of puberty and the formation of sexual gametes in adolescent boys and girls.

INTERMEDIATE OBJECTIVES	ADDITIONAL INFORMATION
2.1 Specify the changes that occur in adolescent boys during puberty.	Voice, body hair, etc.
2.2 Describe how hormones regulate testicular activity.	Hypothalamus: gonadotropin-releasing hormone Pituitary gland: FSH and LH Testicles: testosterone
2.3 Describe the spermatogenesis process.	Cell and chromosome division
2.4 Describe the structure of a spermatozoon.	Head, body and tail
2.5 Specify the changes that occur in adolescent girls during puberty.	Breasts, body hair, menstruation, etc.
2.6 Describe how hormones regulate ovarian activity.	Hypothalamus: gonadotropin-releasing hormone Pituitary gland: FSH, LH and LTH Ovaries: estrogens and progesterone
2.7 Describe the process of oogenesis.	Cell division, chromosome division
2.8 Describe the structure of the ovum.	Nucleus, cytoplasm, <i>corona radiata</i> and <i>zona pellucida</i>
2.9 Compare spermatogenesis and oogenesis.	Differences and similarities

TERMINAL OBJECTIVE 3

Explain the physical, physiological and hormonal aspects of the menstrual cycle, and possible menstrual disorders.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

3.1 Distinguish the four phases of the menstrual cycle.	Pre-menstrual phase, menstruation, post-menstrual phase, inter-menstrual phase and ovulation
3.2 Explain the cycle and role of hormones related to the menstrual and ovarian cycles.	Pituitary gland: FSH and LH Ovaries: estrogens and progesterone
3.3 Describe what occurs during the ovarian cycle.	Development of follicles, ovulation and formation of the corpus luteum
3.4 Describe the changes in the uterus during the menstrual cycle.	Endometrium and cervical mucus
3.5 Describe the relationship between the ovarian cycle and the menstrual cycle.	
3.6 Associate the periods of female fertility and infertility with aspects of the menstrual cycle.	
3.7 Describe the following menstrual disorders: amenorrhea and dysmenorrhea.	
3.8 Describe menopause and its symptoms.	

TERMINAL OBJECTIVE 4

Describe the physiological process leading to the formation and development of the embryo and fetus.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

4.1 Describe male and female sexual reactions during intercourse.	Male: erection, lubrication, ejaculation and orgasm Female: erection, lubrication and orgasm
4.2 Describe the spermatozoon's path from its formation to fertilization of the ovum.	
4.3 Describe ovum fertilization in the Fallopian tubes.	
4.4 Explain migration of the embryo and its implantation in the uterus.	
4.5 Describe the embryonic development process.	Morula, blastocyte, embryo
4.6 Specify the role of the fetal appendages during the development of the fetus.	Amniotic sac, umbilical vesicle, fetal membrane and chorion
4.7 Explain the physiological exchanges that occur between mother and fetus.	Contribution of oxygen and nutrients Elimination of carbon dioxide and embryo waste
4.8 Distinguish between the embryonic and fetal phases of pregnancy.	

TERMINAL OBJECTIVE 5

Explain the events related to childbirth.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

5.1 Describe the choices available to women regarding support during pregnancy and physical environment during childbirth.	Diversity of locations, caregivers, physical environment, etc.
5.2 Describe the early signs and different stages of vaginal delivery.	Early signs: <ul style="list-style-type: none">- rupture of amniotic sac (“breaking water”)- regularity of contractions Stages of labour: <ul style="list-style-type: none">- cervical dilation- entry of the baby into the vagina- delivery of the baby (birth)- delivery (expulsion of the placenta)
5.3 Describe various medical interventions possible during childbirth.	Version, forceps, cesarean section, episiotomy, induction, artificial rupturing of the membranes, local or regional anesthesia (epidural, pudendal block, etc.), etc.

TERMINAL OBJECTIVE 6

Describe the characteristics of breast-feeding.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

6.1 Name the different parts of the mammary glands.	Parts of the mammary glands:
6.2 Identify, on a diagram, the different parts of the mammary glands.	- nipple - areola - fatty and glandular tissue - lactiferous ducts and ampulla
6.3 Describe the mechanism that triggers breast-feeding.	Role of prolactin and oxytocin hormones
6.4 Compare the composition of breast milk and that of various prepared formulas sold on the market.	
6.5 Compare the advantages and disadvantages of the different feeding methods.	Breast, bottle, or both

TERMINAL OBJECTIVE 7

Differentiate between the various methods of contraception and sterilization, based on their characteristics and action.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

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|---|---|
| 7.1 Distinguish between “sterilization” and “contraception.” | |
| 7.2 Be familiar with the different contraception methods. | “Natural” methods:
- abstinence, temperature chart, etc. |
| 7.3 Describe how the different contraception methods work. | Local contraception (physical or chemical):
- condom, cream, gel, etc. |
| 7.4 Be familiar with the efficacy rate of the different methods of contraception. | Hormonal contraception:
- estrogen-progestin pill, Depo-Provera, mini-pill, “morning after” pill, etc. |
| 7.5 Describe the advantages and disadvantages of the different contraception methods. | Intrauterine devices:
- IUD, progesterone-releasing IUD, etc. |
| 7.6 Describe vasectomy and tubal ligation as a means of sterilization. | |
| 7.7 Describe the advantages and disadvantages of vasectomy and tubal ligation. | |

TERMINAL OBJECTIVE 8 Describe different abortion techniques.
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INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

- 8.1 Describe the different methods used to terminate pregnancy, based on the stage of the pregnancy.
- 8.2 Explain the advantages of consulting a specialist in case of pregnancy termination.
- 8.3 Based on case studies, describe the effects of using inappropriate means to terminate pregnancy.

Non-surgical abortion: 7 weeks
Manual vacuum aspiration: 8 weeks
Suction and curettage: 6 to 14 weeks
Dilation and expulsion: 14 to 20 weeks

TERMINAL OBJECTIVE 9

Explain the health problems related to sexually transmitted diseases.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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- | | |
|--|---|
| 9.1 Describe the characteristics and symptoms of sexually transmitted diseases (STD). | Sexually transmitted diseases:
- Chlamydia
- genital warts |
| 9.2 Specify the risk factors and transmission of sexually transmitted diseases. | - genital herpes
- gonorrhea
- hepatitis B and C |
| 9.3 Describe the consequences of non-treatment or late treatment of sexually transmitted diseases. | - HIV and AIDS
- pubic lice and scabies
- syphilis
- vaginitis |

BLG-5063 The Human Digestive System
2 credits (50 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human digestive system and the health problems associated with it.

TERMINAL OBJECTIVES

1. Describe the digestive tract.
2. Describe the digestive glands.
3. Explain digestion and absorption as they relate to the various parts of the digestive system.
4. Explain the human body's requirements for carbohydrates, lipids, proteins, vitamins, mineral salts and water.
5. Describe the principal health problems associated with the digestive system, and the factors that contribute to its health.

TERMINAL OBJECTIVE 1
Describe the digestive tract.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

1.1 Distinguish between the digestive tract and its associated glands.	Digestive tract: mouth, pharynx, esophagus, stomach, small intestine, large intestine Digestive glands: salivary glands, gastric glands, intestinal glands, pancreatic glands and liver
1.2 Name the different parts of the digestive tract.	Parts of the digestive tract: - mouth: tongue, teeth, oral cavity, uvula, palate
1.3 Identify, on a diagram, the different parts of the digestive tract.	- pharynx and epiglottis - esophagus
1.4 Describe briefly the different parts of the digestive tract.	- stomach: cardia, pylorus, body, fundus and antrum
1.5 Specify the role of the different parts of the digestive tract.	- small intestine: duodenum, jejunum, ileum and ileocecal valve - large intestine: cecum, appendix, ascending colon, transverse colon, descending colon, sigmoid colon, rectum and anus
1.6 Describe the characteristics of human dentition in terms of number, role and position of each type of tooth.	
1.7 Describe the structure of a tooth.	Internal and external parts
1.8 Associate the different parts of the digestive tract with the basic processes of the digestive system.	Basic processes of the digestive system: - ingestion, propulsion, mechanical digestion, chemical digestion, absorption and defecation

TERMINAL OBJECTIVE 2
Describe the digestive glands.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

2.1 Distinguish between the glands that are part of the digestive tract and the accessory glands.	Glands that form an integral part of the digestive system: - salivary glands: submandibular, sublingual and parotid - gastric glands: surface epithelium, chorion, gastric crypts, goblet cells, parietal cells, zymogenic cells and muscle mucosa - intestinal glands
2.2 Name the different digestive glands.	
2.3 Identify, on a diagram, the different digestive glands.	
2.4 Describe briefly the different digestive glands.	Glands appended to the digestive system: - liver: gallbladder and bile duct - pancreas: pancreatic duct
2.5 Specify the role of the different digestive glands.	
2.6 Associate the different digestive glands with the basic processes of the digestive system.	Basic processes of the digestive system: - ingestion, propulsion, mechanical digestion, chemical digestion, absorption and defecation

TERMINAL OBJECTIVE 3

Explain digestion and absorption as they relate to the different parts of the digestive system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 3.1 Distinguish between the physical and chemical aspects of food digestion. | Physical: mastication, mixing, etc.
Chemical: conversion of starch into glucose, proteins into amino acids, etc. |
| 3.2 Specify the nature and role of an enzyme and how it functions. | |
| 3.3 Distinguish between the two types of basic movement that ensure the mixing and transport of food. | Segmentation and peristalsis |
| 3.4 Describe the movement of a bolus of food in the mouth, pharynx and upper esophagus during swallowing. | |
| 3.5 Describe the phenomenon of motility for the stomach and small and large intestine. | |
| 3.6 Describe the physical and chemical mechanisms of digestion and absorption that occur in the mouth, stomach, small intestine and large intestine. | |

TERMINAL OBJECTIVE 4
 Explain the human body's requirements for carbohydrates, lipids, proteins, vitamins, mineral salts and water.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

4.1 Distinguish between carbohydrates, lipids and proteins in everyday foods.	
4.2 Distinguish between categories of carbohydrates, lipids and proteins.	Simple and complex molecules
4.3 Specify the principal roles of carbohydrates, lipids and proteins.	
4.4 Specify the caloric content of carbohydrates, lipids and proteins.	
4.5 Explain how carbohydrates, lipids and proteins are stored in the body.	
4.6 Distinguish between water soluble and fat soluble vitamins.	Fat soluble vitamins: A, D, E, K Water soluble vitamins: C and B complex
4.7 Specify the role of vitamins and their sources.	
4.8 Specify the role of the principal mineral salts and their sources.	Principal minerals: calcium, phosphorus, magnesium, copper, potassium, sodium, sulphur, iron, iodine and fluorine
4.9 Specify the role of water in the body.	
4.10 Specify the ideal composition of a daily diet, using criteria in <i>Canada's Food Guide</i> .	

TERMINAL OBJECTIVE 5

Describe the principal health problems associated with the digestive system, and the factors that contribute to its health.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

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- 5.1 Specify the causes of teeth or gum problems such as dental plaque, tartar and *materia alba*.
 - 5.2 Describe how dental plaque, tartar and caries are formed.
 - 5.3 Specify the dangers of carbohydrate, lipid, protein, vitamin and mineral excess and deficiency.
 - 5.4 Specify the dangers of excessive salt consumption.
 - 5.5 Describe the most frequent health problems associated with the digestive system.
 - 5.6 Explain the lifestyles that help the digestive system function properly.

Heartburn, gastritis, gastroenteritis, gastric or intestinal ulcers, gallstones, hepatitis, appendicitis, constipation

BLG-5064 The Anatomy and Physiology of Cells
2 credits (50 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the function of cells, the basic units of life.

TERMINAL OBJECTIVES

1. Compare plant and animal cells.
2. Differentiate between modes of absorption and excretion of cells.
3. Distinguish between modes of cellular reproduction, as well as the sequences and characteristics specific to each mode.
4. Associate cellular respiration with the release of energy required by the body.
5. Distinguish between deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) in terms of chemical composition, structure and cell activity.

TERMINAL OBJECTIVE 1 Compare plant and animal cells.
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INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 1.1 Name the principal components of plant and animal cells. | Animal cell: |
| 1.2 Identify, on a diagram, the principal components of plant and animal cells. | - cytoplasmic membrane |
| 1.3 Describe briefly the principal components of plant and animal cells. | - nucleus: nuclear membrane, nucleoplasm, nucleolus, chromatin network and chromosomes |
| 1.4 Specify the role of the principal components of plant and animal cells. | - cytoplasm: vacuoles, mitochondria, ribosomes, endoplasmic reticulum, Golgi apparatus, lysosomes and centrioles |
| 1.5 Establish a parallel between plant and animal cell composition. | Plant cell: |
| 1.6 Illustrate the variety of cell shapes. | - cytoplasmic and cellulosic membranes |
| 1.7 Associate various cell shapes with specific roles. | - nucleus identical to that of the animal cell |
| | - cytoplasm: vacuoles, mitochondria, ribosomes, endoplasmic reticulum, Golgi apparatus and plastids |

TERMINAL OBJECTIVE 2

Differentiate between modes of absorption and excretion of cells.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

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| 2.1 Describe the structure of the cell membrane. | |
| 2.2 Distinguish between active and passive absorption through the cell membrane. | Passive: diffusion and osmosis
Active: phagocytosis and active transport |
| 2.3 Describe passive absorption through the cell membrane. | |
| 2.4 Describe active absorption through the cell membrane. | |
| 2.5 Illustrate osmosis and active transport. | Osmosis:
- movement of water through the cell membrane, from a less concentrated to a more concentrated environment
Active transport:
- movement of a substance through the cell membrane, from a less concentrated to a more concentrated environment |
| 2.6 Describe modes of excretion through the cell membrane. | |

TERMINAL OBJECTIVE 3

Distinguish between modes of cellular reproduction, as well as the sequences and characteristics specific to each mode.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

3.1 Differentiate between the three modes of cell division: amitosis, mitosis and meiosis.	
3.2 Describe the various phases of mitotic division.	Interphase, prophase, metaphase, anaphase and telophase
3.3 Specify the characteristics inherent in each stage of mitotic division.	
3.4 Describe the different phases of meiotic cell division.	Two-phase division
3.5 Specify the characteristics inherent in each stage of meiotic division.	
3.6 Establish a parallel between the functions of mitosis and meiosis.	Mitosis: equational division of somatic cells Meiosis: reductional division of sexual cells

TERMINAL OBJECTIVE 4

Associate cellular respiration with the release of energy required by the body.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 4.1 Define the expression “cellular respiration.” | Cellular respiration:
Glucose \Rightarrow carbon dioxide + water + energy |
| 4.2 Associate adenosine triphosphate (ATP) with energy released. | |
| 4.3 Associate the digestive and respiratory systems with the process of cellular respiration. | Digestive system: nutrient intake
- carbohydrates \Rightarrow glucose
- lipids \Rightarrow glycerol + fatty acid
- proteins \Rightarrow amino acids
Respiratory system: oxygen intake and elimination of carbon dioxide |
| 4.4 Specify the nature and role of an enzyme, and how it functions. | |
| 4.5 Associate cellular respiration with enzyme-controlled combustion. | |
| 4.6 Associate glycolysis, the Krebs cycle and the respiratory chain, with cellular respiration. | |
| 4.7 Associate energy released by cellular respiration with the activities of the cell and the body. | Cell division, protein synthesis, etc. |

TERMINAL OBJECTIVE 5

Distinguish between deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) in terms of chemical composition, structure and cell activity.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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|------|---|----------------------------------|
| 5.1 | Describe the structure of a chromosome as an arrangement of nucleotides, genes and DNA. | |
| 5.2 | Describe the molecular structure of DNA. | Nucleotide structure and diagram |
| 5.3 | Describe duplication of a DNA molecule. | |
| 5.4 | Associate DNA duplication with cell reproduction. | |
| 5.5 | Describe the molecular structure of RNA. | Nucleotide structure and diagram |
| 5.6 | Transcribe the coded language of a DNA molecule into the coded language of an RNA molecule. | |
| 5.7 | Describe how messenger RNA molecules and transfer RNA molecules are synthesized from DNA. | |
| 5.8 | Describe protein synthesis by the two RNA molecules. | |
| 5.9 | Explain DNA's biological code. | |
| 5.10 | Associate the transcription of genetic traits with the presence of a biological code. | |

BLG-5065 The Transmission of Hereditary Characteristics
2 credits (50 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the transmission of human hereditary characteristics, and the health problems associated with it.

TERMINAL OBJECTIVES

1. Explain how hereditary characteristics are transmitted.
2. Explain the transmission of human hereditary characteristics linked to blood type.
3. Explain problems associated with the transmission of hereditary characteristics.
4. Associate the causes of certain mutations with their effects.

TERMINAL OBJECTIVE 1
Explain how hereditary characteristics are transmitted.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

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|--|---|
| 1.1 Associate the cell nucleus, chromosomes and DNA with the transmission of hereditary characteristics. | |
| 1.2 Describe the structure of a chromosome and a gene. | |
| 1.3 Define the term “allele.” | |
| 1.4 Distinguish between a diploid somatic cell and a haploid sexual cell. | Somatic cell: $2n$ chromosomes
Sexual cell: n chromosomes |
| 1.5 Distinguish between a dominant trait and recessive trait. | |
| 1.6 Distinguish between genotype and phenotype. | |
| 1.7 Distinguish between homozygous and heterozygous for a specific trait. | |
| 1.8 Distinguish between monohybrid and dihybrid cross-breeding. | |
| 1.9 Distinguish between genotypic ratio and phenotypic ratio. | |
| 1.10 Illustrate Mendel’s three laws based on his experiments in crossbreeding peas. | Law of dominance
Law of segregation
Law of independent assortment |

TERMINAL OBJECTIVE 1 (CONT.)

Explain how hereditary characteristics are transmitted.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

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- 1.11 Establish, for a monohybrid and a dihybrid cross, the offsprings' phenotype, genotype, phenotypic ratio and genotypic ratio.
- 1.12 List dominant or recessive hereditary traits that are easy to identify in humans.
- 1.13 Solve monohybrid or dihybrid cross problems.
- 1.14 Define the expression "incomplete dominance" in the transmission of hereditary characteristics.
- 1.15 Solve cross problems involving incomplete dominance of hereditary characteristics.

Detached earlobe, U-shaped tongue, chin dimple, allergic tendencies, freckles, etc.

Seven pairs of traits in the pea (Mendel): stem length, flower position, pea shape, etc.
Eye colour in humans
Fur colour in mice, etc.

TERMINAL OBJECTIVE 2
 Explain the transmission of human hereditary characteristics linked to blood type.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

- 2.1 Describe the characteristics of each blood type in terms of the antigens (agglutinogens) and antibodies (agglutinins) in the blood.
- 2.2 Explain the compatibility and incompatibility of blood types.
- 2.3 List the three alleles responsible for the four blood types.
- 2.4 Determine the homozygous and heterozygous genotypes of each blood type.
- 2.5 Solve cross problems linked with blood types.
- 2.6 Distinguish between Rhesus positive blood (Rh⁺) and Rhesus negative blood (Rh⁻).
- 2.7 Determine the possible genotypes of Rhesus positive blood and Rhesus negative blood.
- 2.8 Describe problems that may occur during pregnancy because of mother/fetus Rhesus incompatibility.

Type A: agglutinogen A and anti-B agglutinins
 Type B: agglutinogen B and anti-A agglutinins
 Type AB: agglutinogens A and B and no agglutinins
 Type O: no agglutinogens and anti-A and anti-B agglutinins

Genotype for the four blood types:
 - Type A: I^AI^A or I^Ai
 - Type B: I^BI^B or I^Bi
 - Type AB: I^AI^B
 - Type O: ii

Rh⁺: RhRh or Rhrh
 Rh⁻: rhrh

TERMINAL OBJECTIVE 2 (CONT.)

Explain the transmission of human hereditary characteristics linked to blood type.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

- 2.9 Solve cross problems related to Rhesus blood groups.
- 2.10 Explain how an individual's blood type and Rhesus factor are determined.

TERMINAL OBJECTIVE 3

Explain problems associated with the transmission of hereditary characteristics.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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- 3.1 Distinguish between a male karyotype and a female karyotype.
 - 3.2 Show that, with regard to gender transmission, there is an equal probability a child will be male or female.
 - 3.3 Determine the genotype of members of a family affected by colour-blindness or hemophilia.
 - 3.4 Solve gender-related cross problems.
 - 3.5 Explain the increased risk of hereditary disorders in consanguineous unions.
 - 3.6 Associate hereditary factors with certain chronic health problems.

Cystic fibrosis, familial hypercholesterolemia, lactic acidosis, tyrosinemia, etc.

TERMINAL OBJECTIVE 4

Associate the causes of certain mutations with their effects.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

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- 4.1 Define the term “mutation.”
- 4.2 Distinguish between chromosome mutation and genetic mutation.
- 4.3 Explain how certain mutagens operate.
- 4.4 Associate chromosome mutations with certain human hereditary defects.

Mutagens:

- chemical substances
- radiation
- etc.

Down syndrome, Turner’s syndrome, Klinefelter’s syndrome, etc.

BLG-5066 The Human Skeletal and Muscular System
1 credit (25 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human skeletal and muscular system and the health problems associated with it.

TERMINAL OBJECTIVES

1. Be familiar with the structure of a long bone, its formation and growth, and the nutrients essential to its health.
2. Describe the structure and functioning of joints.
3. Describe the human skeleton.
4. Describe a skeletal muscle and the phenomena associated with its contraction.
5. Illustrate the antagonistic action of certain muscles related to forearm flexion and extension.
6. Describe the principal health problems associated with the skeletal and muscular system, and the factors that contribute to its health.

TERMINAL OBJECTIVE 1

Be familiar with the structure of a long bone, its formation and growth, and the nutrients essential to its health.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 1.1 Describe the characteristics of the four classes of bones. | Long bones, short bones, flat bones and irregularly-shaped bones |
| 1.2 Name the different components of a long bone. | Epiphysis, diaphysis, medullary cavity, red bone marrow, yellow bone marrow, cancellous (spongy) bone, compact bone, periosteum, articular cartilage and growth cartilage |
| 1.3 Identify, on a diagram, the different components of a long bone. | |
| 1.4 Specify the role of the different components of a long bone. | |
| 1.5 Understand the different stages in long bone formation and growth. | |
| 1.6 Specify the principal nutrients required for the development and maintenance of good bone structure, as well as the principal food sources of these nutrients. | Calcium (Ca), phosphorus (P) and vitamins A, C and D |

TERMINAL OBJECTIVE 2

Describe the structure and functioning of joints.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

2.1 Specify the role of joints.

2.2 Illustrate the different types of joints.

Types of joints:

- fixed

- mobile: hinged, gliding, saddle, pivoting, condyloid and balland socket

- semi-mobile

2.3 Specify the role of cartilage and bursa in lubricating and protecting joints.

2.4 Specify the role of tendons and ligaments.

TERMINAL OBJECTIVE 3

Describe the human skeleton.

INTERMEDIATE OBJECTIVES	ADDITIONAL INFORMATION
3.1 Name the three anatomical regions of the human body.	Head, trunk and limbs
3.2 Distinguish the two regions of the head.	Skull and face
3.3 Identify, on a diagram, the eight bones that make up the skull.	Frontal bone, parietal bones (2), temporal bones (2), occipital, sphenoid and ethmoid bones
3.4 Distinguish between the five regions of the spinal column.	Cervical (7), thoracic (12), lumbar (5), sacral (5) and coccyx (4) vertebrae
3.5 Specify the role of the intervertebral discs.	
3.6 Identify, on a diagram, the principal bones of the rib cage.	Ribs (12 pairs): true (7), false (3) and floating (2) Sternum
3.7 Identify, on a diagram, the principal bones in each part of the upper limbs.	Shoulder girdle: clavicles and scapulae Arm: humerus Forearm: radius and ulna Hand: carpal bones, metacarpal bones and phalanges
3.8 Describe the principal joints of the upper limbs.	Shoulder, elbow and wrist

TERMINAL OBJECTIVE 3 (CONT.)

Describe the human skeleton.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

3.9 Identify, on a diagram, the principal bones in each part of the lower limbs.	Pelvic girdle: hip bones (ilium, ischium and pubis) Thigh: femur Knee: patella Leg: tibia and fibula Foot: tarsi, metatarsi and phalanges
3.10 Describe the principal joints of the lower limbs.	Hip, knee and ankle joints
3.11 List the basic movements that are possible for the principal joints of the upper and lower limbs.	Abduction, adduction, extension, flexion, pronation, rotation, supination

TERMINAL OBJECTIVE 4

Describe a skeletal muscle and the phenomena associated with its contraction.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 4.1 Distinguish between smooth muscle, skeletal muscle and cardiac muscle, based on shape, structure and role. | |
| 4.2 Illustrate, using examples, the four muscle functions. | Movement, posture control, joint stabilization and heat release |
| 4.3 Describe briefly the four properties of muscles. | Excitability, contractility, extensibility and elasticity |
| 4.4 Illustrate the organization of a skeletal muscle. | Muscle, connective tissue, tendons, muscle fibre bundles, muscle fibres, myofibril, sarcomere |
| 4.5 Describe the mechanism of muscle contraction. | Neuromuscular junction
Role of actin and myosin
Excitability threshold
All-or-nothing law |
| 4.6 Define the expression “muscle tone.” | |
| 4.7 Explain muscle fatigue and tetanus. | |

TERMINAL OBJECTIVE 5

Illustrate the antagonistic action of certain muscles related to forearm flexion and extension.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

- 5.1 Describe muscle movements produced by forearm flexion and extension.
- 5.2 Indicate, on a diagram, the origin and insertion points of biceps and triceps.
- 5.3 Explain what is meant by “antagonistic muscles.”

TERMINAL OBJECTIVE 6

Describe the principal health problems associated with the skeletal and muscular system, and the factors that contribute to its health.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

6.1 Describe how exercising muscles affects the human body.	Muscle mass and tone, respiratory system, circulatory system (heart rhythm, blood pressure), metabolism, composition of urine, etc.
6.2 Explain the lifestyles that help the skeletal and muscular system function properly.	Exercise, proper posture, ergonomic environment, etc.
6.3 Distinguish between the different types of fractures.	Closed, open, comminuted, compression or depressed, impacted, spiral and greenstick
6.4 Describe the methods used to immobilize a fractured bone.	Cast, attachment of rods or plates, etc.
6.5 Describe the repair process of a fracture.	
6.6 Describe the appropriate treatment for a torn muscle.	
6.7 Describe the principal diseases associated with the skeletal and muscular system, and the appropriate treatment for each.	Arthritis, rheumatoid arthritis, strain, sprain, dislocation, synovial effusion, gout, primary and secondary bone cancer, rickets and flat feet, muscular dystrophy, hernia, etc.

BLG-5067 The Human Endocrine System
1 credit (25 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human endocrine system and the health problems associated with it.

TERMINAL OBJECTIVES

1. Describe the endocrine system.
2. Associate the endocrine organs with the hormones they secrete, the effects of these hormones on the body and the disorders caused by a dysfunction in these organs.
3. Associate the thyroid and parathyroid glands with the hormones they secrete, the effects of these hormones on the body and the disorders caused by a dysfunction in these glands.
4. Associate the adrenal glands with the hormones they secrete, the effects of these hormones on the body and the disorders caused by a dysfunction in these glands.
5. Associate the pituitary gland with the hormones it secretes, the effects of these hormones on the body and the disorders caused by a dysfunction in this gland.

TERMINAL OBJECTIVE 1 Describe the endocrine system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 1.1 Name the anatomical structures of the endocrine system. | Endocrine organs:
- stomach, pancreas, kidneys, ovaries and testicles |
| 1.2 Identify, on a diagram, the anatomical structures of the endocrine system. | Endocrine glands:
- thyroid, parathyroid, adrenal and pituitary |
| 1.3 Describe briefly the anatomical structures of the endocrine system. | |
| 1.4 Distinguish between the exocrine, endocrine and mixed glands. | |
| 1.5 Illustrate the regulatory function of the endocrine system and hormones. | Relationship between certain hormones and their antagonistic effects |

<p>TERMINAL OBJECTIVE 2 Associate the endocrine organs with the hormones they secrete, the effects of these hormones on the body and the disorders caused by a dysfunction in these organs.</p>
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INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

INTERMEDIATE OBJECTIVES	ADDITIONAL INFORMATION
2.1 Distinguish between the endocrine and exocrine functions of the stomach.	Exocrine function: gastric juice production Endocrine function: hormone production (gastrin, secretin and cholecystokinin)
2.2 Specify the role of hormones secreted by the stomach.	
2.3 Describe the disorders caused by endocrine dysfunction in the stomach.	
2.4 Distinguish between the endocrine and exocrine functions of the pancreas.	Exocrine function: pancreatic juice production Endocrine function: hormone production (insulin and glucagon)
2.5 Specify the role of hormones secreted by the pancreas.	
2.6 Describe the disorders caused by endocrine dysfunction in the pancreas.	Hypoglycemia, hyperglycemia and diabetes
2.7 Distinguish between the endocrine and exocrine functions of the kidneys.	Exocrine function: urine production Endocrine function: hormone production (erythropoietin)
2.8 Specify the role of the hormone secreted by the kidneys.	
2.9 Specify the role of the hormone secreted by the testicles.	Testosterone
2.10 Specify the role of the hormones secreted by the ovaries.	Estrogens and progesterone

TERMINAL OBJECTIVE 3

Associate the thyroid and parathyroid glands with the hormones they secrete, the effects of these hormones on the body and the disorders caused by a dysfunction in these glands.

INTERMEDIATE OBJECTIVES	ADDITIONAL INFORMATION
3.1 Specify the role of hormones secreted by the thyroid gland.	Thyroxin, triiodothyronine and calcitonin
3.2 Describe the disorders caused by a dysfunction in the thyroid gland.	Hypothyroidism and hyperthyroidism
3.3 Specify the role of the hormone secreted by the parathyroid glands.	Parathormone
3.4 Describe the disorders caused by a dysfunction in the parathyroid glands.	Hypoparathyroidism and hyperparathyroidism

TERMINAL OBJECTIVE 4

Associate the adrenal glands with the hormones they secrete, the effects of these hormones on the body and the disorders caused by a dysfunction in these glands.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

4.1	Identify, on a diagram, the two parts of an adrenal gland.	
4.2	Specify the role of the hormones of the adrenal medulla.	Adrenaline and noradrenaline (also called epinephrine and norepinephrine)
4.3	Specify the role of the hormones of the adrenal cortex.	Aldosterone, cortisol and gonadocorticoids
4.4	Describe the disorders caused by a dysfunction in the adrenal glands.	
4.5	Explain the regulatory function of the adrenal glands.	

TERMINAL OBJECTIVE 5

Associate the pituitary gland with the hormones it secretes, the effects of these hormones on the body and the disorders caused by a dysfunction of this gland.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 5.1 | Identify, on a diagram, the two lobes of the pituitary gland. | |
| 5.2 | Describe the effects of hormones secreted by the anterior lobe of the pituitary gland. | Somatotropin, prolactin and gonadotrophins (FSH and LH) |
| 5.3 | Describe the interaction between the anterior pituitary and the thyroid gland. | |
| 5.4 | Describe briefly the regulatory function of the hypothalamus on the anterior lobe of the pituitary gland. | |
| 5.5 | Describe the effects of the hormones secreted by the posterior lobe of the pituitary gland. | Oxytocin and vasopressin |
| 5.6 | Describe briefly the disorders caused by a dysfunction in the pituitary gland. | |

BLG-5068 The Human Nervous System
2 credits (50 hours)

GENERAL OBJECTIVE

By learning concepts of anatomy and physiology, adults will gain a better understanding of the human nervous system and the health problems associated with it.

TERMINAL OBJECTIVES

1. Describe the organization of the nervous system.
2. Describe nerve cells.
3. Describe the propagation of nerve impulses.
4. Describe the central nervous system.
5. Describe the peripheral nervous system.
6. Explain the reflex arc.
7. Illustrate the regulatory process of the autonomic nervous system.
8. Explain the effects of alcohol, drugs and certain heavy metals on the nervous system.

TERMINAL OBJECTIVE 1

Describe the organization of the nervous system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

1.1 Specify the three basic functions of the nervous system.	Sensory, integrative and motor
1.2 Distinguish between the different levels of organization of the nervous system.	Organization of the nervous system - Central nervous system: <ul style="list-style-type: none">. brain (cerebrum, brainstem and cerebellum). spinal cord
1.3 Illustrate, using a diagram, the different levels of organization of the nervous system.	- Peripheral nervous system: <ul style="list-style-type: none">. afferent: somatic and visceral sensory neurons. efferent: somatic nervous system and autonomic nervous system (sympathetic and parasympathetic)
1.4 Describe briefly the different levels of organization of the nervous system.	
1.5 Specify the role of the different levels of organization of the nervous system.	
1.6 Associate the different parts of the nervous system with the corresponding functions.	

TERMINAL OBJECTIVE 2

Describe nerve cells.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

2.1 Distinguish between the different cells of the nervous system.	Neurons, neuroglia and Schwann cells
2.2 Name the parts of a neuron.	Dendrite, cell body, axon and terminal arborization
2.3 Identify, on a diagram, the parts of a neuron.	
2.4 Describe briefly the parts of a neuron.	
2.5 Specify the role of the parts of a neuron.	
2.6 Distinguish between myelinated fibres and unmyelinated fibres.	
2.7 Distinguish between the different types of neurons by shape and function.	Shapes: unipolar, bipolar and multipolar Functions: sensory, motor or association
2.8 Specify the role of somatic sensory, visceral sensory and motor neurons.	
2.9 Specify the characteristics and role of the different neuroreceptors.	Types of neuroreceptors: proprioceptors, thermoreceptors, etc.

TERMINAL OBJECTIVE 3

Describe the propagation of nerve impulses.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 3.1 | Define the expression “nerve impulses.” | |
| 3.2 | Specify the factors that create nerve impulses. | |
| 3.3 | Explain how nerve impulses are propagated. | Propagation of a depolarization wave along the nerve fibre |
| 3.4 | Specify the factors that affect the propagation of nerve impulses. | Excitability threshold, diameter of nerve fibres, presence of myelin |
| 3.5 | Specify the role of a synapse. | |
| 3.6 | Specify the nature and source of neurotransmitters. | |
| 3.7 | Describe various ways in which nerve impulses are propagated. | |

TERMINAL OBJECTIVE 4

Describe the central nervous system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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|---|---|
| 4.1 Show how the central nervous system fits into the nervous system. | |
| 4.2 Distinguish between the two parts of the central nervous system. | Brain and spinal cord |
| 4.3 Name the main parts of the brain. | Parts of the brain: |
| 4.4 Identify, on a diagram, the main parts of the brain. | - cerebrum: cerebral hemispheres, cerebral lobes (frontal, parietal, temporal and occipital), central sulcus and lateral sulcus |
| 4.5 Describe briefly the main parts of the brain. | - brainstem: pons and medulla oblongata |
| 4.6 Specify the role of the main parts of the brain. | - cerebellum |
| 4.7 Name the main components of the spinal cord. | Protection: meninges and skull |
| 4.8 Identify, on a diagram, the main components of the spinal cord. | Components of the spinal cord: |
| 4.9 Describe briefly the main components of the spinal cord. | - white matter: dorsal, ventral and lateral tracts |
| 4.10 Specify the role of the main components of the spinal cord. | - grey matter: dorsal, ventral and lateral horns |
| 4.11 List the specific features of the cerebral hemispheres and certain of their areas. | - anterior and posterior median fissures |
| | - spinal canal |
| | Protection: meninges, vertebral column and cerebrospinal fluid |

TERMINAL OBJECTIVE 4 (CONT.) Describe the central nervous system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

- 4.12 Identify, on a diagram, the location of the following areas:
sensory, premotor, primary motor and primary sensory areas.
- 4.13 Specify the function of the premotor, the primary motor and
the primary sensory areas.

TERMINAL OBJECTIVE 5

Describe the peripheral nervous system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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- 5.1 Show how the peripheral nervous system fits into the nervous system.
- 5.2 Name the components of the peripheral nervous system.
- 5.3 Identify, on a diagram, the components of the peripheral nervous system.
- 5.4 Describe briefly the components of the peripheral nervous system.
- 5.5 Specify the role of the components of the peripheral nervous system.
- 5.6 Specify the nature of a nerve and that of a ganglion.
- 5.7 Explain the nature of a plexus.

Composition of the peripheral nervous system:

- cranial nerves
- spinal nerves: cervical, thoracic, lumbar, sacral and coccyx
- ganglia

Nerve: a bundle of axons

Ganglion: a collection of cell bodies

TERMINAL OBJECTIVE 6 Explain the reflex arc.
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INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 6.1 Define the expression “reflex arc.” | |
| 6.2 Locate, in the brain, the control centres of a reflex arc. | |
| 6.3 Describe the components of a simple or complex reflex arc. | Neural receiver, sensory neuron, synapse, associative neuron, motor neuron, effector neuron. |
| 6.4 Distinguish between a monosynaptic reflex and a polysynaptic reflex. | |
| 6.5 Specify the role of patellar, Achilles and radial reflexes. | |
| 6.6 Explain the mechanism of the reflex arc for a given situation. | |

TERMINAL OBJECTIVE 7

Illustrate the regulatory process of the autonomic nervous system.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 7.1 | Show how the autonomic nervous system fits into the nervous system. | |
| 7.2 | List the organs controlled by the autonomic nervous system. | Heart, liver, intestines, etc. |
| 7.3 | Explain the main difference between the autonomic nervous system and the somatic nervous system. | |
| 7.4 | List the three principal ways in which the sympathetic and parasympathetic systems differ. | |
| 7.5 | Describe the process that regulates respiration. | |
| 7.6 | Name the anatomical structures involved in regulating heartbeat. | |
| 7.7 | Identify, on a diagram, the anatomical structures involved in regulating heartbeat. | |
| 7.8 | Describe the process that regulates the heart. | |

TERMINAL OBJECTIVE 8
Explain the effects of alcohol, drugs and certain heavy metals on the nervous system.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

8.1 Define the term “drug.”	
8.2 Distinguish between the various types of drugs.	Hallucinogens, analgesics, narcotics, sedatives, hypnotics, tranquilizers, stimulants and cannabis derivatives.
8.3 Give at least two examples of each type of drug.	
8.4 Specify the main effects of each type of drug.	
8.5 Explain two ways in which psychotropic drugs affect neurons.	
8.6 Describe the effects of alcohol on the nervous system.	
8.7 Explain the variations, from one individual to another, of the effects of alcohol on the nervous system.	
8.8 Describe the effects of the harmful components of tobacco on the nervous system.	Nicotine, carbon monoxide, etc.
8.9 Describe the effects of cannabis and cocaine on the nervous system.	
8.10 Explain the various aspects of dependency with respect to drug and alcohol consumption.	Tolerance, dependence, cross-dependence, physical dependence and psychological dependence.
8.11 Specify the effects of certain heavy metals on the nervous system.	Examples: lead, mercury, etc.

BLG-5069 Ecology
1 credit (25 hours)

GENERAL OBJECTIVE

By learning concepts of ecology, adults will gain a better understanding of the dynamics that exist among the elements of an environment and the problems caused by environmental imbalance.

TERMINAL OBJECTIVES

1. Explain photosynthesis and why it is important for the animal kingdom.
2. Explain the relationships between individuals in a population.
3. Explain the relationships between individuals in populations making up a community.
4. Describe the structure of an ecosystem and its food web.
5. Illustrate some of the effects of human action on the dynamics of an ecosystem, using artificial eutrophication of a lake as an example.

TERMINAL OBJECTIVE 1

Explain photosynthesis and why it is important for the animal kingdom.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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- 1.1 Describe briefly the structure of a leaf.
 - 1.2 Specify the role of stomata and guard cells in a leaf.
 - 1.3 Establish the relationship between the structure of a leaf and the gas exchanges that take place within it.
 - 1.4 Describe the process of photosynthesis.
 - 1.5 Specify the factors essential to photosynthesis.
 - 1.6 Explain the relationship between photosynthesis and plant respiration.
 - 1.7 Establish the relationship between photosynthesis and the regeneration of oxygen in the air.
 - 1.8 Explain why the products of photosynthesis are important for the other links in the food chain.

Green plants (chlorophyll) + light + carbon dioxide + water
⇒ sugar (starch) + oxygen + water

Glucose + oxygen in the air ⇒ energy + carbon dioxide + water

TERMINAL OBJECTIVE 2

Explain the relationships between individuals in a population.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 2.1 | Define the terms “biosphere,” “ecology” and “environment.” | |
| 2.2 | Distinguish between biotic and abiotic factors for a given environment. | Biotic factors: insects, mammals, plants, etc.
Abiotic factors: climate, temperature, humidity, light, etc. |
| 2.3 | Distinguish between “species” and “population.” | |
| 2.4 | Specify the characteristics of a biome and a population. | Characteristics: population density, birth and death rates and growth rate |
| 2.5 | Explain population fluctuation using limiting factors. | Factors: available food, space, predation and competition |
| 2.6 | Define the expression “biotic potential.” | |
| 2.7 | Explain the different phases in the growth of a population. | Latent phase, exponential growth phase and equilibrium phase |

TERMINAL OBJECTIVE 3

Explain the relationships between individuals in populations making up a community.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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| 3.1 Distinguish between “population” and “community.” | |
| 3.2 Describe the relationship between producers, consumers and decomposers in a community. | Energy transfer between nutritional levels |
| 3.3 Distinguish between a species’ ecological niche and its habitat. | |
| 3.4 Define the expression “ecological succession.” | |
| 3.5 Illustrate ecological succession, giving examples. | Examples of ecological succession:
- Pond ⇨ meadow
- Rocky area ⇨ terrestrial community. |
| 3.6 Define the expression “climax community.” | |
| 3.7 Specify the relationship between a climax community and a biome. | |
| 3.8 Specify the relationship between a type of vegetation, latitude gradient and altitude gradient. | |
| 3.9 Differentiate between the types of vegetation found in each biome. | |

TERMINAL OBJECTIVE 3 (CONT.)

Explain the relationships between individuals in populations making up a community.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

3.10 Explain factors that have an influence on succession in a community.	Natural factors: climate, latitude, etc. Human factors: fires, logging, etc.
3.11 Differentiate between symbiosis, parasitism and commensalism.	
3.12 Illustrate, using examples, symbiosis, parasitism and commensalism.	Symbiosis: lichen, legumes and nitrogen-fixing bacteria Parasitism: mosquitoes Commensalism: cattle egret and buffalo

TERMINAL OBJECTIVE 4

Describe the structure of an ecosystem and its food web.

INTERMEDIATE OBJECTIVES**ADDITIONAL INFORMATION**

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|---|--------------------------------------|
| 4.1 Distinguish between “community” and “ecosystem.” | |
| 4.2 Describe an ecosystem. | Examples: a pond, lake, meadow, etc. |
| 4.3 Describe the interactions between the different animal and plant populations of an ecosystem. | |
| 4.4 Specify the biotic and abiotic factors that affect an ecosystem. | |
| 4.5 Describe the food chain in an ecosystem. | Producers, consumers, decomposers |
| 4.6 Explain average loss of energy between links in the food chain of an ecosystem. | |
| 4.7 Illustrate, using examples, how an element circulates within an ecosystem. | Examples: DDT, mercury, etc. |

TERMINAL OBJECTIVE 5

Illustrate some of the effects of human action on the dynamics of an ecosystem, using artificial eutrophication of a lake as an example.

INTERMEDIATE OBJECTIVES

ADDITIONAL INFORMATION

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| 5.1 Describe lake eutrophication. | |
| 5.2 Distinguish between natural eutrophication and artificial eutrophication. | |
| 5.3 List the substances that cause artificial eutrophication in a lake. | |
| 5.4 Describe how artificial eutrophication affects aquatic fauna and flora in a lake. | Bioindicators |
| 5.5 Indicate the measures that can be taken to prevent artificial eutrophication. | |

