تقرير حول تعليق العمل في بعض مواضيع

مادة علوم الحياة

في المرحلتين المتوسطة والثانوية

REDUCTION OF THE LIFE AND EARTH SCIENCES CURRICULUM

7th Year Basic Education

1.1.1- Capture, consumption and choice of food. - Capturing or picking up. • Organs of capturing and picking up. - Consumption • Modes - Digestion. • Digestive fluids • Absorption	- Notice that capturing and picking up organs vary to match the different kinds of food. - Distinguish between an animal that picks up food and a predator. - Identify capturing and picking up organs of an animal. - Notice that most animals, fragment the solid food before swallowing thus, performing a mechanical transformation necessary to enhance digestion. - Relate consumption organs to types of food. - Notice that some food are consumed directly without transformation. - Identify consumption organs. - Notice that food liquefied by digestive fluids is transformed during digestion into nutrients that can be utilized by the organism. - Understand that absorption is the passage of nutrients into the blood and that the non absorbed materials are eliminated. - Notice that the organs involved in digestion from the digestive system. - Label a schematic drawing of the digestive system of a vertebrate and indicate the pathway of food.	
1.4.2 From dormant life to active life : hibernation and germination. – Seed germination	-Understand that the germination is the passage of a seed from the dormant to the active stage of life. - Determine the principal characteristics of germination. - Determine that the germination requires the following conditions: water, oxygen, and temperature and a seed able to germinate.	

Content	Learning objectives (Skills...) Ac	Remarks
2- Reproduction 2.2 Plant reproduction 2.2.1 Reproduction of flowering plants - Sexual reproduction • Flower • Pollination • Fertilization . • Fruit • Seed • Germination • Vegetative reproduction 2.2.2 Reproduction of non- flowering plants. • Sporangium and spores • Prothallus. • Fertilization . Development.	- Understand that the flower is the reproductive part of a plant. - Label a schematic Diagram and identify the different parts of a flower. - Understand that the stamens is the male reproductive part of a flower and the pistil is the female part. - Label a schematic drawing of a stamen and a pistil. - Identify a pollen grain and an ovule. - Describe the mechanism of pollination until fertilization. - Understand that in some plants the flower can be self pollinated or cross pollinated by the same species. Understand that the pollen grain is the male gamete and the ovule contains the female gamete Understand that the union of the female reproductive gamete and the male reproductive gamete forms the zygote. - Understand that after fertilization the ovaries changes to into a fruit which contains one or more seeds. - Identify the different parts of a fruit - Know that the fertilized ovule becomes a seed - Identify the embryo and food reserve in a seed. - Draw and label the different of a fruit - Know that the embryo develops into plant using food reserves -Identify the different steps of germination - Understand that in some plants, vegetative parts can develop into new plants identical to the parent - Compare vegetative and sexual reproduction -Know that some non-flowering plants reproduce by spores. - Identify a sporangium and spores. - Know that spore forming plants produce a prothallus that gives two types of gametes: the male and the female gametes. - Know that the union of a male and a female gamete gives a zygote. - Know that the development of a zygote gives an adult plant. - Observe a small fern growing from a prothallus.	- Limited to ferns.
3 - Interdependence of living things	- Recognize that a society is a group of individuals of the same species where	

3.2 Relationships between individuals in the ecosystems. 3.2.1 Relationships between individuals of the same species. - Social life. - Importance of communication.	each member performs a specific duty. - Identify the principal modes of social lives and specify their characteristics. - Notice that communication in social life is based on the exchange of information among the members of the society and permits the performance of vital functions.	

إقتراح لتوزيع سنوي لدروس مادة علوم الحياة والأرض
موزعة على 21 أسبوعًا - عدد حصص التدريس: ثلاث حصص في الأسبوع - في الصف السابع الأساسي

	Week	Activity	Remarks
	Week 1	Activity1: Nutritive needs of chlorophyllic plants	
		Activity1: Nutritive needs of chlorophyllic plants	
		Activity2: Absorption and translocation of water and minerals	
	Week 2	Activity3: Photosynthesis and production of organic matter	
		Activity3: Photosynthesis and production of organic matter	
		Activity4: Nutritive needs of fungi	
	Week 3	Activity4: Nutritive needs of fungi	
		Exercises of Chapter 2	
		Exercises of Chapter 2	
Chapter 3 Respiration of living Beings	Week 4	Activity 1: Respiratory movements and circulation of air or water	
		Activity 2: Respiratory gas exchange	
		Activity 2: Respiratory gas exchange	
	Week 5	Activity 3: Life in the absence of oxygen	
		Activity 3: Life in the absence of oxygen	
		Activity 4: Respiration in aerial medium	
	Week 6	Activity 4: Respiration in aerial medium	
		Activity 5: Respiration in aquatic medium	
		Activity 5: Respiration in aquatic medium	
	Week 7	Exercises of Chapter 3	
		Exercises of Chapter3	
		Test 1	
Chapter 4 Relations among the conditions of the environment, activity and functions of nutrition	Week 8	Correction of Test	
		Activity 1:Temperature and activity of organisms	
		Activity 1:Temperature and activity of organisms	
	Week 9	Activity 2: Temperature and consumption of food	
		Activity 3: Activity and Energy Expenditure	
		Activity 3: Activity and Energy Expenditure	
	Week 10	Activity 4: Nutrition and respiration: a vital necessity	
		Activity 5: Hibernation of animals	
		Activity 5: Hibernation of animals	
	Week 11	Exercises of Chapter 4	
		Exercises of Chapter 4	

Chapter 5 Reproduction of Animals		Activity 1: Sexual Dimorphism and reproduction behavior	
	Week 12	Activity 2: Emission and Union of Gametes	
		Activity 3: Reproduction of a viviparous animal in a terrestrial animal	
		Activity 3: Reproduction of a viviparous animal in a terrestrial animal	
	Week 13	Activity 4: Reproduction of an oviparous animal in a terrestrial animal	
		Activity 4: Reproduction of an oviparous animal in a terrestrial animal	
		Activity 5: Reproduction in an aquatic animals	
	Week 14	Exercises of Chapter 5	
		Exercises of Chapter 5	
		Test 2	
Chapter 8 Significance of Reproduction	Week 15	Correction of Test 2	
		Activity 1: Reproduction: Diversity and stability Activity 2: Hybridization and new varieties	
		Activity 2: Hybridization and new varieties	
	Week 16	Activity 3: Asexual Reproduction and Biotechnology	
		Exercises of Chapter 8	
Chapter 9 Interdependence of living things		Activity 3: Pyramid Biomass and Natural Equilibrium	
	Week 17	Activity 3: Pyramid Biomass and Natural Equilibrium	
		Activity 4: Cycle of matter	
		Activity 4: Cycle of matter	
	Week 18	Exercises of Chapter 9	
Chapter 10 Relations in an Ecosystem		Activity 1: Association for Survival	
		Activity 1: Association for Survival	
	Week 19	Activity 3: Interspecific Relations in an ecosystem	
		Activity 3: Interspecific Relations in an ecosystem	
		Exercises of Chapter 10	

Chapter 11 Man and the Environment	Week 20	Activity 1: Overexploitation and Management of an Aquatic Environment	
		Activity 1: Overexploitation and Management of an Aquatic Environment	
		Activity 2: Pollution and Treatment of Water	
	Week 21	Activity 3: Impact of Man on the Environment	
		Exercises of Chapter 11	
		Exercises of Chapter 11	

REDUCTION OF THE LIFE AND EARTH SCIENCES CURRICULUM

8th Year Basic Education

Content	Learning objectives (Skills...)	Activities	Remarks
3- Earth and the environment **3.2 Manifestations of Earth avtivity** **3.2.1** Volcanism − Volcanic eruptions -Rocks of volcanic origin − World Distribution	− Know that volcanism ia a visible manifestation of the Earth's activities charecterized by the emission of lava, solid fragments, and gas at its surface. − Notice that the magma is a mixture of meleted rocks and gas produced as a result of fusion of solid material situated in the depth of the earth − Relate th volacnic eruptions to the arrival of magma to the surface. − Emphasize on the characteristics of smooth volcanic eruptions and explosive ones - Know that the cooled lava from volcanic rocks: Basalt (dense igneous rock) and ndesite. - Identify the characteristics of andesite and basalt - Mention that the majority of volcanic rocks have a hemicristalline structure, containing phenocrysts of microcrysts and quartz - Notice that the structure (hemicrystalline or holocrystalline) of rocks informs about the conditions needed for their cooling. - Indicate the differences existing between the conditions required for the formations of granophyre and andesite. - Localize the two types of active volcanism, that are unequally spread on the surface of the earth, on land as well as in oceans. - Relate the existence of an ancient volcanism in a region to the presence of rocks and volcanic edifice -Notice that seisms result from the brutal rupturing of confined deep rocks where it is known as the focus.	- Analyis of given documents - Analysis of a relief map of the Earth’s surface. - Observation and analysis of documents and graphs.	

3.2,2 Seisms - Seisms and seismic waves − World Distribution 3..3.1 Structure of the Earth - Earth’s surface.	- Note that the rupturing of rocks produces seismic waves responsible for the effect that happens on the Earth surface, - Describe the different manifestations observed on the earth surface that results in seism. - Relate the intensity of seism to the effects produced - Relate seisms to converging, diverging, and gliding movements that affect land at the Earth's surface. - Relate the seismogram recrdings to the characteristics of seisms. Note that the construction of buildings must respect " paraseismic" methods. - Localize the world distribution of the different seismic waves. - Know that the ocean floor and land differ in their morphology. - Identify the principal zones of oceans and land.	- Analysis and observations of documents, given tables and graphs.	

إقتراح لتوزيع سنوي لدروس مادة علوم الحياة
في الصف الأساسي الثامن
عدد حصص التدريس: حصتان في الأسبوع

	Week	Activity	Remarks
Chapter 4: Geology: Earth Science	**Week 1**	**Activity 1:**The Type of Rocks	
		Activity 2: Utilisation of Rocks by Humans	
	Week 2	**Activity 2:** Utilisation of Rocks by Humans	
		Exercises	
Chapter 6 Rocks Deformatio	Week 3	**Activity 1:**Folds and Faults	
		Activity 2: Deep Deformation of Rocks	
	Week 4	**Activity 2:**Deep Deformation of Rocks	
		Activity 3: World Distribution of Deformed Rocks	
	Week 5	**Exercises** of Ch 6	
Chapter 8 Dynamics of Terrestrial Globe		A**ctivity 2: Lithospheric plates**	
	Week 6	**Activity 2: Lithospheric plates**	Prerequisite: Only Paragraph 2: Structure of Earth
	Week 7	**Activity 3: The Consequences of Plate Tectonics**	
	Week 8	**Activity 4: The Circulation of Matter in the terrestrial Globe**	.
		Activity 4: The Circulation of Matter in the terrestrial Globe	
	Week 9	**Exercises** of Ch8	
		Activity 1: Management of Subterranean Water	
Chapter 9: Geology and Human Responsibility	Week 10	**Activity 2: Management of Energetic Rocks: The Charcoal**	
		Activity 3: Detection and Prevention of Natural Risks	
	Week 11	**Exercises** of Ch9	
		Test	
	Week 12	**Correction of test**	
Chapter 1: The immune response	Week 13	**Activity 1:** The Self and the None Self	
		Activity 1: The Self and the None Self	
	Week 14	**Activity 2**: Cells, Molecules, and Organs of the Immune System	
		Activity 2: Cells, Molecules, and Organs of the Immune System	
		Activity 3: Non Specific Immune Response	

	Week 15	**Activity 4:** Specific Immune Response	
	Week 16	**Activity 4:** Specific Immune Response	
		Activity 5: Characteristics of the Specific Immune Response	
	Week 17	**Activity 5:** Characteristics of the Specific Immune Response	
		Exercises	
	Week 18	Test	
		Test Correction	
Chapter 2: Anti-microbial prophylactic and therapeutic methods	Week 19	**Activity 1:** Vaccination and Serotherapy	
		Activity 2: Antisepsis, Chemotherapy, and Antibiotherapy	
	Week 20	**Exercises of Ch 2**	
Chapter 3: Dysfunction of the Immune System		**Activity 1:** Deficiency of the Immune System	Make a link with common STD and contraceptive methods
	Week 21	**Activity 2:** Allergy	
		Ex of Ch3	

REDUCTION OF THE LIFE AND EARTH SCIENCES CURRICULUM
9th Year Basic Education

إنطلاقًا من زيادة عدد حصص المخصصة لمادة علوم الحياة حصة واحدة لتصبح 3 حصص، وانطلاقًا من أن الوقت المخصص لتعليم هذه المادة يستثمر بشكل كبير في التدريب على استخدام الأفعال الإجرائية وليس على محتوى المادة ونظرًا لأهمية الدروس والمواضيع المعلق العمل بها من ناحية امتلاك المتعلمين للمهارات والعادات الصحية السليمة ونظرًا لسهولة محتواها إلى حدّ ما، إرتأينا إعادة بعض من هذه المواضيع والتي يشكل محتواها مادة علمية غنية لتدريب التلامذة على منطقية التفكير العلمي.

Content	Learning objectives (Skills ...)	Activities	Remarks
1- Nutrition and metabolism 1.2.1Respiratory system and pulmonary ventilation - Pulmonary ventilation. 1.3.1 Circulatory system - Arterial pressure.	Know that pulmonary ventilation is the permanent partial renewal of alveolar air by the rhythmic movement of the thorax. – Notice the permanent presence of oxygen in the pulmonary alveoli. – Calculate the proportion of the renewed air knowing the volume of the residual air. – Know that the arterial pressure is the pressure exerted by the blood on the wall of the arteries. – Notice that the arterial pressure varies during the cardiac revolution between a maximum at ventricular systole and a minimum at the end of diastole. – Notice the importance of the arterial pressure for medical diagnosis.	– Give examples from everyday life. – Probing tables of given. – Analysis of sequences of a film. – Use a spirometer to determine the respiratory volume and analyze the obtained results. – Analysis of documents, of tables of givens and of graphs. – Measure the arterial pressure with the help of a sphygmomanometer.	– Mention the consequences of hypotension and of hypertension.
1.3.4 Adaptation of the organism to effort.	– Notice that there is a modification in the spread of the blood in the organs, at rest and during an intensive activity. – Notice that the modifications of the respiratory and cardiac rhythms are directly	– Analysis of documents, of graphs and of tables of givens.	

	related to the effort done. – There is a correlation between the functioning of circulation and that of respiration in the organism.		
1.6.1 Varieties and equilibrium of nourishment – Role of food.	– Relate the diversity of the organism's needs to the diversity of food. – Know that food ensures, on one hand, the growth of the organism and the renewal of cells by the help of assimilation, and on the other hand, the energy production by respiratory oxidations. – Relate the assimilation to the building food (plastic) and the production of energy to the oxidation of energy food. – Associate to each category of the simple food its energy value.	– Give examples from every day life. – Analysis of documents, of tables of given and of graphs. – Probing a text.	

Content	Learning objectives (Skills ...)	Activities	Remarks
2- Nervous communication and human behavior. 2.1 Reactions of the organism to environmental stimuli. 2.1.1 Human behavior.	– Know that a behavior is a group of reactions more or less complex, involuntary or voluntary, in response to environmental stimuli. – Notice that these reactions are done by the help of sensory receptors, the nervous centers and the effector organs that are connected to each other by nerves. – Relate a behavior to the anatomical structures involved in it. – List in order the organs involved in a certain behavior.	– Give examples from every day life. – Analysis of documents, of tables of given (reaction of salivation upon smelling a certain food, reaction of the organism to a skin burn…) – Analysis of sequences of a film.	
2.1.2 Involuntary and voluntary reactions.	- Know that an involuntary reaction is an unconscious automatic (reflex) and not varied response adapted to a given stimulation. - Identify the characteristics of the reflex activity. - Know that a voluntary reaction is a conscious, individual and varied response in which the cerebral hemispheres interfere. - Distinguish between the voluntary reactions and the involuntary ones. - Draw a functional diagram showing the		

	relation-ship between the elements participating in a response.		
2.2 Elaboration of the tactile sensation.	– Notice that the tactile sensation is done after a contact with the skin (excitation). – Notice that the elaboration of the tactile sensation necessitates three steps: the excitation of the tactile receptors which provokes a nerve message, the conduction of this message and the role played by the sensory cerebral center. – Draw a functional diagram illustrating the conduction of the tactile nerve message from its initiation until it reaches the nervous center.	– Give examples from every day life. – Analysis of documents and of tables of given. – Give examples from every day life. – Analysis of documents, of tables of given.	
2.2.1 Threshold of stimulation.	– Know that the threshold of stimulation is the minimum intensity that a stimulation must attain for eliciting a nerve message.		
2.2.2 Tactile receptors.	– Know that the tactile receptors are the structures situated in the dermis and are sensitive to the variations of pressure. – Design and describe an experimental procedure to prove the presence of these tactile receptors.	– Observation of a microscopic section of the skin.	
2.2.3 Neuron.	– Notice that the neuron, characterized by at least two prolongations (nerve fibers), is a nerve cell that creates and conducts the nerve messages. – Identify the characteristics of a nerve cell. – Make a functional diagram of a neuron.	– Dilaceration of a nerve. – Observation of a microscopic preparation of a nerve and of cell bodies in a section of the spinal cord. – Analysis of documents.	
2.2.4 Synapse.	– Notice that the synapse is a region of junction between two neurons ensuring the transmission of nerve		

	messages. – Identify the region of junction between two neurons.		

Content	Learning objectives (Skills…)	Activities	Remarks
2.3 Organization of the encephalon.	– Notice that the human encephalon has three essential parts: the cerebrum, the cerebellum and the medulla oblongata. – Notice that the cerebral hemispheres have dif-ferent sensory areas that can be localized by the variations of the blood discharge related to the cerebral activity. – Identify the organization of the encephalon of a mammal and notice the activity of a cerebral center.	– Analysis of documents: MRI = Magnetic Resonance Imagery, scintigraphy.	
2.4 Danger of toxication: addiction to tobacco, alcohol and drugs.	– Notice that the function of the nervous system can be disturbed by certain substances (alcohol, tobacco, drugs), by certain elements of the environment (noise, light)and by certain life styles leading to a disequilibrium in the alternation of waking-sleeping. – Know that toxication is a repeated and abused consumption of harmful substances to the or-ganism. – Notice that toxication leads to a dependance revealed by a physical suffering and a psycho-logical one in case of its lack. – Make a relationship between the habituation caused by addiction and the necessity to increase regularly the doses to be consumed to obtain the required effect.	– Give examples from every day life. – Probing a scientific text. – Analysis of documents and tables of given. – Analysis of sequences of a film. – Searching in CDI.	

Content	Learning objectives (Skills…)	Activities	Remarks
3- Reproduction and genetics. 3.3 Sexual reproduction and maintenance of the karyotype of the species - Diversity of gametes	- Notice that the random segregation of each pair in the gametes is at the origin of genetic recombination - Relate genetic recombination to the high genetic diversity of gametes		-The origin of mutation/abnormality due to Non disjunction at the level of AI or AII of Meiosis I and Meiosis II respectively is not required. - Only autosomal linked traits are considered in genetics exercises. (exercises related to sex linked traits are suspended)
3.5 Production of substances necessary for the industry of nutrition and for medicine by genetic engineering.			
3.5.1 Biomedical and agronutritional use of microorganisms.	- Notice that Man uses certain non-pathogenic microorganisms in biology, in medicine and in the agronutritional industry, for the manufactu-ring of products that are beneficial to Man. * Notice that biotechnology is the group of industrially used techniques of living beings that aim at producing certain substances necessary for Man. * Notice the means that permit the increase of the yield and the quality of the production.	* Give examples from every day life. * Probing a text. * Analysis of documents, of tables of given and of graphs.	
3.5.2 Variety and importance of the usages of microorganisms.	– Notice that the natural use of certain micro-organisms permits the production of food, the industrial manufacturing of pharmaceutical substances or of substances used in the pro-	– Production of agronutritional and phar-maceutical substances; manufacturing of	

	duction of food. – Show that the biomedical and agronutritional use of microorganisms rests on the use of varieties that can multiply in a certain medium and transforming it. – Search for the diversity of the techniques of the usages of microorganisms. – Demonstrate that certain techniques which modify the genetic make-up of certain bacteria permit the manufacture of nutritional or vaccines… – Schematize a technique of the genetic make-up modification.	yoghurt, cheese, bread, antibiotics, vitamins and enzymes. – Analysis of sequences of a film. – Analysis of documents.	– Include some techniques to illustrate the importan-ce of microorganisms.

Content	Learning objectives (Skills…)	Activities	Remarks
3.5.3 Microorganisms .	* Know that all microorganisms are only obser-ved under the microscope and that some are pathogenic, others are not.		
* Systematic diversity.	* Notice that the microorganisms belong to many varied groups: protozoa, microscopic fungi, yeasts, mosses, bacteria and viruses.	* Give examples from every day life. * Probing a scientific text. * Analysis of documents and tables of given.	* Do not go through the systematic study of micro-organisms and their chara-cteristics. Mention their presence, their biologic and systematic diversity, and their capability of multiplication in the different techniques used.
	* Gather the criteria that permit to classify micro-organisms.		* Table of classification accessible by students is enough.
* Biologic diversity.	* Notice that the life styles of microorganisms are widely varied (free life, mutualism, parasitism) and are either aerobic or anaerobic. * Design an experimental procedure that permits to determine the life conditions of some micro-organisms.		
* Multiplication power.	* Know that the microorganisms quickly repro-duce asexually. * Relate the genetic identity of microorganisms to their mode of reproduction.		

التوزيع السنوي لدروس مادة علوم الحياة والأرض

في الصف التاسع الأساسي
مع الأخذ بعين الإعتبار الأهداف المعلّق العمل بها
عدد حصص التدريس للصف : ثلاث حصص في الأسبوع

إنطلاقًا من زيادة عدد حصص المخصصة لمادة علوم الحياة حصة واحدة لتصبح 3 حصص، وانطلاقًا من أن الوقت المخصص لتعليم هذه المادة يستثمر بشكل كبير في التدريب على استخدام الأفعال الإجرائية وليس على محتوى المادة ونظرًا لأهمية الدروس والمواضيع المعلق العمل بها من ناحية امتلاك المتعلمين للمهارات والعادات الصحية السليمة ونظرًا لسهولة محتواها إلى حدّ ما، إرتأينا إعادة بعض من هذه المواضيع والتي يشكل محتواها مادة علمية غنية لتدريب التلامذة على منطقية التفكير العلمي.

	Week	Activity	Remarks
Chapter 1 Transformation of food into Nutrients	Week 1	Activity 1: Our Food	Chapter 5: Activity 1: Variety of food- Revision as this objective was mastered in grade 5 (don't discuss the concept energy supply of food doc f)
		Activity 1: Our Food	
		Activity 2: Chemical Transformation of food	
	Week 2	Activity 2: Chemical Transformation of food	
		Activity 3 Enzymes Agents of digestion	
		Activity 3 Enzymes Agents of digestion	
	Week 3	Activity 4: From Food to Nutrients	
		Activity 4: From Food to Nutrients	
		Activity 5: The Routes of Nutrients	
	Week 4	Activity 5: The Routes of Nutrients	
		Exercises of Chapter 1	
		Exercises of Chapter 1	
Chapter 5 Nutrition and Health	Week 5	Activity 2: Food Ration	Relate these facts by the end of Chapter 3. Relate the diversity of the organism's needs to the diversity of food Know that food ensures, on one hand, the growth of the organism and the renewal of cells by the help of assimilation, and on the other hand, the energy production by respiratory oxidations. Relate the assimilation to the building food (plastic) and the production of energy to the oxidation of energy food.
		Activity 2: Food Ration	
		Activity 3: Balanced Food Diet	
	Week 6	Exercises of chapter 5	
		Test 1	

		Test 1 (Correction)	
Chapter 2 From Nutrients to Energy: Respiration	Week 7	Activity 1: Organization of the respiratory system	
		Activity 3: Respiratory gas exchange	
		Activity 3 Respiratory gas exchange	
	Week 8	Activity 4: Transport of Respiratory Gases	
		Activity 4: Transport of Respiratory Gases	
		Exercises of Chapter 2	
		Exercises of Chapter 2	

	Week	Activity	Remarks
Chapter 3 Transport and Distribution of Nutrients and Oxygen Gas to Organs	**Week 9**	Activity 1 :Heart and Cardiac activity	
		Activity 1 :Heart and Cardiac activity	
		Activity 1 :Heart and Cardiac activity	
	Week 10	Activity 2 : Blood vessels and the dynamic circulation	Notice that the arterial pressure varies during the cardiac revolution between a maximum at ventricular systole and a minimum at the end of diastole. Notice the importance of the arterial pressure for medical diagnosis. Know that the arterial pressure is the pressure exerted by the blood on the wall of the arteries
		Activity 3 : Cardio-vascular accidents	
		Activity 5 : Usage of nutrients and Oxygen gas by the cells	
	Week 11	Activity 5 : Usage of nutrients and Oxygen gas by the cells	Relate these facts related to nutrition by the end of Chapter 3. Relate the diversity of the organism's needs to the diversity of food Know that food ensures, on one hand, the growth of the organism and the renewal of cells by the help of assimilation, and on the other hand, the energy production by respiratory oxidations. Relate the assimilation to the building food (plastic) and the production of energy to the oxidation of energy food.
		Exercises of Ch 3	
		Exercises of Ch 3	
Chapter 4: Regulation of the internal renal Function	Week 12	Activity 1: Kidney, site of Urine Formation	
		Activity 1: Kidney, site of Urine Formation	
		Activity 2:Renal Function	
	Week 13	Activity 2:Renal Function	
		Exercises of Chapter 4	
		Exercises of Chapter 4	
	Week 14	Test 2	
		Test 2 correction	

	Week	Activity	Remarks
	Week 14	Activity 1 : Transmission of Hereditary Characteristics	
	Week 15	Activity 1 : Transmission of Hereditary Characteristics	Autosomal linked traits
		Activity 2 : The Laws of Heredity	Autosomal linked traits
		Activity 2 : The Laws of Heredity	
	Week 16	Activity 3 : The Carriers of the Genetic Information	
		Activity 3 : The Carriers of the Genetic Information	
		Activity 4 : Chromosomes and Traits of the individuals	The origin of mutation/abnormality due to Non disjunction at the level of AI or AII of Meiosis I and Meiosis II respectively is not required .
	Week 17	Activity 5 :The Genes, Units of Genetic Information	Autosomal linked genes.
		Activity 5 :The Genes, Units of Genetic Information	Autosomal linked genes.
		Exercises of Chapter 7	Ignore Sex Linked Exercises
	Week 18	Exercises of Chapter 7	Ignore Sex Linked Exercises

	Week	Activity	Remarks
Chapter 8 Conformed Reproduction of Genetic Information	Week 18	Activity 1 : Transmission of Genetic Information	
		Activity 1 : Transmission of Genetic Information	
	Week 19	Activity 2: Conformed reproduction of chromosomes	
		Exercises of Chapter 8	
		Exercises of Chapter 8	
		Activity 1 : Gametes Specialized cells with 23 chromosomes	
		Activity 3: Fertilization, a New Genetic Combination	
Chapter 9 Sexual Reproduction and		Activity 3: Fertilization, a New Genetic Combination	
	Week 21	Exercises of Chapter 9	
		Test 3	
		Correction of tests	

REDUCTION OF THE LIFE SCIENCE CURRICULUM
1st Year Secondary

Content	earning Objectives (Skills...)ِ L	Activities	Remarks
Functional organization of living things. 1.1 Nutrition and organization of a chlorophyllic vascular plant 1.1.1 Autotrophy and photosynthesis - Autotrophy Photosynthetic activity of chlorophyllic cells Leaf and starch synthesis -	- Understand that chlorophyllic plants are autotrophs They synthesize organic substances from mineral substances present in the medium - Determine the mineral needs of green plants. - Identify the chemical elements that constitute plant living matter. - Demonstrate the presence of starch in green plants - Formulate hypothesis to explain color difference between leaves that are collected in the morning and others collected in the evening. - Find out the necessary conditions for starch synthesis.	All related documents	- Remind students with the scientific content mastered in grade 7 , that chlorophyllic plants are autotrophs. They synthesize organic substances from mineral substances present in the medium

Content	earning Objectives (Skills...)ِ L	Activities	Remarks
1.2 Communication Communication And Organization In An Animal 1.2.1 Nervous communication • Nature of the nervous message. • Coding and management of the information 1.2.2 Hormonal communication. - System of communication. • The discovery of chemical communication.	- Understand that the nervous message is a series of recordable electric signals. - Analyze recorded results relative to stimuli below and above the threshold. - Notice that every action potential is a modification of the electric state of the plasma membrane of nerve fiber of constant amplitude and duration. - Elaborate a hypothesis relative to the coding of the nervous message which carries an order of muscle cells. - Relate the significance of the message conducted by a nerve (coding) to the number of activated fiber. - Recognize that the conduction of a nervous message is a biological mechanism related to the properties of the nerve. - Understand that nervous centers are structures for the management of the sensory nervous messages. - Point out that nervous centers organize an answer by elaborating a motor nervous message, carrying an order to the effector organ. – Analyze certain experiments that has lead to the discovery of chemical communication. – Explain how the experiment of Bayliss and Starling demonstrates that the communication between the duodenum and the pancreas is done by blood. – Deduce that a hormone is a specific chemical messenger.	– Use of documents or getting information from a text (The work of Pavlov, Wertheimer and Lepage, and Bayliss and Starling).	

Content	earning Objectives (Skills...)ـ L	Activities	Remarks
2- Plant productivity and environmental factors. 2.1 Producing productive plants. 2.1.1 Productive plants and genetic programs.	– Know that plants are said to be productive when they have the ability of being cultured in an economic and productive way in a given field. – Relate the productivity of a plant to its genetic program. – Find out information that show the improvement done on a plants' productivity.	– Search in a CDI (Center of documentation and information). – Use of documents.	
Increased production of productive plants.	– Notice that Man always resolves to improve the productivity of cultivated plants through empirical selection. – Relate the genetic selection and hybridization to the obtaining of more productive producers. – Plan for an experimental protocol to obtain a pure line. – Identify hybridization techniques and deduce their economic interests. – Appreciate the importance of the conservation of genetic diversity in a species.	– Search in a CDI. – Observation and analysis of documents (data, tables, films, text...) for the comprehension of hybridization techniques and their economic interest.	
Production of plants in a massive number. -Vegetative multiplication.	– Notice that Man has always used the technique of vegetative multiplication (cuttings, grafting,...) to obtain clones.	– Field observation of grafting and cuttings	—

- Obtaining plants by microfragments.	– Explain how in vitro cultures of meristems, protoplast and by microcuttings, permit obtaining an entire organism identical to the mother plant. – Compare the characteristics of different multiplication techniques in vitro. – Understand that a potent cell is capable of giving individuals identical to each other and in turn identical to the mother plant (clones). – Notice the importance of the “non-stop” production of plants.	techniques. – Making cultures in vitro in the classroom. – Use of documents, tables and graphs about cultures in vitro concerning ornamental plants (carnation, orchids, roses,...) or food plants (potatoes, peaches, almond, strawberries...) – Getting information from a text	

Content	Learning Objectives (Skills...)	Activities	Remarks
3- Management and protection of the environment -3.1.3 Management and protection of fresh water habitats - Water protection against pollution.		– Observation and analysis of documents. – Use of a scientific text. – Analysis of tables and graphs.	
• Reduction of water beds pollution by nitrates.	All objectives related to get rid of nitrates pollutants		
3.2 Degradation, management, and protection of soil. 3.2.1 Soils as organized evolving systems. - Organization of a soil.	– Notice that soil is generally organized in a horizon characterized by their structure and texture.	– Field observation or analysis of documents concerning a soil vertical section.	

Content	Learning Objectives (Skills...)	Activities	Remarks
- Physio-chemical study of soil. • Study of the chemical composition of soil.	- Identify the different soil horizons in a soil profile. – Recognize that the soil components are mineral (sand, silt, clay) and organic in nature (organic debris and humus). – Show the fundamental constituents of soil.	– Experimental study of the main organic and mineral constituents of a soil.	
• Physical study of soil.	– Relate the texture of soil to its granulometric composition and its structure, to the humic clay complex. – Relate the texture and structure to the porosity, permeably, capacity of water retention and absorption of soil. – Make a relationship between the structure and the fertility of agricultural lands.	– Tactile discrimination of soil texture. – Observation of documents or microscopic observation of soil structure. – Measurement of porosity of soils and their capacity of water retention. – Measurement of the calcium concentration in a soil.	- Make a link with the second part of the program: plant produc tion and environmental factors.
- Formation of soils. • Factors of formation.	– Notice that soil is the result of the surface alteration (weathering) of parent sandstone rocks under the combined action of climatic factors (precipitation and temperature) and living things.		
• Mechanisms of the formation.	– Relate the mechanism of soil formation to the degradation of rocks and to the processes of mineralization and humification. – Notice that parent soilstone rock	– Observation of documents. – Analysis of sequences in a film. – Use scientific	

Content	Learning Objectives (Skills...)	Activities	Remarks
- Evolution of soils.	degradation (weathering) is due to physical and chemical processes. – Recognize the role of microorganisms in the transformation of organic matter as a result of mineralization and humus formation. – Recognize that soil is a dynamic system that evolves under the action environmental factors. – Differentiate between an evolved soil from a non-evolved soil.	documents. – Use a key to determine the fauna in a soil.	- Limit the study to micro organisms that are responsible for mineralization and to the detritivores that assure the decomposition of leaves. - All the steps of evolution of soil starting from rocks to climatic soil (brown soil for example) are not required.

Content	earning Objectives (Skills...)ۦ L	Activities	Remarks
3.2. Soils as fragile ecosystems. 2 - Soils and vegetal production. • Forests as balanced ecosystems. • Cultivated soils: agrosystems in disequilibrium.	– Precise the composition of the mineral reserves of forest soil. – Relate the uptake of the mineral reserves of soil and the mineralization of litter to the dynamic equilibrium of a forest ecosystem. – Identify the different steps of the cycle of a biogenic element. – Notice that equilibrium of mineral reserves in soil is ensured by natural processes that obtain a supplementary intake of biogenic elements. – Notice that crops take from a medium a major part of organic matter that must be compensated by intakes of mineral elements. – Identify the role of fertilizers in the conservation of the favorable structure of soil (stabilized wet-clay complex) and in restoring the biogenic elements. – Compare between an ecosystem in equilibrium and an agrosystem which is not in equilibrium.	– Observation and analysis of documents. – Use of CDROM to simulate the carbon and nitrogen cycles. – Analysis of graphs and experimental results. – Inquiry to discover the functioning and contribution of agronomic laboratory in Lebanon in making agricultural land fertile.	

Content	earning Objectives (Skills...)ِ L	Activities	Remarks
3.1 Fresh Water Pollution Degradation of soils by Man's action.	– Quality of Water – Know that deforestation, mechanization – and intensive cultures, overgrazing and unfavorable climatic factors lead to desertification and soil erosion.		
• Intensive agriculture and erosion.	– Relate running water and intensive monocultures to erosion.	– Direct observation or analysis of aerial photographs concerning soil degradation and its consequences.	
• Deforestation.	– Identify reasons and consequences of deforestation.	– Inquiry on deforestation in Lebanon.	
• Overgrazing.	– Relate overgrazing to desertification.	– Analysis of documents to show the impact of soil degradation on water tables and productivity.....	
• Chemical and biological degradation of soils.	– Recognize that chemical and biological degradation of soil are due to salinity and the utilization of pesticides.	– Analysis of documents	
	– Relate micro-irrigation and utilization of biodegradable products respectively to the decrease of salinity and the maintenance of microfauna and microflora of soil.	– Analysis of a text. – Research on pesticides used in Lebanon.	
- Protection of soils.	– Indicate the principal methods used by Man to protect soil (crop rotation, controlling running water, respecting the forests covers, amending by humus or calcareous substances). – Recognize that Man should have a responsible behavior towards equilibrium in nature.	– Analysis of documents. – Analysis of sequences in a film.	– Underline the impor- tance of ploughing with the direction of inclination in agricultural practices.

عدد حصص التدريس: حصتان في الأسبوع

	Week	Activity	Remarks
Chapter 1: Autotrophy and Photosynthesis	**Week 1**	**Activity 3:** The chloroplast: Site of Photosynthesis	
		Activity 4: Photosynthetic Gas Exchange	
	Week 2	**Exercises**	
		Activity 1: Absorption of Water and Mineral Ions	
Chapter 2: Plant Supply with Raw Materials	Week 3	**Activity 2:** Transport and Upward Movement of the Crude Sap	
		Activity 2: Transport and Upward Movement of the Crude Sap	
	Week 4	**Activity 3:** The Xylem: Structures of Conduction of the Crude Sap	
		Activity 4: The Stomata: Site of Gas Exchange	
	Week 5	**Activity 4:** The Stomata: Site of Gas Exchange	
		Exercises of Ch2	

	Week	Activity	Remarks
Chapter 3 The Use of the Photosynthetic Products	Week 6	**Activity 1:** Translocation and Composition of the Elaborated Sap	
		Activity 2: The Phloem: Structures of Conduction of the Elaborated sap	
	Week 7	**Activity 3:** The Use of the Synthesized Substances	Review Quickly the stages of a germinating seeds (covered in grade 7)
		Exercises of Ch 3	

	Week	Activity	Remarks

Chapter 4 **Nervous Communication**	Week 8	**Activity 1:** Organization of the Nervous System in the Vertebrates	- Remind students with the scientific content mastered in grade 7 , that chlorophyllic plants are autotrophs. They synthesize organic substances from mineral substances present in the medium
		Activity 2: Organization of the Nervous system in the Invertebrates	
	Week 9	**Activity 3:** Histology of the Nervous System: The Neuron; A Functional Unit	
		Activity 4: From Stimulus to Response: Pathway and Nervous Centers	
	Week 10	**Activity 4:** From Stimulus to Response: Pathway and Nervous Centers	
		Activity 5: The Nature of the nerve message (electric impulse propagating along the nerve fiber)	Focus only on the following notion: nerve messages are recorded as electrical signals propagating along the nerve fibers. These electrical signals are called Action Potentials.
	Week 11	**Activity 7:** One Way Communication: Synapses	
		Activity 7: One Way Communication: Synapses	

	Week	**Activity**	**Remarks**

	Week 12	**Test**	
		Correction of test	
Chapter 5 Hormonal Communication	Week 13	**Activity 2:** The Thyroid: An Endocrine Gland	
		Activity 2: The Thyroid: An Endocrine Gland	
	Week 14	**Activity 3:** Functional Characteristics of an Endocrine	
		Activity 3: Functional Characteristics of an Endocrine	
	Week 15	**Ex of Ch 5**	
		Test	

Chapter 7: Influence of Environmental Factors on the Production of High Quality Plants	Week 16	**Activity 1:** Plant Production and Environmental Factors	
		Activity 1: Plant Production and Environmental Factors	
	Week 17	**Activity 2:** The Influence of Light and Carbon Dioxide on the Intensity of Photosynthesis	
		Activity 2: The Influence of Light and Carbon Dioxide on the Intensity of Photosynthesis	
	Week 18	**Activity 3:** A Limiting Factor	
		Activity 4: Greenhouse Cultures	
	Week 19	Ex of Ch7	
		Ex of Ch7	
Chapter 8: Fresh Water Pollution	Week 20	**Activity 1 Quality of Water**	
		Activity 2: Evaluation of running water pollution	
	Week 21	**Activity 4:** Eutrophication	
		Activity 5: Pollution of Underground Water	

	Week		**Remarks**
Chapter 9: Management and Protection of Fresh Water	22	Exercises of Ch8	**Give a notion about the parameters related to** Quality of Water **Activity 1:**
		Activity 3: Precipitation and Infiltration	
	23	**Activity 5:** Intensive Exploitation of Water	
		Activity 8: Reduction of Agricultural Polluants	
		Exercises of chapter 9	

REDUCTION OF THE LIFE SCIENCE CURRICULUM
2nd Year Secondary - Humanities

Content	Learning objectives (Skills ...)	Activities	Remarks
1. Reproduction and heredity			
1.3.2- Medically assisted procreation technique.	- Point out that the use of medically assisted procreation technique is a procedure capable of alleviating sterility in certain couples.	- Analysis of a table of data relevant to artificial procreation methods.	– Mention the current medically assisted procreation methods: artificial insemination, in vitro fertilization....
1.3.3- Birth control and bioethical problems	– Recognize that birth control often poses serious ethical, psychological and jurisdictional problems which may not be solved. – Point out that abortion is not a contraceptive method, and that if it is performed within legal limits, it permits termination of a risky pregnancy.	– Observation of documents – Getting information from a text or a document.	– IUD: intrauterine device.
1.4- Sexually transmitted diseases	– Recognize that sexually transmitted diseases (STD) are infectious diseases transmitted by sexual contact between an infected person and another healthy one. – Notice that sexually transmitted diseases affect males and females. – Recognize that STD are caused by different pathogenic agents.	– Getting information from a text. - Observation of micrographs showing the causative microorganisms of certain STD.	– AIDS will be studied under the

	– Identify a few STD. – Notice that most STD result in sterility and sometimes death. – Point out that prevention of STD starts with information which permits everybody to assume full responsibility in his sexual relations.	– Analysis of a table of data relevant to STD. – Analysis of sequence in a film or projection slides. – Search for information about STD (prevention campaigns, pamphlets...)	immunity part. – Note that AIDS is the most serious STD disease because no treatment exists actually up till now.
1.5- Chromosomes	– Recall that chromosomes are located in the cell nucleus.		
1.5.1- Human karyotype	– Note that all human beings have the same number of chromosomes. – Point out that a karyotype is the chromosome complement of a somatic cell arranged in pairs by order of size and form. – Identify sex chromosomes and autosomes.	– Observation of a document showing a human karyotype. – Observation of a male human karotype and a female one.	– Develop the subject of prevention because the number of STD sufferers is increasing.
1.5.2- Transmission of chromosomes through sexual reproduction	– Note that meiosis results in the formation of gametes. – Point out that meiosis reduces the number of chromosomes to the half and consequently every gamete receives one member from every pair of chromosomes.	– Analysis of a document	

	– Demonstrate the role of chromosomes in the determination of sex.	– Interpretation of the results of a chromosomal analysis.	
1.5.3- Chromosomes and gene transmission	– Recognize that the principal constituent of chromosomes is DNA. – Describe the structure of DNA. – Point out that the order of nitrogenous bases in DNA varies infinitely. – Notice that DNA is the hereditary material – Know that the chromosomes carry the hereditary factors (genes). – Point out that a gene is a segment of DNA which determines a certain hereditary characteristic.	– Getting information from a text or a document about DNA structure.	
1.6- Genetic and chromosomal abnormalities 1.6.1- Chromosomal aberrations	– Recognize that chromosomal aberrations include all the abnormalities of number and structure of chromosomes. – Find out that the aberrations affecting the number of chromosomes arise from accidents occurring during parental meiosis.	– Analysis of documents which reveal the consequence of abnormality during the formation of gametes through meiosis.	

	– Notice that an abnormality in meiosis leads to a bad consequence in the expected baby. – Point out that trisomy-21 (Down's syndrome) is the most frequent chromosomal aberration. – Identify trisomy-21. – Compare the course of normal meiosis to the abnormal one which leads to trisomy-21. – Point out the common characteristics to all persons having trisomy-21. – Notice that trisomy-21 is not hereditary and that its frequency increases with the age of the mother. – Notice that the sex chromosomes may also present abnormality.	– Analysis of a table showing the frequency of different chromosomal abnormalities. – Analysis of a relevant document. – Analysis of documents. – Getting information from a text. – Analysis of a graph. – Analysis of karyotypes with abnormalities in the sex chromosomes.	– Do not develop the subject of the aberrations affecting the structure of chromosomes.
1.6.2- Gene abnormalities	– Notice that a mutated gene results in a genetic disease. – Notice that genetic diseases are transmitted hereditarily.	– Analysis of a document related to sickle-cell anemia or thalassaemia. – Analysis of pedigrees.	
1.6.3- Prenatal diagnosis	– Recognize that prenatal diagnosis aims at anticipating the appearance of an abnormality from the embryonic stage of development. – Point out that prenatal diagnosis includes a group of methods for detection of fetal abnormality. – Notice that prenatal diagnosis is	– Observation of a document or sequence in a film.	– Mutation: modification in the structure of a

1.7- Human diversity 1.7.1- Polymorphism and uniqueness of man 1.7.2- Cause of genetic diversity 1.7.3- Consequence of genetic polymorphism	carried out when a risky pregnancy is suspected. – Notice that human beings present a very great variability. – Recognize that interchromosomal and intrachromosmal mixing results in unique individuals. – Notice that genetic polymorphism offers advantages to the individual and to the species as well.	– Analysis of photographic documents – Analysis of documents related to heterozygous individuals. – Drawing information out of a text.	gene. – Evoke the risks of marriage among relatives. – Pedigree: genealogical tree – Mention the role of mutations. – Mention, as an example, that the DNA is a real “genetic imprint”

Contents	Learning Objectives (Skills ...)	Activities	Remarks
2- Immunology and Health 2.3- Deficiencies and disorders of the immune system			
2.3.1- Allergies	– Recognize that allergy is an immediate reaction to an allergen. – Identify the two phases of an allergic reaction: sensitization and reaction. – Explain the mechanism of an allergic reaction.	– Observation of a photographic document showing allergic manifestations in a human. – Analysis of documents relative to allergens and to the reactions which they induce. – Observation and analysis of a document showing the phases of allergy. – Getting information from a text.	– Mention the existence of a genetic predisposition to allergy. – Mention that allergic reactions may be reduced by antihistaminic medicines.
2.3.2- Auto-immune diseases	– Recognize that auto-immune diseases in certain persons are due attacks made on them by their own immune systems.	– Observation of documents on auto-immune diseases or a table of data.	
2.4- Immune response supports	– Note that it is important to support the immunity system in case of deficiency and failure. – Recognize that there are three ways to support the immunity system: vaccination, serotherapy and bone marrow transplantation. – Recognize that vaccination is a way of prevention which consists of inducing an immune reaction by		– Mention that there is an

2.4.1- vaccination 2.4.2- Serotherapy 2.4.3- Bone marrow transplantation	introduction of an attenuated antigen or a killed one (vaccine) – Notice that vaccination launches an unimmediate immune response but with a long-lasting effect. – Notice that serotherapy is a curative method which consists of injecting specific antibodies to the antigen in action. – Notice that serotherapy launches an immediate reaction but a short lasting one. – Recognize that bone marrow transplantation is a recent technique which provides an organism deprived of immunity defenses with cells that can reconstruct these defenses.	– Observation and analysis of a document showing transplantation. – Getting information from a text.	obligatory timetable for vaccination in Lebanon. – Note that the currently used sera of human origin are gradually replacing the sera of animal origin.

REDUCTION OF THE LIFE SCIENCE CURRICULUM
2nd Year Secondary –Science Series

Content	Learning objectives (Skills ...)	Activities	Remarks
1- Functional characteristics of the systems of living things at the cellular level. 1.1 Biological identity and genetic information. . 1.1.1 Diversity of organisms: prokaryotes and eukaryotes	– Notice that organogenesis, and growth require nutrients as a source of materials and energy.	– Getting information from: • tables about blood composition that show the nature of placental exchanges.	– Emphasize the placental organization.

Content	Learning objectives (Skills ...)	Activities	Remarks
1.2 Molecular renewal and energetic metabolism 1.2.1 : molecular renewal	- Note the flow of matter in an organism. - Describe Mechanisms of molecular renewal		
1.2.4 Energy metabolism in Man.. – Nature and origins of energy metabolites. • Various metabilites.	– Note that many cells are capable of using the various metabilites «glucose, fatty acids, amino acids»? – Note that the nerve cells and the blood cells use only glucose. – Compare the amount of glucose in the blood of a fasting individual and after a meal rich in carbohydrates. – Analyzing the composition of plasma metabolites.	– Getting information from document, graphs and tables. – Getting information from a text. – Interpreting the results of blood analysis.	
• Storing organs.	– Identify the organs that store glucose (liver, muscles, and adipose tissue).	– Analyzing the experimental results of graphs and of tables of givens.	
• The liver: the organ that regulates glycemia.	– Note that the primordial role of the liver is the continuous furnishing of glucose despite the irregular uptakes. – Note that the variation in the amount of glycogen in the liver is highly related to the nutritive uptake of carbohydrates. – Relate glycogengenesis and glycogenlyses to the presence of enzymes in the liver.	– Experimentation to give an evidence of the hepatic glycogen. – Using documents and tables of givens related to the storing and the production of glucose by the liver.	– Emphasize the role of the liver as a fundamental organ of adjusting the glucose uptake to the cells.

Content	Learning objectives (Skills ...)	Aactivities	Remarks
• Restoring ATP in muscles • Retaining to its initial state.	– Relate the metabolism of muscle fibers to their characteristics. – Note that the reserves of tryglycerides and of glycogen, allow the muscle to partially use the glucose in the blood. – Know that the muscles are large consumers of ATP when they contract, but the reserves of ATP are very weak. – Relate the mechanical energy necessary for muscular contraction, to the direct conversion of chemical energy of ATP. – Note that during extrinsic but short exercises, ATP is restored almost instantaneously and anaerobically without the formation of lactic acid (use of phospho-creatine reserves). – Note that when extrinsic work is maintained for 1 to 2 minutes, the restoration of ATP is specially ensured by an anaerobic lactic metabolism (lactic acid fermentation). – Note that for extrinsic work of a long duration, aerobic metabolism (respiration) interferes for regenerating ATP. – Note that at the end of contraction, the muscle slowly retains its initial state by cellular respiration	– Getting information from documents and experimental results. – Analyzing experimental results concerning the invention of phospho-creatinine. – Interpreting the results of blood analysis done at the entry and at the exit of a muscle at rest and of a muscle in action. – Interpreting documents that relate the duration of the work to the formation of lactic acid. – Interpreting documents, graphs and tables of givens. – Getting information from a text.	

Content	Learning objectives (Skills ...)	Activities	Remarks
2- Interdependance of living things and their relationship with the environment. 2.1 conversion of light energy to chemical energy.	– (All the learning objectives related to photosynthesis and the needs and the use of photosynthetic products are suspended)	All documents, , figures experiments related to photosynthesis are suspended	
2.2 Energy flow and the carbon cycle. 2.2.1 Trophical organization of an ecosystem.	– Know that the trophical relationships between all the living things of an ecosystem, ensure a transfer of materials which favors a flow of energy. – Differentiate between primary productivity and secondary one, producers and consumers. – Notice that there is a progressive decrease of biomass starting from producers until the final consumer, in an ecosystem of dynamic equilibrium. – Illustrate the complexity of the trophical relationships in an ecosystem by ecological pyramids. – Compare the pyramid of biomass to pyramids of productivity.	– Getting information from a text. – Probing through documents, graphs, and givens about the net and the crude photosynthetic turnover and on the ecological turnover. – Interpreting tables of givens related to the ecological pyramids.	
2.2.2 Energy flow in an ecosystem.	– Notice that every energetic conservation (photosynthesis, biological oxidation...) liberates heat. – Know that the primary production, conditions the flow of energy in an ecosystem. – Notice that the quantitative study of the	– Getting information from documents, graphs, and tables of givens.	– Guide the students to reflect upon the use of natural resources by Man.

	energy flow in an ecosystem allows the establishment of energy relationships at equilibrium. – Establish a relationship between the heat lost and energy conservation in an ecosystem, which explains the release of external energy.	– Analyzing a concept map of energy in an ecosystem.	

The entire unit concerning Human Reproduction is suspended.

التوزيع السنوي لدروس مادة علوم الحياة
في الصف الثانوي الثاني- فرع العلوم
عدد حصص التدريس: حصتان في الأسبوع

	Week	Activity	Remarks
Chap1 : the diversity of organisms & the uniqueness of the individual	Week 1	**Activity 2:** Polymorphism within a population + Activity 3: Biological Identity of organisms	Activity 2: Focus on the difference between Morphological polymorphism and Biochemical polymorphism (Very important for Genetics in Sec3 LS) Activity 3: Only Paragraph 1
		Activity 4: Renewal of cells & maintenance of their characteristics	
Chapter 2 DNA genetic information & cell cycle	Week 2	**Activity 3**: The structure & the chemical components of chromosomes	**Activity 2** Mitosis, an equal division of the chromosomal set. Revision since it is taken throughly in grade 9, but as base line for introducing the cell cycle
		Activity 3: The structure & the chemical components of chromosomes.	
	Week 3	**Activity 4**: Identical reproduction & cell cycle	
		Activity 4: Identical reproduction & cell cycle	
	Week 4	Ex of Ch2	
		Ex of Ch2	

	Week	Activity	Remarks
Chap3 : protein synthesis & enzymatic activity	Week 5	**Activity 1:** Proteins , an association of amino acids	
		Activity 1: Proteins , an association of amino acids	
	Week 6	**Activity 2:** The gene , structure & information unit	
		Activity 2: The gene , structure & information unit	
	Week 7	**Activity 3:** Transcription : first step of protein synthesis	
		Activity 3: Transcription : first step of protein synthesis	
	Week 8	**Activity 4:** Translation : second step of protein synthesis	
		Activity 4: Translation : second step of protein synthesis	
	Week 9	**Activity 5:** Fate of synthesized proteins	
		Activity 5: Fate of synthesized proteins	
	Week 10	**Activity 8:** Specifity and Mechnism of Enzyme action	
		Exercises	
	Week 11	Test	
		Correction of Test	

	Week	Activity	Remarks
Chap 6 : energy expenditure of organism	Week 12	**Activity 1:** Evaluation of energy expenditure	
		Activity 2: Variations of energy expenditure	
	Week 13	**Activity 3:** Basal metabolism	
		Activity 4: Basal Metabolism	
	Week 14	Exercises	
		Exercises	

	Week	Activity	Remarks
Chap 7: energy of cell functioning	Week 15	**Activity 1:** Cellular respiration	Memorization of chemical reactions is not required. Exercises run in parallel with the activities
		Activity 2: Fermentation	
	Week 16	**Activity 3:** Conversion of the energy of metabolites	
		Activity 5: The mitochondrion , site of cellular oxidations	
	Week 17	Exercises	

	Week	Activity	Remarks
Chap 10 basic principles	Week 18	**Activity 1:** Energy expenditure & quantitative needs	. We can re-add it and write next to it no memorization of tables (roles of vitamins and minerals) just for comprehensive reading)
		Activity 2: Qualitative needs: the building foods & the energetic foods	
	Week 19	**Activity 3:** Qualitative needs: vitamins and minerals	
		Activity 4: A balanced diet	
Chap 11 : nutritional diseases	Week 20	**Activity 4:** A balanced diet	Quick revision (mastered in grade 9)
		Activity1 Food deficiency diseases Activity 2: Diseases of excessive food intake : cardiovascular diseases	
	Week 21	**Activity 3: Diseases caused by Food Excess: Obesity**	
		Activity 3: Diseases caused by Food Excess: Obesity	

	Week	Activity	Remarks
Chap 14 :Man & the carbon cycle	Week 22	**Activity 1:** The biogeochemical cycle of carbon	Prerequisite (mostly covered in grade 7: Ch13 **energy flow and the carbon cycle in ecosystems.***
		Activity 2: Human activities & the carbon cycle	
	Week 23	**Activity 3:** Greenhouse effect & global warming	
		Exrcises	

REDUCTION OF THE LIFE SCIENCE CURRICULUM
3rd Year Secondary – Literature and humanities Series

Content	Learning objectives (skills…)	Activities	Remarks
1- 1. Nutrition and health. 1.1 Diversity of food habits.	Identify the different food habits of people	– Getting information from text. – Search in a CDI. – Analysis of statistical data concerning an industrial country and results of surveys. – Observation and analysis of documents, tables or graphs.	– Recall that consumed food is a mixture of mineral and organic substances. – Recall briefly the role of foods as source of matter and energy. It is not required to do a practical study of food. – Mention the existence of quantitative inequality of food between overnourished people and people that die of famine.
1.2 The basic principles for a balanced diet - Quantitative needs: Vitamins, amino acids, and mineral substances • Needs of Vitamins	-Specify the different types of vitamins and the role of each	-Analysis and studying of the source and role of different types of vitamins.	– Recall the energetic values of the – Stress only the notion that vitamins (hydrosoluble vitamins: B, C and liposoluble vitamins: A,D,E,K) are organic substances essential in small amounts for the maintenance of good health and they are provided by food, and any deficiency leads to
	Deduce the importance of		

• Need of amino acids	certain amino acids which must be found in food.	- Probing experimental results: Experiments conducted on animals (Magendie, Osborne, and Mendel) - Probing the doc related to the nutritional or biological value of a protein and the information accompanying it.	malnutrition disease: avitaminosis disease. - Needs of non-essential amino acids to build up body proteins (structural and functional proteins). Some aminoacids are produced in the body (nonessential aminoacids) while other aminoacids are not and should be supplied by protein rich food. (analysis of table showing the source of some of the non essential amino acids and their quantitative needs. The information is not for memorizing)
• Needs of fatty acids	Recognise that certain fatty acids are not synthesized by the body and that they must be supplied by food (particularly vegetable oil).	- Drawing information from a text or analysis of experimental results (experiment of Evans and Burr in 1928) - Observation and analysis of documents or graphs.	- Stress only the fact that certain fatty acids are not synthesized by the body and that they must be supplied by food (particularly vegetable oil).
• Needs of Minerals	- Needs of mineral slats: Recognise that certain mineral elements such as iodine and fluorine are essential in a very small dose for the proper functioning of the organism, and that their total lack induces very serious troubles.	- Drawing information from text or document	- Stress only the fact that certain mineral elements such as iodine and fluorine are essential in a very small dose for the proper functioning of the organism, and that their total lack induces very
1.4 Biological Renwal	- Recognise that the stability of living is not as it appears	- Observation of documents,	

• Food Digestion and dissimilation • Synthesis of molecules	- Point out that the majority of cells in a body are continuously replaced and that their characteristics are maintained in spite of renewal. Know that the constituting molecules of all cells are renewed without stop – Recognise that continuous renewal of molecules compensates for loss occurring due to continuous degradation of intracellular materials in a manner which lets the organism maintain a dynamic equilibrium. – Note that biological renewal might not happen except when the diet is balanced. – Know that the molecules necessary for biological renewal are derived from nutrients produced by food digestion. – Understand that nutrients are assimilated by the cells in order to construct their proper matter and insure biological renewal. – Know that proteins are macromo;ecules synthesised according to a plan which imposes its sequence of amino acids on their manufacture.	skin section, blood smears,.. and evidences from daily life	serious troubles. The sources and role of the different ions is not for memorizing.

Content	Learning objectives (skills…)	Activities	Remarks
2.2 Nervous communication - Nervous message - Synaptic transmission - Cerebral activity and conditioned reflex.	– Note that the nervous impulse is a temporary electric signal which corresponds to inversion of polarisation of the neuron membrane. – Relate depolarisation which constitutes the action potential to alteration of neuron membrane permeability to Na and K ions. - Excitatory post synaptic potential (hypoplarization of post synaptic membrane) and Inhibitory synapse (hypeplarization of post synaptic membrane) – Point out that the human's brain consists of two cerebral hemispheres composed of white matter covered by a grey one which forms the cerebral cortex. – Note that the cerebral cortex contains an enormous quantity of neurons.	–Analysis of documents.	– Draw attention to the fact that communication is achieved by exchange of signals (speaking, signs...) received by sensory receptors. -Stess the fact that excitatory synapse allows the passage of nerve meassge while inhibitory synapses don't. – Point out the existence of excitatory synapses which permit passage of the nervous message, and opposing inhibitory ones on the same neuron.

• The cerebrum and conscious perception	– Recognise that the human cerebrum is a treatment center for complex nervous messages. – Understand that the cerebrum is the organ of the central nervous system at the origin of general sensitivity and general movement. – Point out that the cerebral cortex is divided into sensory areas, motor areas and associative ones. – Note that the area of general sensitivity receives nervous messages sent by different receptors in the body, and that the psycho-sensitive areas integrate and interpret sensations to elaborate perception. – Specify the afferent sensory pathways and their synaptic relays. – Recognise that all voluntary actions are commanded by the motor area of the cerebral cortex. – Locate the motor area in the cerebral cortex. – Note that every part of the body is represented in the motor area as a function of its functional importance. – Specify the direct voluntary motor pathways and indirect ones (pyramidal and extra-pyramidal). – Indicate that the nervous motor	– Observation of documents – Drawing information from text – Analysis of sequence in a film – Getting information from text –Analysis of graphs –Evidence from every day life. –Analysis of a diagram showing the nervous mechanism acting during reaction to stress (cold...) –Analysis of diagrammatic figure showing the different nervous and hormonal	– Mention that certain aggressions due to stress are greatly perceived (death, divorce...) and they provoke marked emotional reactions while others, such as the daily stress (traffic...) are not perceptible except when they are added. – Recall briefly in the form

	pathways intersect and that every motor area commands the opposite half of the body. – Recognise that the psychomotor area allows co-ordination of voluntary movements. – Point out that voluntary movements are controlled by different levels of the central nervous system and that sensory information is received at every level (sensory-motor relation).	pathways. – Drawing information from a text or a table. – Observation of a model or a frontal section of the cerebrum. – Microscopic observation of a section of the cortex. – Making use of experimental results which lead to the notion of cerebral localisations.	of a general diagram the possible sense of nervous messages between receptors, nervous centers and effectors.
• Simple reflexes. • Conditional reflexes	– Recognise that reflexes are automatic and involuntary responses to excitation. – Identify the different elements of the reflex arc – Recognise that reflex reactions are two types: innate and acquired. – Point out that certain activities necessitate learning or conditioning before becoming reflexes. – Cite the characteristics of conditioned reflexes. – Indicate the importance of conditioned reflexes in an animal (training) and in Man (learning). – Deduce that the development of conditioned reflexes requires the presence of cerebral hemispheres.	– Analysis of documents – Analysis of clinical observations – Observation of documents showing the location of the cortical sensory areas –Analysis of scintillography of the cerebrum. –Analysis of a document showing the ascending sensory tracts in the case of tactile sensation. – Analysis of clinical observations – Analysis of a negative plate	–Certain techniques (EEG, MRI, scintillography...) which contribute to the well knowing of the functioning of the cerebrum should be presented. –Bring out the meaning of the notions of sensation and perception.

• Volantary action	– Compare the path of the nervous impulse throughout the innate reflex action of salivation to that throughout conditioned salivation. – Note that the important factor in conditioning is establishment of new nervous links between the nervous centers.	obtained by scintillography made throughout a movement – Observation and analysis of a diagrammatic section of the motor area (homonculus) – Analysis of a document showing the two great motor tracts.	
2.3 Hormonal communication. - Characteristics of the hormonal message • Elaboration and transportation of hormonal messages.	–Recognise that inside an organism, different groups of cells communicate among one another by hormonal messages. – Understand that a hormone is a chemical compound produced by an endocrine gland and then liberated in small amount into the internal medium acting as a means of transport. – Note that endocrine glands manufacture and secrete hormones under the effect of nervous, hormonal or mixed stimulations. – Point out that production of hormones is carried out in steps: taking raw materials from the blood, synthesis and later secretion. – Note that hormones act on target cells and modify their activity. – Point out that responding of target	– Analysis of a document showing the multiple nervous mechanisms intervening in a voluntary movement – Recall in the form of a diagram the anatomical elements of the pathway of the Nervous message during a simple reflex. –Analysis of a text about pavlov's experiment –Drawing information from text	–Draw attention to the fact that paralysis of the right half of the body may be induced by destruction of the left motor area.

- Neuro-hormonal integration. • Complementary of the nervous and hormonal systems. • Role of the hypothalamus. 2.5 Biological rhythms.	cells to hormonal messages requires temporary binding between the hormone molecules and receptors located on the membrane or inside the target cell. – Recognise that certain activities the body involve some complementarity between nervous and hormonal mechanisms. – Take into account the integrating role of the hypothalamus in neuro-hormonal correlation. – Recognise that biological rhythms are periodic variation of the functions of the body. – Point out the existence of biological rhythms at all levels of the organism. – Note that the well known biological rhythms are the circadian ones or those with medium frequency. – Notice that sleep is a phenomenon that passes in many phases. – Notice that the awakening-sleep rhythm changes and progressively through out life. – Note that the troubles of sleep are very frequent , and that anxiety is often the cause, and that proper	–Drawing information from text –Drawing information from text –Analysis of documents –Analysis of documents – Observation of a microscopic section of an	- Mention that spinal reflexes or bulbar ones are innate

- Synchronisation of endogenic rhythms. - Applications of chronobiology	hygiene may prevent those troubles. – Point out that biological rhythms have an endogenous origin but they are synchronised by environmental factors. – Point out that in the human kind, the principal synchronisation is the rhythm imposed by the social context: the schedule of activity and rest. – Notice that the body presents a periodic variation in its susceptibility to administered chemical substances. – Deduce that the conditions of life and work may disturb the biological rhythms.	endocrine gland – Analysis of documents – Analysis of documents – Analysis of documents and graphs – Analysis of documents - Probing documents which show the relation between the hypothalamus, hypophysis, glands and target cells. –Analysis of a table of data –Analysis of documents –Analysis of a hypnogram –Analysis of sequence in a film –Analysis of documents	- Limited to only one endocrine gland (the thyroid pancreas…)

		–Drawing information from text –Getting information from text which provides experimental results. –Getting information from text – Analysis of graphs which represent the interference between the biological rhythm and the time of administration of medicines. – Drawing information from a text or a document.	– Draw attention to the existence of circanual rhythms... – The mechanism of sleep is not required. – Chronobiology: study of biological rhythms. – Pharmacology: science of drugs, i.e. natural or synthetic chemical substances capable of inducing a biological response. – Give as an example the work by shifts. - Chronopharmacology: study of the effects of medicines according to the time of their

			administration.

Content	Learning objectives (skills…)	Activities	Remarks
3.Theories of evolution 3.1. the process of evolution through molecular biology and palaeontology	– Recognise that evolution is modification of living structures in time. – Establish that the differences between homologous molecules (insulin, hemoglobin...) result in evolution from a common model. – Note that the comparison between the genes coding for homologous molecules allows to establish phylogenetic relationships. – Point out that the data of palaeontology confirm that the actually living things do not resemble their ancestors. – Note the principal points of the transformist theory of Lamarck. – Point out the principal points of Darwin's theory: evolution by natural selection. – Note the different points of the mutationist theory of Hugo de Vries: evolution occurs by mutation and the species are stable outside mutations. – Note that biologists admit currently a synthetic theory according to which evolution is transformation of populations and not single individuals by the action of natural selection.	–Analysis of documents –Analysis of documents. – Analysis of documents (horse legs, human skill...). – Analysis of documents. – Analysis of a text by lamarck. – Analysis of documents – Analysis of a text by Darwin. – Getting information from text. – Analysis of documents (the pepper moth, resistant bacteria to antibiotics, resistant insects to insecticides...)	– Phylogeny: evolutionary history. – Palaeontology: the science which studies fossils. – Mention that fixism is a doctrine which affirms steadiness of species. – The synthetic theory is also called Neo-Darwinism. – Without detailed description of all forms, the great steps of hominids evolution would be treated starting from australopithecines.

في الصف الثالث ثانوي- فرع الإنسانيات

عدد حصص التدريس: حصة واحدة
بما أن الصف الثاني عشر فرع الإجتماع والإقتصاد يعتمد حصتين في حين فرع الإنسانيات يعتمد حصة واحدة،

المخصصة لفرع الإجتماع والإقتصاد والمخصص لها أصلًا حصة إضافية كما هو موضح في Biotechnologyسوف يدرس كل من فرعي الإجتماع والإقتصاد المواضيع نفسها باستثناء الوحدة المتعلقة بـ الجدول أدناه.

		Week	Activity	Remarks
Unit I **Nutrition and Health**	**Chapter 2: The Basic Principles of Balanced Diets**	**Week 1**	• Food supplies	
		Week 2	• Quantitative needs: energetic needs	
			•	
		Week 3	• Qualitative requirements: energetic needs-	**Briefly**
		Week 4	• Qualitative needs: requirements in proteins/Vitamins/ mineral ions	**Briefly**
		Week 5	• To make a balanced diet	
	Chapter 3: Nutritional diseases: characteristics, causes and prevention	Week 6	• **Ex of Ch2**	.
		Week 7	• Food deficiency	
		Week 8	• Diseases of excessive food intake: cardiovascular diseases	
		Week 9	• Obesity. Affliction of rich countries	

		Week	Activity	Remarks
Unit II Neur obiolo	**Ch ap ter 1: N**	Week 10	• **Ex of Ch3**	

		Week 11	• **Test 1**	
		Week 12	• The Nervous System: an Organized Network	
		Week 13	• Nervous Information: Nature and Propagation	
		Week 14	• Nervous Information: Nature and Propagation	
		Week 15	• Synaptic Transmission	.
		Week 16	• Chemical Perturbation of the Synapse	Brief explanation concerning the structure of DNA and RNA and gene expression (portein synthesis)**.**
		Week 17	• Chemical Perturbation of the Synapse	
		Week 18	**Ex of Ch1**	

		Week	Activity	Remarks
	Chapter 5: Drugs and drug addiction	Week 18	• Drug addiction, an artificial paradise	
		Week 19	• Drugs' mode of action	
		Week 20	• **Ex of Ch3**	
	Chapter 4: Stress and emotional reaction	**Week 21**	• Reaction to stress	
		Week 22	• Mechanism of stress response •	
		Week 23	Exercises	.

REDUCTION OF THE LIFE SCIENCE CURRICULUM
3rd Year Secondary - Life Science Series

Content	Learning objectives (Skills...)	Activities	Remarks
1- Genetics 1.3 Genetic diversity of populations.	– Know that a population is a group of individuals of the same species who live and reproduce by interbreeding in a well defined medium. – Notice that this group of individuals share a "gene pool" proper to the population. – Notice that in any population there is a genetic variation known as polymorphism. – Establish a relationship between the selective pressure exerted by the environmental factors and the increase in the frequency of certain alleles in defined populations. – Point that the migration tends to decrease the genetic divergences between the populations of a species. – Notice that natural selection stresses the genetic divergence in the case where the populations are placed in different environmental conditions. – Infer that there are no specific alleles that define a certain human population. – Notice that human populations differ in the relative frequency of alleles of certain	- Analysis of documents, of tables of given and graphs. - Probing a text. - Searching in CDI. – Analysis of documents, tables of given and graphs. – Searching in CDI.	

1.2 Fundemental mechanisms of sexual reproduction and genetic recombination 1.2.2 Fertilization	genes. – Deduce that the notion of race is perfectly arbitrary and without scientific foundation. - Draw the different steps of fertilization	– Probing a text.	There is prerequisite knowledge that fertilization restores the diploid state of the organism (must be stressed)

Content	Learning objectives (Skills...)	Activities	Remarks
2- Immunolgy 2-4: Deficiency of the Immune system • Allergy	**All objectives related to Allergic reaction are suspended**		
3.3 Example of cerebral activity: directed motor activity	**All objectives related to this content are suspended** – Discover that the encephalon is a privileged and protected structure which treats infor-mation. – Notice that the brain is made up of a large number of neurons forming numerous inter-connections. – Define the directed motor activity as an inten-tional movement (voluntary). – Locate the neuron of the parietal cortex partici-pating in the directed motor activity. – Determine the motor areas and the motor nervous pathways.	– Analysis of documents and of tables of given concerning the: • organization of the encephalon. • histological sections of the cerebral cortex. • different methods of exploring the cerebral cortex (Scanner, MRI, EEG, Scintigraphy...) – Analysis of electrophysiological recor-dings of the activity of neurons of the cerebral cortex.	– MRI (magnetic resonance imaging). – EEG: (electroencephalography).

4- Systems of regulation and functional unity of the organism.	– Relate between making an intentional movement and the permanent integration of the sensory information to the motor orders in the neurons of the nervous centers. – Notice that the triggering of the motor activity is done by the under-cortical and cerebellar centers that participate in a very important way in the regulation of the directed motor activities.		
4.2 Regulation of the arterial pressure. 4.2.1 Measure and variations of the arterial pressure.	Know that the measure of the arterial tension is estimating, in a direct manner, the blood pressure in the humeral artery. – Compare the maximal or systolic arterial pressure to the minimal or diastolic pressure. – Mention the techniques permitting a direct measure of the pressure inside the circulatory system. – Notice the normal and the pathological variations of arterial pressure. – Locate the intracardiac innervation and specify its role in the cardiac revolution. – Draw a functional diagram of the extracardiac innervation, sympathetic and parasympathetic. – Prove the action of the nervous centers and of the sympathetic and parasymphatetic nerves on the cardiac frequency and the motor activity of blood vessels. – Infer that the sympathetic centers are cardio-accelerators and vaso-motor and that the	- Analysis of results of: • recordings of pressure in the different parts of the circulatory system. • the arterial pressure in function of activities, constraints… – Analysis of experimental results relative to the cardiac automatism. – Analysis of documents and of tables of given. – Methodical analysis of experiments of stimulation and of sectioning. – Analysis of the experimental results and of the clinical	– Recall the anatomy and physiology of the heart and that of the vascular system.

	medullary parasympathetic are cardio-moderators. – Identify the different physiological parameters that can influence the arterial pressure.	observations (cardiac flow, vasoconstriction, vasodialation, athero-sclerosis,...).	

Content	Learning objectives (Skills...)	Activities	Remarks
5- Evolution of living things. 5.1 Parental relationships between living things. 5.1.1 Time framework of evolution of life.	– Know the geologic time and its subdivisions into eras, periods… – Specify the criteria that define the unity of the living world.	– Analysis of documents and of tables of given relative to geologic time.	**All the unit is suspended** – Mention: genetic code, proteosynthesis, ATP, meiosis, fertilization, chemical communication, the same nitrogenous bases.
	– Notice the diversity of the actual living world. – Recall the definition of species and its impor-tance in the classification of the living world. – Notice that the living things are divided into prokaryotes and eukaryotes according to recent biological given.	– Analysis of documents, of tables of given and of graphs. – Getting information from a text. – Analysis of sequences in a film. – Searching in CDI.	– Eukcaryotes: DNA constituents of cells organized in chromoso-mes present in a nucleus and the presence of other cellular organelles. – Prokaryotes: absence of differentiated cellular organelles, DNA strand free in the cytoplasm.
	– Notice the succession of species during the geologic times. – Notice that the evolution is the only scientific explanation that considers the unity and the diversity of the living world in addition to the changes occurring during the	– Analysis of documents and of tables of given relative to the: • appearance of vertebrates during geologic times. (study of fossils permitting	

	geologic times.	to establish a chronological order). • phylogenetic links between the dif-ferent vertebrates.	

Content	Learning objectives (Skills...)	Activities	Remarks
5.1.2 The search for parental relationships.	– Notice that evolution implies a filiation between the species: members of the same species ori-ginate from common ancestors and are modi-fied in time. It is probable that all living things have a common origin. – Find out the parental links between the living things from the morphological and anatomical characteristics. – Analyze embryonic characteristics to show that species resemble each other more by their em-bryos than by their adults. – ~~Determine and compare the homologous molecules (proteins, genes): same structure, same function, variation in the nature of the sequence (aminoacids, or nucleotides).~~ – ~~Find out the parental links between living things by relying on the analysis of homologous molecules.~~ – Define phylogeny as the science that estab-lishes parental relationships by comparing the homologous molecules. – Construct and interpret a phylogenetic tree for qualitative probing.	– Study of a fossilized lineage to iilustrate a parental link between living things: case of horses' fossils. – Analysis of embryonic stages in vertebrates. – ~~Comparaison of documents relative to homologous molecules (enzymes, hor-mones) and to sequences of genes~~. – Analysis of sequences illustrating de-grees of molecular parenthood to estab-lish phylogeny between the species.	– Qualitative probing is not required.
	– Deduce that the organisms of close ancestors resemble each other more than those who have a common ancestor in the far past.		

Content	Learning objectives (Skills...)	Activities	Remarks
	– Notice that the most evident cause of a reproductive isolation is the geographical isolation.	– Getting information from a text.	
5.3 Human evolution. 5.3.1 Criteria of human evolution.	– Know that the human evolution is the progressive acquisition of morphological and cultural characteristics of the human lineage, and also of language. – Compare the morphological, anatomical and cultural characteristics that distinguish the principal types of hominids.	– Analysis of documents relative to the comparative study of moldings or reconstituted anatomical elements of the human species lineage; tools testifying their culture.	– Mention certain Australopithecus, Homo habilis, Homo erectus, Homo sapien.
	– Know the main evolutionary stages of hominids.	– Analysis of documents relative to the main evolutionary stages of humans since the appearance of hominoids 4 to 1.4 MYA passing by the appearance of the genus Homo until the birth of the modern Man: Homo sapiens.	
	– Notice the criteria of human evolution: bipedal walking, increase in the cerebral volume, appearance of language, acquisition of techniques and development of cultural activity.		
5.3.2 Phylogenic relationships between Man and primates.	– Notice the phylogenic relations between modern Man and that of primates by a comparative study of karyotypes and homologous proteins. – Notice that a modification of certain genes of	– Analysis of documents relative to the comparative study of karyotypes, of homologous proteins of Man and of apes	

	regulation, related to environmental changes, can be at the origin of the human lineage.	(anthropomorphs).	

التوزيع السنوي لدروس مادة علوم الحياة
في الصف الثانوي الثالث- فرع علوم
عدد حصص التدريس: 6 حصص في الأسبوع

Chapter	Weeks		Remarks
Chapter 1: Basic Mechanisms of Sexual Reproduction	1	Doc 1: Male and Female Reproductive Systems /Doc 2: Diploid and Haploid Cells	Doc 2 is revision or prerequisite material The information in these documents is essential and prerequisite for the information in the following chapters in Unit **1**
		Doc 3: meiosis	
		Doc 4Spermatogenesis	
		Doc 5: Oogenesis and Folliculogenesis	
		Doc 5: Oogenesis and Folliculogenesis	
		Doc6: Fertilization+ Exercises	The stages of fertilization are suspended
Chapter 2: Transmission of genes and genetic recombination	2	Doc 1 :Hereditary Ttraits and Genes	
		Doc 1 : Hereditary Ttraits and Genes	
		Doc 2: Transmission of Allelic Genes	
		Doc 2: Transmission of Allelic Genes	
		Doc 3: Inter-chromosomic Recombination	
		Doc 3: Inter-chromosomic Recombination	
	3	Doc 4: Intra-chromosomic Recombination	
		Doc 4: Intra-chromosomic Recombination	
		Ex of ch2	
		Ex of ch2	
Chapter 3: Genetic Diversity of Population		Doc 1: Mutations and the Environment	
		Doc 2: Mutations and Multiple Alleles	
	4	Doc 3: Polymorphic Genes in a Population	
		Doc 4: Detection of Genetic Polymorphism	
		Doc 4: Detection of Genetic Polymorphism	
		Doc 5: Genetic Identity of Individuals	
		Doc 5: Genetic Identity of Individuals	
		Ex of ch2	
	5	Ex of ch2	
Chapter 18: Mechanisms of evolution		Chapter 18: Document 2: doc1:Mutation and genetic innovations	
		Doc 3: Multigene families	
		Doc 3: Multigene Families	
Exercise 5: Human		Doc1:Inheritance of Genetic Traits	

Genetics		Doc 2: Autosomal Diseases	
	6	Doc 2: Autosomal Diseases	
		Doc 3: Sex-linked Diseases	
		Doc 3: Sex-linked Diseases	
		Doc4: Chromosomal Abnormalities	
		Doc4: Chromosomal Abnormalities	
		Doc5: Prenatal Diagnosis	and Genetics
	7	Ex of ch3	
		Ex of ch3	
Exercises		Practice Exercises	Complex Situations integrating the covered competencies in Unit 1: Reproduction
		Practice Exercises	
Test		Test	
		Test	
	8	Test Correction	
Chapter 6: Role and Components of the Immune System		Doc1:HLA: a major self-marker	
		Doc 1: HLA: a major self-marker	
		Doc 2: Blood groups: another self-marker	
		Doc 2: Blood groups: another self-marker	
		Doc3: The “non-self”	
	9	Doc 4: Cells of the Immune System	
		Doc 4: Cells of the Immune System	
		Doc5: Lymphoid Organs	
		Doc5: Lymphoid Organs	
		Doc6: Antigen Recognition by B Lymphocytes	
		Doc6: Antigen Recognition by B Lymphocytes	
	10	Doc7: Antigen Recognition by T Lymphocytes	
		Doc7: Antigen Recognition by T Lymphocytes	
		Ex of ch6	
		Ex of ch6	
Chapter 7: The Immune Response		Doc 1: Non-specific Immune Response	
		Doc1: Non-specific Immune Response	
		Doc2: Specific Immune Response	
	11	Doc2: Specific Immune Response	
		Doc3: Induction of the Specific Immune Response	

		Doc3: Induction of the Specific Immune Response	
		Doc4: Role of TH in the Specific Immune Response	
		Doc4: Role of TH in the Specific Immune Response	
		Doc5: Specific Humoral Specific Immune Response	
	12	Doc5: Specific Humoral Specific Immune Response	
		Doc6: Specific Cell-mediated Specific Immune Response	
		Doc6: Specific Cell-mediated Specific Immune Response	
		Doc7: Immunological Memory	
		Doc7: Immunological Memory	
		Doc8: Diagnostic Applications of Antibody Properties	
	13	Doc8: Diagnostic applications of Antibody Properties	
		Ex of ch6	
		Ex of ch6	
Chapter 8: Disorders of the Immune system		Doc1: Immunodeficiency	
		Doc1: Immunodeficiency	
		Doc3: Autoimmune Diseases	
	14	Doc3: Autoimmune Diseases	
		Ex Ch8	
		Ex Ch8	
		Testing Periods	
		Testing Periods	
Chapter 9: Function of Neuron		Test Correction	
	15	Doc 1: Resting Potential	Revision Components of Nervous system
		Doc 1: Resting Potential	
		Doc 1: Resting Potential	
		Doc2: AP	
		Doc 2: Action Potential	
		Doc 2: Action Potential	
	16	Doc 3: Nerve Impulse and Action Potentail	
		Doc 3: Nerve Impulse and Action Potentail	
		Doc 4: Sensory Receptor and Nerve Impulse	
		Doc 4: Sensory Receptor and Nerve Impulse	
		Doc 5: Synapse Structure and Function	
		Doc 5: Synapse Structure and Function	
	17	Doc6: Integrative Properties of Nerve Centers	
Chapter 10: Myotatic Reflex		Doc6: Integrative Properties of Nerve Centers	
		Ex Ch9	

		Ex Ch9	
		Doc 1: Maintaining Posture	
		Doc 1: Maintaining Posture	
	18	Doc2: Anatomy of the Reflex Action	
		Doc2: Anatomy of the Reflex Action	
		Doc3: Reflex Control	
Chapter 12 : Neurotransmitters and medical applications		Doc3: Reflex Control	Direct Application: Disorders of the Nervous System
		Ex Ch10	
		Doc1: Neurotransmitters and Membrane Channels	
	19	Doc2: Neurotransmitters and Pain Circuit	
		Doc2: Neurotransmitters and Pain Circuit	
		Doc 3: Diseases of N.S.	
		Doc 4: Drugs	
		Ex Ch12	
		Test	Test Period
	20		Test Period
			Test Correction
Chapter 13: Regulation of Glycemia		Doc1:Glycemia, a Biological Constant	
		Doc2: The Liver, an Effector Organ in the Regulation of Glycemia	
		Doc2: The Liver, an Effector Organ in the Regulation of Glycemia	
		Doc3: The Pancreas and Glycaemia	
	21	Doc3: The Pancreas and Glycaemia	
		Doc4: Hypoglycemic System	
		Doc4: Hypoglycemic System	
		Doc5: Hyperglycemic System	
		Doc6: Regulation of Glycemia by Feedback Control	
		Ex Ch 13	
	22	Ex Ch13	
Chapter 15: Regulation of female sex Hormones		Doc1: The Sexual Cycle	
		Doc2: Cyclic evolution of the Ovarian Hormones	
		Doc3: The Hypothalamo-pituitary Axis and Ovarian Secretions	
		Doc3: The Hypothalamo-pituitary Axis and Ovarian Secretions	
		Doc4: Ovarian feedback Control of the Hypothalamo-Pituitary axis	
Chapter 16 Birth Control	23	Exercises of Ch15	
		Doc1:Contraceptive Methods	
		Doc1: Contraceptive Methods	
		Doc2: Contragestive Methods	

		Doc3: Medically Assisted Procreation	
		Exercises of Ch 16	

REDUCTION OF THE LIFE SCIENCE CURRICULUM
3rd Year Secondary – Sociology and Economics Series

Content	Learning objectives (skills…)	Activities	Remarks
2- 1. Nutrition and health. 1.1 Diversity of food habits.		– Getting information from text. – Search in a CDI. – Analysis of statistical data concerning an industrial country and results of surveys. – Observation and analysis of documents, tables or graphs.	– Recall that consumed food is a mixture of mineral and organic substances. – Recall briefly the role of foods as source of matter and energy. It is not required to do a practical study of food. – Mention the existence of quantitative inequality of food between overnourished people and people that die of famine.
1.2 The basic principles for a balanced diet - Quantitative needs: Vitamins, amino acids, and mineral substances	-Specify the different types of vitamins and the role of each	-Analysis and studying of the source and role of different types of vitamins.	– Recall the energetic values of the
• Needs of Vitamins			– Stress only the notion that vitamins (hydrosoluble vitamins: B, C and liposoluble vitamins: A,D,E,K) are organic substances essential in small amounts for the maintenance of good health and they are provided by food, and any deficiency leads to malnutrition disease: avitaminosis disease.
• Need of amino acids	Deduce the importance of certain amino acids which must be found in food.	- Probing experimental results: Experiments conducted on animals (Magendie, Osborne, and Mendel)	- Needs of non-essential amino acids to build up body proteins (structural and functional proteins). Some aminoacids are produced in

• Needs of fatty acids • Needs of Minerals 1.4 Biological Renwal	Recognise that certain fatty acids are not synthesized by the body and that they must be supplied by food (particularly vegetable oil). - Needs of mineral slats: Recognise that certain mineral elements such as iodine and fluorine are essential in a very small dose for the proper functioning of the organism, and that their total lack induces very serious troubles. - Recognise that the stability of living is not as it appears - Point out that the majority of cells in a body are continuously replaced and that their characteristics are maintained in spite of renewal. Know that the constituting molecules of all cells are renewed without stop	- Probing the doc related to the nutritional or biological value of a protein and the information accompanying it. - Drawing information from a text or analysis of experimental results (experiment of Evans and Burr in 1928) - Observation and analysis of documents or graphs. - Drawing information from text or document - Observation of documents, skin section, blood smears,.. and evidences from daily life	the body (nonessential aminoacids) while other aminoacids are not and should be supplied by protein rich food. (analysis of table showing the source of some of the non essential amino acids and their quantitative needs. The information is not for memorizing) - Stress only the fact that certain fatty acids are not synthesized by the body and that they must be supplied by food (particularly vegetable oil). - Stress only the fact that certain mineral elements such as iodine and fluorine are essential in a very small dose for the proper functioning of the organism, and that their total lack induces very serious troubles. The sources and role of the different ions is not for memorizing.

• Food Digestion and dissimilation • Synthesis of molecules	– Recognise that continuous renewal of molecules compensates for loss occurring due to continuous degradation of intracellular materials in a manner which lets the organism maintain a dynamic equilibrium. – Note that biological renewal might not happen except when the diet is balanced. – Know that the molecules necessary for biological renewal are derived from nutrients produced by food digestion. – Understand that nutrients are assimilated by the cells in order to construct their proper matter and insure biological renewal. – Know that proteins are macromo;ecules synthesised according to a plan which imposes its sequence of amino acids on their manufacture.		

Content	Learning objectives (skills…)	Activities	Remarks
2.2 Nervous communication - Nervous message - Synaptic transmission - Cerebral activity and conditioned reflex.	– Note that the nervous impulse is a temporary electric signal which corresponds to inversion of polarisation of the neuron membrane. – Relate depolarisation which constitutes the action potential to alteration of neuron membrane permeability to Na and K ions. - Excitatory post synaptic potential (hypoplarization of post synaptic membrane) and Inhibitory synapse (hypeplarization of post synaptic membrane) – Point out that the human's brain consists of two cerebral hemispheres composed of white matter covered by a grey one which forms the cerebral cortex. – Note that the cerebral cortex contains an enormous quantity of neurons. – Recognise that the human cerebrum is a treatment center for complex nervous messages. – Understand that the cerebrum is the organ of the central nervous system	–Analysis of documents. – Observation of documents – Drawing information from text – Analysis of sequence in a	– Draw attention to the fact that communication is achieved by exchange of signals (speaking, signs...) received by sensory receptors. -Stess the fact that excitatory synapse allows the passage of nerve meassge while inhibitory synapses don't. – Point out the existence of excitatory synapses which permit passage of the nervous message, and opposing inhibitory ones on the same neuron.

• The cerebrum and conscious perception	at the origin of general sensitivity and general movement. – Point out that the cerebral cortex is divided into sensory areas, motor areas and associative ones. – Note that the area of general sensitivity receives nervous messages sent by different receptors in the body, and that the psycho-sensitive areas integrate and interpret sensations to elaborate perception. – Specify the afferent sensory pathways and their synaptic relays. – Recognise that all voluntary actions are commanded by the motor area of the cerebral cortex. – Locate the motor area in the cerebral cortex. – Note that every part of the body is represented in the motor area as a function of its functional importance. – Specify the direct voluntary motor pathways and indirect ones (pyramidal and extra-pyramidal). – Indicate that the nervous motor pathways intersect and that every motor area commands the opposite half of the body. – Recognise that the psychomotor area allows co-ordination of voluntary movements.	film – Getting information from text –Analysis of graphs –Evidence from every day life. –Analysis of a diagram showing the nervous mechanism acting during reaction to stress (cold...) –Analysis of diagrammatic figure showing the different nervous and hormonal pathways. – Drawing information from a text or a table. – Observation of a model or a frontal section of the	– Mention that certain aggressions due to stress are greatly perceived (death, divorce...) and they provoke marked emotional reactions while others, such as the daily stress (traffic...) are not perceptible except when they are added. – Recall briefly in the form of a general diagram the possible sense of nervous messages between receptors, nervous centers and effectors.

• Simple reflexes. • Conditional reflexes • Volantary action	– Point out that voluntary movements are controlled by different levels of the central nervous system and that sensory information is received at every level (sensory-motor relation). – Recognise that reflexes are automatic and involuntary responses to excitation. – Identify the different elements of the reflex arc – Recognise that reflex reactions are two types: innate and acquired. – Point out that certain activities necessitate learning or conditioning before becoming reflexes. – Cite the characteristics of conditioned reflexes. – Indicate the importance of conditioned reflexes in an animal (training) and in Man (learning). – Deduce that the development of conditioned reflexes requires the presence of cerebral hemispheres. – Compare the path of the nervous impulse throughout the innate reflex action of salivation to that throughout conditioned salivation.	cerebrum. – Microscopic observation of a section of the cortex. – Making use of experimental results which lead to the notion of cerebral localisations. – Analysis of documents – Analysis of clinical observations – Observation of documents showing the location of the cortical sensory areas –Analysis of scintillography of the cerebrum. –Analysis of a document showing the ascending sensory tracts in the case of tactile sensation. – Analysis of clinical observations – Analysis of a negative plate obtained by scintillography made throughout a movement – Observation and analysis of a diagrammatic section of	–Certain techniques (EEG, MRI, scintillography...) which contribute to the well knowing of the functioning of the cerebrum should be presented. –Bring out the meaning of the notions of sensation and perception.

2.3 Hormonal communication. - Characteristics of the hormonal message • Elaboration and transportation of hormonal messages.	– Note that the important factor in conditioning is establishment of new nervous links between the nervous centers. –Recognise that inside an organism, different groups of cells communicate among one another by hormonal messages. – Understand that a hormone is a chemical compound produced by an endocrine gland and then liberated in small amount into the internal medium acting as a means of transport. – Note that endocrine glands manufacture and secrete hormones under the effect of nervous, hormonal or mixed stimulations. – Point out that production of hormones is carried out in steps: taking raw materials from the blood, synthesis and later secretion. – Note that hormones act on target cells and modify their activity. – Point out that responding of target cells to hormonal messages requires temporary binding between the hormone molecules and receptors located on the membrane or inside	the motor area (homonculus) – Analysis of a document showing the two great motor tracts. – Analysis of a document showing the multiple nervous mechanisms intervening in a voluntary movement – Recall in the form of a diagram the anatomical elements of the pathway of the Nervous message during a simple reflex. –Analysis of a text about pavlov's experiment –Drawing information from text –Drawing information from text –Drawing information from text	–Draw attention to the fact that paralysis of the right half of the body may be induced by destruction of the left motor area. - Mention that spinal

- Neuro-hormonal integration. • Complementary of the nervous and hormonal systems. • Role of the hypothalamus. 2.5 Biological rhythms. - Synchronisation of endogenic rhythms.	the target cell. – Recognise that certain activities the body involve some complementarity between nervous and hormonal mechanisms. – Take into account the integrating role of the hypothalamus in neuro-hormonal correlation. – Recognise that biological rhythms are periodic variation of the functions of the body. – Point out the existence of biological rhythms at all levels of the organism. – Note that the well known biological rhythms are the circadian ones or those with medium frequency. – Notice that sleep is a phenomenon that passes in many phases. – Notice that the awakening-sleep rhythm changes and progressively through out life. – Note that the troubles of sleep are very frequent , and that anxiety is often the cause, and that proper hygiene may prevent those troubles. – Point out that biological rhythms have an endogenous origin but they are synchronised by environmental factors.	–Analysis of documents –Analysis of documents – Observation of a microscopic section of an endocrine gland – Analysis of documents – Analysis of documents – Analysis of documents and graphs	reflexes or bulbar ones are innate - Limited to only one endocrine gland (the thyroid pancreas…)

- Applications of chronobiology	– Point out that in the human kind, the principal synchronisation is the rhythm imposed by the social context: the schedule of activity and rest. – Notice that the body presents a periodic variation in its susceptibility to administered chemical substances. – Deduce that the conditions of life and work may disturb the biological rhythms.	– Analysis of documents - Probing documents which show the relation between the hypothalamus, hypophysis, glands and target cells. –Analysis of a table of data –Analysis of documents –Analysis of a hypnogram –Analysis of sequence in a film –Analysis of documents –Drawing information from text –Getting information from text which provides experimental results. –Getting information from text – Analysis of graphs which represent the interference between the biological rhythm and the time of	– Draw attention to the existence of circanual rhythms... – The mechanism of sleep is not required. – Chronobiology: study of

		administration of medicines. – Drawing information from a text or a document.	biological rhythms. – Pharmacology: science of drugs, i.e. natural or synthetic chemical substances capable of inducing a biological response. – Give as an example the work by shifts. - Chronopharmacology: study of the effects of medicines according to the time of their administration.

Content	Learning objectives (skills…)	Activities	Remarks
3.Theories of evolution 3.2. the process of evolution through molecular biology and palaeontology	– Recognise that evolution is modification of living structures in time. – Establish that the differences between homologous molecules (insulin, hemoglobin...) result in evolution from a common model. – Note that the comparison between the genes coding for homologous molecules allows to establish phylogenetic relationships. – Point out that the data of palaeontology confirm that the actually living things do not resemble their ancestors. – Note the principal points of the transformist theory of Lamarck. – Point out the principal points of Darwin's theory: evolution by natural selection. – Note the different points of the mutationist theory of Hugo de Vries: evolution occurs by mutation and the species are stable outside mutations. – Note that biologists admit currently a synthetic theory according to which evolution is transformation of populations and not single individuals by the action of natural selection.	–Analysis of documents –Analysis of documents. – Analysis of documents (horse legs, human skill...). – Analysis of documents. – Analysis of a text by lamarck. – Analysis of documents – Analysis of a text by Darwin. – Getting information from text. – Analysis of documents (the pepper moth, resistant bacteria to antibiotics, resistant insects to insecticides...)	– Phylogeny: evolutionary history. – Palaeontology: the science which studies fossils. – Mention that fixism is a doctrine which affirms steadiness of species. – The synthetic theory is also called Neo-Darwinism. – Without detailed description of all forms, the great steps of

			hominids evolution would be treated starting from australopithecines.

Note: All topics in Biotechnology part are required and not reduced

في الصف الثالث ثانوي- فرع الإجتماع والإقتصاد

عدد حصص التدريس: حصة واحدة

بما أن الصف الثاني عشر فرع الإجتماع والإقتصاد يعتمد حصتين في حين فرع الإنسانيات يعتمد حصة واحدة،

ونظرًا لأهمية الوحدة المتعلقة بالتغذية والنظام الغذائي الصحيح والمتوازن وازدياد الأمراض الناتجة عن العادات الغذائية والحركية غير الصحية وخاصة بين المتعلمين في هذه الفئة العمرية، تم وضعه ضمن المخصصة لفرع الإجتماع والإقتصاد والمخصص لها أصلًا Biotechnologyالمواد المطلوبة لفرعي الإجتماع والإقتصاد والإنسانيات ، إذا كلا الفرعين يتضمنان المواضيع نفسها باستثناء الوحدة المتعلقة بـ حصة إضافية كما هو موضح في الجدول أدناه.

		Week	Activity	Remarks
Unit I **Nutrition and Health**	**Chapter 2:** **The Basic Principles of Balanced Diets**	**Week 1**	• Food supplies	
			• Quantitative needs: energetic needs	
		Week 2	• Qualitative requirements: energetic needs/ Qualitative needs: requirements in proteins	**Brief focus on general role**
			• Qualitative needs: requirements in vitamins /Qualitative needs: mineral requirements	**Brief focus on general role**
		Week 3	• To make a balanced diet	
			• The fate of nutrients	
		Week 4	• **Ex of Ch2**	
			• **Ex of Ch2**	
		Week 5	• Food deficiency	
			• Diseases of excessive food intake: cardiovascular diseases	
	Chapter 3: **Nutritional diseases: characteristics,**	Week 6	• Obesity. Affliction of rich countries	.
			• **Ex of Ch3**	
		Week 7	• **Ex of Ch3**	
			Test 1	
		Week 8	**Ccorrection of Test 1**	
			Ccorrection of Test 1	
		Week 9	**Introduction to the Nervous System**	

		Week	Activity	Remarks
Unit II **Neurobiology, Human Behavior and Health**	**Chapter 1: Neural Communication**	**Week 9**	• The Nervous System: an Organized Network	
		Week 10	• The Nervous System: an Organized Network	
			• Nervous Information: Nature and Propagation	
		Week 11	• Nervous Information: Nature and Propagation	
			• Synaptic Transmission	
		Week 12	• Synaptic Transmission	
			• Chemical Perturbation of the Synapse	

		Week 13	• Chemical Perturbation of the Synapse	
			Ex of Ch1	
		Week 14	**Ex of Ch1**	
	Chapter 5: Drugs and drug addiction		• Drug addiction, an artificial paradise	
		Week 15	• Drugs' mode of action	.
			• Drugs' mode of action	
		Week 16	**Ex of Ch3**	
			Ex of Ch3	
		Week 17	**Test**	
			Test Correction	
	Chapter 4: Stress and emotional reaction		• Reaction to stress •	**Describe briefly the origin of hormones related to short term stress and long term stress**
			• Mechanism of stress response	
		Week 18	• Mechanism of stress response	
			Exercise of ch4	
Unit IV Science and Economy	**Chapter 1: Biotechnology and immunology**			
		Week 19	• Principles of Biotechnology	Brief explanation concerning the structure of DNA and RNA and gene expression (portein synthesis)**.**
			• Principles of Biotechnology	
		Week 20	• Recombinant DNA: Therapeutic Drugs • Recombinant DNA: Vaccine Production	
			• Monoclonal antibodies and their application	
		Week 21	• **Ex of Ch1**	
			• Searching for performing species	
		Week 22	• The transfer of genes	
			• Industrial breeding, a controlled production	
		Week 23	• Animal foods	
	Chapter 2: Biotechnology		• The Cost of Progress.	
		Week 24	• The struggle against pollution **Ex of Ch2**	.