France Educational Curriculum Alignment

The presentations offered by The Educated Choices Program provide support for teaching and learning of the following standards:

Physics & Chemistry for Health - tech path, specialist courses, High School		**Environment and Modern Agriculture**	**Healthful Eating**
Theme 1: Prevention and Security	Chemical and electrical safety in the home Concepts and content Required knowledge and skills Students will be able to define and interpret: • Experimental training support activities • How to use acidic household products or safe basics • Quantity of matter, relation between mass and quantity of matter • Solute and solvent • Mass concentration Cm and molar concentration C of a solute in solution • pH of an aqueous solution [H3O +] = 10-pH • Measurement of the pH of a solution aqueous • Acid, base, acid/base couple, acid-base reaction • Scales of acidity and basicity, acidic, basic aqueous solution, neutral • Autoprotolysis of water, product water ion, concentrations molars [H3O +] and [HO-]	✔	✔

	• Safety pictograms • Chemical Safety Rules relating to acids and bases Students will be able to: • Calculate a molar mass M. Know and use the relation n = m/M.' • Define a solute, a solvent and a solution. • Know and use the n = C × V and m = Cm × V relationships. • Propose and/or implement a protocol for dissolution and dilution to prepare a solution of molar concentration or mass concentration given as a molecular or ionic solute. • Know and use the relationship [H3O +] = 10-pH. Set the neutral, acidic or basic character of an aqueous solution in terms of pH. • Propose and/or implement an experimental protocol to measure the pH of an aqueous solution. • Define an acid and a base according to Brönsted. To write the equation of an acid-base reaction from the couples acid/base. • Know the common name and formulas of most common acids and bases: acid hydrochloric acid, ethanoic acid, sulfuric acid, soda, ammonia. • Write the equation for the self-protolysis reaction of water. • Use, without calculation, the expression of the ionic product of water to qualitatively relate the concentrations [H3O +] and [HO-]. • Propose and/or implement a protocol for classification of household products according to their acidity. • Know the meaning of the safety pictograms. • Apply the safety rules related to the use of concentrated acidic and basic solutions, and to their mixed. Know the first aid actions in case of acid or base splash. • As part of waste management, implement a protocol for neutralizing an acid solution with a basic solution or vice versa.		

	How can disinfectants and antiseptics be used safely? ● Oxidizer, reducer, couple oxidant/reducer, redox half equation, redox reaction ● Oxidizing properties of some household products and pharmaceuticals stock qualitative antiseptic of a oxidant on a microorganism ● Dilution of an aqueous solution ● Safety rules relating to the use of oxidizing products Students will be able to: ● Define an oxidant and a reducer. ● Identify an oxidizer and a reducer in a redox half equation. ● Write the equation of a redox reaction from oxidation-reduction half-equations. ● Acquire and analyze property information oxidants of a disinfectant or an antiseptic (bleach, tincture of iodine, medical alcohol, water oxygen, etc.). ● Propose and/or implement a dilution protocol for a disinfectant or antiseptic product. ● Explain the risk associated with mixing bleach and of a descaling product by commenting on the reaction corresponding. ● Qualitatively explain the origin of the aging of oxygenated water. How are electrical risks in the home limited? ● Sinusoidal alternating voltage. ● Period, frequency, values maximum and minimum, value efficient ● Electric current intensity ● Electrical hazards ● Damage to devices ● Electrification and electrocution		

	• Power socket: phase, neutral, grounding Students will be able to: • Know the characteristics of the mains voltage. • Use an oscillogram. • Define electric current and its intensity. • Relate the intensity of the electric current to the deterioration of electrical appliances. Describe the principle of a circuit breaker. • Know that the human body conducts electricity. To master the rules to follow in order to avoid the risks of electrification. • Describe the importance of grounding when connection of electrical devices. • Implement a protocol to show interest in a circuit breaker. How is infrared used in certain detection systems? • Wave domain • Electromagnetic • Temperature of a body and emitted radiation. Wien's law • Infrared emission by the human body Students will be able to: • Know the wavelength limits in vacuum of the visible range and locate infrared radiation and ultraviolet. • Know that the human body emits radiation infrared, invisible to the naked eye and safe for the man. • Exploit the graphical representation of Wien's law in order to show that the human body emits infrared radiation. • Collect and use information on the use of infrared radiation in some detectors.		

	Road safety -Concepts and content -Required knowledge and skills -Experimental training -Support activities How does a vehicle's speed affect its stopping distance? ● speed of a body, energy ● translational kinetics ● Braking distance, distance stop Students will be able to: ● Know and use the expression for kinetic energy. ● Know the definition of braking and stopping distances of a vehicle. ● Appropriate and analyze information relating to braking distances. ● Know a few factors influencing the stopping distance. ● Implement an experimental protocol or use a simulation software to illustrate the influence of some factors (speed, mass, road condition, etc.) on the stopping distance		
Theme 2: Analyze and diagnose	Sound waves in the hearing process -Concepts and content -Required knowledge and skills -Experimental training support activities What are the characteristics of a sound? ● Frequency and pitch of a sound ● Audible sounds		✔

	• Sound intensity level (dB) Students will be able to: • Know the range of frequencies audible to the ear human. Locate ultrasound and infrasound. • Distinguish between bass, midrange and treble. • Make and use a sound recording to determine the characteristics of a sound. How is hearing loss identified and compensated? • Perception of sound by the ear • Human hearing risks • Compensation for a deficiency auditory; amplification of sound Students will be able to: • Briefly explain the principle of issuing, propagation and perception of sound. • Measure sound intensity levels. • Analyze an audiogram in terms of hearing loss. • Explain the principle of compensation for a deficiency auditory. The propagation of light in the process of vision Concepts and content Required knowledge and skills Experimental training support activities What is the mechanism of human vision? • Light spread • Brief description of mechanism of vision		

	Students will be able to: ● Know that light travels in a straight line in a homogeneous and transparent medium. ● Know the main optical components of the eye and their respective roles: cornea, iris, pupil, lens, retina and optic nerve. ● Represent the optical model of the eye. How is an image formed using a lens? ● Spherical thin lenses convergent and divergent; symbols ● Optical center O, object foci F and image F’ of a lens ● Focal distance f’ and vergence V ● Formation of an image by a converging lens character real or virtual of the image, magnification ● Principle of the magnifying glass Students Will be able to: ● Trace the course of the light rays passing through the points O, F and F' of a converging or diverging lens. ● Geometrically construct the image of a real object by a converging lens. ● Characterize an image by its property of being real or Virtual. ● Evaluate its growth by construction geometric. ● Implement imaging experiments by a converging lens in simple situations. How are vision defects corrected? ● Accommodation ● Vision defects: myopia, farsightedness and presbyopia ● Compensation of a hyperopia and myopia by corrective lenses ● Vergence of a system of two thin contact lenses		

	Students will be able to: ● Explain the principle of accommodation and the origin of presbyopia. Implement an experiment illustrating the principle of accommodation. ● Give the definition of a myopic eye and that of a farsighted. ● Qualitatively justify the choice of a corrective lens. ● Implement experiments that qualitatively illustrate the principle of correcting an eye defect. ● Know and use the expression of the vergence of a system of two thin lenses placed side by side. -The properties of fluids in the analysis of blood pressure -Concepts and content -Required knowledge and skills -Experimental training support activities How to define the flow rate of a flow? ● Flow, relationship between flow, flow velocity and section ● Relationship between cardiac output DC, heart rate fC and stroke volume VES Students will be able to: ● Know and apply the relationship D = v × S. ● Know and apply the relationship DC = fC × VES. ● Implement an average throughput measurement protocol. ● Implement a speed measurement protocol flow average. How to define the pressure in a liquid? ● Pressing force and pressure; international units		

	Students will be able to: ● Know and apply the relationship P = F/S How does the pressure in a liquid vary? ● Variation of the pressure with the depth, fundamental law of fluid statics Students will be able to: ● Use the relation P2-P1 = g (z1-z2). ● Implement a verification protocol fundamental to the statics of fluids. How is blood pressure defined and measured? ● Systolic blood pressure and diastolic ● Principle of measuring tension. ● Centimeter of mercury Students will be able to: ● Distinguish blood pressure and blood pressure. ● Appropriate and analyze documents relating to blood pressure measurements. Chemical analysis to control the composition of biological media -Concepts and content -Required knowledge and skills -Experimental training support activities How to describe organic molecules? ● Raw formula, developed, semi-developed and topological ● Covalent bonds		

	• Carbon skeleton • Functions • Constitutional isomerism • Nomenclature Students will be able to: • Switch from one type of representation to another. • Know the number of covalent bonds for the H, C, O and N atoms. • Build and operate molecular models. • Utilize molecular model visualization software. • Know and identify the functions alcohol, aldehyde, ketone, carboxylic acid, ester, etheroxide, amine, amide on simple examples. • Identify isomers from distinctions in the carbon chain, functions or spatial arrangement. • Name alkanes, alcohols, carboxylic acids and common carbonyl derivatives at six carbon atoms at most. What is the structure of molecules of biological interest? • Carbohydrates • Lipids from examples saturated fatty acids or unsaturated, triglycerides, sterols • Alpha amino acids, proteins • Polypeptides, peptide bond • Urea • Vitamins Students will be able to: • Identify some functions present in carbohydrates, lipids, proteins. • Know that the molecules of glucose, fructose and lactose exist in linear or cyclic form.		

	• Implement a protocol to differentiate aldehyde and ketone functions in carbohydrates. • Define a fatty acid, a triglyceride. • Comment on the saturated or unsaturated structure of some fatty acids: α-linoleic acid, palmitic acid, acid oleic, stearic acid. • Define an alpha amino acid. • Identify a peptide bond. Identify acids and amino constituents of a polypeptide. • Know that urea is the breakdown product of proteins. • Highlight the chemical properties of the vitamin C in relation to its chemical functions. How does the molecular structure of water explain its physical properties and its interaction with molecules of biological interest? • Water, polar molecule • Physical states of water • Hydrogen bond • Solubility of substances molecules in water • Hydrophobic and hydrophilic • Miscibility • Aqueous phase and phase organic Students will be able to: • Define a polar bond. • Give the representation of the water molecule taking into account the comparison of the electronegativity of hydrogen and oxygen atoms. • Know the temperatures of change of state of water at atmospheric pressure. • Simply highlight the levels of fusion and vaporization at atmospheric pressure, and the thermal effect physical changes.		

	• Represent a hydrogen bond. Interpret qualitatively the difference in the volumes occupied by the ice and liquid water. • Qualitatively justify the solubility of carbohydrates in the water. • Qualitatively interpret micelle formation. • Propose and/or implement a protocol illustrating the solubilities of different molecular substances. • Locate the aqueous and organic phases from the given densities. • Propose and/or implement a phase separation protocol and a protocol extraction.		
Theme 3: Making autonomous and responsible choices	Analysis of energy needs for a thoughtful diet -Concepts and content -Required knowledge and skills -Experimental training support activities What are the energy needs of humans? • Daily energy expenditure • Heat transfers by radiation, convection and conducting; application to the body human energy conversion, application to muscle activity • Endothermic transformations and exothermic Students will be able to: • Define daily energy expenditure. • Use the relationship of Harris and Bénédict making it possible to estimate the daily energy expenditure. • Know the units of energy (calories, joules and kilojoules) and their correspondence. • Experimentally highlight the transfers heat by convection and conduction.	✔	✔

	• Identify the different forms of heat loss from organisms (by radiation, by convection, by conduction, evaporation). • Experimentally demonstrate a conversion of energy. • Establish the energy balance for a muscle by action (conversion of chemical energy into heat and mechanical energy). • Practice an experiential approach to put in place demonstrates the thermal effect of a physical transformation or chemical. • Define endothermicity and exothermicity of a physical or chemical transformation. • Appropriate and analyze documents relating to endothermicity or exothermicity of a transformation physical or chemical in the body. How are human energy needs satisfied? • Food, fuels of the human body • Energy value of food Students will be able to: • Implement a protocol to identify the presence of carbohydrates, proteins, lipids and certain minerals in food. • Extract data relating to the energy provided by each food group. • Define calories. • Calculate the caloric value of a food. • Calculate the energy delivered by a food ration. • Implement a protocol to determine the energy released by burning food. How do the biochemical transformations of food produce energy? • Energy aspect of biochemical transformations • Glucose transformations in the body • Combustion reaction		

	• Hydrolysis reaction Students will be able to: • Exploit the energy value delivered by the transformation of carbohydrates, lipids, proteins. • Do the link with the property of carbohydrates to constitute the main sources of energy. • Write the chemical equations of the transformations of aerobic and anaerobic glucose. • Define a combustion reaction, write and use its equation. • Treat cases of glucose and pyruvic acid. • Define a hydrolysis reaction, use its equation. • Write the equation for the hydrolysis reaction of lactose. • Link the transformation of nutrients and the oxygen demand in athletes. The role of biomolecules in the body for effective health prevention -Concepts and content -Required knowledge and skills -Experimental training support activities How are carbohydrates stored and processed in the body? Classification of carbohydrates: simple and complex carbohydrates. • Carbohydrate isomerism • Chemical transformation of complex carbohydrates: hydrolysis acid, enzymatic hydrolysis • Condensation of glucose into glycogen		

	Students will be able to: ● Define a simple carbohydrate and a complex carbohydrate. ● Identify the chemical functions present in a carbohydrate. ● Recognize isomers. ● Write the equation of the hydrolysis reaction of a carbohydrate complex. ● Implement an experimental hydrolysis protocol of a complex carbohydrate. ● Implement an experimental protocol to carry out without formalism a kinetic study of the hydrolysis of starch. ● Define a polymer. ● Recognize a glucose polymer. ● Appropriate and analyze documents relating to the storage of carbohydrates by the body, their content and the blood sugar control. Responsible management of natural resources for human food -Concepts and content -Required knowledge and skills -Experimental training support activities What factors determine the use of essential natural resources? ● Chemical potability criteria of a water ● Origins of water pollution Students will be able to: ● Comment on the ionic composition of different waters drinking water (tap water, mineral water, spring water). ● Interpret quantitative results on composition of water compared to reference data.		

	• Linking water consumption by human beings to their daily trace element requirements. • Know the main causes of water pollution terrestrial and underground. • Appropriate and analyze soils, media for the exchange of matter ; N, P, K fertilizer documents highlighting the impact of practices aimed at saving and preserving water in quantity and quality. • Describe the role of the clay-humus complex. • Know the role of nitrate, phosphate and potassium ions brought by fertilizers. • Describe the functions of insecticides, fungicides and herbicides. • Appropriate and analyze documents describing a good use of pesticides for a health impact and environmentally sustainable. • Implement an experimental protocol to dose at using a color scale a species present in water or phytosanitary products. • Appropriate documents and analysis in support of energy data the competition between the role of nutrient and the biofuel role of a cereal.		