The Ellesmere Port C of E College

Applied Science (Teacher 2)

Part of the Frank Field Education Trust

KS5 Curriculum Plan 2025-26

Year 12

TOPIC	LP1	LP2	LP3	LP4	LP5
	Referencing, Avoiding plagiarism, Chromatography of plant pigments and amino acids.	**Temperature and heat, types of thermometer, calibrating thermometers, analysis and evaluation of calibrations, cooling curves, making primary standard solutions and calibrating an electronic balance.**	**Making a primary standard solution, determining concentration by titration, pH/volume graphs, investigating concentration by colorimetry.**	**Review personal development of scientific skills for laboratory work**	**Review of work from LP1, LP2, LP3 and LP4 teacher 1 (External exam work) and teacher 2 (coursework).**
	How to reference sources appropriately and avoid plagiarism when writing coursework; How to use paper chromatography to calculate Rf values and analyse chemicals; Compare paper chromatography, thin-layer chromatography, gas-liquid chromatography and ion-exchange chromatography; Describe how to prepare samples for chromatography; Understand the safety hazards associated with working with the equipment and chemicals involved in the investigations; Use the correct terminology to discuss chromatography; Carry out two chromatographic procedures.	Compare the differences between temperature and heat; Discuss the different types of thermometer and evaluate the advantages and disadvantages of each; Explain how to calibrate equipment and evaluate the calibration techniques discussing the errors and improvements; Understand and discuss Newtons law of cooling; Carry out two investigations to observe the cooling curves of stearic acid and paraffin wax; Understand the safety hazards associated with working with the equipment and chemicals involved in the investigations; Calculate the rate of cooling from the tangents of the cooling curve graphs; Discuss the movement of particles during the process of freezing; Understand what is meant by a primary standard solution; Explain how to prepare a primary standard solution.	How to calculate the concentration of a primary standard solution using the mass and the Mr of sodium carbonate; How to determine the concentration of an unknown solution of hydrochloric acid by titration using concentration calculations; How to plot a pH versus volume graph and a ΔpH/Δvolume versus volume graph using titration; How to determine the concentration of unknown values of copper sulphate by colorimetry; Understand the safety hazards associated with working with the equipment and chemicals involved in the investigations.	Understanding personal responsibility in terms of how to work to appropriate standards and protocols, standard operating procedures, application of safe working practices, accept responsibility for the quality of your own work, take responsibility for completing tasks and procedures and use judgement, analysis of personal responsibility and improving personal responsibility. Understanding interpersonal skills in terms of communication and co-operation in the scientific working environment, give and receive constructive feedback, behaviour for safe and efficient working in science, analysis of interpersonal skills, improving personal responsibility. Understanding professional practice in terms of recognising problems, using resources effectively, competence at work, improving professional practice.	Knowledge review of all content from LP1, LP2, LP3 and LP4 teacher 1 and teacher 2.
Skills	Writing about introductions, equipment, safety hazards, methods and evaluations scientifically; Carry out two chromatographic procedures; To interpret and analyse results of chromatograms; To evaluate the accuracy, precision and errors of the chromatographic procedures and suggest improvements.Writing about introductions, equipment, safety hazards, methods and evaluations scientifically; Carry out investigations on the cooling of two substances; To interpret and analyse cooling curve graphs; To evaluate the accuracy, precision and errors of the chromatographic procedures and suggest improvements. How to make a primary standard solution; How to calibrate equipment such as thermometers and electronic balances.Writing about introductions, equipment, safety hazards, methods and evaluations scientifically; Preparing a standard solution of sodium carbonate; Carry out titrations to calculate the concentration of hydrochloric acid (secondary standard solution) using a sodium carbonate solution of known concentration (primary standard solution; To determine how pH of sodium hydroxide solution changes when hydrochloric acid is added and to use this information to determine the point of neutralisation through investigation; To use colorimetry to determine the concentration of unknown values of copper sulphate. □ Writing about personal				
Key Vocab	Reference, plagiarism, chromatography, pigment, amino acids, Rf values paper chromatography, thin-layer chromatography, gas-liquid chromatography and ion-exchange chromatography, mobile phase, stationary phase, absorption, locating agents, solubility, mobility, polarity, introduction, aim, method, equipment, justification, risk assessment, analysis, interpretation, identification, evaluation, accuracy, precision, error, improvement.	Temperature, heat, kinetic energy, particles, joules, Celsius, thermometer, accuracy, precision, temperature probe, calibration, health and safety, analysis, error, cooling curve, intermolecular forces, Newtons law of cooling, super cooling, independent variable, dependent variable, control variable, rate of cooling, tangent, gradient, plateau, evaluation, error, improvement, primary standard solution.	Primary standard solution, sodium carbonate, Calibrate, concentration, titration, pH, neutralisation, pH probe, copper sulphate, colorimetry, colorimeter, absorbance, solutions, introduction, aim, method, equipment, justification, risk assessment, analysis, interpretation, identification, evaluation, accuracy, precision, error, improvement.	Personal responsibility, appropriate standards, protocols, standard operating procedures, safe working practices, responsibility, completing tasks and procedures, judgement, analysis, personal responsibility, interpersonal skills, communication, co-operation, environment, constructive feedback, analysis, interpersonal skills, personal responsibility, professional practice resources, competence.	Key vocabulary reviewed from LP1, LP2, LP3 and LP4 teacher 1 and teacher 2.

Year 13	TOPIC	LP1	LP2	LP3	LP4	LP5
		Planning a scientific investigation	**Processing data / Drawing conclusions and evaluating**	**Cardiovascular system regulation and control**	**Understand the role of hormones in the regulation and control of the reproductive system**	
	Knowledge	Know how to write a hypothesis for an investigation and select appropriate equipment, techniques and standard procedures. Understand health and safety issues involved with various equipment. Identify independent, dependent and control variables in an investigation and suggest how to manipulate these in an investigation. Understand the important of accuracy and precision in a scientific investigation. Identify data as quantitative or qualitative and suggest how to make accurate, reliable and precise measurements. Understand the importance of taking repeat measurements and identifying anomalous data. Know how to construct an appropriate table for the data. Understand how to draw conclusions from data, including qualitative.	Calculate mean and standard deviation and draw conclusions based on this. Be able to give answers to various significant figures. Identify different distributions from their shape and understand how to interpret a normal distribution curve. Conduct a t-test and see if the results are significant using the critical value, accepting or rejecting the null hypothesis. Conduct a chi-squared test and see if the results are significant using the critical value, accepting or rejecting the null hypothesis. Understand correlation analysis and how to interpret the shape of graphs using this data. Use standard form. Calculate percentage error and draw conclusions on the data collected using this. Know different ways of displaying data including tables, pie charts, bar charts, histograms, line graphs. Understand how to draw a line of best and use it to interpret finding. Know how to interpret and analyse data. Understand how to identify anomalous data. Suggest improvements to investigations that would improve reliability and eliminate anomalies.	Understand the role of chemoreceptors in the cardiovascular system. Understand the role of baroreceptors in the cardiovascular system. Understand the principles of gas exchange. Know the structure and function of the gas exchange system including the adaptation of alveoli. Explain the mechanisms of breathing. Understand the processes by which oxygen and carbon dioxide are exchanged. Know all the parts and functions of the circulatory system. Understand the structure of blood vessels and how these link to function. Know the structure of the heart and link this to the function. Explain the cardiac cycle using ideas about pressure changes. Understand how the cardiac cycle is controlled by electrical transmission. Know how to measure the activity of a heart using an ECG and how to interpret these to look for issues with heart function. Understand how the brain controls heart rate to increase or decrease cardiac output.	Know the structure and function of the female reproductive system. Know the structure and function of the male reproductive system. Know how gametes are formed in the testes and ovaries on a microscopic level, using the terms spermatogenesis and oogenesis. Explain how disorders in sperm production and ovulation can result in infertility. Express in detail the hormonal and physiological changes that occur in the menstrual cycle. Understand the processes that lead to conception including ejaculation, fertilisation and implantation. Explain how conception can be assisted using IVF. Use knowledge to explain how problems with conception can be caused by erectile dysfunction, anti-sperm antibodies, menopause, hypo or hyperthyroidism. Use knowledge to explain how various methods of contraception work including progesterone only and oestrogen and progesterone combination contraception.	
	Skills	Use this knowledge to conduct statistical tests and identify the significance of their results, resulting in accepting or rejecting the null hypothesis. Carry out enzyme reactions and use knowledge to draw in depth conclusions, analyses and evaluations. Carry out fermentation reactions and use knowledge to draw in depth conclusions, analyses and evaluations. Carry out diffusion and use knowledge to draw in depth conclusions, analyses and evaluations. Carry out sampling for distribution and abundance and use knowledge to draw in depth conclusions, analyses and evaluations. Carry out photosynthesis reactions and use knowledge to draw in depth conclusions, analyses and evaluations. Carry out investigations using the calorimeter and use knowledge to draw in depth conclusions, analyses and evaluations. Conduct calculations for resistance, mechanical power, electrical power, energy and efficiency. Carry out investigations into energy using the calorimeter and use knowledge to draw in depth conclusions, analyses and evaluations.				
	Key Vocab	Planning, scientific investigation, hypothesis, appropriate equipment, techniques, standard procedures, health and safety, Independent variable, dependent variable, control variables, manipulate, accuracy, precision, data, quantitative, qualitative, accurate, reliable, precise, measurements, repeat measurements, anomalous data, conclusions, qualitative.	Processing, data, calculate, mean, standard deviation, conclusions, significant figures, distributions, normal distribution curve, t-test, significant, critical value, accepting, rejecting, null hypothesis, chi-squared test, correlation analysis, standard form, percentage error, conclusions, displaying data, tables, pie charts, bar charts, histograms, line graphs, line of best, interpret, drawing conclusions, evaluating, interpret, analyse, data, anomalous data, improvements, reliability, eliminate, anomalies.	Cardiovascular system, regulation, control, chemoreceptors, baroreceptors, gas exchange, adaptation, alveoli, mechanisms, breathing, oxygen, carbon dioxide, circulatory system, blood vessels, arteries, arterioles, capillaries, venules, veins, heart, ventricles, atria, septum, atrioventricular valves, semi-lunar valves, AVN, SAN, purkinje fibres, bundle of His, pulmonary vein, pulmonary artery, aorta, vena cava, cardiac cycle, systole, diastole, pressure, electrical transmission, ECG, hypothalamus, accelerator nerve, vagus nerve	Hormones, regulation, reproductive system, structure, function, female reproductive system, ovaries, uterus, oviduct, cervix, vagina, male reproductive system, testes, urethra, vas deferens, prostate, gametes, microscopic, spermatogenesis, oogenesis, disorders in sperm production, ovulation, infertility, hormonal, physiological, menstrual cycle, conception, ejaculation, fertilisation, implantation, IVF, erectile dysfunction, anti-sperm antibodies, menopause, hypo or hyperthyroidism, contraception, progesterone, oestrogen, progesterone, combination contraception.	