Key Stage 4 Overview – OCR 21st Century Science Year 10

	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
Year 10	University Challenge: P3 and P4 Context in school: Known only by its effects, electricity provides an ideal vehicle to illustrate the use and power of scientific models. During the course of the 20th century, electrical engineers completely changed whole societies, by designing systems for electrical generation and distribution, and a whole range of electrical devices. Students shall also study Simple but counterintuitive concepts of forces and motion, developed by Galileo and Newton, can transform young people's insight into everyday phenomena. These ideas also underpin an enormous range of modern applications, including spacecraft, urban mass transit systems, sports equipment and rides at theme parks. Skills: • be aware of the existence of electric charge, and understand how simple electrostatic phenomena can be explained in terms of the movement of electrons between and within objects • understand the idea of an electric circuit (a closed conducting loop containing a battery) that conducts an electric current and be able to predict the current in branches of a parallel circuit • understand the idea of voltage as a measure of the 'strength' of a battery or power supply • know that electrical resistance is measured in ohms and can be calculated by dividing the voltage across the component by the current through it • know that the power ratings of electrical appliances are related to the rate at which the appliances transfers energy	University challenge: C4 – material choices and C5 – chemical analysis Context in schools: Our society uses a large range of materials and products that have been developed, tested and modified by the work of chemists. Materials used to make a particular product need to meet a specification which describes the properties the material needs to make it suitable for a particular use. This chapter looks at a range of different materials and investigates their properties in the context of their suitability for making consumer products. The chapter also considers how the life cycle of a product is assessed in its journey from raw material to final disposal. Skills: • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular use • know the differences between atoms, elements and compounds • recognise chemical symbols and formulae for some elements and compounds • know about the properties of ceramics, polymers and composites (qualitative).	University challenge: B3 – Life on Earth Context in school: Biodiversity is recognised as an important natural resource, which is increasingly threatened by human activity. Students consider how ecosystems are in balance and how living organisms are dependent on their environment and each other for survival. The extinction of species is a growing concern often featured in the media. Students consider causes of extinction and whether extinctions should be a global concern. Skills: • investigate adaptation in plants and animals • eco-column practical investigation of food webs • fieldwork to investigate biodiversity and environmental change in local habitats • investigate the changes in nitrogen in an establishing aquarium over three weeks • calculate an ecological 'footprint' that measures how great an impact an individual's lifestyle has on the environment.	University challenge: P4 and P5 Context: The terms 'radiation' and 'radioactivity' are often interchangeable in the public mind. Because of its invisibility, radiation is commonly feared. A more objective evaluation of risks and benefits is encouraged through developing an understanding of the many practical uses of radioactive materials. Skills • use arrows to indicate the different forces acting on objects, and predict the net force when two or more forces act on an object • know that the forces due to gravity, magnetism and electric charge are all non-contact forces • understand how the forces acting on • recall that in each atom its electrons are arranged at different distances from the nucleus • recall that gamma rays are emitted from the nuclei of atoms • be able to describe how ionising radiation can have hazardous effects, notably on human bodily tissues.	University challenge: C5- Chemical analysis and C6 – making useful chemicals Context: This chapter looks at how chemicals are analysed. Chemical analysis is important in chemistry for the quality control of manufactured products and also to identify or quantify components in testing of new products, mineral extraction, forensics and environmental monitoring. Chemists need to both identify which substances are present (qualitative analysis) and the quantity of each substance (quantitative analysis). Measuring purity and separating mixtures is important in manufacturing to ensure quality and to separate useful products from bi-products and waste. Being able to analyse quantities of chemicals enables chemists to plan for the amounts of reactants they need to use to make a product, or predict quantities of products from known amounts of reactants. Skills: • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • understand the concept of a pure substance and how to identify a pure substance • know about simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • know about the pH scale for measuring acidity/ alkalinity; and indicators.	University challenge: B4 – using food and controlling growth Context: All living organisms depend on molecules of glucose obtained from photosynthesis (or from biomass obtained through food chains that start with photosynthetic organisms). The glucose is used for cellular respiration and in the synthesis of larger organic molecules used for growth. Skills: • be familiar with the processes of aerobic and anaerobic respiration in living organisms, and fermentation in microorganisms, including word summaries of the reactions • be able to recall the differences between aerobic and anaerobic respiration in terms of the reactants, products and implications for the organism • be familiar with the tissues and organs of the human digestive system, including adaptations to function • understand in simple terms that the human digestive system uses chemicals (including enzymes) to digest food • appreciate the importance of bacteria in the human digestive system • know how nutrients and water are transported within animals, including humans.