Year 13: Physics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topics	**Gravitational and Electric Fields; Nuclear reactions and power** **Focus**: Understanding the similarities and differences between Gravitational and Electric fields. Describing the process of Nuclear Power generation and Nuclear decay including energy changes.		**Capacitors, Magnetic Fields, Astro Physics, and Practical Skills** **Focus:** Understanding and explaining practical uses of Electric and Magnetic fields. Describing Astronomical telescopes, and explaining how they can be used to classify stars and discover exoplanets as well as how the lead to the discovery of the Big Bang Theory and life cycle of stars.		**Exam Preparation** **Focus:** Develop mathematics and problem-solving skills prior to end of year exams, concentrating on recognising problems regardless of context.	
Assessments	In class testing for Fields	Full AQA A-Level paper 1 based on a full past (secure) paper	Paper 2 mock based on a full past (secure) paper	Paper 3 Mocks (Astro P3BA then Prac P3A) based on a full past (secure) paper	Final exams	

Building on Prior Learning	**Substantive Knowledge –** From year 12 students will be further developing knowledge and use of Forces and Mechanics equations, applying them to their study of fields to describe and explain things such as orbits. They will also be developing their knowledge of space and stars from KS4 in both the Astrophysics and Gravitational Fields sections of the work this year. Development of circuit building and electricity knowledge through the Capacitors topic and practical **Disciplinary/procedural Knowledge –** Students should now be able to solve multistep calculation problems, and will now work on developing their ability to recognise and solve problems regardless of context. Their knowledge of standard form will continue to expand, and the ability to shift between standard form and different units should be used frequently. Lab skills will be greatly improved and assessed through Required Practicals and presentation and data analysis skills developed through the analysis of these practicals.
Cultural Capital	**There is cultural capital in abundance in this programme of study:** Students will learn about the development of scientific models, as well as the current scientific models in use. Students will learn about historical, current and developmental sources of nuclear power, including costs and benefits to the differing sorts of nuclear power, as well as context for nuclear disasters such as Chernobyl and Fukushima. They will also learn about collaborative international research projects, such as the James Webb telescope and Hubble Telescope, and have the opportunity to visit Switzerland to experience the culture as well as the Large Hadron Collider
Mastery	**In terms of mastery** students will need to apply their Physics knowledge through increasingly varied and complex contexts & scenarios. In a change from GCSE, students are provided with almost all the equations they could need in examinations, so instead of a test of memory it is much more a test of identifying situations and using the appropriate tools. By this point student should eb comfortable completing multistep calculations, and now the focus shifts to the identification and explanation of their answers and steps taken. Student should eb able to separate the context from the scientific question in order to find the answer, and then explain how this would work in the context i.e what it would look like or how this action would be useful.
Development of Character	**A wide range of virtues are covered through the teaching of Physics:** The intellectual virtues of curiosity and resilience are explored through the teaching of many different scientific theories. A logical approach to breaking down problems into smaller chunks is taught through the use of multi-step problem solving, both mathematical and experimental. These lessons can be applied more widely to personal and professional situations.
Extra-Curricular opportunities	**In School: STEM Club** (across all 3 science) **Outside of School: STEM trip to CERN (provisional)**
Metacognitive Learning	Students will initially be shown how to approach estimation of answers and values, to act as a check of their answers throughout the a-level. By the start of this year, students will have seen the teacher talk through their thought process and steps in first identifying and then solving questions in a variety of contexts and will be expected to start solving these problems themselves. As the year goes on the teacher will remove the scaffold of breaking down the questions with the students and begin to expect the students to identify the stages of the questions and work through them logically themselves. The teacher will also start the year modelling the explanation questions, explaining not just how something acts but using scientific knowledge to explain why, and removing the scaffolding over the course of the year to get the student to complete this independently.