Science Course Descriptions

SCIENCE COURSES

M/J Science 1 Advanced #200205001: Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. **Annual Course** Honors Equivalent

M/J Science 2 Advanced #200208001: Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs).

School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007). **Annual Course** *Honors Equivalent*

Physical Science Honors, #200332001: The Cambridge Pre-AICE/IGCSE Physical Science syllabus helps learners to understand the technological world in which they live, and take an informed interest in science and scientific developments. They learn about the basic principles of Physical Science through a mix of theoretical and practical studies. Learners also develop an understanding of the scientific skills essential for further study at Cambridge International AS and A Level, skills which are useful in everyday life. As they progress, learners gain an understanding of how science is studied and practiced and become aware that the results of scientific research can have both good and bad effects on individuals, communities and the environment. **Annual Course** *Honors Equivalent*

M/J Critical Thinking, Problem Solving, and Learning, #170010001: In this course students explore science, technology, engineering, and math all in one curriculum. This course offers an innovative approach to learning in which students use problem solving skills to tackle hands-on- learning activities. They will learn about different careers in the STEM fields. Students in this course will develop critical thinking skills which will benefit the student.

Students will have opportunities to acquire and apply a range of skills, including:

- gathering, synthesizing and communicating information
- collaborating with others to achieve a common outcome

- analyzing and evaluating planning, processes and outcomes
- developing and justifying a line of reasoning

Biology I, #200031001: The purpose of this course is to provide students with general exploratory experiences and activities in the fundamental concepts of life. Opportunities to understand the interactions of science with technology and society should be provided. The content should include, but not be limited to, scientific method, laboratory safety and the use of a laboratory apparatus, biochemistry, cell biology, cell reproduction, genetics, biological changes through time, classification and taxonomy, microorganisms and disease, structure and function of plants, structure and function of animals, human anatomy and physiology, and ecological relationships. Laboratory investigations of selected topics in the content which also include the use of scientific method, measurement, laboratory apparatus, and safety are an integral part of the course. **Prerequisite:** "C" or better in Physical Science. **Annual Course**

Biology I Honors, #200032001/Gifted Biology I # 200032002: The purpose of this course is to provide students with advanced exploratory and inquiry-based experiences and activities in the fundamental concepts of life. The content should include, but not be limited to, scientific method, laboratory safety and the use of a laboratory apparatus, biochemistry, cell biology, cell reproduction, genetics, biological changes through time, classification and taxonomy, microorganisms and disease, structure and function of plants, structure and function of animals, human anatomy and physiology, and ecological relationships. Laboratory investigations of selected topics in the content that also include the scientific method, measurement, laboratory apparatus and safety are an integral part of the course. **Prerequisite:** "B" or better in Algebra I and in Physical Science. **Annual Course**

Advanced Placement Biology I, #200034003: The purpose of this course is to provide a study of the facts, principles, and processes of biology, and the collection, interpretation, and formulation of hypotheses from available data. The content should include, but not limited to, that determined by the advanced placement program. Laboratory investigations of selected topics in the content that also include the use of scientific methods, measurement, laboratory apparatus and safety are an integral part of the course. Completion of this course precludes the subsequent earning of credit in Biology I or Biology I Honors. **Prerequisite:** "B" or better in Honors Chemistry and a 4 or 5 on the Biology End of Course Exam. Recommendation from prerequisite course teacher. An AP Biology study guide is required. **Annual Course**

AICE Biology 1 AS Level, #200032101: Cambridge International AS Level Biology builds on the skills acquired at Cambridge Pre-AICE/ IGCSE, and the AICE level. The syllabus includes the main theoretical concepts that are fundamental to the subject, a section on some current applications of biology, and a strong emphasis on advanced practical skills. Practical skills are assessed in a timetabled practical examination. The emphasis throughout is on the understanding of concepts and the application of biology ideas in novel contexts as well as on the acquisition of knowledge. AS Level concepts include: foundations of biochemistry, cellular biology, transport in plants and mammals, and immunology. The course encourages creative thinking and problem-solving skills which are transferable to any future career path. Cambridge International AS and A Level Biology is ideal for learners who want to study biology or a wide variety of related subjects at a university or to follow a career in science. **Prerequisite**: 4 or 5 on Biology EOC and a "B" or better in Honors Chemistry. Recommendation from prerequisite course teacher. **Annual Course**. *Advanced Placement Equivalent*.

AICE Biology 2 A Level, #200032302: Cambridge International A Level Biology builds on the skills acquired at Cambridge AICE level. The syllabus includes the main theoretical concepts that are fundamental to the subject, a section on some current applications of biology, and a strong emphasis on advanced practical skills. The emphasis throughout is on the understanding of concepts and the application of biology ideas in novel contexts as well as on the acquisition of knowledge. A Level concepts include: biochemical processes, homeostasis, control and coordination, genetics, natural selection, evolution, biodiversity and classification, and applications of biotechnology. The course encourages creative thinking and problem-solving skills which are transferable to any future career path. Cambridge International A Level Biology is ideal for learners who want to study biology or a wide variety of related subjects at a university or to follow a career in science. **Prerequisite**: Completion of AICE Biology 1 AS Level with a "B" or better and earning passing scores on all three paper examinations. Recommendation from prerequisite course teacher. **Annual Course**. *Advanced Placement Equivalent*.

Chemistry, #200334001: The purpose of this course is to provide students with the study of the composition, properties, and changes associated with matter. The content should include, but not be limited to, changes of matter, classification and structure of matter, atomic theory and structure, the periodic table, the mole concept, and chemical bonding, chemical formulas, chemical reactions and balanced equations, and chemical history. Laboratory investigations of selected topics in the content, which also includes the use of the scientific method, measurement, laboratory apparatus and safety, are an integral part of the course. Graphing or scientific calculator is required. **Prerequisite:** Completion of Geometry and Biology (Regular or Honors). Co-requisite is Alg. II. **Annual Course**

Chemistry Honors, #200335001: The purpose of this course is to provide students with a rigorous study of the composition, properties and changes associated with matter. The content should include, but not be limited to changes of matter, atomic theory and structure, the periodic table, bonding, formulas and equations, the mole concept, solutions: acids, bases, salts, and chemical history. Laboratory investigations of selected topics in the content which also include the use of the scientific method, measurement, laboratory apparatus and safety are in integral part of the course. Graphing or scientific calculator is required. **Prerequisite:** "A" or "B" in Honors Biology, or "A" in Regular Biology, and concurrent enrollment in at least Algebra II Honors. Recommendation from prerequisite course teacher. **Annual Course**

AICE Chemistry AS Level, #200337101: Cambridge International AS Level Chemistry builds on the skills acquired at Honors Chemistry. The syllabus includes the main theoretical concepts that are fundamental to a section on some current applications of chemistry, and a strong emphasis on advanced practical skills. Practical skills are assessed in a timetabled practical examination. The emphasis throughout is on the understanding of concepts and the application of chemistry ideas in novel contexts as well as on the acquisition of knowledge. The course encourages creative thinking and problem-solving skills that are transferable to any future career path. Cambridge International AS Level Chemistry is ideal for learners who want to study chemistry or a wide variety of related subjects at a university or to follow a career in science. Prerequisite: A or B in Honors Chemistry. Recommendation from chemistry teacher. Annual Course Advanced Placement Equivalent

AICE Chemistry A Level, #200337301: Cambridge International AS Level Chemistry builds on the skills acquired at AS Chemistry level. The syllabus includes the in-depth theoretical concepts that are fundamental to Physical, Inorganic & Organic Chemistry, a section on some current applications of chemistry, and a strong emphasis on advanced practical skills. Practical skills are assessed in a timetabled written examination. The emphasis throughout is on the understanding of concepts and the application of chemistry ideas in novel contexts as well as on the acquisition of knowledge. The course encourages creative thinking and problem-solving skills that are transferable to any future career path. Cambridge International A Level Chemistry is ideal for learners who want to study chemistry or a wide variety of related subjects at a university or to follow a career in science. Prerequisite: Passing grade in AS Chemistry examination. Recommendation from AS level chemistry teacher. Annual Course Advanced Placement Equivalent

Physics I, #200338001: The purpose of this course is to provide students with an introductory study of the theories and laws governing the interaction of matter, energy, and the forces of nature. The content includes kinematics, dynamics, energy, work and power, gravitation, heat and thermodynamics, waves and sound, oscillations, light, electricity and magnetism, atomic and nuclear physics. Laboratory investigations of selected topics in the content that also include the use of the scientific method, measurement, laboratory apparatus and safety are an integral part of the course. **Annual Course**

Honors Physics I, #200339001: The purpose of this course is to provide students with a rigorous and challenging introductory study of the theories and laws governing the interaction of matter, energy, and the forces of nature. The content includes kinematics, dynamics, energy, work and power, gravitation, heat and thermodynamics, waves and sound, oscillations, light, electricity and magnetism, atomic and nuclear physics. Laboratory investigations of selected topics in the content that also include the use of the scientific method, measurement, laboratory apparatus and safety are an integral part of the course. **Prerequisite:** concurrent enrollment in Precalculus or higher. **Annual Course**

Advanced Placement Physics C – Mechanics, #200343004: This course is a calculus-based, college-level physics course, especially appropriate for students planning to specialize or major in physical sciences or engineering. The purpose of this course is to provide students with a study of Classical Mechanics. Topics include: kinematics, Newton's laws of motion, work, energy and power, circular motion, momentum, rotational motion, oscillations and gravitation. The AP exam includes questions posed in a laboratory or experimental setting. Questions assess understanding of content as well as experimental skills. The exam may also include questions that overlap several major topical areas or questions on miscellaneous topics, such as identification of vectors and scalars, vector mathematics, or graphs of functions. **Prerequisite**: At least concurrent enrollment in AP Calculus AB and a "B" in Honors Physics. Recommendation from prerequisite course teacher is required. **Annual Course**

Advanced Placement Physics C – Electricity and Magnetism, #200342501: This course is a calculus-based, college-level physics course, especially appropriate for students planning to specialize or major in physical sciences or engineering. The purpose of this course is to explore topics such as electrostatics, conductors, capacitors and dielectrics, electric circuits, magnetic fields, and electromagnetism. Introductory differential and integral calculus is used throughout the course. **Prerequisite**: A passing score on AP Physics C – Mechanics exam AND at least concurrent enrollment in AP Calculus BC. Recommendation from prerequisite course teacher is required. **Annual Course**

Honors Anatomy & Physiology, #200360001: This course is a study of the major systems of the human body. Career opportunities in medical-related fields are examined. The course is intended for advanced-level students. Anatomy and Physiology topics include cells, tissues along with the following systems: skeletal, muscular, integumentary, nervous, digestive, respirator circulatory, excretory, endocrine, and reproductive. Prerequisite: Teacher recommendation and a "B" or better in Biology. **Annual Course.**

AICE Marine Science AS / A Level #200251501 / #200253501: The AS and A Level Marine Science courses provide a coherent and stimulating introduction to the science of the marine environment. The AS Level course focuses on the scientific study of the sea and its ecosystems, while the A Level course concentrates on human activities that depend on the sea and have an impact on it. Cambridge International AS and A Level Marine Science can form part of an ideal subject combination for learners who want to study Marine Biology or Environmental Science at university or to follow a career in shipping, fisheries, tourism, or aquaculture. **Prerequisite** completion of Chemistry Regular or Honors and recommendation from current year science teacher. **Annual Course**.

Exploration of Solar Energy and Alternatives I (Honors) #200254001: The main focus of the course is on solar energy and other renewable alternative resources. This integrated science course implements hands-on and minds-on experiences where, through a series of short and long-term experiments and research, students investigate several aspects of solar energy and develop products related to solar heat and solar electricity. Students will also compare other renewable resources and will be able to critically analyze and discuss the intimate relationships between energy, ecology, economy and politics. This course will be a springboard for discussing career opportunities in the domain of alternative energy development and applications to minimize the abuse of the natural resources and the continuous environmental degradation. **Prerequisite:** "B" or better in Physical Science Honors and at least a "B" in Algebra I Honors. **Annual Course**

Advanced Placement Environmental Science, #200138001: The purpose of this course is to provide the student with the study of man's interaction with the environment. The content should include, but not be limited to, forms of pollution, conservation, environmental planning and policy, public land usage, population dynamics, and major forms of energy. Laboratory investigations of selected topics in the content that also include the use of the scientific method, measurement, laboratory apparatus and safety are an integral part of the course. Precludes earning credit in any other environmental sciences course. **Prerequisite or Co-requisite:** "B" or better in Honors Chemistry, preference is to have taken Regular Environmental Science. Recommendation from prerequisite course teacher. **Annual Course.** *AS equivalent.*

AICE Environmental Management AS Level, #200138101: This AS Level syllabus develops scientific knowledge and understanding of global environmental issues and theories, and of the policies and strategies for managing the environment.
The course covers the sustainable use and management of resources, and strategies that aim to protect environments. Learners will interpret and analyze data and do investigative work. Case studies allow teachers to choose their own examples to investigate, which may be local, regional, or global. Although Cambridge International AS Level Environmental Management extends and complements the relevant Cambridge O Level and Cambridge IGCSE syllabuses, learners do not need to have studied the subject before starting the course. **Prerequisite** completion of Biology Regular or Honors and recommendation

from current year science teacher. **Annual Course.** *Advanced Placement Equivalent*