SCIENCE OVERVIEW

DAVIDSON EXPLORE

Davidson Explore (DE) courses exist offered through the Davidson Institute for Talent Development and not by Davidson Academy Online. They are taught by Davidson Academy Online staff.

PLACEMENT IN SCIENCE

Students are welcome to take a placement test for any level of science they want to try. Beyond that, we also use the diagnostic period to determine placements. During the first three weeks of the semester, teachers look at lab skills, accuracy of measurements, analytical skills, and more to determine appropriate placements. Students who are interested in an advanced science course must either complete the introductory version of the course or receive teacher approval after placement testing or the diagnostic period.

GRADUATION REQUIREMENTS

Students need three credits of high school science for graduation, including at least one credit in each of the core subjects:

- Biology
- Chemistry
- Physics

Some universities have science requirements for admissions, and students should look into those requirements for the universities they are most interested in.

CONTEMPORARY SCIENCE

(Davidson Explore only): This introductory science course will touch on content topics that include Earth science, astronomy, biological diversity, and historical developments in science. The main focus of this course will not be content knowledge (although students will gain content knowledge through the course) but instead on developing science skills. These skills are essential for success in higher level science courses.

ENVIRONMENTAL SCIENCE

Environmental Science is designed to introduce students to major ecological concepts as well as the interactions between humans and their environment. In this course students will investigate various environmental problems that affect the world in which we live. Students will become familiar with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them.

INTRODUCTION TO BIOLOGY

This course will explore the evolutionary relationships of species on earth. It will focus on their form, function, and diversity. Students will have opportunities to explore many types of organisms from the cellular level up through their place in the biosphere. Survival and homeostasis are major challenges for organisms, and this course will explore the diverse mechanisms that have evolved to meet those challenges.

PHYSICAL SCIENCE

Physical Science is a branch of natural science that studies non-living systems, as opposed to life sciences, which dedicates its studies to living systems. It examines the physical laws that govern the universe and characteristics of matter from the microscopic (atomic) level to the macroscopic (universal) level. This course is divided into two sections: matter and the changes it undergoes; and the underlying principles of physics. Special emphasis on the standardized SI systems used in scientific measurements; the application of Newton's Laws; and the Law of Conservation of Energy. Students will engage in hands-on lab exercises that emphasize inquiry.

SCIENTIFIC REASONING

Environmental Science and Introduction to Biology are offered in alternating years and give our youngest students two full years to build their scientific reasoning skills.

BIOLOGY

All the processes of living things happen in the aqueous environment in or around cells, and these processes are constantly changing (both in response to the immediate environment, and over time through evolution). Biology focuses on the cellular basis of life (and could alternately be named "Cell Biology"). This class is designed to explore cell processes, genetics and heredity, evolution, and microbiology. Various lab activities and collaborative group work will be required. The concepts and activities in this course will prepare students for post secondary education, possibly with a focus in the sciences.

CHEMISTRY

Chemistry is the study of matter and the changes that matter undergoes. Matter is anything that has mass and occupies space. Rather than asking what chemistry is, a better question would be what in the world is not chemistry. Chemistry is involved in some way with almost everything we do or use. It is central to most of science and technology, blending at one extreme into physics, mathematics, and engineering and at the other end into the earth and life sciences. The major principles, concepts, and applications of chemistry will be reviewed while employing a hands-on approach to learning. The goal is to prepare students for college-level chemistry and/or science-related college majors.

PHYSICS

This course covers a variety of traditional topics including mechanics, waves, thermodynamics, optics, and fluids as well as the more modern topics of quantum physics and special relativity. Students will learn about the physical world around them in much the same way that scientists do. This course utilizes inquiry and student-centered learning to foster the development of critical thinking skills. Lecture and demonstration activities will often center on having students evaluate their own thinking and then making predictions about a given situation.

ADVANCED BIOLOGY

Advanced Biology takes an inquiry-based approach to biology, with students using a combination of research and project based learning, online investigations, and laboratory explorations. Students will incorporate both individual and group learning to explore the topics of biochemistry and cellular processes, including transport, energy and communication, inheritance, evolution, and ecology.

ADVANCED CHEMISTRY

Advanced Chemistry is designed to be the equivalent of the general chemistry course taken during the first year of college. Students successfully completing this course will be endowed with an exceptional understanding of the fundamentals of chemistry and achieve proficiency in solving chemical problems. This course will contribute to the development of each student's ability to think critically and to express their ideas, in both oral and written fashion, with clarity and logic.

ADVANCED PHYSICS

This college-preparatory, calculus-based advanced physics class covers a variety of topics, including: kinematics, Newton's Laws, circular motion, work, power, energy, momentum and statics, rotational mechanics, electrostatics, electric potential and energy storage, electric currents, resistance and DC circuits, magnetism, electromagnetic induction, and Faraday's Law. This course utilizes student-centered learning to foster the development of critical thinking skills. Discussion and demonstration activities allow students to construct explanations and engage in argument from evidence gleaned through investigations. Laboratories include both teacher-directed and student- directed investigations to develop the ability to analyze complex information.

ORDER OF THE CLASSES

There is no particular order in which the science classes are taken. After taking Physical Science, students are ready for either Physics or Chemistry—the choice is theirs. Alternatively, they may want to go to Biology if they find that subject more appealing than what was covered in Physical Science. After taking one "regular HS" level class, some students choose to go on to the advanced level in that same subject; others choose to do all three of the regular science classes before taking an advanced science. Some students skip most or all of the regular level classes, and with a teacher's approval, go straight into the advanced classes. There is not a right or wrong way to progress.

CREDIT BY EXAM

Unlike in math, we do not give CBE credits in science. The placement tests check readiness for a given level, rather than mastery of a given topic. Science classes are dynamic in what they cover each year, and the lab work is a big part of the science experience, so just showing some content knowledge is not enough to justify credit in these subjects.