SCIENCE
Course Guide - Huron & Pioneer

NOTES ON THE SCIENCE COURSE OFFERINGS
Most of the courses listed are offered at both Huron and Pioneer High Schools. However, depending upon varying student interest and staff availability, minor differences may sometimes exist between course offerings in the two schools.

MINIMUM SCIENCE REQUIREMENTS
Two units of science credit, one unit of Life Science and one unit of Physical Science must be earned in the span of grades 9-12 to meet the graduation requirement. One unit of science credit is two semesters of course work.

CAREER AND TECHNICAL EDUCATION
The following vocational courses may be substituted for part of the district's science graduation requirement. *NOTE: No student may use career and technical education courses to satisfy more than one credit of the two credit science graduation requirement.*

CTE Course:	May Be Substituted for:
10396 Health Sciences Technology	1 unit of Biological Science
13388 Cosmetology	1 unit of Biological Science
11121 Basic Electronics	1/2 unit of Physical Science

SUGGESTED COURSE SEQUENCE
The student's decision about which science course to elect should be made with a view toward the science courses which he or she will elect in grades 9-12. To assist the student in this matter, listed below are several suggested sequences of science courses. The student is encouraged to invite his/her eighth grade science teacher to recommend an appropriate science course for grade nine. Students preparing for careers in science should, as a minimum, ordinarily complete a four-year sequence that includes courses in earth science, biology, chemistry, and physics. This sequence should be accompanied with at least three years of mathematics. Listed below are several suggested sequences of science courses.

For students who take Earth Science in Grade Nine:
Sequence (a) —This sequence is recommended as a minimum for most students planning to attend college and pursue science-related areas.

9th—Earth Science 04131/04132
10th—Biology 04121/04122
11th—Chemistry 04333/04334, 04381/04382
12th—Physics 04439/04440, or 04483/04484
(Biology AP 04121/04122 may be taken concurrently.)

For students who take Biology in Grade Nine:
Sequence (b) — This sequence is generally followed by students who wish to take AP Chemistry and AP Physics. Students who elect this sequence should be taking Math 317 or 339 in Grade 9 and plan to take physical science 429-430 AC in Grade 10.

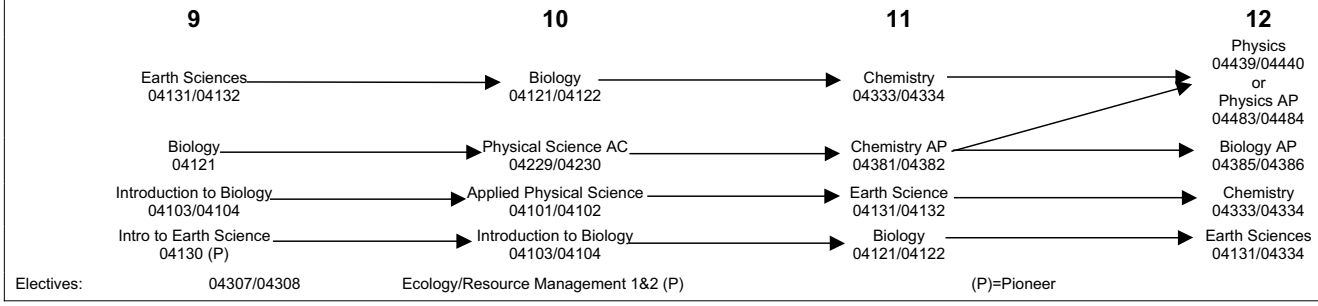
9th—Biology 04121/04122
10th—Applied Physical Science 04229/04230 (AC)
11th—Chemistry 04333/04334 or 04381/04382 (AP)
12th—Physics 04439/04440 or 04483/04484 (AP)
(Biology AP 04121/04122 may be taken concurrently.)

For students who take Introduction to Biology in Grade Nine:
Sequence (c) — This sequence is for students who want practical applications in their science work.

9th—Introduction to Biology 04130/04104
10th—Applied Physical Science 04101/04102
11th—Earth Science 04131/04132 or Biology 04121/04122
12th—Electives as appropriate and desired

Numerous alternative course sequences are possible; this alternative science sequences chart should be helpful in planning course sequences to meet the needs of individual students.

Alternative Science Sequences



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COURSE #	COURSE	TERM	GRADE LEVEL			PREREQUISITE
04101	**Applied Physical Science 1**	Semester	10	11	12	None

This course is designed to develop understanding of some of the important facts and ideas of the earth and physical sciences. Laboratory activity emphasizes practical application of the science studied to every day situations. The course outline is flexible to allow for some choice of topics based on the interests and needs of class members. Note: This course should not ordinarily be elected after, nor concurrently with Physical Science, Earth Science, Chemistry, or Physics.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Huron only

04102	**Applied Physical Science 2**		10	11	12	None

Useful topics for the study of applications of physical science concepts are more extensive than can be studied in a one semester course. Therefore, a student should elect both courses. The purpose and nature of the courses are similar, but their content is not repetitious.

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04103, 04104	**Introduction to Biology**	9	10	11	12	None

The content of this course parallels Biology 04121/041222. This course is slower paced and emphasizes a hands-on practical approach. Difficult concepts are taught using analogies and examples that are familiar to students. Note: This course should not be elected after or concurrently with Biology 04121/04122.

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04121, 04122	**Biology 1 and 2**	9	10	11	12	Recommendation of previous science teacher (Pioneer only).

The course emphasizes the use of laboratory investigations to discover important facts, principles and interrelationships involved in the science of living things. It is designed to provide a solid background in biology. It should be elected in either grade nine or ten by students planning careers in science. The course is more theoretical and quantitative than the parallel course 403/404. It should not be elected in grade nine unless the student intends to take Physical Science AC229/230 in grade ten and to follow this with additional rigorous science courses in grades eleven and twelve. Unless a student has such plans, it is wiser to take Earth Science 431/432 in grade nine and biology in grade ten. Recommendation for enrollment helps to ensure that the student understands this. Note: Courses 421/422 are not to be taken in any combination with courses 403 and 404 unless special permission is given by the department chairman.

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COURSE #	COURSE	TERM	GRADE LEVEL				PREREQUISITE
04130	**Intro to Earth Science**		9	10	11	12	None

This course takes an inquiring view of the planet earth in its environment in space. Course content is drawn from the fields of astronomy, geology, meteorology, oceanography, earth history, geography, hydrology, and ecology. It is a laboratory course. The content of this course parallels Earth Science 04131. This course is slower paced and emphasizes a hands-on practical approach. Difficult concepts are taught using analogies and examples that are familiar to students. Often students who elect Intro to Earth Science in grade nine follow it with Intro to Biology in grade ten. Note: This course should not be elected after or concurrently with Earth Science 04131.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Pioneer

04131, 04132	**Earth Science**		9	10	11	12	None

This course takes an inquiring view of the planet earth in its environment in space. Course content is drawn from the fields of astronomy, geology, meteorology, oceanography, paleontology, geography, soil science, and ecology. It is a laboratory course which, just as biology, may be used in meeting college admission requirements. It is no less demanding academically than the biology course. Often students who elect earth science in grade nine follow it with biology in grade ten.

Because of considerable overlap of subject matter, Earth Science cannot be taken if credit has already been earned for Physical Science 429/430; otherwise, it may be taken as part of any sequence of science courses.

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04229, 04230	**Physical Science 1AC and 2AC**			10			

This is a challenging course designed for able students with a keen interest in science. A strong background in mathematics is essential. Basic principles of physics, chemistry, astronomy, geology, and meteorology. Laboratory activity is a part of the course. The course is intended to be part of a four-year sequence of science courses, beginning with biology in grade nine. After Physical Science AC, students are expected to select (04318-04382) Chemistry AP in grade eleven.

Because of considerable overlap in subject matter, courses 04229-04230 cannot be taken if credit has been earned in Earth Science in grade nine, nor can Earth Science 04131-04132 be taken following Physical Science 04229-04230.

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04307	**Ecology/Resource Management 1**	Semester			11	12	None

This course is designed to develop the student's appreciation and scientific understanding of his environment. Course content emphasizes basic ecological principles and problems involving land and peoples' relation to it. Laboratory and field studies, as facilities permit, are important aspects of course work. Note: This elective course is offered to 11th & 12th grade students only.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Pioneer only

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COURSE #	COURSE	TERM	GRADE LEVEL		PREREQUISITE
04308	**Ecology/Resource Management 2**	Semester	11	12	04307 Ecology/Resource Management 1 or 04121/04122 Biology

This course is designed to extend the student's understanding of ecological principles and to show their relation to problems in several areas of conservation and resource management, such as forestry, fisheries, wildlife management, energy resource, outdoor recreation, urban planning, etc. Laboratory and field studies, as facilities permit, are important aspects of course work. Note: This elective course is offered to 11th & 12th grade students only.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Pioneer only

04333, 04334	**Chemistry 1 and 2**		11	12	

Chemistry is the study of matter, its properties, its composition, and how and why it reacts and changes. The laboratory is used extensively as a means to discover and develop understanding of the facts, principles, and theories that are the framework of this science. Ten or more laboratory exercises will be required each semester. Since a quantitative, mathematical approach is used frequently, success depends upon the ability to use mathematics. Chemistry should be considered essential for students planning careers in science.

Chemistry is generally elected in the 11th grade, but it is also open to seniors. Sophomores who have taken biology and who have the mathematics prerequisites will need a teacher recommendation to take chemistry. Completion of Chemistry 04333 with a grade "D" or higher is a prerequisite for enrollment in Chemistry 04334.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Huron & Pioneer

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04380	**Chemistry AP Laboratory**	Year	11	12	Concurrent enrollment in 04381/04382 AP

Chemistry AP Laboratory must be elected concurrently with Chemistry 04381/04382. Course 04380 meets every other day throughout the school year and provides the extra time to do the laboratory work which is involved in Chemistry 04381/04382. It does not yield extra credit.

Meets every other day.

CREDIT(S) No Credit **SCHOOL(S)** Huron & Pioneer

04381, 04382	**Chemistry 1AP and 2AP**		11	12	Recommendation of previous science teacher.

This first year college course begins at the same point as Chemistry 04333, but studies the content in greater breadth and depth. There is greater emphasis on theory and a mathematical quantitative approach. More laboratory work is required. A college textbook is used. Extra laboratory time is required.

Enrollment in Chemistry AP Laboratory

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COURSE #	COURSE	TERM	GRADE LEVEL		PREREQUISITE
04385, 04386	**Biology 1AP and 2AP**			12	Biology and Chemistry

This is a challenging second-year course for able students with a keen interest in biology. A college textbook is used, and the depth of the material studied is typical of a first-year college course. Emphasis is placed on laboratory investigations as students consider aspects of molecular and cellular biology, organismic biology, ethology, evolution, and ecology. Note: Enrollment in Biology AP should be based on previous excellent work in Biology and Chemistry. Biology AP should not be considered as a substitute for Physics by students planning careers in science; it and Physics may be taken concurrently in grade twelve. The nature of the course may require the student to spend some extra time in the laboratory.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Huron & Pioneer

04439, 04440	**Physics 1 and 2**		11	12	

The course involves a heavy emphasis on the laboratory and a quantitative, mathematical approach in developing an understanding of physical laws and theories by which they are explained. Topics studied include mechanics, wave motion and sound, optics, heat, electricity, and electromagnetism, and atomic structure. The course is strongly recommended for all students planning careers in science or engineering, but its value is not limited to students with such plans.

A working knowledge of algebra and geometry is essential to success in the course, and because of this, it is generally recommended that the course be taken in the senior year. Completion of Physics 04439 with a grade of "D" or higher is a prerequisite for enrollment in Physics 04440.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Huron & Pioneer

04441	**Physics-Analysis**		11	12	Successful completion of two years of Algebra and one year of Geometry.

Physics-Analysis 04441 is a two-hour inter-disciplinary block class. It is a course which combines the curriculums of Physics 04439/04440 and Math Analysis 03411/03412. The physics curriculum provides a wonderful application for many of the topics covered in analysis. An emphasis is placed on showing how many math ideas and concepts are used in science. Amongst these are vectors, sequences and series, limits, introductory calculus (applied maximum/minimum, time rates of change, simple integration), exponential growth and decay, trigonometry, and circular functions. Laboratory work and experiments are the chief method used to study Newtonian Physics. In addition, an emphasis is placed on developing problem solving skills.

CREDIT(S) 1.0 unit per semester **SCHOOL(S)** Pioneer only

04442	**Conceptual Physics**	Year	11	12	

This course is a descriptive approach to physics for students with less of a mathematics background. It is a survey course about topics such as light and sound as well as many of the topics covered in Physics 1 and Physics 2.

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COURSE #	COURSE	TERM	GRADE LEVEL		PREREQUISITE
04483, 04484	**Physics 1AP and 2AP**			12	

The course begins at the same point as Physics 04339, but the depth of the material studied is typical of a college course; a college textbook and calculus are used in the course. Topics considered in greater depth than in Physics 439/440 include rotational and translational aspects of mechanics, oscillations, gravitation, thermodynamics, and kinetic theory. The nature of the course may require the student to spend some extra time in the laboratory.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Huron & Pioneer

04490	**Independent Study in Science**	As	11	12	Permission of science department chairperson and student's counselor.

Occasionally advanced science students wish to conduct lengthy research projects or study particular scientific topics to greater depth than is possible in established courses. It is sometimes possible to accommodate these wishes through programs of independent study. Plans for independent study programs must be developed in consultation with the department chairperson.

CREDIT(S) .50 unit per semester **SCHOOL(S)** Huron & Pioneer

14101	**Interdisciplinary Block**	Year	9	

IDB 460 is a unique, full-year program open to all 9th graders at Huron. The program consists of a three-hour block of classes: English, Earth Science, and Social Studies in consecutive hours. Three teachers share the same students and teach the curriculum for each course through "thematically connected'' (interdisciplinary) units of study. Students learn to see and use these connections among subjects in a thoroughly academic approach to exploring and learning. Specifically, the individual courses are: 9th grade English (both "Intensive'' and "Regular'' students are welcome); Earth Science 431-432; Law 211 (first semester); and African & Middle Eastern Civilizations (second semester).
IDB 460 teachers believe that students learn more and learn better when they study subjects in association with each other—when they understand that all knowledge is related. Throughout the year parents receive frequent informational letters from the teachers and study guides for each unit.

CREDIT(S) 1.0 per year English; 1.0 per year Science; 1.0 per year Social Studies **SCHOOL(S)** Huron only