

Courses

Science

Science Graduation Requirement (3 Credits)

Recommended Science Course Sequence

Numerous research studies support students taking specific science courses to ensure a strong foundation of scientific understanding. College requirements and State requirements also influence this recommended course sequence. For these reasons, the following science course sequence is to be followed in MNPS.

Grade Level	Community College, College or University	Rigorous University Path	Rigorous University Path with Physical Science credit earned in 8th grade	Rigorous University Path with Physical Science credit earned in 8th grade and with a Science emphasis	IB Sequence
9th Grade	Physical Science	Physical Science - Honors	Biology I - Honors	Biology I - Honors	Physical Science - Honors or Biology I - Honors
10th Grade	Biology I	Biology I - Honors	Chemistry I or Chemistry I - Honors	Chemistry I or Biology - AP	Biology I - Honors or Chemistry I - Honors
11th Grade	Chemistry I	Chemistry I or Chemistry I - Honors	Physics I or Chemistry - AP	Chemistry I or Physics I <i>and/or</i> Biology - AP	Biology I - IB or Chemistry - IB/AP <i>and/or</i> Biology - IB/AP or Physics I
12th Grade	Physics I or Ecology (Physics I is preferred)	Physics I, Biology - AP <i>and/or</i> Chemistry - AP <i>and/or</i> Physics - AP B or C <i>and/or</i> Environmental Science - AP	Biology - AP <i>and/or</i> Chemistry - AP <i>and/or</i> Physics - AP B or C <i>and/or</i> Environmental Science - AP	Chemistry - AP <i>and/or</i> Physics - AP B or C <i>and/or</i> Human Anatomy /Physiology <i>and/or</i> Environmental Science - AP	Biology – IB/AP or Chemistry – IB/AP <i>and</i> Biology – IB or Physics AP

State Requirements for Graduation

Three courses of science are required for high school graduation, one of which must be Biology I. One must be a physical science, chosen from the following: Physical Science, Geology, Chemistry I, Chemistry II, and Physics I. Environmental Science is considered interdisciplinary, and may be taught with a life or physical science content emphasis. Ecology is not allowed in the ninth grade.

Animal Studies

Recommended Prerequisite:

Biology I

Grades Offered: 10 - 12

Credit: ½, 1

SDE Course Code: 3299

MNPS Course Code: SCI6553

This course equips students with a working knowledge of caring for animals, as well as learning the anatomy and physiology of animals. This laboratory-oriented course has students care for domesticated and

captivated animals kept in schools. Students learn to establish and maintain marine and fresh water aquaria and terraria, as well as an appreciation of the humane treatment of living things.

Biology I

Recommended Prerequisite:

None

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3210

MNPS Course Code: SCI6150

Biology introduces students to the world of living things. Students will experience the content through inquiry. Using available technology, students will investigate the world around them. The Gateway Biology standards include: inquiry, technology and engineering, cells, interdependence, flow of matter and energy, heredity, biodiversity and change. Credit cannot be awarded for both Biology I and Honors Biology I. Students will be administered the TCAP Gateway Biology Test at the conclusion of this course.

Biology I - Honors

Recommended Prerequisite:

None

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3210

MNPS Course Code: SCI6155

Biology I Honors deals more extensively with the abstract concepts of biology and incorporates a more extensive practice of higher order thinking skills and science processes. Honors courses must substantially exceed the content standards and learning experiences of regular courses. Honors courses must incorporate projects, open-

ended investigations, technology, and problem solving experiences plus other additional components. Students will study the Biology standards in depth. Laboratory activities are designed to provide students with creative problem solving experiences. Credit cannot be awarded for both Biology I and Biology I Honors. Students will be administered the TCAP Gateway Biology Test at the conclusion of this course.

Biology I - Sheltered

Recommended Prerequisite:

None

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3210

MNPS Course Code: SCI6151

In a sheltered classroom environment, this course introduces students to the world of living things. Students will experience the content through inquiry. Using available technology, students will investigate the world around them. The Gateway Biology standards include: inquiry, technology and engineering, cells, interdependence, flow of matter and energy, heredity, biodiversity and change. Credit cannot be awarded for both Sheltered Biology I and Biology I. Students will be administered the TCAP Gateway Biology Test at the conclusion of this course.

Biology - AP

Recommended Prerequisites:

Biology I and Chemistry I

Grades Offered: 10 - 12

Credit: ½, 1

SDE Course Code: 3217

MNPS Course Code: SCI6250

This course is a continuation and more in-depth study of Biology I and follows the College Board guidelines for AP Biology. This course includes cellular and molecular biology, microbiology, processes of biological investigation with statistical evaluation of data, growth, development and behavior of individuals, science and society, and the literature of biology.

Biology – AP (Biology Studies)

Recommended Prerequisites:

Biology I and Chemistry I

Grades Offered: 11 - 12

Credit: ½, 1

SDE Course Code: 3217

MNPS Course Code: SCI6460

Arranged in a two-hour teaching block, this course integrates the study of AP Biology with Anatomy and Physiology. (Note: One credit is earned for Anatomy and Physiology, Honors and one credit for AP Biology.) This course is for schools with block scheduling.

Chemistry I

Recommended Prerequisite:

Algebra I

Grades Offered: 10 - 12

Credit: ½, 1

SDE Course Code: 3221

MNPS Course Code: SCI6111

Students will study atomic structure, matter & energy, interactions of matter, and technology & engineering. Students should explore chemistry through inquiry, hands-on laboratory investigations, individual studies and group activities. Their study should include both qualitative and quantitative descriptions of matter, and the changes that matter undergoes. Students should practice the necessary precautions for performing safe inquiries and activities, and appreciate the risks and benefits of producing and using chemical substances. Chemistry is required for all medical and health-oriented careers, as well as careers involving agriculture, engineering and homemaking.

Chemistry I - Honors

Recommended Prerequisite:

Algebra I

Grades Offered: 10 - 12

Credit: ½, 1

SDE Course Code: 3221

MNPS Course Code: SCI6114

Chemistry I Honors deals more extensively with the abstract concepts of chemistry and incorporates a more extensive practice of higher order thinking skills and science process skills. Students will study atomic structure, matter & energy, interactions of matter, and technology & engineering. Honors courses must substantially exceed the content standards and learning expectations of regular courses. Honors courses must incorporate projects, open-ended investigations, technology, and problem solving ex-

periences plus other additional components. Students should explore chemistry through inquiry, hands-on laboratory investigations, individual studies and group activities. Their study should include both qualitative and quantitative descriptions of matter, and the changes that matter undergoes. Students should practice the necessary precautions for performing safe inquiries and activities, and appreciate the risks and benefits of producing and using chemical substances. Chemistry is required for all medical and health-oriented careers, as well as careers involving agriculture, engineering and homemaking.

Chemistry– AP

Recommended Prerequisites:

Chemistry I; Algebra II

Grades Offered: 11 - 12

Credit: ½, 1

SDE Course Code: 3225

MNPS Course Code: SCI6211

This course is designed to meet the College Board requirements to prepare students to take the AP exam, which may result in the awarding of college credit. The course will cover the atomic structure and the interaction of atoms. Students will study stoichiometry, equation balancing, problem solving, states of matter, oxidation-reduction reactions, equilibrium, kinetics, thermodynamics, periodicity of the elements, bonding, basic organic chemistry and environmental chemistry.

Chemistry– AP (Chemistry Studies)

Recommended Prerequisites:

Chemistry I; Algebra II

Grades Offered: 11 - 12

Credit: ½, 1

SDE Course Code: 3225

MNPS Course Code: SCI6411

Arranged in a two-hour teaching block, this course integrates the study of AP Chemistry with Chemistry II, Honors. (Note: One credit is earned for AP Chemistry and one credit for chemistry II, Honors.) This course is for schools with block scheduling.

Chemistry II, Honors (Chemistry Studies)

Recommended Prerequisites:

Chemistry I; Algebra II

Grades Offered: 11-12

Credit: ½, 1

SDE Course Code: 3224

MNPS Course Code: SCI6424

Arranged in a two-hour teaching block, this course integrates the study of AP Chemistry with Chemistry II. Chemistry II is a continuation of Chemistry I, but it investigates in greater depth the fundamental makeup of matter, interactions of matter, and the energy of such interactions. Students will investigate the structure of matter, states of matter, and reactions through an inquiry approach. This course is to be taught concurrently with AP Chemistry. (Note: One credit is earned for AP Chemistry and one credit for chemistry II, Honors.) This course is for schools with block scheduling.

Ecology

Recommended Prerequisites:

Biology I and Physical Science,

Chemistry I or Physics

Grades Offered: 10 - 12

Credit: ½, 1

SDE Course Code: 3255

MNPS Course Code: SCI6501

Ecology is a laboratory science course that enables students to develop an understanding of the natural and man-made environment and the environmental problems the world faces. Students will study individuals, populations, communities, ecosystems, biomes, human and sustainability. The concepts of ecology will be studied through an inquiry approach. Concepts from Biology I and Chemistry I will be applied. Many labs and field experiences are included to assist students in learning the science content, as well as addressing personal and civic responsibility and the challenges facing our world – pollution, extinct species, abuse of natural resources and overpopulation.

Environmental Science - AP

Recommended Prerequisites:

Biology I, Physical Science,

Chemistry and Algebra I

Grades Offered: 10 - 12

Credit: ½, 1

SDE Course Code: 3236

MNPS Course Code: SCI6710

This course is designed to meet the College Board requirements to prepare students to take the AP exam, which may result in the awarding of college credit. Students are provided the scientific principles, concepts and methodologies required to understand the interrelationships of the natural world, while engaging in laboratory and field investigations. Students are asked to identify and analyze environmental problems, both natural and man-made to evaluate the relative risks associated with these problems, and to examine alternative solutions to resolving and/or preventing them.

Environmental Science – AP (Environmental Studies)

Recommended Prerequisites:

Biology, Chemistry and Algebra I

Grades Offered: 11 - 12

Credit: ½, 1

SDE Course Code: 3236

MNPS Course Code: SCI6410

Arranged in a two-hour teaching block, this course integrates the study of AP Environmental Science with Scientific Research. (Note: One credit is earned for AP Environmental Science and one credit for Scientific Research.) This course is for schools with block scheduling.

General Astronomy

Recommended Prerequisite:

None

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3299

MNPS Course Code: SCI6603

This course surveys the universe, beginning with the earth and its movements in and through space. Students will be acquainted with the moon, solar system, nebulae, stars, galaxies, quasars, pulsars, black holes and other aspects of space. Students will learn the major stars and constellations of each season. Night sessions will allow telescopic viewing of celestial objects. This course cannot be used to fulfill the State requirement for science, but may be used to earn credit above the State minimum of three science credits.

Geology

Recommended Prerequisites:
Physical Science, Biology I and Chemistry I, or Physics I
Grades Offered: 9 - 12
Credit: ½, 1
SDE Course Code: 3205
MNPS Course Code: SCI6607

Geology is a course that explores the origins and the connections between the physical, chemical and biological processes of the Earth system. Students will experience the content of geology through investigations and observations both in the field and the laboratory, and through open-ended problem solving via cooperative learning and individual research. Students will focus on the physical aspects of Earth processes and cycles. Maps, minerals, rocks, geologic history, plate tectonics and external landform morphology are areas of study in geology.

Human Anatomy and Physiology

Recommended Prerequisites:
Biology I and Chemistry I
Grades Offered: 10 - 12
Credit: ½, 1
SDE Course Code: 3251
MNPS Course Code: SCI6551

This course is a systematic study of the human body designed for students considering a career in the health field, as well as taking an active part in their own health and wellness. Students will study the body through models, diagrams and/or comparative studies of the anatomy of other organisms. Students will study anatomical orientation; the body systems that provide protection, support, and movement; integration and regulation; transportation; absorption and excretion; and reproduction, growth, and development. This is a laboratory-oriented course involving detailed dissection and experiences related to human physiology, such as: urine analysis, blood counts, blood typing, enzyme studies and bone analysis.

Human Anatomy & Physiology-Honors

Recommended Prerequisites:
Biology I and Chemistry I
Grades Offered: 10 - 12
Credit: ½, 1

SDE Course Code: 3251
MNPS Course Code: SCI6561

Human Anatomy and Physiology, Honors incorporates a more extensive practice of higher order thinking skills and science process skills. Honors courses must incorporate projects, open-ended investigations, technology, and problem solving experiences plus other additional components. This course is a systematic study of the human body designed for students considering a career in the health field, as well as taking an active part in their own health and wellness. Students will study the body through models, diagrams and/or comparative studies of the anatomy of other organisms. Students will study anatomical orientation; the body systems that provide protection, support, and movement; integration and regulation; transportation; absorption and excretion; and reproduction, growth, and development. This is a laboratory-oriented course involving detailed dissection and experiences related to human physiology, such as: urine analysis, blood counts, blood typing, enzyme studies and bone analysis.

Human Anatomy & Physiology-Honors(Advanced Biology Studies)

Recommended Prerequisites:
Biology I and Chemistry I
Grades Offered: 11 - 12
Credit: ½, 1
SDE Course Code: 3251
MNPS Course Code: SCI6461

Arranged in a two-hour teaching block, this course integrates the study of Anatomy and Physiology with AP Biology. (Note: One credit is earned for Anatomy and Physiology, Honors and one credit for AP Biology.) This course is for schools with block scheduling.

Nutrition Science

Recommended Prerequisites: A credit in Physical Science or Biology is recommended
Grades Offered: 9 - 12
Credit: ½, 1
SDE Course Code: 3261
MNPS Course Code: SCI3261

This full-year course creates interest in science by focusing on the practical application of scientific

concepts and processes to nutrition and foods. It includes the science of the production, processing, preparation, evaluation and utilization of foods. Students use scientific methods in laboratory experiments to facilitate the understanding of the human body, food and nutrition and science. The course is designed to be team-taught by a Family and Consumer Sciences teacher, and either a Chemistry or Biology teacher. Nutrition Science satisfies either one credit of Life science (if team-taught with a Biology teacher) or one credit of Physical Science (if team-taught with a Chemistry teacher). The University of Tennessee and the Board of Regents schools' approve Nutrition Science for admission as a third science requirement.

Physical Science

Recommended Prerequisite:
None
Grades Offered: 9 - 12
Credit: ½, 1
SDE Course Code: 3202
MNPS Course Code: SCI6103

Students will study introductory chemistry and physics topics though an inquiry approach. This course covers fundamental concepts such as: force, motion, interactions of matter, energy, structure and properties of matter. Students learn the relationships between science and technology, and how science affects all life. Hands-on laboratory investigations, individual studies and group activities should constitute a major portion of the learning experience. Conservation of matter and energy is an underlying theme throughout the course. Physical Science will provide the knowledge, prerequisite skills and habits of mind needed for problem solving and ethical decision-making about matters of scientific and technological concern. Students will be administered the Physical Science end-of-course test at the conclusion of this course.

Physical Science - Honors

Recommended Prerequisite:
None
Grades Offered: 9 - 12
Credit: ½, 1
SDE Course Code: 3202
MNPS Course Code: SCI6105

Physical Science Honors incorporates a more extensive proactive of higher order thinking skills and science process skills in this introductory study of chemistry and physics topics. Honors courses must substantially exceed the content standards and learning expectations of regular courses. Honors courses must incorporate projects, open-ended investigations, technology, and problem solving experiences plus other additional components. This course covers fundamental concepts such as: force, motion, interactions of matter, energy, structure and properties of matter. Students learn the relationships between science and technology and how science affects all life. Hands-on laboratory investigations, individual studies and group activities should constitute a major portion of the learning experience. Conservation of matter and energy is an underlying theme throughout the course. Physical Science will provide the knowledge, prerequisite skills and habits of mind needed for problem solving and ethical decision-making about matters of scientific and technological concern. Students will be administered the Physical Science end-of-course test at the conclusion of this course.

Physical Science - Sheltered

Recommended Prerequisite:

None

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3202

MNPS Course Code: SCI6104

In a sheltered classroom environment, students will study introductory chemistry and physics topics through an inquiry approach. This course covers fundamental concepts such as: force, motion, interactions of matter, energy, structure and properties of matter. Students learn the relationships between science and technology, and how science affects all life. Hands-on laboratory investigations, individual studies and group activities should constitute a major portion of the learning experience. Conservation of matter and energy is an underlying theme throughout the course. Physical Science will provide the knowledge, prerequisite skills, and habits of mind needed for problem solving and ethical decision-making

about matters of scientific and technological concern. Students will be administered the Physical Science end-of-course test at the conclusion of this course.

Physics I

Recommended Prerequisite:

Geometry or Algebra II

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3231

MNPS Course Code: SCI6112

Physics deals with the relationship between matter and energy, and how they interact. Students will study mechanics; thermodynamics; waves and sound; light and optics; electricity and magnetism; and atomic and nuclear physics. The major emphasis is concept development through inquiry learning and hands-on laboratory experiences, and concept reinforcement through application activities.

Physics I - Honors

Recommended Prerequisite:

Geometry or Algebra II

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3231

MNPS Course Code: SCI6122

Physics, Honors incorporates a more extensive practice of higher order thinking skills and science process skills. Students will study Physics in more depth, as honors courses must substantially exceed the content standards and learning expectations of regular courses. Honors courses must incorporate projects, open-ended investigations, technology, and problem solving experiences plus other additional components. Physics deals with the relationship between matter and energy, and how they interact. Students will study mechanics; thermodynamics; waves and sound; light and optics; electricity and magnetism; and atomic and nuclear physics. The major emphasis is concept development through inquiry learning and hands-on laboratory experiences, and concept reinforcement through application activities.

Physics - AP Physics B

Recommended Prerequisites:

Physics I

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3233

MNPS Course Code: SCI6202

This course is designed to meet the College Board requirements to prepare students to take the AP exam, which may result in the awarding of college credit. This course expects students to be able to apply pre-calculus and algebra concepts, but not calculus. It stresses problem-solving and laboratory experiences. Topics studied include Newtonian mechanics; fluid mechanics and thermal physics; electricity and magnetism; waves and optics; and atomic and nuclear physics. This course prepares students for careers in life sciences, pre-medicine and other applied science careers.

Physics - AP Physics C

Recommended Prerequisite:

Physics I

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3234

MNPS Course Code: SCI6213

This course is designed to meet the College Board requirements to prepare students to take the AP exam, which may result in the awarding of college credit. In the typical course, the first semester is devoted to Newtonian mechanics. Use of calculus in problem solving and in derivations is expected to increase as the course progresses. In the second semester, the primary emphasis is on classical electricity and magnetism. Calculus is used freely in formulating principles and in analytical problem-solving. This course is for students planning to specialize in careers in a physical science or in engineering.

Scientific Research

Recommended Prerequisites:

Biology I and Chemistry I

Grades Offered: 11-12

Credit ½, 1

SDE Course Code: 3295

MNPS Course Code: SCI6175

This course is one in which each student conducts an in-depth research project and presents his/her

findings using a variety of media at local, district, regional, state, and/or national competitions and/or presentations. The major components of the course are: (1) a technical report including sections for literature search, design, procedures, analysis of data, experimental results, conclusions, and future directions, and (2) an audio-visual presentation that is appropriate to the nature of the research and the type of audience. The major areas of

investigation will be: ethical practices, critical thinking skills, scientific inquiry, analyzing and evaluating data, and communicating scientific results. This course may be taught concurrently with AP Environmental Science.

Scientific Research (Advanced Environmental Studies)

Recommended Prerequisites:

Biology I and Chemistry I

Grades Offered: 11-12

Credit ½, 1

SDE Course Code: 3295

MNPS Course Code: SCI6475

Arranged in a two-hour teaching block, this course integrates the study of AP Environmental Science with Scientific Research. (Note: One credit is earned for AP Environmental Science and one credit for Scientific Research.) This course is for schools with block scheduling.

INTERVENTIONS: These courses cannot substitute for a required Science course, but they may be counted as an elective credit.

Biology Gateway Intervention I

Recommended Prerequisite:

Biology

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3280

MNPS Course Code: SCI6140

Biology Gateway Intervention I is the first Biology intervention course in a series of four. Students will work to strengthen their understanding of the Gateway Biology I indicators as indicated by testing. This course will assist students to gain the skills and knowledge for which they have not yet been able to demonstrate mastery on the Gateway Biology Test. Students who have been unsuccessful in passing the Biology I Gateway Test are encouraged to take this elective. This course cannot be used to fulfill the State requirement for Science, but may be used to earn elective credit. Students will be administered the TCAP Gateway Biology Test at the conclusion of this course.

Biology Gateway Intervention II

Recommended Prerequisites:

Biology and Biology Gateway Intervention I

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3280

MNPS Course Code: SCI6141

Biology Gateway Intervention II is the second biology intervention course in a series of four. Students will work to strengthen their understanding of the Gateway Biology I indicators as indicated by testing. This course will assist students to

gain the skills and knowledge for which they have not yet been able to demonstrate mastery on the Gateway Biology Test. Students who have been unsuccessful in passing the Biology I Gateway Test and Biology Gateway Intervention I are encouraged to take this elective. This course cannot be used to fulfill the State requirement for Science, but may be used to earn elective credit. Students will be administered the TCAP Gateway Biology Test at the conclusion of this course.

Biology Gateway Intervention III

Recommended Prerequisites:

Biology and Biology Gateway Intervention I and II

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3280

MNPS Course Code: SCI6142

Biology Gateway Intervention III is the third biology intervention course in a series of four. Students will work to strengthen their understanding of the Gateway Biology I indicators as indicated by testing. This course will assist students to gain the skills and knowledge for which they have not yet been able to demonstrate mastery on the Gateway Biology Test. Students who have been unsuccessful in passing the Biology I Gateway Test and Biology Gateway Intervention I and II are encouraged to take this elective. This course cannot be used to fulfill the State requirement for Science, but may be used to earn elective credit. Students will be administered the TCAP Gateway

Biology Test at the conclusion of this course.

Biology Gateway Intervention IV

Recommended Prerequisites:

Biology and Biology Gateway Intervention I, II and III

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3280

MNPS Course Code: SCI6143

Biology Gateway Intervention IV is the fourth biology intervention course in a series of four. Students will work to strengthen their understanding of the Gateway Biology I indicators as indicated by testing. This course will assist students to gain the skills and knowledge for which they have not yet been able to demonstrate mastery on the Gateway Biology Test. Students who have been unsuccessful in passing the Biology I Gateway Test and Biology Gateway Intervention I, II and III are encouraged to take this elective. This course cannot be used to fulfill the State requirement for Science, but may be used to earn elective credit. Students will be administered the TCAP Gateway Biology Test at the conclusion of this course.

Science- Content Area Reading (CAR)

Recommended Prerequisite:

TCAP Reading Scores between the 35th—50th Percentile

Grades Offered: 9 - 12

Credit: ½, 1

SDE Course Code: 3081

MNPS Course Code: SCI1107

Students will learn, practice and internalize strategies that are essential life-long learning skills for reading, writing, understanding and interpreting content specific materials. The strategies will be applied to the content areas of English, Mathematics, Science and Social studies. Skills will include previewing and reviewing print and non-print material, activating prior knowledge, processing and acquiring new vocabulary, organizing information, understanding visual presentations, self-monitoring and reflecting. This course may be used as a Gateway Intervention. This course does not meet the science requirement for high school graduation, but may be counted as an elective credit.