

SCIENCE (SCIEN-UH)

SCIEN-UH 1121EQ Foundations of Science 1-2: Physics (1.5 Credits)

Typically offered Fall and Spring

This is the Physics component for Foundations of Science 1-2. Energy and Matter focuses on velocity, acceleration, forces, and energy, while simultaneously introducing students to atoms and molecules and the basic blocks of life: biomolecules, DNA and cells. Chemical reactions are introduced and explained through the electronic structure of atoms, used to introduce the basic elements of quantum theory. Forces and Interactions introduces students to fundamental forces, the theory of molecular bonding, and molecular structures and shapes, in which forces and energy play a role. Thermodynamics and elements of statistical mechanics provide the basis to understand how the microscopic properties of matter determine its macroscopic ones. Students apply these concepts to deepen their understanding of biomolecules; their structures and functions.

Grading: Ugrd Abu Dhabi Graded

Repeatable for additional credit: No

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1122EQ Foundations of Science 1-2: Chemistry (3 Credits)

Typically offered Fall and Spring

This is the Chemistry component for Foundations of Science 1-2. Energy and Matter focuses on velocity, acceleration, forces, and energy, while simultaneously introducing students to atoms and molecules and the basic blocks of life: biomolecules, DNA and cells. Chemical reactions are introduced and explained through the electronic structure of atoms, used to introduce the basic elements of quantum theory. Forces and Interactions introduces students to fundamental forces, the theory of molecular bonding, and molecular structures and shapes, in which forces and energy play a role. Thermodynamics and elements of statistical mechanics provide the basis to understand how the microscopic properties of matter determine its macroscopic ones. Students apply these concepts to deepen their understanding of biomolecules; their structures and functions.

Grading: Ugrd Abu Dhabi Graded

Repeatable for additional credit: No

Corequisites: MATH-UH 1012 or MATH-UH 1013 or Math Placement Assessment of 5.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1123EQ Foundations of Science 1-2: Biology (1.5 Credits)

Typically offered Fall and Spring

This is the Biology component for Foundations of Science 1-2. Energy and Matter focuses on velocity, acceleration, forces, and energy, while simultaneously introducing students to atoms and molecules and the basic blocks of life: biomolecules, DNA and cells. Chemical reactions are introduced and explained through the electronic structure of atoms, used to introduce the basic elements of quantum theory. Forces and Interactions introduces students to fundamental forces, the theory of molecular bonding, and molecular structures and shapes, in which forces and energy play a role. Thermodynamics and elements of statistical mechanics provide the basis to understand how the microscopic properties of matter determine its macroscopic ones. Students apply these concepts to deepen their understanding of biomolecules; their structures and functions.

Grading: Ugrd Abu Dhabi Graded

Repeatable for additional credit: No

Corequisites: MATH-UH 1012 or MATH-UH 1013 or Math Placement Assessment of 5.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1124C Foundations of Science 2 Lab: Chemistry (1 Credit)

Typically offered Fall and Spring

This is the Lab component for Foundations of Science 2 (Chemistry).

Grading: Ugrd Abu Dhabi Graded

Repeatable for additional credit: No

Corequisites: MATH-UH 1012 or MATH-UH 1013 or Math Placement Assessment of 5.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1124P Foundations of Science 1 Lab: Physics (1 Credit)

Typically offered Fall and Spring

This is the Lab component for Foundations of Science 1 (Physics).

Grading: Ugrd Abu Dhabi Graded

Repeatable for additional credit: No

Corequisites: MATH-UH 1012 or MATH-UH 1013 or Math Placement Assessment of 5.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1341Q Foundations of Science 3-4: Physics (3 Credits)*Typically offered Fall and Spring*

This is the Physics component for Foundations of Science 3-4. Systems in Flux focuses on changes in systems in the physical and living worlds. Capacitors, current, and basic circuits are explored with an eye toward understanding their applications to chemical reactions and the behavior of living cells. The rates and directions of chemical reactions are explored as chemical kinetics and chemical equilibrium are investigated with a special focus on acid-base chemistry. These fundamental physical and chemical principles are used to describe basic cellular monomers and polymers including DNA, RNA, and protein, and the sequence of events that leads to information flow and its regulation in the cell nucleus. They are also applied to macroscopic systems found in the biosphere. Form and Function explores a question applicable to all branches of science: How does the form or shape of a physical entity set its function? This leads to another question: If a specific function is desired, can a form or shape be engineered or modified to execute or improve the execution of that function? The course examines the form/function concept in rigid bodies, electromagnetic fields, the behavior and design of small molecules, and the activity of proteins as the workhorse in biological systems.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 1-2 Pre- or Corequisite: MATH-UH 1020 or MATH-UH 1021 or Math Placement Assessment of 5.**Corequisites:** SCIEN-UH 1341, SCIEN-UH 1342, SCIEN-UH 1343, SCIEN-UH 1344C and SCIEN-UH 1344B.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1342Q Foundations of Science 3-4: Chemistry (3 Credits)*Typically offered Fall and Spring*

This is the Chemistry component for Foundations of Science 3-4. Systems in Flux focuses on changes in systems in the physical and living worlds. Capacitors, current, and basic circuits are explored with an eye toward understanding their applications to chemical reactions and the behavior of living cells. The rates and directions of chemical reactions are explored as chemical kinetics and chemical equilibrium are investigated with a special focus on acid-base chemistry. These fundamental physical and chemical principles are used to describe basic cellular monomers and polymers including DNA, RNA, and protein, and the sequence of events that leads to information flow and its regulation in the cell nucleus. They are also applied to macroscopic systems found in the biosphere. Form and Function explores a question applicable to all branches of science: How does the form or shape of a physical entity set its function? This leads to another question: If a specific function is desired, can a form or shape be engineered or modified to execute or improve the execution of that function? The course examines the form/function concept in rigid bodies, electromagnetic fields, the behavior and design of small molecules, and the activity of proteins as the workhorse in biological systems.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 1-2 Pre- or Corequisite: MATH-UH 1020 or MATH-UH 1021 or Math Placement Assessment of 5.**Corequisites:** SCIEN-UH 1341, SCIEN-UH 1343, SCIEN-UH 1344C, and SCIEN-UH 1344B.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1343 Foundations of Science 3-4: Biology (2 Credits)*Typically offered Fall and Spring*

This is the Biology component for Foundations of Science 3-4. Systems in Flux focuses on changes in systems in the physical and living worlds. Capacitors, current, and basic circuits are explored with an eye toward understanding their applications to chemical reactions and the behavior of living cells. The rates and directions of chemical reactions are explored as chemical kinetics and chemical equilibrium are investigated with a special focus on acid-base chemistry. These fundamental physical and chemical principles are used to describe basic cellular monomers and polymers including DNA, RNA, and protein, and the sequence of events that leads to information flow and its regulation in the cell nucleus. They are also applied to macroscopic systems found in the biosphere. Form and Function explores a question applicable to all branches of science: How does the form or shape of a physical entity set its function? This leads to another question: If a specific function is desired, can a form or shape be engineered or modified to execute or improve the execution of that function? The course examines the form/function concept in rigid bodies, electromagnetic fields, the behavior and design of small molecules, and the activity of proteins as the workhorse in biological systems.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 1-2 Pre- or Corequisite: MATH-UH 1020 or MATH-UH 1021 or Math Placement Assessment of 5.**Corequisites:** SCIEN-UH 1341, SCIEN-UH 1342, SCIEN-UH 1344C and SCIEN-UH 1344B.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1344BE Foundations of Science 4 Lab: Biology (1 Credit)*Typically offered Fall and Spring*

This is the Lab component for Foundations of Science 4.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 1-2 Pre- or Corequisite: MATH-UH 1020 or MATH-UH 1021 or Math Placement Assessment of 5.**Corequisites:** SCIEN-UH 1341, SCIEN-UH 1342, and SCIEN-UH 1343.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1344CE Foundations of Science 3 Lab: Chemistry (1 Credit)*Typically offered Fall and Spring*

This is the Lab component for Foundations of Science 3.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 1-2 Pre- or Corequisite: MATH-UH 1020 or MATH-UH 1021 or Math Placement Assessment of 5.**Corequisites:** SCIEN-UH 1341, SCIEN-UH 1342, and SCIEN-UH 1343.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1561Q Foundations of Science 5-6: Physics (3 Credits)*Typically offered Fall and Spring*

This is the Physics component for Foundations of Science 5-6. FoS 5&6 are the final courses in the sequence; by this point, students have developed a knowledge base and a set of skills that can be applied to a wide range of topics across physics, biology and chemistry, and therefore FoS 5&6 will serve as a culmination of the integration. Foundational physics will focus on waves and oscillations as both a fundamental means of propagating change, but also as a powerful descriptive and analytical tool via Fourier analysis. Foundational biology will analyze these same waves and oscillations as key signaling agents in living organisms, generating responses as sensory systems detect them, including nerves in some species. Interactions among light, matter, and living systems are examined. Change during the growth of cells is explored at the molecular level. Large timescale oscillations are also considered as drivers of evolution. To further promote the integration, FoS 5&6 will also include a focused interdisciplinary module dedicated to a single theme or topic. This module will draw from the fundamental knowledge acquired in all three science disciplines (physics, chemistry and biology), and its purpose will be to provide an example of how the disciplines come together and approach a common problem from different perspectives. The specific content covered will be selected from a range of options designed cooperatively by faculty across all three disciplines, and will be chosen based on faculty and student interest.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 3-4 and completion of MATH-UH 1020/1021 MVC.**Corequisites:** SCIEN-UH 1563, SCIEN-UH 1564B and SCIEN-UH 11564P.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1563 Foundations of Science 5-6: Biology (3 Credits)*Typically offered Fall and Spring*

This is the Biology component for Foundations of Science 5-6. FoS 5&6 are the final courses in the sequence; by this point, students have developed a knowledge base and a set of skills that can be applied to a wide range of topics across physics, biology and chemistry, and therefore FoS 5&6 will serve as a culmination of the integration. Foundational physics will focus on waves and oscillations as both a fundamental means of propagating change, but also as a powerful descriptive and analytical tool via Fourier analysis. Foundational biology will analyze these same waves and oscillations as key signaling agents in living organisms, generating responses as sensory systems detect them, including nerves in some species. Interactions among light, matter, and living systems are examined. Change during the growth of cells is explored at the molecular level. Large timescale oscillations are also considered as drivers of evolution. To further promote the integration, FoS 5&6 will also include a focused interdisciplinary module dedicated to a single theme or topic. This module will draw from the fundamental knowledge acquired in all three science disciplines (physics, chemistry and biology), and its purpose will be to provide an example of how the disciplines come together and approach a common problem from different perspectives. The specific content covered will be selected from a range of options designed cooperatively by faculty across all three disciplines, and will be chosen based on faculty and student interest.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 3-4 and completion of MATH-UH 1020/1021 MVC.**Corequisites:** SCIEN-UH 1561, SCIEN-UH 1564B and SCIEN-UH 1564P.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1564BE Foundations of Science 5 Lab: Biology (1 Credit)*Typically offered Fall and Spring*

This is the Lab component for Foundations of Science 5.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 4 and (MATH-UH 1020 or MATH-UH 1021) **Corequisites:** SCIEN-UH 1561, SCIEN-UH 1563 and SCIEN-UH 1564P.

- Bulletin Categories: Foundations of Science Courses

SCIEN-UH 1564EP Foundations of Science 6 Lab: Physics (1 Credit)*Typically offered Fall*

This is the Lab component for Foundations of Science 6.

Grading: Ugrd Abu Dhabi Graded**Repeatable for additional credit:** No**Prerequisites:** Foundations of Science 5 and (MATH-UH 1020 or MATH-UH 1021) **Corequisites:** SCIEN-UH 1561, SCIEN-UH 1563 and SCIEN-UH 1564B.

- Bulletin Categories: Foundations of Science Courses