**NSTA Science Content Analysis Form**

**Integrated Science Secondary Education**

This table was completed using science courses found in each respective discipline major. Completion of the entire table in all four science disciplines and their supporting disciplines demonstrates content coverage to fulfill teacher certification requirements for grades 6-12 certification in the following areas: Biology, Chemistry, Earth/Space Science, Physics and Integrated Science.

**Table preparation instructions:**

Tables provided below include, in the left column, the 2012 NSTA subject matter for each science discipline. In the right hand column, include the name and course number for each relevant course. With licensure requirements varying from state to state, the requirements for each discipline were delineated and placed in separate tables, to include: Competency requirements for all secondary teachers;

* Core competencies required of all teachers in a discipline (biology, chemistry, etc.);
* Advanced competencies required of specialists in a given discipline; and
* Supporting competencies for each discipline in the other sciences and mathematics.

Include the tables relevant to your licensure area. Use this table to decide on that mix. Note that there are choices to demonstrate alignment with the NSTA Content Standard Requirement, NSTA 2012 Standard 1 Element a.

* Choice 1: Demonstrate alignment through courses or transcript analysis using the NSTA Content Analysis Form.
* Choice 2: Demonstrate alignment through coursework as described in the chart below.
* Choice 3: Demonstrate alignment through a preservice preparation program recognition by affiliates. (As of this date, there are no affiliates that offer this option)

| **If the preparation program:** | CHOICE A  **Content Analysis Form** | CHOICE B  **Coursework** |
| --- | --- | --- |
| Prepares a teacher to teach courses such as general science at or above the middle school (grades 6-8). This licensure may not teach discipline specific courses (such as biology or chemistry) | * Core competencies in the disciplines comprising the composite course (Bio,Chem, Phys, E/Sp). | * One year of introductory coursework in each of the disciplines (Biology, Chemistry, Physics and Earth/Space Science) |
| Prepares a teacher in a single field (often a major) with or without a supporting second teaching field (a teaching minor). This is a **single field** program. | * Core (Bio, Chem, Phys, or E/Sp) in the primary discipline, and * Advanced competencies in the primary discipline (Bio, Chem, Phys, or E/Sp), * Supporting competencies in the primary discipline (Bio, Chem, Phys, or E/Sp). | * One year of introductory coursework in the area of the Single Field Licensure (Biology, Chemistry, Physics or Earth/Space Science). * Coursework for a major * At least 20 semester hours at the third year or above |
| Prepares a teacher about equally in two teaching disciplines, usually with less than a major in each. This is a **dual field** program. | * Core in both major disciplines: (Bio, Chem, Phys, E/Sp) and * Advanced competencies in both major disciplines (Bio, Chem, Phys, E/Sp) and * Supporting competencies in both disciplines (Bio, Chem, Phys, E/Sp). | * One year of introductory coursework in each area of the Dual Field Licensure (Biology, Chemistry, Physics or Earth/Space Science). * At least 16 semester hours at the third year or above in each area of the Dual Field |
| Prepares a teacher at once to teach in three or four disciplines with licensure in each individual discipline. This is a **broad field** program. | * Core competencies (Table A in Bio, Chem, Phys, or E/Sp) in all discipline and * Advanced competencies (Table B Bio, Chem, Phys, or E/Sp) in at least one disciplines and * Supporting competencies in all disciplines (Bio, Chem, Phys, or E/Sp). | * One year of introductory coursework in each area (Biology, Chemistry, Physics and Earth/Space Science). * Coursework for a major in one area * At least 16 semester hours at the third year or above dispersed among the remaining 3 areas (not the major) |

For each program, the program level, licensure track, and thenature of preparation areat the top of the page. For example, “Masters secondary single field program in biology with possible minors in chemistry, physics, or earth/space science.” *Report your requirements in the most efficient way*. For example, if all of the teaching minors are the same regardless of the major they are paired with, report them only once.

*Your program does not have to be aligned completely with the standards at least initially*. A 90% **alignment between the NSTA content standards and program coursework** is expected within each content table.

**Instructions for Completing the Forms**

For each program, complete the curriculum evaluation as follows:

* If your institution prescribes the coursework in science for each teaching major and minor, as is the case in most undergraduate programs, enter in column B the numbers and titles of the **required** courses that address the subject matter identified in column A. Include advising sheets as a separate attachment.
* If you accept candidates with science coursework taken elsewhere, state the advising requirement using column B that ensures that candidates have studied the subject matter content in column A. Include your advising sheets in the appendix.
* DO NOT provide syllabi. Include brief content descriptions for courses ONLY when the course titles are not reasonably descriptive of the content. (“Ecology” is reasonably descriptive, while “Integrative Science” is not descriptive). Be sure to refer reviewers to the descriptor.
* If a course has a typical science name (such as Analytical Chemistry), but the content in that course is atypical (if there is a significant amount of environmental science in the course), include brief content descriptions.
* Note that the same courses or advising requirements may appear multiple times in these tables.
* If you do not have a requirement that covers a particular topic, simply enter “not covered.” Do not leave the space blank. NOTE: **Science content may be in science courses or in education courses**

**Special instructions:**

* Secondary Physical Science is usually a composite of two disciplines (chemistry and physics) but sometimes also includes earth/space sciences. General science usually includes all four traditional subject area disciplines, but the teacher does not teach specific content courses.

Preparation of elementary science specialists or **middle school** science teachers should follow the specific recommendations outlined on the Elementary Science Specialists and Middle Level Science Teachers Content Analysis Form available from the NSTA website: www.nsta.org/preservice.

**Content Analysis for Secondary Science**

**Competency Requirements for All Science Teachers**

**Science Content Requirement Analysis Tables A, B, and C for Biology**

**Table A: Biology**

|  |  |
| --- | --- |
| **A. Core Competencies (numbers 1-12)** | **B: Required course number & name or advising requirements** |
| Life processes in living systems including organization of matter and energy. | BIO 120General Biology I  BIO 215 General Ecology |
| Similarities and differences among animals, plants, fungi, microorganisms, and viruses | BIO 121 General Biology II |
| Ecological systems including the interrelationships and dependencies of organisms with each other and their environments. | BIO 215General Ecology |
| Population dynamics and the impact of population on its environment. | BIO 215 General Ecology |
| General concepts of genetics and heredity | BIO 375Genetics  BIO 376Genetics Laboratory |
| Organizations and functions of cells and multi-cellular systems. | BIO 120 General Biology I  BIO 121 General Biology II |
| Behavior of organisms and their relationships to social systems. | BIO 121 General Biology II  BIO 215 General Ecology  BIO 210 Evolutionary Biology |
| Regulation of biological systems including homeostatic mechanisms | BIO 120 General Biology I  BIO 121 General Biology II |
| Fundamental processes of modeling and investigating in the biological sciences | BIO 120 General Biology I  BIO 215 General Ecology  BIO 376Genetics Laboratory  SCI 450 Earth Science and Biology in Secondary Education |
| Applications of biology in environmental quality and in personal and community health | BIO 215 General Ecology  SCI 450 Earth Science and Biology in Secondary Education |
| Bioenergetics including major biochemical pathways | BIO 120 General Biology I  BIO 121 General Biology II  BIO 215 General Ecology |
| Molecular genetics and heredity and mechanisms of genetic modification | BIO 375Genetics  BIO 376Genetics Laboratory |
| Molecular basis for evolutionary theory and classification | BIO 121 General Biology II  BIO 375 Genetics  BIO 210 Evolutionary Biology |

**Table B: Biology**

|  |  |
| --- | --- |
| **B. Advanced Competencies (numbers 13-21)** | **B: Required course number & name or advising requirements** |
| Biochemical interactions of organisms and their environments | BIO 120 General Biology I  BIO 215 General Ecology |
| Causes, characteristics, and avoidance of viral, bacterial, and parasitic diseases |  |
| Molecular genetics | BIO 375Genetics  BIO 376Genetics Laboratory |
| Issues related to living systems such as genetic modification, uses of biotechnology, cloning, and pollution from farming. | BIO 215 General Ecology  BIO 375Genetics  BIO 376Genetics Laboratory |
| Historical development and perspectives in biology including contributions of significant figures and underrepresented groups, and the evolution of theories in biology | BIO 120 General Biology I  BIO 375 Genetics  BIO 210 Evolutionary Biology  SCI 450 Earth Science and Biology in Secondary Education |
| How to design, conduct, and report research in biology | BIO 215 General Ecology  BIO 376Genetics Laboratory  BIO 210 Evolutionary Biology |

**Table C: Biology**

|  |  |
| --- | --- |
| **C. Supporting Competencies (numbers 22-42)** | **B: Required course number & name or advising requirements** |
| **General chemistry** |  |
| Biochemistry | CHM 231Introductory Organic Chem |
| Basic chemistry laboratory techniques | CHM 115Principles of Chemistry I  CHM 116Principles of Chemistry II  CHM 231 Introductory Organic Chem  CHM 221 Survey of Analytical Chem |
| **Physics** | |
| Light | PHY 231 Principles of Physics II  PHY 302 Intro to Modern Physics |
| Sound | PHY 231 Principles of Physics II |
| Optics | PHY 231 Principles of Physics II |
| Electricity | PHY 231 Principles of Physics II |
| Energy and order | PHY 231 Principles of Physics II |
| Magnetism | PHY 231 Principles of Physics II |
| **Earth and space sciences** | |
| Energy and geochemical cycles | GEO 111 Exploring the Earth  GEO 112 Earth History |
| Climate | GEO 203 Weather for Pre-Service Teach  SCI 450 Earth Science and Biology in Secondary Education |
| Oceans | GEO112 Earth History  GEO 203 Weather for Pre-Service Teach  SCI 450 Earth Science and Biology in Secondary Education |
| Weather | GEO 203 Weather for Pre-Service Teach  SCI 450 Earth Science and Biology in Secondary Education |
| Natural resources | GEO 111 Exploring the Earth  GEO 211 Mineralogy  SCI 450 Earth Science and Biology in Secondary Education |
| Changes in the Earth | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| **Mathematics** |  |
| Probability | BIO 375 Genetics |
| Statistics | BIO 215 General Ecology  PHY 230Principles of Physics I  PHY 231 Principles of Physics II  PHY 302 Intro to Modern Physics |

**Science Content Requirement Analysis Tables A, B, and C for Chemistry**

**Table A: Chemistry**

|  |  |
| --- | --- |
| **A. Core Competencies (numbers 1-13)** | **B: Required course number & name or advising requirements** |
| Fundamental structures of atoms and molecules | CHM 115 Principles of Chemistry I |
| Basic principles of ionic, covalent, and metallic bonding | CHM 115 Principles of Chemistry I |
| Periodicity of physical and chemical properties of elements | CHM 115 Principles of Chemistry I |
| Laws of conservation of matter and energy | CHM 115 Principles of Chemistry I |
| Fundamental of chemical kinetics, equilibrium and thermodynamics | CHM 116 Principles of Chemistry II |
| Kinetic molecular theory and gas laws | CHM 115 Principles of Chemistry I |
| Mole concept, stoichiometry, and laws of composition | CHM 115 Principles of Chemistry I |
| Solutions, colloids, and colligative properties | CHM 116 Principles of Chemistry II |
| Acids/base chemistry | CHM 116 Principles of Chemistry II |
| Fundamental oxidation-reduction chemistry | CHM 116 Principles of Chemistry II |
| Fundamental organic chemistry and biochemistry | CHM 231 Introductory Organic Chem |
| Nature of science: Fundamental processes in chemistry | SCI 440: Physics and Chemistry in Secondary Education |
| Applications of chemistry in personal and community health and environmental quality | CHM 221 Survey of Analytical Chem  SCI 440: Physics and Chemistry in Secondary Education |
| Fundamentals of nuclear chemistry |  |
| Historical development and perspectives in chemistry | CHM 115 Principles of Chemistry I  SCI 440: Physics and Chemistry in Secondary Education |

**Table B: Chemistry**

|  |  |
| --- | --- |
| **B. Advanced Competencies (numbers 14-27)** | **B: Required course number & name or advising requirements** |
| Principles of electrochemistry | CHM 116 Principles of Chemistry II  CHM 221 Survey of Analytical Chem |
| Transition elements and coordination compounds | CHM 116 Principles of Chemistry II |
| Molecular orbital theory, aromaticity, metallic and ionic structures, and correlation to properties of matter | CHM 115 Principles of Chemistry I |
| Advanced concepts in chemical kinetics, equilibrium, gas laws, and thermodynamics | CHM 351 Intro to Physical Chem |
| Lewis structures and molecular geometry | CHM 115 Principles of Chemistry I |
| Advanced concepts in acid/base chemistry, including buffers | CHM 116 Principles of Chemistry II |
| Major biological compounds and reactions | CHM 231 Introductory Organic Chem |
| Solvent system concepts | CHM 116 Principles of Chemistry II  CHM 231 Introductory Organic Chem |
| Chemical reactivity and molecular structure including electronic and steric effects | CHM 231 Introductory Organic Chem |
| Organic chemistry including syntheses, reactions, mechanisms, and aromaticity | CHM 231 Introductory Organic Chem |
| Green chemistry and sustainability |  |
| How to design, conduct, and report research in chemistry | CHM 115 Principles of Chemistry I  CHM 116 Principles of Chemistry II  CHM 231 Introductory Organic Chem  CHM 221 Survey of Analytical Chem  CHM 351 Intro to Physical Chem |

**Table C: Chemistry**

|  |  |
| --- | --- |
| **C. Supporting Competencies (numbers 28-47)** | **B: Required course number & name or advising requirements** |
| **Biology** | |
| Molecular biology | BIO 120 General Biology I  BIO 375Genetics  BIO 376Genetics Laboratory |
| Ecology | BIO 215 General Ecology  SCI 450 Earth Science and Biology in Secondary Education |
| **Earth science** | |
| Geochemistry | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 211 Mineralogy  GEO 212 Petrology |
| Cycles of matter | GEO 112 Earth History  GEO 211 Mineralogy  GEO 212 Petrology |
| Energetics of Earth systems | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 211 Mineralogy |
| **Physics** | |
| Energy | PHY 231 Principles of Physics II |
| Properties and function of waves | PHY 230 Principles of Physics I PHY 302 Intro to Modern Physics |
| Properties and function of motions | PHY 230 Principles of Physics I |
| Properties and function of forces | PHY 230 Principles of Physics I |
| Electricity | PHY 231Principles of Physics II |
| Magnetism | PHY 231 Principles of Physics II |
| **Mathematical and statistical concepts** | |
| Statistics | PHY 230 Principles of Physics I  PHY 231 Principles of Physics II  PHY 302Intro to Modern Physics |
| Use of differential equations | MTH 201 Calculus I  MTH 202 Calculus II  PHY 302 Intro to Modern Physics |
| Calculus | MTH 201 Calculus I  MTH 202 Calculus II  PHY 230 Principles of Physics I  PHY 231 Principles of Physics II  PHY 302Intro to Modern Physics |

**Science Content Requirement Analysis Tables A, B, and C for the Earth/Space Sciences**

**Table A: Earth/Space science**

|  |  |
| --- | --- |
| **A. Core Competencies (numbers 1-12)** | **B: Required course number & name or advising requirements** |
| Characteristics of land, atmosphere, and ocean systems on Earth | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| Properties, measurement, and classification of Earth materials | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| Changes in the Earth including land formation and erosion | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| Geochemical cycles including biotic and abiotic systems | GEO 112 Earth History  SCI 450: Earth Science and Biology in Secondary Education |
| Energy flow and transformation in Earth systems | GEO 112 Earth History  SCI 450 Earth Science and Biology in Secondary Education |
| Hydrological features of the Earth | GEO 111 Exploring the Earth  GEO 112 Earth History |
| Patterns and changes in the atmosphere, weather, and climate | GEO 203 Weather for Pre-Service Teach  SCI 450 Earth Science and Biology in Secondary Education |
| Origin, evolution, and planetary behaviors of Earth | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| Origin, evolution, and properties of the universe | PHY 105 Descriptive Astronomy |
| Fundamental processes of investigating in the Earth and space sciences | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| Sources and limits of natural resources | GEO 111 Exploring the Earth  SCI 450 Earth Science and Biology in Secondary Education |
| Applications of Earth and space sciences to environmental quality and to personal and community health and welfare. | GEO 111 Exploring the Earth  SCI 450 Earth Science and Biology in Secondary Education |

**Table B: Earth/Space Science**

|  |  |
| --- | --- |
| **B. Advanced Competencies (numbers 13-22)** | **B: Required course number & name or advising requirements** |
| Gradual and catastrophic changes in the Earth | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| Oceans and their relationship to changes in atmosphere and climate. | GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 212 Petrology |
| Hydrological cycles and problems of distribution and use of water | GEO 111 Exploring the Earth  GEO 112 Earth History |
| Dating of the Earth and other objects in the universe | GEO 111 Exploring the Earth  GEO 112 Earth History |
| Structures and interactions of energy and matter in the universe. | PHY 105 Descriptive Astronomy |
| Impact of changes in the Earth on the evolution and distribution of living things. | GEO 112 Earth History  SCI 450 Earth Science and Biology in Secondary Education |
| Issues related to changes in Earth Systems such as global climate change, mine subsidence, and channeling of waterways. | GEO 111 Exploring the Earth  SCI 450 Earth Science and Biology in Secondary Education |
| Historical development and perspectives, including contributions of significant figures and underrepresented groups, and the evolution of theories in the Earth and space sciences. | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology |
| How to design, conduct, and report research in the Earth and space sciences | GEO 111 Exploring the Earth  GEO 112 Earth History  GEO 203 Weather for Pre-Service Teach  GEO 211 Mineralogy  GEO 212 Petrology  PHY 105 Descriptive Astronomy |

**Table C: Earth/Space Science**

|  |  |
| --- | --- |
| **C. Supporting Competencies (numbers 23-47)** | **B: Required course number & name or advising requirements** |
| **Biology** | |
| Evolution | GEO 112 Earth History  BIO 210 Evolutionary Biology  SCI 450 Earth Science and Biology in Secondary Education |
| Ecology | BIO 215 General Ecology  SCI 450 Earth Science and Biology in Secondary Education |
| Population dynamics | BIO 210 Evolutionary Biology  BIO 215 General Ecology |
| Flow of energy | BIO 120 General Biology I  BIO 121 General Biology II  BIO 215 General Ecology |
| Flow materials through Earth systems | GEO 112 Earth History  BIO 215 General Ecology  SCI 450 Earth Science and Biology in Secondary Education |
| **Chemistry** | |
| Broad concepts of inorganic chemistry | CHM 115 Principles of Chemistry I |
| Basic laboratory techniques of inorganic chemistry | CHM 115 Principles of Chemistry I  CHM 116 Principles of Chemistry II |
| Broad concepts of organic chemistry | CHM 231 Introductory Organic Chem |
| Basic laboratory techniques of organic chemistry | CHM 231 Introductory Organic Chem |
| **Physics** | |
| Electricity | PHY 231 Principles of Physics II |
| Forces and motion | PHY 230 Principles of Physics I |
| Energy | PHY 230 Principles of Physics I |
| Magnetism | PHY 231 Principles of Physics II |
| Thermodynamics | PHY 302 Intro to Modern Physics |
| Optics | PHY 231 Principles of Physics II |
| Sound | PHY 231 Principles of Physics II |
| **Mathematics** | |
| Statistics | BIO 215 General Ecology  PHY 230 Principles of Physics I  PHY 231 Principles of Physics II  PHY 302 Intro to Modern Physics |
| Probability | BIO 375 Genetics |

**Science Content Requirement Analysis Tables A, B, and C for Physics**

**Table A: Physics**

|  |  |
| --- | --- |
| **A. Core Competencies (numbers 1-11)** | **B: Required course number & name or advising requirements** |
| Energy, work, and power | PHY 230 Principles of Physics I |
| Motion, major forces, and momentum | PHY 230 Principles of Physics I |
| Newtonian physics w/engineering applications | PHY 230 Principles of Physics I |
| Conservation mass, momentum, energy, and charge | PHY 230 Principles of Physics I |
| Physical properties of matter: solids, liquids, and gases | CHM 211 Principles of Chemistry I |
| Kinetic-molecular motion and atomic models | PHY 230 Principles of Physics I |
| Radioactivity, nuclear reactors, fission, and fusion | PHY 302 Intro to Modern Physics |
| Wave theory, sound, light, the electromagnetic spectrum and optics | PHY 231 Principles of Physics II |
| Electricity and magnetism | PHY 231 Principles of Physics II |
| Fundamental processes of investigating in physics | PHY 230 Principles of Physics I  PHY 231 Principles of Physics II  SCI 440 Physics and Chemistry in Secondary Science |
| Applications of physics in environmental quality and to personal and community health | SCI 440 Physics and Chemistry in Secondary Science |

**Table B: Physics**

|  |  |
| --- | --- |
| **B. Advanced Competencies (numbers 12-22)** | **B: Required course number & name or advising requirements** |
| Thermodynamics and energy-matter relationships | PHY 302 Intro to Modern Physics |
| Nuclear physics including matter-energy duality and reactivity | PHY 302 Intro to Modern Physics |
| Angular rotation and momentum, centripetal forces, and vector analysis | PHY 230 Principles of Physics I |
| Quantum mechanics, space-time relationships, and special relativity | PHY 302 Intro to Modern Physics |
| Models of nuclear and subatomic structures and behavior | PHY 302 Intro to Modern Physics |
| Light behavior, including wave-particle duality and models | PHY 231 Principles of Physics II  PHY 302 Intro to Modern Physics |
| Electrical phenomena including electric fields, vector analysis, energy, potential, capacitance, and inductance | PHY 231 Principles of Physics II |
| Issues related to physics such as disposal of nuclear waste, light pollution, shielding communication systems and weapons development |  |
| Historical development and cosmological perspectives in physics including contributions of significant figures and underrepresented groups, and evolution of theories in physics | PHY 302 Intro to Modern Physics  PHY 230 Principles of Physics I  PHY 231 Principles of Physics II |
| How to design, conduct, and report research in physics | PHY 302 Intro to Modern Physics |
| Applications of physics and engineering in society, business, industry, and health fields. | PHY 230 Principles of Physics I  PHY 231 Principles of Physics II |

**Table C: Physics**

|  |  |
| --- | --- |
| **C. Supporting Competencies (numbers 23-40)** | **B: Required course number & name or advising requirements** |
| **Biology** |  |
| Organization of life | BIO 120 General Biology I  BIO 121 General Biology II  GEO 112 Earth History |
| Bioenergetics | BIO 120 General Biology I  BIO 121 General Biology II |
| Biomechanics | BIO 121 General Biology II |
| Cycles of matter | BIO 215 General Ecology  GEO 112 Earth History  SCI 450 Earth Science and Biology in Secondary Education |
| **Chemistry** |  |
| Organization of matter and energy | CHM 115 Principles of Chemistry I |
| Electrochemistry | CHM 116 Principles of Chemistry II  CHM 221 Survey of Analytical Chem |
| Thermodynamics | CHM 116 Principles of Chemistry II  CHM 221 Survey of Analytical Chem |
| Bonding | CHM 115 Principles of Chemistry I |
| **Earth sciences and/or astronomy** | |
| Structure of the universe | PHY 105 Descriptive Astronomy |
| Energy | GEO 111 Exploring the Earth |
| Interactions of matter | GEO 112 Earth History  GEO 211 Mineralogy  GEO 212 Petrology |
| **Mathematical and statistical concepts and skills** | |
| Statistics | PHY 230 Principles of Physics I  PHY 231 Principles of Physics II  PHY 302 Intro to Modern Physics |
| Use of differential equations | MTH 201 Calculus I  MTH 202 Calculus II  PHY 302 Intro to Modern Physics |
| Calculus | MTH 201 Calculus I  MTH 202 Calculus II  PHY 230 Principles of Physics I  PHY 231 Principles of Physics II  PHY 302 Intro to Modern Physics |