## Contextual Information

ATTACHMENT C
Names of Programs*

| Degree Level | Grades of License | Model of Program | Disciplines |
|---|---|---|---|
| ***Undergraduate*** | ***7-12*** | ***Single-field*** | ***Biology, B.S., Chemistry, B.A., Earth/Space (Geology major, B.S.)*** |
| ***Undergraduate*** | ***7-12*** | ***Dual-field*** | ***Physical Science (Chemistry-Physics major, B.S.)*** |
| ***Undergraduate*** | ***5-9*** | ***Single-field*** | ***General Science, B.A.*** |

### 1. Programs of Study

***(Please see Assessment #2 (Grade Point Average and Content Analysis Tables) for the charts that demonstrate that the science coursework below is aligned with the content standards recommended by the NSTA.)**

Common to all five areas (Biology, Chemistry, Earth/Space, General Science, and Physical Science) of certification

| Course number | Course Title | Credits |
|---|---|---|
| ESEC 100 | Introduction to Teaching | 3.0 |
| ESEC 150 | Development, Exceptionality, and Learning I | 3.0 |
| ESEC 250 | Development, Exceptionality, and Learning II | 3.0 |
| ESEC 282 | Literacy in Content Areas | 3.0 |
| ESEC 320 | Education Environments/Practices | 3.0 |
| ESEC 385 | Methods: Secondary | 3.0 |
| ESEC 386 | Methods: Field Experience | 3.0 |
| ESEC 387 | Creating Social Contexts for Learning | 3.0 |
| ESEC 450 | Seminar: Education Principles | 3.0 |
| ESEC 460 | Student Teaching | 12.0 |
| CHEM 111 | General Chemistry I[i] | 3.0 |
| CHEM 115 | General Chemistry I Laboratory | 1.0 |
| CHEM 112 | General Chemistry II[ii] | 3.0 |
| CHEM 116 | General Chemistry II Laboratory | 1.0 |
| GEOL 201 | Introductory Physical Geology | 4.0 |
| PHYS 210 | History of Science | 3.0 |
| | A Geography course (NH certification) | 3.0 |
| | A US History course (NH certification) | 3.0 |
| ENG 101 | Essay Writing | 4.0 |

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|---|---|---|
| | One literature course | 4.0 |
| | One course in Fine Arts (Art, Film Studies, Music, or Theatre and Dance) | 3.0 |
| | One course in American Studies, Art, Communication, English, Film Studies, History, Journalism, Modern Languages, Music, Philosophy, Theatre and Dance, or an approved interdisciplinary course | 3.0 |
| | Three or more Social Science courses )Anthropology, Economics, Geography, Political Science, Psychology, Sociology, or an approved interdisciplinary course) | 9.0 |

**Biology (B.S.) undergraduate**

| **Course number** | **Course Title** | **Credits** |
|---|---|---|
| BIO 151 | Life: Diversity | 3.0 |
| BIO 152 | Life: Diversity Lab | 1.0 |
| BIO 153 | Life: Processes | 3.0 |
| BIO 154 | Life: Processes Lab | 1.0 |
| BIO 251 | Genetics | 3.0 |
| BIO 252 | Ecology & Evolution | 3.0 |
| BIO 253 or<br>BIO 232/233 | Physiology of Plants and Animals or<br>Human Anatomy and Physiology II & Lab | 3.0 |
| BIO 254 | Cell Biology` | 3.0 |
| Two of the following:<br>BIO 255<br>BIO 256<br>BIO 257<br>BIO 280 | <br>Experimental Genetics<br>Experimental Ecology & Evolution<br>Experimental Physiology<br>Research Rotations | 4.0-6.0 |
| BIO 315 | General Microbiology | |
| BIO 401 | Biochemistry | 3.0 |
| BIO 403 | Experimental Biochemistry | 2.0 |
| BIO 495 | Biology Seminar | 3.0 |
| One of the following:<br>BIO 322<br>BIO 333<br>BIO 334<br>BIO 351<br>BIO 352<br>BIO 365<br>BIO 415 | <br>Flowering Plant Biology<br>Invertebrate Zoology<br>Vertebrate Zoology<br>Ornithology<br>Entomology<br>Plant Evolution<br>Microbial Diversity | 3.0 |
| One of the following course pairs:<br>BIO 451 and BIO 457<br>BIO 452 and BIO 457<br>BIO 454 and BIO 457 or BIO 458<br>BIO 455 and BIO 458 | <br>Population Ecology AND Research Methods: Ecology<br>Community and Ecosystem Ecology AND Research Methods: Ecology<br>Ecological Physiology AND Research Methods: Ecology OR Research Methods: Physiology<br>Comparative Animal Physiology AND Research Methods: Physiology | 5.0 |
| One of the following courses:<br>BIO 405<br>BIO 408<br>BIO 409 | <br>Molecular Biology<br>Developmental Biology<br>Neurobiology | 5.0 |
| CHEM 111 | General Chemistry I | 3.0 |

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|---|---|---|
| CHEM 115 | General Chemistry I Laboratory | 1.0 |
| CHEM 112 | General Chemistry II | 3.0 |
| CHEM 116 | General Chemistry II Laboratory | 1.0 |
| CHEM 221 | Organic Chemistry I | 3.0 |
| CHEM 225 | Organic Chemistry I Laboratory | 1.0 |
| CHEM 222 | Organic Chemistry II | 3.0 |
| CHEM 226 | Organic Chemistry II Lab | 1.0 |
| GEOL 201 | Introductory Physical Geology | 4.0 |
| PHYS 141 | College Physics I[iii] | 4.0 |
| PHYS 142 | College Physics II[iv] | 4.0 |
| MATH 151 | Calculus I | 4.0 |
| MATH 141 | Introductory Statistics | 3.0 |

**Chemistry (B.A.) undergraduate**

| Course number | Course Title | Credits |
|---|---|---|
| CHEM 111 | General Chemistry I | 3.0 |
| CHEM 115 | General Chemistry I Laboratory | 1.0 |
| CHEM 112 | General Chemistry II | 3.0 |
| CHEM 116 | General Chemistry II Laboratory | 1.0 |
| CHEM 221 | Organic Chemistry I | 3.0 |
| CHEM 225 | Organic Chemistry I Lab | 1.0 |
| CHEM 222 | Organic Chemistry II | 3.0 |
| CHEM 226 | Organic Chemistry II Lab | 1.0 |
| CHEM 251 | Quantitative Analysis | 3.0 |
| CHEM 255 | Quantitative Analysis Lab | 2.0 |
| CHEM 341 | Physical Chemistry I | 3.0 |
| CHEM 345 | Physical Chemistry I Lab | 2.0 |
| CHEM 342 | Physical Chemistry II | 3.0 |
| CHEM 346 | Physical Chemistry II Lab | 2.0 |
| CHEM 363 | Inorganic Chemistry | 3.0 |
| CHEM 365 | Inorganic Chemistry Lab | 1.0 |
| CHEM 401 | Biochemistry | 3.0 |
| CHEM 403 | Biochemistry Lab | 2.0 |
| CHEM | Chemistry Electives | 6.0 |
| BIO 153 | Life: Processes | 3.0 |
| BIO 154 | Life: Processes Lab | 1.0 |
| BIO 254 | Cell Biology (recommended) | 3.0 |
| GEOL 201 | Introductory Physical Geology | 4.0 |
| MATH 141 | Introductory Statistics | 3.0 |
| MATH 151 | Calculus I | 4.0 |
| MATH 152 | Calculus II | 4.0 |
| PHYS 141 | College Physics I | 4.0 |
| PHYS 142 | College Physics II | 4.0 |

**Earth and Space Science (Geology, B.S.) undergraduate**

| Course number | Course Title | Credits |
|---|---|---|
| BIO 151 | Life: Diversity | 3.0 |
| BIO 152 | Life: Diversity Lab | 1.0 |

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|---|---|---|
| CHEM 111 | General Chemistry I | 3.0 |
| CHEM 115 | General Chemistry I Laboratory | 1.0 |
| CHEM 112 | General Chemistry II | 3.0 |
| CHEM 116 | General Chemistry II Laboratory | 1.0 |
| GEOL 201 | Introductory Physical Geology | 4.0 |
| GEOL 202 | Historical Geology | 4.0 |
| GEOL 206 | Oceanography | 3.0 |
| GEOL 210 | The Hydrologic Cycle | 3.0 |
| GEOL 301 | Mineralogy | 4.0 |
| GEOL 302 | Petrology | 4.0 |
| GEOL 303 | Structural Geology | 3.0 |
| GEOL 305 | Paleontology | 3.0 |
| GEOL 306 | Stratigraphy | 3.0 |
| GEOL 315 | Environmental Geology | 4.0 |
| | Geology Electives | 5.0 |
| MET 225 | Meteorology | 3.0 |
| ASTR 307 | University Astronomy | 3.0 |
| PHYS 141 or 241 | College Physics I or University Physics I | 4.0 |
| PHYS 142 or 242 | College Physics II or University Physics II | 4.0 |
| MATH 141 | Introductory Statistics | 3.0 |
| MATH 152 | Calculus II | 4.0 |
| CPSC | Computer Science Elective | 3.0 |

**General Science (B.A.) undergraduate**

| **Course number** | **Course Title** | **Credits** |
|---|---|---|
| BIO 151 | Life: Diversity | 3.0 |
| BIO 152 | Life: Diversity Lab | 1.0 |
| BIO 153 | Life: Processes | 3.0 |
| BIO 154 | Life: Processes Lab | 1.0 |
| BIO 252 | Ecology and Evolution | 3.0 |
| CHEM 111 | General Chemistry I | 3.0 |
| CHEM 115 | General Chemistry I Laboratory | 1.0 |
| CHEM 112 | General Chemistry II | 3.0 |
| CHEM 116 | General Chemistry II Laboratory | 1.0 |
| ASTR 101 or 307 | Elementary Astronomy or University Astronomy | 3.0 |
| PHYS 201 | Phenomenal Science[v] | 3.0 |
| GEOL 201 | Introductory Physical Geology | 4.0 |
| GEOL 202 | Historical Geology | 4.0 |
| MET 225 | Meteorology | 3.0 |
| MATH 141 | Introductory Statistics | 3.0 |
| MATH 120 OR<br>130 OR<br>151 | Applied Algebra & Trigonometry OR<br>Precalculus OR<br>Calculus I | 3.0<br>3.0<br>4.0 |
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| **For NH certification students must specialize (9-12 credits) or minor (12-16 credits) in one of the following areas:<br>Biology, Chemistry, or Geology** | | |

**Physical Science (Chemistry-Physics, B.S.) undergraduate**

| Course number | Course Title | Credits |
|---|---|---|
| CHEM 111 | General Chemistry I | 3.0 |
| CHEM 115 | General Chemistry Lab | 1.0 |
| CHEM 112 | General Chemistry II | 3.0 |
| CHEM 116 | General Chemistry II Lab | 1.0 |
| CHEM 221 | Organic Chemistry I | 3.0 |
| CHEM 225 | Organic Chemistry I Lab | 1.0 |
| CHEM 222 | Organic Chemistry II | 3.0 |
| CHEM 226 | Organic Chemistry II Lab | 1.0 |
| CHEM 251 | Quantitative Analysis | 3.0 |
| CHEM 255 | Quantitative Analysis Lab | 2.0 |
| CHEM 401 | Biochemistry | 3.0 |
| CHEM 341 or 342 | Physical Chemistry I or Physical Chemistry II | 3.0 |
| CHEM 345 or 346 | Physical Chemistry I Lab or Physical Chemistry II Lab | 2.0 |
| CHEM 363 | Inorganic Chemistry | 3.0 |
| CHEM 365 | Inorganic Chemistry Lab | 2.0 |
| CHEM | Elective | 3.0 |
| PHYS 241 | University Physics I | 4.0 |
| PHYS 242 | University Physics II | 4.0 |
| PHYS 245 | University of Physics III | 3.0 |
| PHYS 260 | Electronics | 3.0 |
| ASTR 307 | University Astronomy | 3.0 |
| PHYS 342 | Modern Physics[vi] | 3.0 |
| PHYS | Physics elective | 3.0-4.0 |
| GEOL 201 | Introductory Physical Geology | 4.0 |
| BIO 153 | Life: Processes | 3.0 |
| BIO 154 | Life: Processes Lab | 1.0 |
| MATH 151 | Calculus I – derivatives, integrals, Fundamental Theorem of Calculus | 4.0 |
| MATH 152 | Calculus II – integrals, transcendental functions, integration, infinite series | 4.0 |
| MATH 251 | Calculus III – multivariable calculus | 4.0 |

[i] General Chemistry I & Lab – stoichiometry, atomic and molecular structure, periodicity, thermochemistry, chemical separations and synthesis, energetics, gases, radioactivity

[ii] General Chemistry II and Lab – bonding, atomic and molecular structure, solutions, chemical equilibria, kinetics, acid-base equilibria, qualitative and quantitative analysis

[iii] College Physics I – Newtonian mechanics, conceptual understanding and problem solving, forces, motion, dynamics (linear, 2-D, rotational), momentum, energy, conservation laws, fluids, vector notation

[iv] College Physics II – electricity, magnetism, vibrations and waves, light and sound, heat flow, thermodynamics, optics, atomic and nuclear physics

[v] Phenomenal Science – motion, forces, energy, fluids, sound, heat, light, electricity, magnetism, atomic and nuclear physics

[vi] Modern Physics – atomic and nuclear physics, quantum mechanics, molecular and solid state physics, relativity, current topics