

## Curriculum Guidelines for the Program in Science Education

This degree program leads to:

- Indiana Teacher Certification in one science field (biology, chemistry, physics or earth and space sciences)
- Bachelor of Arts or Sciences in Science Education with a double major in biology, chemistry or physics, or a concentration in Earth and Space Sciences

Revised 08/31/2011

### Foundational Studies

#### I. Composition

Freshman composition

- A. ENG 101 and 105 (ACT <20; SAT <510) or,
- B. ENG 107 or 108 (ACT 20 or higher; SAT 510 or higher) or,
- C. SAT Verbal score of 650 or above (or an ACT Verbal score of 33 or above) and completion of the University Honors curriculum (GH 101 and GH 201).

Junior composition

One upper-division course (recommended, ENG 305T, Technical Writing)

#### II. Communication

One course (select from COMM 101, COMM 202, COMM 215, or COMM 302)

#### IIIA. Quantitative Literacy

- A. One Quantitative Literacy course (select from ECON 101, FIN 108, or MATH 102) or,
- B. SAT Math score of 650 or above (or an ACT Math score of 33 or above) or,
- C. 23 out of 30 on the Quantitative Literacy Exemption.

#### IIIB. Mathematics

MATH131 (Also required for the Science Education Core)

#### IV. Non-Native Language

- A. Four courses in high school in a single or multiple non-native languages, including American Sign Language, with a grade of C or better or,
- B. Two courses at ISU in a single or multiple non-native languages, (select from 101 and 101, or 101 and 102) or,
- C. Two courses, from an accredited college or university, in a single or multiple non-native languages, including American Sign Language or,
- D. Completion of English as a Second Language (this is only for students who are non-native English speakers).

1. BANNER CODE 200 + ESL 103A and B, or ESL 103 B, and completion of ENG 105.

V. Health and Wellness

- A. One course with an activity component (select from Health 111 or PE 101/PE 101 L) or,
- B. Completion of U.S. armed military services basic training (reserves or enlisted).

VI. Social and Behavioral Sciences

EPSY 202 (also required as a Professional Education course)

VII. Literary Studies

One course (select from ENG 239, ENG 338, ENG 339, ENG 346, LAT 215 or PHIL 321).

VIII. Fine and Performing Arts

One course (select from ART 151, ARTE 390, COMM 240, COMM 436, ENG 219, MUS 150, MUS 233, MUS 236, MUS 333, THTR 150, or THTR 174).

IX. Historical Studies

One course (select from HIST 102, HIST 113, HIST 201, HIST 202, or MUS 351).

X. Global Perspectives and Cultural Diversity

EPSY 341 (also required as a Professional Education course)

XI. Ethics and Social Responsibility

One course (select from ECON 103, MUS 418 pending required change, PHIL 190, PHIL 201, or PHIL 303)

XII. Integrative and Upper Division Electives

One course (select from ECON 103, MUS 418 pending required change, PHIL 190, PHIL 201, or PHIL 303)

XIII. Integrative and Upper Division Electives

One upper-division, integrative elective (select one from AET 330, AFRI 312, AFRI 329, BUS 401, CRIM 355/ECON 355, ECON 302, ECON 331, ECON 353, ECON 355, ENG 335, ENG 484, ENG 486, ENG 487, ELEM 457, ENVI 310, ENVI 360/PHY 360, ENVI 361, ENVI 376, ENVI 419, ENVI 423, ENVI 460, HIST 320, HIST 336, HIST 345, HIST 350, LLL 350, MATH 492, MUS 329, MUS 350, NURS 486, PHIL 313, PHYS 360, PSY 350, PSY 485, SOC 302, SWK 400, SWK 494, TMGT 421, or WS 450)

AND completion of a second major, a minor, a certificate, or a degree in education where content courses are delivered outside the College of Education.

**Core Science Requirements (36-38 credits):**

BIO 101 Principles of Biology I 3 credits

BIO 101L Principles of Biology I Laboratory 1 credit

BIO 102 Principles of Biology II 3 credits

BIO 102L Principles of Biology II Laboratory 1 credit

CHEM 105 General Chemistry I 3 credits

CHEM 105L General Chemistry I Laboratory 1 credit

CHEM 106 General Chemistry II 3 credits

CHEM 106L General Chemistry II Laboratory 1 credit

ENVI 110 Introduction to Environmental Sciences 3 credits

ENVI 110L - Environmental Sciences: Human and Environmental Change Laboratory 1 credit

ENVI 170- Earth Science 3 credits

***Also Required for Biology Major and Earth Space Science Concentration:***

PHYS 105 General Physics I 3 credits

PHYS 105L General Physics I Laboratory 1 credit

PHYS 106 General Physics II 3 credits

PHYS 106L General Physics II Laboratory 1 credit

***Also Required for Chemistry and Physics Majors:***

PHYS 115 University Physics I 4 credits

PHYS 115L University Physics I Laboratory 1 credit

PHYS 116 University Physics II 4 credits

PHYS 116L University Physics II Laboratory 1 credit

MATH 132 Calculus II

**Science Education Courses (7 credits):**

SCED 396L The Teaching of Science in the Junior High/Middle School 3 credits

(Must be taken **concurrently** with CIMT 301/302 in the spring)

SCED 398L The Teaching of Science in High School 3 credits

(Must be taken **concurrently** with CIMT 400/400L in the fall)

SCED 402 Teaching an Integrated Unit in Science 1 credit

(Must be taken **concurrently** with CIMT 401: student teaching)

**Professional education courses taught in the College of Education (30 credits):**

SPED 226 - The Exceptional Learner in the Regular Classroom 3 credits

CIMT 200 – Teaching I 2 credits

CIMT 301 - Teaching IIA 2 credits

CIMT 302 - Teaching IIB 2 credits

(Must be taken **concurrently** with SCED 396L in the spring)

CIMT 400 - Teaching III 3 credits

CIMT 400L - Teaching III Practicum 1 credits

(Must be taken **concurrently** with SCED 398L in the fall)

CIMT 401 - Student Teaching 11 credit

(Must be taken **concurrently** with SCED 402)

**To complete the Science Education major, students must also complete the Biology, Chemistry or Physics Major, or complete the Earth Space Science Concentration.**

**Earth Space Science Concentration 39 credits**

ENVI 212 Geographic Information Systems 3 credits

ENVI 115 Earth from Space: Contemporary Remote Sensing 3 credits

ENVI 130 World Cultures and Environments 3 credits

ENVI 211 Physical Geography 3 credits

ENVI 270 Earth History 3 credits

ENVI 353 Weather and Climate 3 credits

ENVI 360 General Astronomy 3 credits

ENVI 361 Oceanography 3 credits

ENVI 452 Quaternary Environments 3

ENVI 460 Conservation and Sustainability of Natural Resources 3 credits  
ENVI 479 Global Biogeochemical Cycles 3 credits

*Approved Electives Choose 6 Credits*

ENVI 376 - Dinosaurs, Quakes, and Volcanoes 3 credits  
ENVI 450 - Environmental Modeling and Mapping  
ENVI 455 - Groundwater Hydrology  
ENVI 456 - Lakes and Wetlands  
ENVI 463 - Soil Genesis and Classification  
ENVI 465 - Fundamentals of Tree Ring Research  
ENVI 471 - Quaternary Paleoecology

**Biology Major** - 40 credits not taken in the Science Education core: See degree requirements listed in the Biology program section of the catalog.

[http://catalog.indstate.edu/preview\\_program.php?catoid=5&poid=722&returnto=97](http://catalog.indstate.edu/preview_program.php?catoid=5&poid=722&returnto=97)

**Biology Core (24 credits)**

CHEM 351 - Organic Chemistry I 3 credits AND  
CHEM 351L - Organic Chemistry Laboratory I 1 credit  
CHEM 352 - Organic Chemistry II 3 credits AND  
CHEM 352L - Organic Chemistry Laboratory II 1 credit  
BIO 380 - Genetics 3 credits AND (F, Prerequisite: BIO102, MATH111)  
BIO 380L - Genetics Laboratory 1 credit  
BIO 350 - Ecology and Evolution 3 credits AND (F, Prerequisite: BIO102)  
BIO 350L - Laboratory in Ecology and Evolution 1 credit  
BIO 330 - General Physiology 3 credits AND (S, Prerequisite: BIO102, CHEM 352& 352L, PHYS105&105L)  
BIO 330L - G. Physiology Laboratory 1 credit  
BIO 374 - Cellular and Microbial Biology 3 credits AND (S, Prerequisite: CHEM 352& 352L)  
BIO 374L - Cell. & Micro. Laboratory 1 credit

**Biology Electives** : A minimum of **16 credits** beyond the core curriculum selected from:

**Cell Biology:** BIO 405 - Cellular Development 3 hours. BIO 406 - Cell and Tissue Culture , + Lab. BIO 408 - General Immunology , + lab. BIO 418 - Cellular and Molecular Biology II.

**Ecology & Evolution**

BIO 450 - Advanced Ecology, BIO 451 - Field Study of Ecosystems (Summer only), BIO 454 - Animal Behavior, BIO 455 - Humans and the World Environment , BIO 458 - Wildlife Management , plus Lab, BIO 415 - Natural History: A Study of the Diversity of Life , BIO 480 – General Evolution, BIO 4XX – Conservation Biology

**Biology of Organisms:** BIO 424 - Vertebrate Zoology , with lab. BIO 425 - Herpetology, with lab.

BIO 426 - Ornithology , with lab. BIO 428 - Mammalogy , with lab. BIO 427 - Plant Taxonomy , with lab.

**Physiology:** BIO 431 - General Endocrinology , BIO 434 - Introduction to Neurobiology (IUSM-TH), BIO 476 - Microbial Physiology

**Botany.** BIO 437 - Plant Physiology , with lab. BIO 445 - Plant Anatomy. BIO 447 - Comparative Morphology of Vascular Plants. BIO 427 - Plant Taxonomy , with lab (Spring, alternate years), BIO 465 - Fundamentals of Tree-Ring Research (EES, Dr. Speer)

**Microbiology:** BIO 475 - Mechanisms of Microbial Disease , BIO 476 - Microbial Physiology.

**Clinical Lab Science, Nursing, Medicine:**

BIO 272 - Clinical Microscopy, BIO 272L - Laboratory. BIO 273 - Hematology, BIO 273L - Laboratory. BIO 371 - Applied Microbiology , BIO 371L - Laboratory. BIO 375 - Immunohematology + BIO 375L - Immunohematology Laboratory 1 hour. BIO 412 - Pathophysiology

**Genetics:** BIO 482 - Recombinant DNA , BIO 482L - Recombinant DNA Laboratory.

**Statistics:** BIO 485 - Introduction to Biometry

**Primary Research:** BIO 490 - Seminar in Life Sciences (Departmental Seminar, 1 hr/week)

**Other:** BIO 491 - Special Topics in Life Sciences 1-4 hours

“New” courses advertised by professors. Examples include: Sex, Brains and Hormones; Emerging Infectious Diseases; Molecular Ecology; many others.

**Student Research:**

**Research Capstone Sequence:**

BIO 497 - Current and Historical Issues in Science and Capstone Research Proposal Development 1 hour, BIO 498 - Capstone Research 1 hour, BIO 499 - Research Capstone Presentations 1 hour

BIO 492 - Special Problems in Life Sciences 1-3 hours Student Research Hours (other than capstone)

**Biochemistry:** CHEM 431 - Biochemistry I , CHEM 431L - Biochemistry Laboratory

**Chemistry Major** (*Pre-Professional concentration*)\* – minimum of 39 credits not taken in Science Education Core: See degree requirements listed in the Chemistry program section of the catalog.

[http://catalog.indstate.edu/preview\\_program.php?catoid=13&poid=1796&returnto=289](http://catalog.indstate.edu/preview_program.php?catoid=13&poid=1796&returnto=289)

[http://www.indstate.edu/chem\\_phys/Preprof\\_concentration.pdf](http://www.indstate.edu/chem_phys/Preprof_concentration.pdf) (*Pre-Professional concentration*)

Math 132 (Calculus II; 4 credits; F, S, and Sum)

Chem 351 (Organic Chem I; 3 credits; F and Sum)

Chem 351L (Organic Chem I Lab; 1 credit; F and Sum)

Chem 352 (Organic Chem II; 3 credits; S and Sum)

Chem 352L (Organic Chem II Lab; 1 credit; S and Sum)

Chem 321 (Analytical Chem; 4 credits; S)

Chem 321L (Analytical Chem Lab; 0 credit; S)  
Chem 461 (Physical Chem I; 4 credits; F)  
Chem 461L (Physical Chem I Lab; 1 credit; F)  
Chem 341 (Inorganic Chemistry; 3 credits; S)  
Chem 431 (Biochemistry I, 3 credits; F)  
Chem 431L (Biochemistry I Lab; 1 credit; F)  
Chem 432 (Biochemistry II; 3 credits; S)  
Chem 400 (Senior Seminar; 1 credit; S)

**Advanced Electives** (7 credits required): Choose approved advanced courses in chemistry or related areas (e.g., mathematics, physics, or biology); consult the Catalog or DARS for specific approved courses. A maximum of 4 credits of Chem 495 (Internship in Chemistry) or 499 (Introduction to Research) may be counted. Chem 330 and 399 cannot be used as advanced electives.

*\*We recommend the **Pre-Professional concentration** for Science Education. Other possible concentrations are offered in the chemistry program. Please see your chemistry advisor for further information.*

**Physics Major** (Chemical Physics concentration)\*- minimum of 40 credits not taken in Science Education  
Core: See degree requirements listed in the Physics program section of the catalog.

[http://catalog.indstate.edu/preview\\_program.php?catoid=13&poid=1920&returnto=289](http://catalog.indstate.edu/preview_program.php?catoid=13&poid=1920&returnto=289)

[http://www.indstate.edu/chem\\_phys/Chemical%20Physics%20Concentration%20Curriculum%20Guide.pdf](http://www.indstate.edu/chem_phys/Chemical%20Physics%20Concentration%20Curriculum%20Guide.pdf) (Chemical physics concentration)

Math 132 (Calculus II; 4 credits; F, S, and Sum)  
PHYS 215 - Modern Physics I 3 credits  
PHYS 215L - Modern Physics I Laboratory 1 credits  
PHYS 216 - Modern Physics II 3 credits  
PHYS 216L - Modern Physics II Laboratory 1 credits  
PHYS 310 - Analytical Mechanics 3 credits  
PHYS 321 - Mathematical Methods for Physics I 2 credits  
PHYS 322 - Mathematical Methods for Physics II 2 credits  
PHYS 341 - Electricity and Magnetism 3 credits  
PHYS 315 - Advanced Laboratory I 1 credits  
PHYS 497 - Quantum Mechanics 3 credits  
CHEM 321 - Analytical Chemistry 4 credits  
CHEM 461 - Physical Chemistry I 4 credits  
CHEM 461L - Experimental Physical Chemistry I 1 credits  
CHEM 462 - Physical Chemistry II 4 credits  
CHEM 462L - Experimental Physical Chemistry II 1 credits

*\* We recommend the **Chemical Physics concentration** for Science Education. Other possible concentrations are offered in the Physics program. Please see your chemistry advisor for further information.*