

# INTEGRATED SCIENCE

The Bachelor of Science in Integrated Science is a degree designed for students seeking to teach science in high schools. The sixty credit hour degree meets the State of Michigan's requirements for 12 credit hours each in Biology, Chemistry, Earth Science and Physics. An additional 12 credit hours in any one of these areas provides the required minor in science. Students successful completing this program and passing the Michigan Test for Teacher Certification in Integrated Science (secondary) will meet the standards for the 'highly qualified' designation. **This degree is only for those students who are also seeking a certificate in secondary education from the College of Education, Health, and Human Services.**

It is also a degree intended for students who wish to teach in smaller school districts. Students seeking employment in large districts should consider majoring in Biology, Chemistry, Earth Science or Physics and minoring in another of these 4 areas.

The degree requires that certain courses in each of the four areas be taken. The remaining hours will consist of electives from the list of courses below. Other courses may be possible. Students should consult with their advisor about course selection. In addition to regularly offered courses in Natural Sciences, students must also elect at least one of the NSCI 331, NSCI 332 or NSCI 333 courses. These latter courses will also count towards the 12 hrs for the minor.

Students will need to consult with advisors in the College of Education, Health, and Human Services in order to meet the certification requirements (<https://umdearborn.edu/cehhs/undergraduate-programs/areas-study/undergraduate-degree-programs/secondary-grades-6-12-certification/>) for teaching in secondary schools.

In addition to the major requirements, students must complete all CASL Degree Requirements (<http://catalog.umd.umich.edu/undergraduate/college-arts-sciences-letters/>).

## Major Requirements

Code	Title	Credit Hours
<b>Integrated Science Core</b>		
Biology:		
BIOL 130	Intro Org and Environ Biology	4
BIOL 140	Intro Molec & Cellular Biology	4
Select one or more courses from the list below to complete 12 hours: 4		
BIOL 301	Cell Biology	
BIOL/ESCI 304	Ecology	
BIOL 306	General Genetics	
BIOL/ESCI 320	Field Biology	
BIOL 324	Invertebrate Zoology	
BIOL 333	Plant Biology	
BIOL/MICR 385	Microbiology	
BIOL 419	Behavior and Evolution	
NSCI 333	Inquiry: PBL in Life Science <sup>1</sup>	
Chemistry:		
CHEM 134	General Chemistry IA	4
CHEM 136	General Chemistry IIA	4
CHEM 225	Organic Chemistry I	3
Select one or more courses from the list below to complete 12 hours: 2-4		

CHEM 226	Organic Chemistry II	
CHEM 227	Organic Chemistry Laboratory	
CHEM 303	Inorganic Chemistry I	
CHEM 344	Quantitative Analysis	
NSCI 331	Phy. Sci. & Everyday Thinking <sup>1,2</sup>	
Earth Science:		
GEOL 118	Physical Geology	4
GEOG/ENST 203	Weather and Climate	3
ASTR 130	Introduction to Astronomy	3
ASTR 131	Introductory Astronomy Lab	1
Select one or more courses from the list below to complete 12 hours: 1		
GEOG/ENST 310/STS 309	Economic Geography	
GEOL 218	Historical Geology	
GEOL/ESCI/ GEOG 305	Intro to GIS	
GEOL/ENST 340	Remote Sensing	
GEOL 342	Physical Oceanography	
GEOL/ESCI 370	Environmental Hazards	
GEOL/ESCI 372	Energy and the Environment	
GEOL 377	Environmental Field Methods	
NSCI 332	Inquiry: Mich Earth Science <sup>1</sup>	
Physics:		
PHYS 125	Introductory Physics I	4
or PHYS 150	General Physics I	
PHYS 126	Introductory Physics II	4
or PHYS 151	General Physics II	
Select one or more courses from the list below to complete 12 hours: 3-4		
PHYS 305	Contemporary Physics	
PHYS 360	Instrumentation for Scientists	
PHYS 401	Mechanics	
PHYS 403	Electricity and Magnetism	
PHYS 405	Optics	
PHYS 406	Thermal and Statistical Physic	
NSCI 331	Phy. Sci. & Everyday Thinking <sup>1,2</sup>	
<b>Concentration in one of the Four Areas Above: Biology; Chemistry; Earth Science; Physics. <sup>4</sup></b>		
Students will select 12 additional upper level credit hours in one of the four areas listed above. <sup>3</sup>		12
<b>Total Credit Hours</b>		<b>60-63</b>

### Notes:

- Up to three credit hours of independent study in one of the four areas listed above may be applied towards the minor.
- Students may graduate from the College of Arts, Sciences, and Letters with a Bachelor of Science in Integrated Science only if also being awarded secondary certification, as recommended by the College of Education, Health, and Human Services. Student who declare Integrated Science but do not subsequently qualify for secondary certification, or otherwise choose not to pursue secondary certification, must choose another major.

<sup>1</sup> At least one course from NSCI 331, NSCI 332, or NSCI 333 must be elected.

<sup>2</sup> The credits for NSCI 331 can be attributed to both Chemistry and Physics.

<sup>3</sup> Any upper division courses accepted for credit towards a degree in the area will meet this requirement.

<sup>4</sup> Students choosing Biology must include at least one course from each of the following categories: Cellular and Molecular (CACM); Organismal (CAOB); Population and Environmental (CAPE). See Degree Works for list of courses.

**CELL & MOLECULAR BIOLOGY FROM (course attribute CACM):** BIOL 301, 306, 307, 370, 381, 385, 405, 406, 440, 450, 455, 459, 470, 471, 472, 473, 474, 485

**ORGANISMAL BIOLOGY FROM (course attribute CAOB):**  
BIOL 303, 310, 311, 324, 333, 335, 350, 352, 353, 357, 412, 424, 456

**POPULATION & ENVIRONMENTAL BIOLOGY FROM (course attribute CAPE):** BIOL 304, 315, 320, 337, 360, 361, 405, 414, 419, 420

## Learning Goals

1. Students will learn science content and scientific thinking in Biology, Chemistry, Earth/Space Science and Physics that will enable them to teach secondary science students in grades 8-12. Mastery of science content will be measured by passage of the secondary Integrated Science Test of the Michigan Test for Teacher Certification (MTTC).  
NSCI 331, 332, 333
2. Students will demonstrate an understanding of the various aspects of scientific thinking and practice such as: abstract reasoning, critical thinking, analyzing data, and the ability to draw evidence-based conclusions. NSCI 331,332, 333
3. Students will be able to demonstrate an ability to consider how their science content knowledge will be conveyed to future 8-12 students. This goal will be assessed by examining their reflective statements submitted as a required assignment in NSCI 331, 332 or 333. Integrated Science students are required to take one of these three courses- NSCI 331,332,333