

Fiscal Unit/Academic Org	Introductory Biology - D0326
Administering College/Academic Group	Biological Sciences
Co-administering College/Academic Group	Arts And Sciences
Semester Conversion Designation	Re-envisioned with significant changes to program goals and/or curricular requirements (e.g., degree/major name changes, changes in program goals, changes in core requirements, structural changes to tracks/options/courses)
Current Program/Plan Name	Biology
Proposed Program/Plan Name	Biology
Program/Plan Code Abbreviation	BIOLOGY-BA
Current Degree Title	Bachelor of Arts

### Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program		45	30.0	32	2.0
Required credit hours offered by the unit	Minimum	10	6.7	4	2.7
	Maximum	10	6.7	4	2.7
Required credit hours offered outside of the unit	Minimum	35	23.3	28	4.7
	Maximum	35	23.3	28	4.7
Required prerequisite credit hours not included above	Minimum	62	41.3	32	9.3
	Maximum	64	42.7	32	10.7

Explain any change in credit hours if the difference is more than 4 semester credit hours between the values listed in columns B and C for any row in the above table

Biology majors are expected to acquire a breadth of experience in different areas of the life sciences (partly through the Integrated Biology core course and partly through their selection of elective courses), as well as depth in one particular area (through the specialization). In reviewing student course selections under the current Biology BS, it is clear that students who have exceeded the current 45 credit minimum often add experiences and breadth that are not evident in students who just reach the 45 hour minimum. To encourage this broader experience, we have added two more semester units to the minimum hours required for the major. The additional coursework would come exclusively from departments outside the Center for Life Sciences Education, where the biology major is housed.

### Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

**Program Learning Goals**

- Goal #1: Explain major biological concepts and discuss how these are connected with various areas of the biological and physical sciences.
  - 1.1 Describe the hierarchical relationship between structure and function at all levels: molecular, cellular, and organismic.
  - 1.2 Diagram, explain, and contrast the major cellular processes in Archaea, bacteria, and eukaryotes.
  - 1.3 Differentiate types of biological macromolecules and compare their contributions to cellular structure and function.
  - 1.4 Apply the principles of genetics and describe the flow of genetic information.
  - 1.5 Explain changes in organisms through time by applying the principles of evolutionary biology.
  - 1.6 Demonstrate how relationships among living things are understood through taxonomy and phylogenetic analysis.
  - 1.7 Describe ecological relationships between organisms and their environment.
- Goal #2: Demonstrate problem solving, analytical, and communication skills that will provide the foundation for lifelong learning and career development.
  - 2.1 Apply the scientific process, including designing and conducting experiments and testing hypotheses.
  - 2.2 Use laboratory equipment, employ safe laboratory practices, and adapt tools such as laboratory notebooks and spreadsheets to organize and analyze data associated with scientific processes.
  - 2.3 Retrieve information from the life sciences literature; read, understand, and critically review scientific papers.
  - 2.4 Prepare oral and written reports following a recognized scientific format.
  - 2.5 Develop an awareness of the careers and professions that rely on knowledge of biological sciences.
- Goal #3: Value biology as an integral part of society and everyday life.
  - 3.1 Integrate biological knowledge in discussions of society and everyday life

**Assessment**

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

**Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes**

**Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? Yes**

**Summarize how the program's current quarter-based assessment practices will be modified, if necessary, to fit the semester calendar.**

No modification will be necessary.

**Program Specializations/Sub-Plans**

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

<b>Program Specialization/Sub-Plan Name</b>	Pre-health Professions (Existing)
<b>Program Specialization/Sub-Plan Goals</b>	<ul style="list-style-type: none"> <li>• This specialization provides a broad preparation in the biological sciences and ensures that graduates are prepared to enter doctoral programs at most professional school.</li> </ul>
<b>Program Specialization/Sub-Plan Name</b>	Forensic Biology (Existing)
<b>Program Specialization/Sub-Plan Goals</b>	<ul style="list-style-type: none"> <li>• This specialization provides a diverse preparation in biological sciences with special attention to genetics, molecular biology, and human biology.</li> </ul>
<b>Program Specialization/Sub-Plan Name</b>	Life Sciences Education (Existing)

**Program Specialization/Sub-Plan Goals**

- This specialization provides a broad exposure to biological sciences and coincides with the recommended coursework for students entering Ohio State's Masters in Education Program in science and technology.

**Pre-Major**

Does this Program have a Pre-Major? No

**Attachments**

- semester conversion directors letter.pages.pdf: Cover Letter  
*(Letter from Program-offering Unit. Owner: Stetson,David Leete)*
- ProgRationale\_TransitionPol\_BiologyBA.pdf: Includes transition  
*(Program Rationale Statement. Owner: Stetson,David Leete)*
- 11BiologyReq\_Old&New.pdf  
*(List of Semester Courses. Owner: Stetson,David Leete)*
- BioBABingo\_Sem.pdf  
*(Semester Advising Sheet(s). Owner: Stetson,David Leete)*
- BioBSBABingo\_Quart.pdf  
*(Quarter Advising Sheet(s). Owner: Stetson,David Leete)*
- 15BiologyBA curriculum map.pdf  
*(Curricular Map(s). Owner: Stetson,David Leete)*

**Comments**

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Stetson,David Leete	04/25/2011 04:47 PM	Submitted for Approval
Pending Approval	Stetson,David Leete Misicka,Matthew Alan	04/25/2011 04:47 PM	Unit Approval



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April 25, 2011

Assoc. Dean Dave Andereck  
Natural and Mathematical Sciences

Dear Dean Andereck:

The Center for Life Sciences Education (CLSE) is pleased to present materials supporting our plans for converting our undergraduate degree programs from quarters to semesters.

The CLSE offers two degree programs:

BS in Biology

BA in Biology

In addition, we are proposing a new undergraduate minor in biology.

The biology major (BS and BA) were reviewed in 2007. The 2007 review sought student feedback and involved faculty input from the Columbus and regional campuses. This semester conversion proposal is based on that review, with the additional changes noted in the program rationale. The changes we propose and the addition of the new biology minor are in response to:

- Student feedback obtained in the course of outcomes assessment
- Advisor feedback solicited during regular meetings as well as one meeting called just to discuss the biology major
- Biology 401 and 402 faculty feedback
- Recent reports that have proposed major changes in the way we structure courses and curricula in biology

As you know, Dr. Stetson and I are the only tenure-track faculty associated with the CLSE, with our tenure residing in Biochemistry and EEOB, respectively. As such, we do not have a faculty to whom we can turn for a vote on the proposed conversion. We are submitting the attached plans to the faculty members who reviewed and proposed revisions to the biology in 2007.

CB will insert outcome of that review – here

I recommend approval of the attached semester conversion plans.

Regards,

Caroline Breitenberger  
Director, Center for Life Sciences Education

Dave Stetson  
Associate Director, CLSE

### **Program Rationale (Biology BA).**

The biology major was last reviewed and extensively revised in 2007. The key features of the revised biology major, an Integrated Biology core course followed by discrete specialization areas and student-selected electives, have been retained in the major as we transition to semesters. The changes in the re-envisioned BA program under semesters include reductions in math, organic chemistry, and physics prerequisites, a reduction in the length of the Integrated Biology course, and a small increase in the total number of hours required for the major.

Reduction in prerequisites for the BA. At the time of the last review of the biology major, the existing distinction between the BS and the BA was reaffirmed, namely one less Math prerequisite (Math 152 is not required in the current BA). Perhaps due to the relatively small difference in requirements between the BA and the BS, very few biology majors graduate with a BA. We would like to encourage more students to consider a BA in Biology, and it is likely that reducing the gauntlet of science and math prerequisites in the major will adequately prepare students for science-related careers without adversely affecting their progress through the major requirements. To this end, we have further reduced the math prerequisites for the major (Math 1150 will now be the minimum for the Biology BA). This level of math is sufficient to meet the Biology 3401 prerequisites and the requirements for many courses in the specialization areas. The organic chemistry lecture requirement has been reduced to the one-semester offering (Chem 2310), and we have eliminated the requirement for laboratories in organic chemistry. Finally, we have eliminated the requirement for a second semester of physics (thermodynamics are covered in the first semester of physics, and this will provide sufficient physics for students who do not plan to pursue significant further training in the health professions or in a graduate program in the sciences. This preparation would be suitable for careers in law, business, education, science journalism, scientific illustration, fields affiliated with health care, etc. Students will be advised that appropriate preparation for biological research careers and professional health degrees requires the BS-level math, organic chemistry, and physics prerequisites.

Reduction in length of Integrated Biology course. The Integrated Biology core courses in the biology major have been offered as a 2-course sequence (Biology 401 and 402) ever since the revised major was approved. Student assessment data indicate that students in this sequence feel that two courses are too much – they think they “get it” after the first course in the series. Faculty input and some assessment data suggest that a single quarter course is not enough, that students are just beginning to understand the interconnectedness between mathematics, chemistry, physics, and the overarching concepts in biology that are the focus of this sequence. A one-semester course might provide the happy middle. We will continue to monitor student attitudes and student learning outcomes to track the success of this slight reduction in the Integrated Biology core of the biology major.

The apparent reduction of credit hours is necessary because of the difference in credit hour definitions under quarters and semesters. In actuality, the semester course, Biology 3401 will be equivalent to Biology 401 plus half of Biology 402. Under quarters, Biology 401 and 402 were offered as two 5 credit courses because of the extensive out-of-class work that is required. Given the hours spent in class, the semester course meets the definition of a 4-unit course, and will be offered as such

Increase in number of hours required for the major. Biology majors are expected to acquire a breadth of experience in different areas of the life sciences (partly through the Integrated Biology core course and partly through their selection of elective courses), as well as depth in one particular area (through the specialization). In reviewing student course selections under the current Biology BS, it is clear that students who have exceeded the current 45 credit minimum often add experiences and breadth that are

not evident in students who just reach the 45 hour minimum. To encourage this broader experience, we have added two more semester units to the minimum hours required for the major. The additional coursework would come exclusively from departments outside the Center for Life Sciences Education, where the biology major is housed.

#### **Rationale for change in credit hours (Biology BA).**

The number of credit hours offered outside the unit and required for the biology major increased by 4.7 units. The 4.7 increase is the sum of the reduction of credit hours (2.7 units) in the Integrated Biology core courses and the increase in units required for the degree (an increase of 2 units compared with the calculations based on the quarter program). The reduction in courses offered by the unit has to be offset by an increase in courses taken outside the unit.

The number of credit hours in prerequisite courses (offered outside the unit) for the Biology BA decreased by 9.3-10.7 units. This decrease was due to elimination of the organic chemistry laboratories from the prerequisites, switching from 2 quarters of organic chemistry to the one-semester organic chemistry course, eliminating one semester of physics, and a reduction in the math prerequisite, all of which are appropriate changes for students interested in a BA degree in Biology.

#### **Transition policy for the Biology BA semester conversion.**

As indicated in the letter from the Director of the Center for Life Sciences Education, steps will be taken to ensure that the transition to semesters does not disrupt the academic progress of students who began their undergraduate studies under quarters. Special consideration will be given to appropriate and timely advising to ensure that Biology students can work with their advisor to develop efficient transition plans. In addition, the CLSE is developing a web site for biology major advising which will address semester conversion issues, notify students when bridge courses are offered, and address the most frequent "what course should I take next?" questions. For the most part, the reduction in major prerequisites will not affect the BA students' preparation for and ability to take the same specialization and elective courses as BS students. Special attention will be given to alerting students to course prerequisites that might preclude BA students from taking certain biology major courses.

Potential transition issues. The obvious concerns that need to be addressed in the transition from quarter to semesters are:

- Prerequisite course sequences that span the quarter-to-semester transition
- Changes in prerequisites (for BA students specifically: discontinuing the organic chemistry lab requirement, changing from two quarters to a one-term organic chemistry lecture, and lowering the math prerequisite)
- Reduction in the Biology major core from a 2-course sequence to a single semester course
- An increase in total hours required for the degree (32 semester hours instead of 45 quarter hours)
- A need for increased access to advising resources by students as they develop individualized transition plans

There are likely to be relatively few transition issues related to the specialization areas, since many of the specializations rely on single courses that are being directly converted to semester versions. For any transition concerns that do arise in the specializations, we will depend on units outside CLSE to develop appropriate transition solutions, including bridge courses. The flexibility of the biology major allows for

appropriate substitutions even under normal circumstances; biology advisors will continue to evaluate student plans individually and identify and recommend appropriate substitutions when deemed necessary to ensure a student's progress to degree.

Prerequisite course sequences. Chemistry and Physics 3-quarter sequences are transitioning to 2-semester sequences. We will rely on those departments to establish transition plans and offer appropriate bridge courses to those students who might be affected.

Changes in prerequisites. Effective Au2012, we will allow students planning a BA in Biology to opt out of the current organic laboratory requirement and the Math 151 requirement. BA students who have taken the first quarter of organic chemistry, Chem 251, will be encouraged to complete the second term before the start of semesters, otherwise they will be expected to complete the equivalent of at least Chem 252, following the bridge program established by the Chemistry Department. BA students who have taken the first quarter of organic chemistry, Chem 251, and who wish to switch to the one-semester organic chemistry course will be granted permission to do so if Chemistry approves.

Reduction in biology core. For students who have taken Biology 401 but not 402 under quarters, a 1-unit bridge course is being developed that will be required of those students and provide an experience comparable to the one-semester Biology 3401.

Hours required for the degree. We will evaluate the hours in the major on a case-by-case basis. For a student who started under quarters and has the equivalent of at least 30 semester units in the Biology major when he/she applies for graduation, advisors may use their discretion in deciding whether the student needs to reach the full 32 semester units. The 32 unit minimum will be enforced for students who start the Biology major under semesters.

Biology major advising. Currently there are about 2000 students majoring in Biology, nearly a third of whom are Honors students. Biology majors are advised in the CLSE by 1 full-time staff advisor, one staff advisor who also coordinates the Biological Sciences Scholars program, and 4 faculty advisors, most of whom focus on Honors student advising. A new staff advisor has been requested to help with the increased advising demand during the transition to semesters.

## Biology Major

	Courses required under quarters	Hours	Courses required under semesters	Units
<b>Required supportive courses (do not count towards hours in the major)</b>				
<b>Bachelor of Science</b>				
Introductory Biology	Biology 113 & 114, or 115H & 116H	10	Biology 1113 & 1114	8
Mathematics	Math 151 & 152 or 161	10	Math 1156 or 1161.01	5
Math/Stat for Biological Sciences	<i>not previously required</i>		Math 1157 or Stat 2480	5
General Chemistry	Chem 121, 122, & 123	15	Chem 1210 & 1220	10
Organic Chemistry	Chem 251 & 252	8	Chem 2510 & 2520	8
Organic Chemistry Lab	Chem 245 & 246, or 254 & 255	4 or 6	Chem 2540 & 2550	4
Physics	Physics 111-113, or 131-133	15	Physics 1200 & 1201, or 1250 & 1251	10
<b>Total Prereqs for BS:</b>		<b>62 - 64</b>		<b>50</b>
<b>Bachelor of Arts</b>				
Introductory Biology	Biology 113 & 114, or 115H & 116H	10	Bio 1113 & 1114	8
Mathematics	Math 150 & 151	10	Math 1150	5
General Chemistry	Chem 121-123	15	Chem 1210 & 1220	10
Organic Chemistry	Chem 251 & 252	8	Chem 2310	4
Organic Chemistry Lab	Chem 245 & 246, or 254 & 255	4 or 6	<i>will no longer be required</i>	0
Physics	Physics 112-113	15	Physics 1200 or 1250	5
<b>Total Prereqs for BA:</b>		<b>62 - 64</b>		<b>32</b>
<b>Courses in the major</b>				
<b>Core Course</b>				
Integrated Biology	Biology 401 and 402	10	Biology 3401	4
<b>Specializations</b>				
<b>Education in Life Sciences</b>				
<b>Required Courses</b>				
Biochemistry	Biochem 511 or 613 & 614	5 or 8	Biochem 4511 or 5613 & 5614	4 or 6
General Genetics	MolGen 500 or 605, 606	5 or 6	MolGen 4500 or 5606	3 or 4
Evolution	EEOB 400	5	EEOB 3310	4
Microbiology	Micro 509 or 520 & 521	5 or 10	Micro 4090 or 4100	4 or 5
Plant Biology	PCMB 300	5	MolGen 3300	3
<b>Additional Coursework (any 2)</b>				
General Entomology	Entomol 500	5	Entomology 3000	3
Introduction to Ornithology	EEOB 322	5	EEOB 2220	2
Diversity and Systematics	EEOB 405.01	5	EEOB 3320	3
Ichthyology	EEOB 621	5	EEOB 5430 or 5930	1.5 or 3
Vertebrate Biology	Not listed	0	EEOB 4210	2 or 4
Mammalogy	EEOB 625	5	EEOB 4220	2 or 4
Invertebrates	Not offered	0	EEOB 4230	1 or 2
DNA Fingerprinting Workshop in CPS	MolGen 591	2	MolGen 4591S	1
<b>Forensic Biology</b>				
<b>Recommended Additional Prerequisite</b>				
Intro Physical Anthropology	Anthro 200	5	Anthro 2200	4
<b>Required Courses</b>				
Biochemistry	Biochem 511 or 613 & 614	5 or 8	Biochem 4511 or 5613 & 5614	4 or 6
Genetics	MolGen 500 or 605 & 606	5 or 6	MolGen 4500 or 5606	3 or 4
<b>Additional Coursework (any 3)</b>				
	Anthropology 603.01	5	Anthropology 5607	3
Biological Anthropology of the Human Skeleton	Anthropology 603.02	5	Anthropology 5608	3
	Anthropology 603.03	5	Anthropology 5609	3
	Anthropology 603.04	5	Anthropology 5610	3
Forensic Anthropology	Anthropology 640.04	5	Anthropology 5644	3
Biochemistry	Biochem 615	4	Biochem 5615	3
Molecular Lab	MolGen 601	5	MolGen 5601	4
Cellular Biology	MolGen 607	3	MolGen 5607	3
Molecular Biology	MolGen 701	3	MolGen 6701	4
Microbiology	Micro 509 or 520 & 521	5 or 10	Micro 4090 or 4100	4 or 5
DNA Fingerprinting	MolGen 591	2	MolGen 4591S	1
<b>Pre-Health Professions</b>				
<b>Recommended Additional Prerequisite</b>				
Organic Chemistry	Chem 253	4		0
<b>Required Course(s)</b>				
Genetics	MolGen 500 or 605 & 606	5 or 6	MolGen 4500 or 5606	3 or 4
<b>Additional Coursework (any 4)</b>				
Biochemistry	Biochem 511 or 613 & 614	5 or 8	Biochem 4511 or 5613 & 5614	4 or 6
Evolution	EEOB 400	5	EEOB 3310	4
Microbiology	Micro 509 or 520 & 521	5 or 10	Micro 4090 or 4100	4 or 5
Cellular Biology	EEOB 415	4	EEOB 3510 or MolGen 5607	3
Vertebrate Histology	EEOB 630	5	EEOB 3520	1.5
Human Anatomy	Anat 200	6	Anat 2199 or 200, or EEOB 2510	3
Comparative Anatomy	EEOB 512	2	EEOB 4510	3
Physiology	PhysioCB 311 & 312 or 601 & 602 or EEOB 410	10	PhysioCB 311 & 312, or 601 & 602, or EEOB 2520, or 4520	3
<b>Elective Courses</b>				
Core, specialization, and elective courses must total 45 credit hours, and must include three laboratory courses. At least 35 of the 45 hours must be courses in Biochemistry, Biology, EEOB, Microbiology, or Molecular Genetics			Core, specialization, and elective courses must total 32 semester units, and must include three laboratory courses. At least 25 of the 32 semester units must be courses in Biochemistry, Biology, EEOB, Microbiology, or Molecular Genetics	
<b>Minimum total hours/units in major</b>		<b>45</b>	<b>32</b>	
Honors versions of courses may be substituted in all cases; no more than 5 hours of S/U credit can count toward the major			Honors versions of courses may be substituted in all cases; no more than 3 units of S/U credit can count toward the major	



Biology Major Program  
Bachelor of Arts  
Pre-Health Professions

Name \_\_\_\_\_  
Semester of Graduation \_\_\_\_\_

**Required Supporting Courses**

Biology (2 courses)

Biology 1113

Biology 1114

Substitution

Waived

Chemistry (2 courses)

Chemistry 1210 or 1610 or 1910H

Chemistry 1220 or 1620 or 1920H

Substitution

Waived

Mathematics (1 course)

Math 1150

Substitution

Waived

Organic Chemistry (1 course)

Chemistry 2310

Substitution

Waived

Physics (1 course)

Physics 1200 or 1250

Substitution

Waived

**Core Course**

Biology 3401

**Pre-Health Professions Specialization**

Required

MolGen 4500 or 5606

Additional Coursework (any 4)

Biochem 4511, or 5613 and 5614

EEOB 3310

Micro 4090 or 4100

EEOB 3510 or MolGen 5607

EEOB 3520

Anatomy 2199 or 200, or EEOB 2510

EEOB 4510

PhysioCB 311 and 312, or 601 and 602, or EEOB 2520 or 4520

**Electives**

\_\_\_\_\_

\_\_\_\_\_

Core, specialization, and elective courses must total 32 semester units, and must include three laboratory courses. Honors versions of courses substitute freely. \*Note: At least 25 of the 32 semester units must be courses in Biochemistry, Biology, EEOB, Microbiology, or Molecular Genetics, and all courses in the major must be approved by a Biology advisor.

Advisor (Printed)

Advisor (Signature)

Date

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Biology Major Program  
Bachelor of Arts  
Forensic Biology

Name \_\_\_\_\_

Semester of Graduation \_\_\_\_\_

**Required Supporting Courses**

Biology (2 courses)

Biology 1113

Biology 1114

Substitution \_\_\_\_\_

Waived \_\_\_\_\_

Chemistry (2 courses)

Chemistry 1210 or 1610 or 1910H

Chemistry 1220 or 1620 or 1920H

Substitution \_\_\_\_\_

Waived \_\_\_\_\_

Mathematics (1 course)

Math 1150

Substitution \_\_\_\_\_

Waived \_\_\_\_\_

Organic Chemistry (1 course)

Chemistry 2310

Substitution \_\_\_\_\_

Waived \_\_\_\_\_

Physics (1 course)

Physics 1200 or 1250

Substitution \_\_\_\_\_

Waived \_\_\_\_\_

Additional Prerequisite (1 course)

Anthropology 2200

**Core Course**

Biology 3401

**Forensic Biology Specialization**

Required

MolGen 4500 or 5606

Biochem 4511, or 5613 and 5614

Additional Coursework (any 3)

Anthropology 5607

Anthropology 5608

Anthropology 5609

Anthropology 5610

Anthropology 5644

Biochem 5615

MolGen 5601

MolGen 5607

MolGen 6701

Micro 4090 or 4100

MolGen 4591S or equivalent

* See note below - at most 7 units from Anthropology may be counted towards the Biology major
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**Electives**

\_\_\_\_\_

\_\_\_\_\_

Core, specialization, and elective courses must total 32 semester units, and must include three laboratory courses. Honors versions of courses substitute freely. \*Note: At least 25 of the 32 semester units must be courses in Biochemistry, Biology, EEOB, Microbiology, or Molecular Genetics, and all courses in the major must be approved by a Biology advisor.

Advisor (Printed) \_\_\_\_\_

Advisor (Signature) \_\_\_\_\_

Date \_\_\_\_\_

Biology Major Program  
Bachelor of Arts  
Education in Life Sciences

Name \_\_\_\_\_  
Semester of Graduation \_\_\_\_\_

**Required Supporting Courses**

<p>Biology (2 courses) Biology 1113 Biology 1114</p> <hr style="width: 80%; margin-left: 0;"/> <p style="text-align: right;">Substitution</p> <p>Waived</p>	<p>Chemistry (2 courses) Chemistry 1210 or 1610 or 1910H Chemistry 1220 or 1620 or 1920H</p> <hr style="width: 80%; margin-left: 0;"/> <p style="text-align: right;">Substitution</p> <p>Waived</p>
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<p>Mathematics (1 course) Math 1150</p> <hr style="width: 80%; margin-left: 0;"/> <p style="text-align: right;">Substitution</p> <p>Waived</p>	<p>Organic Chemistry (1 course) Chemistry 2310</p> <hr style="width: 80%; margin-left: 0;"/> <p style="text-align: right;">Substitution</p> <p>Waived</p>
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Physics (1 course)  
Physics 1200 or 1250

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Substitution

Waived

**Core Course**

Biology 3401

**Education in Life Sciences Specialization**

<p>Required (5 courses) Biochem 4511, or 5613 and 5614 MolGen 4500 or 5606 EEOB 3310 Micro 4090 or 4100 MolGen 3300</p>	<p>Additional Coursework (any 2) EEOB 2220 EEOB 3320 (<i>strongly recommended</i>) EEOB 4210 EEOB 4220 EEOB 4230 EEOB 5430 or 5930 Entomology 3000 MolGen 4591S or equiv.</p>
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**Electives**

\_\_\_\_\_

\_\_\_\_\_

Core, specialization, and elective courses must total 32 semester units, and must include three laboratory courses. Honors versions of courses substitute freely. \*Note: At least 25 of the 32 semester units must be courses in Biochemistry, Biology, EEOB, Microbiology, or Molecular Genetics, and all courses in the major must be approved by a Biology advisor.

Advisor (Printed) \_\_\_\_\_

Advisor (Signature) \_\_\_\_\_

Date \_\_\_\_\_

**BIOLOGY MAJOR PROGRAM APPROVAL FORM  
PRE-HEALTH SPECIALIZATION**

Name \_\_\_\_\_ BS \_\_\_\_\_ BA \_\_\_\_\_

Quarter to Graduate \_\_\_\_\_

**REQUIRED PREREQUISITES**

**BIOLOGY - ONE SEQUENCE**

- \_\_\_ Biology 113 & 114
- \_\_\_ Biology H115 & H116
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**CHEMISTRY - TAKE ALL 3 COURSES**

- \_\_\_ Chem 121 & 122 & 123
- \_\_\_ Chem H201 & H202 & H203
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**MATHEMATICS**

- \_\_\_ Math 152
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**ADVANCED CHEMISTRY - COMPLETE 4 COURSES**

- \_\_\_ Chem 251
- \_\_\_ Chem 252
- \_\_\_ Chem 245 OR 254
- \_\_\_ Chem 246 OR 255
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**PHYSICS - COMPLETE 1 SEQUENCE**

- \_\_\_ Physics 111 & 112 & 113
- \_\_\_ Physics 131 & 132 & 133
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

Suggested prerequisite (not required).

- \_\_\_ Chem 253

**CORE COURSES:**

**INTEGRATED BIOLOGY**

- Hours \_\_\_\_\_
- \_\_\_ Biology 401 and
  - \_\_\_ Biology 402
  - \_\_\_ Substitution \_\_\_\_\_
  - \_\_\_ Waived

**SOPHOMORE COLLOQUIUM**

- Hours \_\_\_\_\_
- \_\_\_ Biology 320 or
  - \_\_\_ Biochem H200 or
  - \_\_\_ Mol Gen H220
  - \_\_\_ Substitution \_\_\_\_\_
  - \_\_\_ Waived

**PRE-HEALTH PROFESSIONS SPECIALIZATION**

**REQUIRED:**

- \_\_\_ Mol Gen 500 or
- \_\_\_ Mol Gen 605 and 606.

**ELECTIVES:** Complete at least 4 courses from the following list:

- \_\_\_ Biochem 511 or Biochem 613
- \_\_\_ Biochem 614
- \_\_\_ EEOB 400
- \_\_\_ Micrbiol 509 or Micrbiol 520
- \_\_\_ Micrbiol 521
- \_\_\_ EEOB 415
- \_\_\_ EEOB 630
- \_\_\_ EEOB 410 or Anatomy 200
- \_\_\_ Physiocb 311 or Physiocb 601
- \_\_\_ Physiocb 312 or Physiocb 602

A minimum of 45 hours or upper division (300 level or above, not including 591 or 597) biological sciences are required for the major, with at least 35 hrs from the following areas:

Biology  
Biochemistry  
EEOB  
Microbiology  
Molecular Genetics  
Plant Biology

Independent Study, e.g. Biol 699 or H783, can be included to a maximum of 5 hours, and may be counted towards the laboratory/data analysis component.

Five courses in the major must have a laboratory or data analysis component (circle).

ANATOMY 200  
BIOCHEM 521, 693, 699, 706, 708, 710, H783  
BIOLOGY 693, 699, H783  
CHEM 245, 246, 254, 255  
EEOB 322, 405.02, 413.03, 440, 470, 503.02, 505, 510, 512, 611, 620,  
621, 622, 625, 626, 630, 647, 651, 652, 653, 655, 657,  
661, 671, 672, 674, 693, 699, 713, 714.02, 720, 730, 741.02, H783  
ENTOMOL H444, 460, 462, 500, 611, 612, 621, 623, 631, 641, 650,  
660, 661, 662, 670, 693, 699, H783  
MICRBIOL 509, 520, 521, 522, 524.02, 581, 610, 629 (AU90-WI08),  
636.02, 655, 693, 699, 723.02, 750, H783  
MOL GEN H500, 601, 602, 650, 693, 699, H783  
PLNT BIO 300, 402, 604, 608.02, 643, 693, 699, H783  
Substitution \_\_\_\_\_  
Waived

Comments:

Major GPA \_\_\_\_\_

Total Major Hours \_\_\_\_\_

ADVISOR APPROVAL

FOR EXCEPTIONS FROM MAJOR:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
CLSE Director or Assoc. Director

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

Last updated 4/1/2009



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Date

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Date

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**BIOLOGY MAJOR PROGRAM APPROVAL FORM  
LIFE SCIENCES EDUCATION SPECIALIZATION**

Name \_\_\_\_\_ BS \_\_\_\_\_ BA \_\_\_\_\_

Quarter to Graduate \_\_\_\_\_

**REQUIRED PREREQUISITES**

**BIOLOGY - ONE SEQUENCE**

- \_\_\_ Biology 113 & 114
- \_\_\_ Biology H115 & H116
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**CHEMISTRY - TAKE ALL 3 COURSES**

- \_\_\_ Chem 121 & 122 & 123
- \_\_\_ Chem H201 & H202 & H203
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**MATHEMATICS**

- \_\_\_ Math 152
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**ADVANCED CHEMISTRY - COMPLETE 4 COURSES**

- \_\_\_ Chem 251
- \_\_\_ Chem 252
- \_\_\_ Chem 245 OR 254
- \_\_\_ Chem 246 OR 255
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**PHYSICS - COMPLETE 1 SEQUENCE**

- \_\_\_ Physics 111 & 112 & 113
- \_\_\_ Physics 131 & 132 & 133
- \_\_\_ Substitution \_\_\_\_\_
- \_\_\_ Waived

**CORE COURSES:**

**INTEGRATED BIOLOGY**

- |                     | Hours | _____ |
|---------------------|-------|-------|
| ___ Biology 401 and |       |       |
| ___ Biology 402     |       |       |
| ___ Substitution    |       | _____ |
| ___ Waived          |       |       |

**SOPHOMORE COLLOQUIUM**

- |                     | Hours | _____ |
|---------------------|-------|-------|
| ___ Biology 320 or  |       |       |
| ___ Biochem H200 or |       |       |
| ___ Mol Gen H220    |       |       |
| ___ Substitution    |       | _____ |
| ___ Waived          |       |       |

**LIFE SCIENCES EDUCATION SPECIALIZATION**

**Required:**

- |                  |                  |
|------------------|------------------|
| ___ BIOCHEM 511  | ___ MOL GEN 500  |
| ___ EEOB 400     | ___ PLNT BIO 300 |
| ___ MICRBIOL 509 |                  |

**Electives: Complete at least two courses from the following list:**

- |                 |                  |
|-----------------|------------------|
| ___ EEOB 322    | ___ ENTOMOL 500  |
| ___ EEOB 405.01 | ___ BIOCHEM 591  |
| ___ EEOB 621    | ___ MICRBIOL 591 |
| ___ EEOB 625    | ___ MOL GEN 591  |



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Date

\_\_\_\_\_  
Date

Last updated 4/1/2009

A

### Biology B.S. Major Requirements

### Program Learning Goals

S Course		S cr hr	Course Title	Comments	1.1	1.2	1.3	1.4	1.5	1.6	1.7	2.1	2.2	2.3	2.4	2.5
Required Courses (offered by the unit)	Biol 1113	4	Biological Sciences: Energy Transfer and Development	Prerequisite; some additional content	*	*	*	*	*			*	*	*	*	*
	Biol 1114	4	Biological Sciences: Form, Function, Diversity, and Ecology	Prerequisite; some additional content	*				*	*		*	*	*	*	*
	Biol 3401	4	Integrated Biology	Core course; because of additional coverage in prerequisites, 2 Q courses combined into one S	**	**	**	**	**	**	**	**	*	*	**	**
Required Prerequisite Courses (offered outside the unit)	Chem 1210	5	General Chemistry		*		*					*	*		*	
	Chem 1220	5	General Chemistry		*		*					*	*		*	
	Chem 2310	4	Organic Chemistry		*		*					*	*		*	
	Math 1150	5	Pre-Calculus										*	*		
	Physics 1200	5	Introductory Physics		*		*					*	*		*	

Education in Life Sciences Specialization

Biochem 4511	4	General Biochemistry																	**	**	**
MolGen 4500	3	General Genetics																	**	**	**
EEOB 3000	4	Evolution																	**	**	**
Micro 4090	4	Basic and Practical Microbiology																	**	**	**
MolGen 3300	4	General Plant Biology																	**	**	**
Additional coursework, including lab requirement	9																		**	**	**

Forensic Biology Specialization

Anthro 2200	4	Physical	Additional prerequisite																*	*	*
Biochem 4511	4	General Biochemistry																	**	**	**
MolGen 4500	3	General Genetics																	**	**	**
Additional coursework, including lab requirement	17																		**	**	**

Pre-Health Professions Specialization

MolGen 4500	3	General Genetics																	**	**	**
Additional coursework, including lab requirement	25																		**	**	**

Courses comprising specializations (offered outside the unit)

\* beginning, \*\* intermediate, \*\*\* advanced