# 2018 - 2019 Major Map

## Biological Sciences (Genetics, Cell and Developmental Biology), BS

**School/College:** The College of Liberal Arts and Sciences  
**Location:** Tempe campus  
LABSCGBS

<table>
<thead>
<tr>
<th>Term</th>
<th>0 - 15 Credit Hours</th>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
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</thead>
</table>
|      | LIA 101: Student Success in the College of Liberal Arts and Sciences | 1 | | | • Mathematics Placement Assessment score determines placement in mathematics and science courses  
• LIA 101 or other First Year Seminar required of all freshman students  
• An SAT, ACT, Accuplacer, IELTS, or TOEFL score determines placement into first-year composition courses  
• Select your career interest area and play me3@ASU. |
|      | BIO 281: Conceptual Approaches to Biology for Majors I (SQ) | 4 | C | |
|      | CHM 113: General Chemistry I (SQ) | 4 | C | |
|      | ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition | 3 | C | |
|      | STP 231: Statistics for Life Science (CS) | 3 | C | |
|      | **Term hours subtotal:** | **15** | | |

<table>
<thead>
<tr>
<th>Term</th>
<th>15 - 32 Credit Hours</th>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>BIO 282: Conceptual Approaches to Biology for Majors II</td>
<td>4</td>
<td>C</td>
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<td></td>
<td>CHM 116: General Chemistry II (SQ)</td>
<td>4</td>
<td>C</td>
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<td></td>
<td>ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition</td>
<td>3</td>
<td>C</td>
<td></td>
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<tr>
<td></td>
<td>MAT 251: Calculus for Life Sciences (MA)</td>
<td>3</td>
<td>C</td>
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<tr>
<td></td>
<td>Social-Behavioral Sciences (SB) AND Global Awareness (G)</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td><strong>Complete BIO 281 AND BIO 282 course(s).</strong></td>
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<td></td>
<td><strong>Complete ENG 101 OR ENG 105 OR ENG 107 course(s).</strong></td>
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<td></td>
<td><strong>Term hours subtotal:</strong></td>
<td><strong>17</strong></td>
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<table>
<thead>
<tr>
<th>Term</th>
<th>32 - 46 Credit Hours</th>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>BIO 340: General Genetics</td>
<td>4</td>
<td>C</td>
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<tr>
<td></td>
<td>CHM 231: Elementary Organic Chemistry (SQ) AND CHM 235: Elementary Organic Chemistry Laboratory (SQ)</td>
<td>4</td>
<td>C</td>
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<tr>
<td></td>
<td>CLAS Science and Society Elective</td>
<td>3</td>
<td>C</td>
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<tr>
<td></td>
<td>Humanities, Arts and Design (HU) AND Historical Awareness (H)</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Complete First-Year Composition requirement.</strong></td>
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<tr>
<td></td>
<td><strong>Complete Mathematics (MA) requirement.</strong></td>
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<tr>
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<td><strong>Term hours subtotal:</strong></td>
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<table>
<thead>
<tr>
<th>Term</th>
<th>46 - 61 Credit Hours</th>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
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<tbody>
<tr>
<td></td>
<td>BIO 345: Organic Evolution</td>
<td>3</td>
<td>C</td>
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<tr>
<td></td>
<td>Literacy and Critical Inquiry (L)</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td><strong>Term hours subtotal:</strong></td>
<td><strong>15</strong></td>
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</tbody>
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*Pre-health students should take CHM 233 and CHM 237 instead of CHM 231 and CHM 235 this term. See pre-health website for more information  
*If CHM 233 and 237 are taken, then CHM 234 and 238 must be taken the following semester  
*Explore extracurriculars (i.e. service learning, community service, internships, research, student involvement, shadowing, etc.)  
*Attend a Study Abroad 101 Session  
*Pre-health students should take CHM 234 and CHM 238 instead of an elective this
Complete 2 courses:  
**BIO 351: Developmental Biology** OR **BIO 353: Cell Biology** OR **BCH 361: Advanced Principles of Biochemistry**  
**PHY 101: Introduction to Physics (SQ)**  
**Humanities, Arts and Design (HU)**  
Upper Division Elective  
Term hours subtotal: 15

**Term 6 77 - 92 Credit Hours**  
Necessary course signified by 🌟  
**BIO 351: Developmental Biology** OR **BIO 353: Cell Biology** OR **BCH 361: Advanced Principles of Biochemistry**  
**BIO 360: Animal Physiology** OR **BIO 446: Principles of Human Genetics (L)** OR **MBB 440: Functional Genomics OR MCB 420: Immunology: Molecular and Cellular Foundations**  
**Upper Division Social-Behavioral Sciences (SB) OR Upper Division Humanities, Arts and Design (HU)**  
**Complete 2 courses:**  
**Elective**  
Complete Cultural Diversity in the U.S. (C) AND Global Awareness (G) AND Historical Awareness (H) course(s).  
Term hours subtotal: 15

**Term 7 92 - 107 Credit Hours**  
Necessary course signified by 🌟  
**Upper Division Major Laboratory/Research Course**  
**Upper Division Major Elective**  
**Upper Division CLAS Science and Society Elective**  
**Upper Division Literacy and Critical Inquiry (L)**  
**Elective OR BIO 484: Internship OR MCB 484: Internship OR MBB 484: Internship**  
Term hours subtotal: 15

**Term 8 107 - 120 Credit Hours**  
Necessary course signified by 🌟  
**Major Laboratory/Research Course**  
**BIO 360: Animal Physiology** OR **BIO 446: Principles of Human Genetics (L)** OR **MBB 440: Functional Genomics OR MCB 420: Immunology: Molecular and Cellular Foundations**  
**Upper Division Major Elective**  
**Upper Division Elective**  
Term hours subtotal: 15

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**Term 5 61 - 77 Credit Hours**  
Necessary course signified by 🌟  
**Complete 2 courses:**  
**Elective**  
Term hours subtotal: 15

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- If CHM 233 and 237 are taken, then CHM 234 and 238 must be taken the following semester.
- Explore or pursue internship opportunities.
- Meet with the Career & Professional Development Center to learn how to develop skills.
- Pre-health students should take PHY 111 and PHY 113 instead of PHY 101 this term. See pre-health website for more information.
- BIO 351 is only taught in the Fall semester.
- Meet with your advisor to discuss ways to maximize your remaining time at ASU.
- Pre-health students should take PHY 112 and PHY 114 instead of an elective this term. See pre-health website for more information.
- Use Handshake to research employment opportunities.
- Explore or apply for full-time career opportunities or graduate school.
- Meet with your advisor to verify remaining degree requirements have been met.
- Continue to apply for full-time career opportunities or graduate school.
Major Laboratory/Research Courses

- BIO 308: Plant Physiology
- BIO 342: General Genetics Laboratory
- BIO 352: Laboratory in Vertebrate Developmental Anatomy
- BIO 451: Cell Biotechnology: Cell Culture, Immunocytochemistry and Bioimaging
- BIO 453: Animal Histology
- BIO 495: Undergraduate Research
- MBB 343: Genetic Engineering and Society (L)
- MBB 350: Applied Genetics
- MIC 206: Microbiology Laboratory (SG)
- MIC 220: Biology of Microorganisms
- MIC 302: Advanced Bacteriology Laboratory (L)
- MIC 421: Experimental Immunology

Major Electives

- BCH 367: Elementary Biochemistry Laboratory
- BIO 302: Cancer--Mother of All Diseases (L)
- BIO 308: Plant Physiology
- BIO 312: Bioethics (HU)
- BIO 320: Fundamentals of Ecology
- BIO 342: General Genetics Laboratory
- BIO 346: The Darwinian Revolution
- BIO 352: Laboratory in Vertebrate Developmental Anatomy
- BIO 355: Introduction to Computational Molecular Biology (CS) or MBB 355: Introduction to Computational Molecular Biology (CS)
- BIO 360: Animal Physiology
- BIO 406: Computer Applications in Biology
- BIO 415: Biometry (CS)
- BIO 416: Biomedical Research Ethics (L)
- BIO 431: Genes, Development, and Evolution (L)
- BIO 440: Functional Genomics or MBB 440: Functional Genomics
- BIO 446: Principles of Human Genetics (L)
- BIO 451: Cell Biotechnology: Cell Culture, Immunocytochemistry and Bioimaging
- BIO 453: Animal Histology
- BIO 455: Introduction to Comparative Genomics
- BIO 462: Endocrine Physiology

All students pursuing a B.S. or B.S.P. degree in the College of Liberal Arts and Sciences must complete two courses from the Science and Society list found at https://clas.asu.edu/resources/science-society. At least one of the two courses must be upper division. Students must earn a C or better in the courses, and no more than one of the two can also be used to simultaneously fill a requirement of the major, minor or related area. Science and Society courses cannot also be used to fill the general studies HU, SB, SQ or SG requirements.
Notes:

- Please keep in mind that the applicability of a specific transfer course toward an ASU degree program depends on the requirements of the department, division, college or school in which you are enrolled at ASU. Transfer agreements that guarantee the completion of university level requirements do not necessarily meet college and major requirements. Please consult with an advisor for more information.

BIO 467: Neurobiology

HPS 322: History of Science (HU & H)

HPS 323: History of Science (HU & H)

HPS 330: History of Biology: Conflicts and Controversies (H)

HPS 331: History of Medicine (HU & H)

MBB 343: Genetic Engineering and Society (L) or BIO 343: Genetic Engineering and Society (L)

MBB 350: Applied Genetics

MIC 302: Advanced Bacteriology Laboratory (L)

MIC 420: Immunology: Molecular and Cellular Foundations

MIC 421: Experimental Immunology

MIC 485: General Virology

Total Hours: 120
Upper Division Hours: 45 minimum
Major GPA: 2.00 minimum
Cumulative GPA: 2.00 minimum
Total hrs at ASU: 30 minimum
Hrs Resident Credit for Academic Recognition: 56 minimum
Total Community College Hrs: 64 maximum
Total College Residency Hrs: 12 minimum

General University Requirements Legend

General Studies Core Requirements:

- Literacy and Critical Inquiry (L)
- Mathematical Studies (MA)
- Computer/Statistics/Quantitative Applications (CS)
- Humanities, Arts and Design (HU)
- Social-Behavioral Sciences (SB)
- Natural Science - Quantitative (SQ)
- Natural Science - General (SG)

General Studies Awareness Requirements:

- Cultural Diversity in the U.S. (C)
- Global Awareness (G)
- Historical Awareness (H)

First-Year Composition

General Studies designations listed on the major map are current for the 2018 - 2019 academic year.