COURSE CHECKLIST FOR THE MAJOR IN BIOLOGY

FOR THOSE ENTERING UNDER THE 2012-13 CATALOG

Students must complete a minimum of 40 BIO credit hours, with at least 20 credit hours at the 300 level or above.

BIOLOGY CORE

Check when met:

- BIO 114. Organisms
- BIO 124. Ecology and Evolution
- BIO 214. Cell and Molecular Biology
- BIO 224. Genetics and Development

COGNATES

Chemistry - complete all of the following courses

- CHEM 131/CHEM 131L + CHEM 132/CHEM 132L
- CHEM 241
- CHEM 242 OR CHEM 355 OR CHEM 361 ...
- If CHEM 361 is used as a cognate, it cannot be used as BIO 361 toward the 40 hr BIO req.

Physics - complete one of the following sequences

- PHYS 140/140L + PHYS 150/150L OR PHYS 240/140L + PHYS 250/150L

Calculus - complete one course (or courses sequence)

- MATH 231 + MATH 232 OR MATH 235

Statistics - complete one course

- MATH 220 OR MATH 285 OR MATH 318

UPPER DIVISION BIOLOGY

- Students must complete at least 24 credit hours of approved biology courses in addition to the core and at least 20 of these must be at the 300 or 400 level. Also, one course must be from a group of courses on organismal diversity, and two courses must have a laboratory component. Three credits of independent research (BIO 497 and/or BIO 499) may be used for one, but only one, of the laboratory courses.
- Only one Topic in Biology (BIO 426/427) may fulfill one of the laboratory course and/or organismal requirements.
- Students are strongly encouraged to discuss their career interests with an advisor who can help select courses best suited to their needs.

Students are encouraged to participate in independent research and teaching courses with a faculty mentor, though a maximum of eight credits of BIO 492, BIO 494, BIO 495, BIO 496, BIO 497, BIO 499 and ISCI 450 can be counted toward the biology major. Courses may be repeated as indicated in the catalog and credits above eight count as degree electives, but not toward the 40 hrs.

Note: The JMU Undergraduate Catalog is the official listing of requirements and takes precedence over this guide, in case of conflicts.
UPPER DIVISION BIOLOGY (continued)

Upper-level Biology Course Requirements

Students in the biology major must complete at least 20 credit hours at the 300 and 400 level. One course must be from a group of courses on organismal diversity. Two courses must have a laboratory component. Courses in both lists may count for both requirements. Three credits of independent research (BIO 497 and/or 499) may be used for one, but only one, of the laboratory courses.

1) Choose at least one course from the following list of organismal diversity courses:
   - BIO 305. Ornithology
   - BIO 309. Marine and Freshwater Invertebrates
   - BIO 310. General Entomology
   - BIO 320. Comparative Anatomy of Vertebrates
   - BIO 340. Morphology and Anatomy of Vascular Plants
   - BIO 345. Animal Field Biology
   - BIO 360. Plant Biology
   - BIO 364. Human Uses of Plants
   - BIO 380. General Microbiology
   - BIO 386. Field Botany
   - BIO 412. Mammalogy
   - BIO 470. Morphology of Nonvascular Plants
   - BIO 486. Systematics of Vascular Plants

2) Choose at least two courses from the following list of laboratory/field courses:
   - BIO 305. Ornithology
   - BIO 310. General Entomology
   - BIO 316L. Principles of Animal Development (must be taken with BIO 316)
   - BIO 320. Comparative Anatomy of Vertebrates
   - BIO 340. Morphology and Anatomy of Vascular Plants
   - BIO/MATH 342. Mathematical Models in Biology
   - BIO 343L. Immunology Laboratory (must be taken with BIO 343)
   - BIO 345. Animal Field Biology
   - BIO 364L. Laboratory in Human Uses of Plants (must be taken with BIO 364)
   - BIO 370. Animal Physiology
   - BIO 380. General Microbiology
   - BIO 386. Field Botany
   - BIO/GEOL 400. Geology and Ecology of the Bahamas
   - BIO/GEOG 402. Forest Ecology
   - BIO 403. Animal Communication
   - BIO 410. Advanced Human Anatomy
   - BIO 412. Mammalogy
   - BIO 416. Human Embryology
   - BIO 420L. Medical Parasitology Lab (must be taken with BIO 420)
   - BIO 432. Light Microscopy
   - BIO 443. Immunology Laboratory (must be taken with BIO 442)
   - BIO 445. Neurobiology BIO 448. Medical Microbiology
   - BIO 451. Ecological Systems
   - BIO 452. Population Ecology
   - BIO 455. Plant Physiology
   - BIO 456. Landscape Ecology
   - BIO 457. Biological Applications of Geographic Information Systems
   - BIO 459. Freshwater Ecology
   - BIO 460. Plant Cell and Tissue Culture
   - BIO 465. Environmental Toxicology
   - BIO 470. Morphology of Nonvascular Plants
   - BIO 480. Advanced Molecular Biology
   - BIO 481. Genomics
   - BIO 482. Human Histology
   - BIO 486. Systematics of Vascular Plants
   - BIO 490. Biomechanics

In addition, some BIO 426 and 427 courses may count toward the Upper-level requirements. Check with your advisor and/or the Undergraduate Academic Coordinator to determine eligibility.

All BIO 300/400 classes count toward the 40 hr BIO course requirement. Those not on the above lists are BIO electives. See the Undergraduate JMU catalog for a list of courses.