PROGRAM IN BIOLOGY
RECORD of CONCENTRATION in BIOLOGY or
GENERAL BIOLOGY
[Eff. 9/2007 – updated 8/09]

Name _____ Uniqname _____

UMID _____ Exp. Date of Graduation _____

For detailed information about the Program in Biology concentrations, refer to the Program in Biology web site, the LS&A Bulletin, or a concentration advisor. Come to the Biology Office in Rm. 1111 Nat. Sci. to schedule an advising appointment.

PREREQUISITES

INTRODUCTORY BIOLOGY – *To complete the introductory series, students must take BIO 171, 172, and 173 (Track #1); or AP BIO 195 and BIO 173 (Track #2); or already have taken BIO 162 (no longer offered) (Track #3).*

	CR	TERM AND YEAR	COMPLETED
Track #1			
Biology 171	4	_____	_____
Biology 172	4	_____	_____
Biology 173 *(lab)*	2	_____	_____
Track #2			
Biology 195 (AP)	5	_____	_____
Biology 173 *(lab)*	2	_____	_____
Track #3			
Biology 162 (or AP credit for BIO 162)	5	_____	_____
INTRODUCTORY PHYSICS *(10 hours incl. 2 labs)*			
Physics 125 or 135 or 140 or 160, **and**	4	_____	_____
Physics Lab 127 (w/125) or 141 (w/135/140/160)	1	_____	_____
Physics 126 or 235 or 240 or 260, **and**	4	_____	_____
Physics Lab 128 (w/126) or 241 (w/235/240/260)	1	_____	_____
MATHEMATICS* *(8 hours)*			
Math 115 or 120 or 185	4	_____	_____
Math 116 or 121 or 186	4	_____	_____
CHEMISTRY *(10 hours including 2 labs)*			
Chemistry 210	4	_____	_____
Chemistry 211 *(lab)*	1	_____	_____
Chemistry 215	3	_____	_____
Chemistry 216 *(lab)*	2	_____	_____

***** *Students with AP credit for Math 120 should enroll in Math 116.*
Students with AP credit for Math 120 and 121 will have fulfilled the mathematics prerequisite requirement.

REQUIRED COURSES in the BIOLOGY CONCENTRATION

• Concentrators must take a minimum of **30 or 33 credit hours**, depending on whether they have credit for BIO 162 or AP credit for BIO 162 (33 hours); or BIO 171, 172, and 173 (30 hours); or BIO 195 and 173 (30 hours). • The minimum credit hours must include **three laboratory courses or courses with a laboratory component**. • Library "research," introductory biology laboratories, BIO 200, and UROP experience do not fulfill a laboratory requirement. • A maximum of **three hours of independent research** (EEB or MCDB 300 or 400) may be used as one of the three laboratory experiences. The three credits must be earned in one term. • A maximum total of **three hours of independent study** from any combination of BIO 200 and EEB or MCDB 300 or 400 may be counted toward the concentration. • *Refer to the document on independent research policies that is available on the Biology web site or in the Program in Biology Office.*

REQUIRED 200-LEVEL COURSES

- *These introductory courses should be taken early in your undergraduate career, immediately or shortly after taking Introductory Biology.*
- Referring to the "Required 200-level Course Listing" (on pg. 4), select one course from Group I and one course from Group II.

COURSE NAME & NUMBER	CR	TERM AND YEAR	LAB	COMPLETED
I–Molecular, Cell, and Developmental Biology				
_____	_____	_____	_____	_____
II–Ecology, Evolution, and Organismal Biology				
_____	_____	_____	_____	_____

REQUIRED COURSES in GENETICS, BIOCHEMISTRY, and EVOLUTION

COURSE NAME & NUMBER	CR	TERM AND YEAR	LAB	COMPLETED
Biology 305, Genetics	_____	_____		_____
Biology/MCDB 310 or 311, or Biolchem. 415 (Medical School)	_____	_____		_____
Biology/EEB 390, Evolution	_____	_____	_____	_____

DISTRIBUTION within the BIOLOGY CONCENTRATION

Select **one course** in EEB or MCDB at the 300 or 400 level (except EEB 302, MCDB 302, or MCDB 412).

_____	_____	_____	_____	_____

ADDITIONAL COURSE SELECTIONS

- Select additional Biology, EEB, or MCDB courses at the **200 level or above** (except BIO 262, EEB 302, MCDB 302, or MCDB 412) to bring the **concentration total to at least 30 or 33 hours** (see above).
- Prerequisites and introductory science courses are excluded (see list attached).
- Two concentration advisor-approved cognate courses may be used toward completing the concentration.

COURSE NAME & NUMBER	CR	TERM AND YEAR	LAB	COMPLETED
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

TOTAL CONCENTRATION HOURS _____

REQUIRED COURSES in the GENERAL BIOLOGY CONCENTRATION

• Concentrators must take a minimum of **24 or 27 credit hours**, depending on whether they have credit for BIO 162 or AP Credit for BIO 162 (27 hours), or BIO 171, 172, and 173 (24 hours), or BIO 195 and 173 (24 hours). • The minimum credit hours must include **two courses with laboratory**. The laboratory requirement may be fulfilled with a lab course or a course with a lab component. • Library "research," introductory biology laboratories, BIO 200, and UROP experience do not fulfill this laboratory requirement. • A maximum of **three hours of independent research** (EEB 300 or 400, or MCDB 300 or 400) may be used as one of the two laboratory experiences. The three credits must be earned in one term. • A maximum of **three hours of independent study** (a total of BIO 200, EEB 300 or 400, or MCDB 300 or 400) may be counted toward the concentration. • *Refer to the document on independent research policies that is available on the Biology web site or in the Program in Biology Office.*

REQUIRED 200-LEVEL COURSES

- *These introductory courses should be taken early in your undergraduate career, immediately or shortly after taking Introductory Biology.*
- Referring to the "Required 200-level Course Listing" (on pg. 4), select one course from Group I and one course from Group II.

COURSE NAME & NUMBER	CR	TERM AND YEAR	LAB	COMPLETED
I–Molecular, Cell, and Developmental Biology				
_____	_____	_____	_____	_____
II–Ecology, Evolution, and Organismal Biology				
_____	_____	_____	_____	_____

REQUIRED COURSES in GENETICS, BIOCHEMISTRY, and EVOLUTION

COURSE NAME & NUMBER	CR	TERM AND YEAR	LAB	COMPLETED
Biology 305, Genetics	_____	_____		_____
Biology/MCDB 310 or 311, or Biolchem. 415 (Medical School)	_____	_____		_____
Biology/EEB 390, Evolution	_____	_____	_____	_____

ONE REQUIRED COGNATE COURSE

Select one course from the General Biology Cognate list (attached) to fulfill this requirement.

_____	_____	_____		_____

ADDITIONAL COURSE SELECTIONS

- Select additional Biology, EEB, or MCDB courses at the **200 level or above** (except BIO 262, EEB 302, MCDB 302, or MCDB 412) to bring your **concentration total to at least 24 or 27 hours** (see above).
- Prerequisites and introductory science courses are excluded (see list attached).

COURSE NAME & NUMBER	CR	TERM AND YEAR	LAB	COMPLETED
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

TOTAL CONCENTRATION HOURS _____

REQUIRED 200-LEVEL COURSE LISTING by DISTRIBUTION GROUP

Laboratory courses, or courses that include a laboratory component, are marked with an asterisk(*).

I: MOLECULAR, CELL, AND DEVELOPMENTAL BIOLOGY

BIO 207* (4) Introductory Microbiology
BIO 208 (3) Embryology
BIO 222 (3) Introduction to Neurobiology
BIO 225 (3) Principles of Animal Physiology *(lecture)*
BIO 230* (4) Introduction to Plant Biology

NOTE: Students who take BIO 225 are also encouraged to take BIO 226 Animal Physiology Laboratory (2 credits).*

II: ECOLOGY, EVOLUTION, AND ORGANISMAL BIOLOGY

BIO 230* (4) Introduction to Plant Biology
BIO 252* (4) Chordate Anatomy and Phylogeny
BIO 255* (4) Plant Diversity
BIO 281 (3) General Ecology
BIO 288* (4) Introduction to Animal Diversity

NOTE: Students who take BIO 281 are also encouraged to take BIO 282 General Ecology Laboratory (3 credits).*

ADDITIONAL COURSES LIST

- These are courses that may be counted toward the Biology and General Biology concentrations. Likely terms of offering are in parentheses.
- Laboratory courses, or courses that include a laboratory component, are marked with an asterisk (*).
- *Courses listed in italics* are offered at the U-M Biological Station.
- Course offerings are subject to change.

BIO 226* (2) Animal Physiology Laboratory (F/W)
BIO 282* (3) General Ecology Laboratory (F)
EEB/MCDB 300* (1-3) Undergraduate Research (F/W/SP/Su)
MCDB 306* (3) Intro. Genetics Laboratory (F/W)
MCDB 307 (3) Developmental Biology
MCDB 308* (3) Develop. Biol. Laboratory (W)
EEB 315 (3) Ecology & Evolution of Infectious Diseases (*This is not a lab course.*)
EEB 318 (4) Food, Land and Society (W)
EEB 320* (4) Rivers, Lakes, and Wetlands (W) (*Su: with lab, 5 cr.*)
MCDB 321 (3) Plant Physiology (W)
EEB 330 (5) Biology of Birds (Su)*
EEB 335 (2) Biodiversity Research Seminar (F,W)
EEB 341* (4) Parasitology (W)
EEB 348 (5) Forest Ecosystems (Su)
EEB 355 (5) Woody Plants (F)
EEB 380 (3) Oceanography (F)
EEB 381 (5) General Ecology (Su)*
EEB/MCDB 397 (3) Writing in Biology
EEB/MCDB 400* (1-3) Advanced Research (F/W/SP/Su)
EEB/MCDB 401 (3) Advanced Topics in Biology (F/W)
MCDB 402 (3) Molec. Biol. of Pain and Sensation
MCDB 403 (3) Molec. & Cell Biol. of the Synapse
MCDB/EEB 404 (3) Genetics, Develop. & Evol. (W)
MCDB 405 (3) Molecular Basis of Development
MCDB 408 (3) Genomic Biology
EEB 410 (3) Capstone Seminar
MCDB 411 (3) Protein Structure and Function (F)
EEB 412 (3) Molecular Ecology
MCDB 413* (3) Plant Molec. Biol. Laboratory (W)
MCDB 415 (3) Microbial Genetics
MCDB 417 (3) Chromosome Struct. & Function
MCDB 418 (3) Endocrinology (F)
MCDB 419* (3) Endocrinology Laboratory (F)
EEB 420 (3) Plant Evolution
MCDB 422 (3) Cellular & Molecular Neurobiology (F)
MCDB 423* (3) Cellular & Molecular Neurobiology Laboratory (F)
EEB 424 (4) Behav. Ecol. & Conservation Biol.
EEB 425 (2) Field Skills in Wildlife Behavior
MCDB 425 (3) Biotechnology: From Concepts to Technologies
MCDB 426 (3) Molecular Endocrinology (W)
MCDB 427 (4) Molecular Biology (F)
MCDB 428 (4) Cell Biology (W)
MCDB 429* (3) Cell and Molec. Biol. Laboratory (W)
MCDB 430 (3) Molecular Biology of Plants (W)
EEB 431 (5) Ecology of Animal Parasites (Su)*

MCDB 432 (3) Biochemistry & Physiology of Prokaryotes
EEB 433* (4) Ornithology (F)
MCDB 435 (3) Intracellular Trafficking (W)
EEB 436* (4) Woody Plants
MCDB 436 (3) Introductory Immunology
EEB 437* (5) Biology of Invertebrates (W)
EEB 440 (3) Biology of Fishes (F)
EEB 441* (1) Biology of Fishes Laboratory (F)
EEB 442* (4) Biology of Insects (F) (*Su at UMBS: 5 cr.*)
MCDB 444 (3) Bacterial Cell Biology
EEB 445 (3) Biogeography (W)
EEB 450* (5) Biology of Amphibians & Reptiles (W)
MCDB 450 (3) Genetics & Molecular Biology of Complex Behavior
EEB 451* (4) Biology of Mammals (F)
EEB 453 (5) Field Mammalogy (Su)*
EEB 455 (5) Ethnobotany (Sp)*
EEB 457 (5) Freshwater Algae (Su)*
EEB 458* (5) Biology of Algae (F)
EEB 459* (4) Systematic Biology (W)
EEB 463* (3) Neotropical Plant Families
EEB 466 (3) Mathematical Ecology
EEB 468* (4) Biology of Fungi
MCDB 469 (3) Signal Transduction (W)
EEB 470 (3) Microbial Diversity
EEB 472 (3) Plant-Animal Interactions (W)
EEB 473* (3) Aquatic Ecology Laboratory (W)
EEB 474 (5) Wetlands Ecology (Su)*
EEB 476 (3) Advanced Ecology (W)
EEB 477* (5) Laboratory in Field Ecology (F)
EEB 478 (3) Advanced Ecology (W)
EEB 479* (2) Dynamics of Neotrop. Rainforests
EEB 480 (4) Computer-Aided Inferences in Evolution and Ecology (F)
EEB 481 (4) Population Dynamics & Ecology (F)
BIO/EEB 482 (5) Limnology (Su–UMBS)*
EEB 483 (3) Limnology: Freshwater Ecology (W)
EEB 484* (3) Limnology Laboratory (W)
EEB 485 (4) Population & Community Ecology
EEB 486 (5) Biology and Ecology of Fishes (Su)*
EEB 487 (3) Ecology of Fishes (W) (*lecture: 3 cr.*) (*lecture w/lab: 4 cr.*)
EEB 489* (3) Soil Ecology (F)
EEB 490 (3) Population & Quant. Genetics (W)
EEB 491 (4) Principles of Phylog. Systematics (W)
EEB 492 (4) Behavioral Ecology (W) (*Su: lab, 5 cr.*)
EEB 496* (3) Applied Population Ecology
EEB 498 (3) Ecology of Agroecosystems (F)
EEB 499 (3) Dynamic Systems in Population and Community Ecology
EEB 512 (3) Molecular Systematics & Evolution
EEB 514 (3) Topics in Molecular Evolution (F)
EEB 516 (4) Principles of Evolution
EEB 532* (3) Birds of the World (W)
EEB 556 (5) Field Botany (Su)*
EEB 581 (3) Adv. Topics in Community Ecol.
MCDB 589 (3) Mechanics of Microbial Evolution (W)

SOME <u>COURSES YOU MAY NOT COUNT</u> TOWARD THE CONCENTRATIONS

Concentration **prerequisite courses may not be counted,** nor the following courses:

BIO 100 Biology for Nonscientists
BIO 101 Biology and Human Affairs
BIO 102 Practical Botany
BIO 103 Ecology: Principles and Applications
BIO 105 Food
BIO 107 Evolution of Life
BIO 108 Introduction to Animal Diversity
BIO 109 Ecological Knowledge and Problem Solving
BIO 110 Introduction to Global Change
BIO 111 Investigative Biology Laboratory
BIO 116 Biology of Sex
BIO 118 AIDS and Other Health Crises
BIO 120 First-Year Seminar in Biology
BIO 124 Cells, Cancer, and Society
BIO 130 Animal Behavior
BIO 140 Genetics and Society
BIO 262 Evolutionary Biology and Human Disease

EEB/ MCDB 302 Teaching Experience for Undergraduates
MCDB 412 Teaching Biochemistry by the Keller Plan

APPROVED COGNATE COURSES <u>for BIOLOGY</u>, but <u>not General Biology</u>

- The courses listed below are approved as cognates for the Biology concentration program.
- A **<u>maximum of two cognate courses</u>** may be applied toward the Biology concentration.

Chemistry
Any course numbered 230 or above.

Environment, Natural Resources, Ecology
ENVIRON 317 – Conservation of Biological Diversity
ENVIRON 415/ NRE 415/ EEB 424 – Behavioral Ecology and Conservation Biology
ENVIRON 418/ NRE 418 – Biology and Management of Insects

Geology
GEOSCI 418 – Paleontology
GEOSCI 437 – Evolution of Vertebrates

Human Genetics
HUNGEN 541 – Gene Structure and Regulation

Mathematics
Any course numbered 200 or above.

Microbiology and Immunology
IMMUN 440 – Immunology
MICRBIOL 405 – Introduction to Infectious Diseases
MICRBIOL 415 – Virology
MICRBIOL 460 – Eukaryotic Microbiology

Physics
Courses approved in advance by a concentration advisor.

Psychology
PSYCH 435 – Biological Rhythms and Behavior
PSYCH 438 – Hormones and Behavior
PSYCH 530 – Advanced Topics in Evolutionary Comparative Psychology

Statistics
STATS 400 – Applied Statistical Methods

APPROVED COGNATE COURSES <u>for GENERAL BIOLOGY</u>, but <u>not Biology</u>

- **<u>One cognate course</u>** is required to complete the General Biology concentration requirements.
- The courses listed below are approved to fulfill the cognate requirement.

English Language and Literature
ENG 217 – Literature Seminar/Sec. 006: Literature and Medicine
ENG 317 – Literature and Culture/Sec. 002: Literature of the American Wilderness

Natural Resources
NRE 270 – Our Common Future: Ecology, Economics, and Ethics of Sustainable Development

Philosophy
PHIL 356 – Issues in Bioethics
PHIL 420 – Philosophy of Science
PHIL 425 – Philosophy of Biology

Program in the Environment
ENVIRON 256/ANTHROCUL 256 – Culture, Adaptation, and Environment

Residential College
RCNSCI 263 – Energy and the Environment
RCNSCI 270 – New Biotechnology: Scientific, Social, and Historical Perspectives
RCSSCI 275/ HISTORY 285 – Science, Technology, Medicine, and Society

Sociology
SOC 330 – Population Problems

Women's Studies
WS 220 – Perspectives in Women's Health