

Biological Sciences (BS): Integrative Physiology and Neurobiology (17BIOSCBS-17BIOSCIPN)

Freshman Year

| Fall Semester | Credit | Spring Semester | Credit |
|---|--------|---|--------|
| LSC 101 Critical Creative Thinking Life Sci* | 2 | BIO 183 Intro Bio: Cellular & Molecular | 4 |
| BIO 181 Intro Bio: Ecol, Evol, Biodiversity | 4 | CH 221 Organic Chemistry I | 3 |
| CH 101 Chemistry-A Molecular Sci | 3 | CH 222 Organic Chemistry I Lab | 1 |
| CH 102 General Chemistry Lab | 1 | ENG 101 Academic Writing & Research* | 4 |
| MA 131 ¹ Calculus Life & Mgmt Sci. A | 3 | MA 231 ¹ Calculus Life & Mgmt Sci. B | 3 |
| LSC 103 Exploring Opportunities Life Sci | 1 | | |
| GEP Health and Exercise Studies Req* | 1 | | |
| | 15 | | 15 |

Sophomore Year

| Fall Semester | Credit | Spring Semester | Credit |
|--|--------|---|--------|
| BIO 250 Animal Anatomy & Physiology ² | 4 | GN 311 Principles of Genetics | 4 |
| CH 223 Organic Chemistry II | 3 | GN 312 Elementary Genetics Lab | 1 |
| CH 224 Organic Chemistry II Lab | 1 | Free Elective ³ | 3 |
| ST 311 Introduction to Statistics | 3 | CH 201 Chemistry-A Quantitative Sci. | 3 |
| GEP Additional Breadth Requirement* | 3 | CH 202 Quantitative Chemistry Lab | 1 |
| GEP Health & Exercise Studies Req* | 1 | GEP Interdisciplinary Perspectives Req* | 3 |
| | 15 | | 15 |

Junior Year

| Fall Semester | Credit | Spring Semester | Credit |
|---------------------------------------|--------|--|--------|
| PY 211 ⁴ College Physics I | 4 | PY 212 ⁴ College Physics II | 4 |
| BCH 351 OR 451 Biochemistry | 4 | Cell Biology Requirement ⁹ | 3 |
| BIO 488 Neurobiology | 3 | Advanced Writing Elective ⁵ | 3 |
| BIO 424 Endocrinology | 3 | GEP Social Sciences Requirement* | 3 |
| GEP Humanities Req* | 3 | | |
| | 17 | | 13 |

Senior Year

| Fall Semester | Credit | Spring Semester | Credit |
|--|--------|--|--------|
| IPN Elective ⁷ | 3 | Supraorganismal Elective ⁸ | 3 |
| IPN Elective ⁷ | 3 | IPN Elective ⁷ | 3 |
| Science and Math Elective ⁶ | 3 | Science and Math Elective ⁶ | 3 |
| GEP Humanities Requirement* | 3 | GEP Social Sciences Requirement* | 3 |
| Free Elective ³ | 3 | Free Elective ³ | 3 |
| | 15 | | 15 |

Minimum Credit Hours Required for Graduation:

120

Major/Program Footnotes

A grade of C- or better is required in the following courses:

BIO 181 Introductory Biology: Ecology, Evolution, and Biodiversity

BIO 183 Introductory Biology: Cellular and Molecular Biology

BIO/PB 414 Cell Biology

BIO 424 Endocrinology

BIO 488 Neurobiology

BCH 351 or 451 Biochemistry

GN 311 Principles of Genetics

GN 312 Elementary Genetics Lab

Physiology Requirement²

MA 131 Calculus for Life and Management Sciences A

MA 231 Calculus for Life and Management Sciences B

CH 101/102 Chemistry – A Molecular Science & Lab

CH 221/222 Organic Chemistry I & Lab

CH 223/224 Organic Chemistry II & Lab

CH 201/202 Chemistry - A Quantitative Science & Lab

PY 211 College Physics I

PY 212 College Physics II

ST 311 Introduction to Statistics

IPN Electives⁷

Supraorganismal Elective⁸

Advanced Writing Requirement⁵

ENG 101 Academic Writing & Research Taking courses for credit only (S/U): PE, Free Electives and courses offered only for S/U credit can be applied to graduation requirements. Students should check with their adviser before electing to take any course that normally is graded A-F as an S/U course.¹ **Mathematics Alternatives**

MA 141 and MA 241 is a suitable substitute for MA 131 and MA 231.²

² **Physiology Requirement** (take one of the following options)

BIO 301 and BIO 302 together are a suitable substitute for BIO 250.

BIO 212 also is a suitable substitute for BIO 250.³ BIO 240 and BIO 245 are a suitable substitute for BIO 250.

³ **Free Electives** (take 9 credit hours)

These electives cannot be remedial nor can they be taken at an elementary level after you have taken comparable coursework at a more advanced level. ST 311 is recommended as a Free Elective. Students interested in graduate school or professional school should check the courses required for admission to the programs to which they plan to apply.⁴

⁴ **Physics Alternatives**

PY 205 and PY 208 can be substitutes for PY 211 and PY 212. PY 205 and PY 208 are calculus-based and require that you take the 40 series of Mathematics¹ (MA 141 and MA 241). PY 201 and PY 202 would also be a suitable substitute for PY 211 and PY 212. PY 201 and PY 202 are calculus-based, require the 40 series of Mathematics¹, and are restricted to students in PAMS.

⁵ **Advanced Writing Requirement** (take one course)

Cannot be double-counted for a GEP requirement.

COM 211 Argumentation and Advocacy

ENG 201 Writing Literary Analysis

ENG 214 Introduction to Editing

ENG 232 Literature and Medicine

ENG 233 The Literature of Agriculture

ENG 287 Explorations in Creative Writing

ENG 288 Fiction Writing

ENG 289 Poetry Writing

ENG 292 Writing about Film

ENG 316 Principles of News and Article Writing

ENG 323 Writing in the Rhetorical Tradition

ENG 331 Communication for Engineering and Technology (Junior standing)

ENG 332 Communication for Business and Management (Junior standing)

ENG 333 Communication for Science and Research (Junior standing)

ENG 381 Creative Nonfiction Writing Workshop (ENG 215, 287, 288, or 289 required)

ENG 388 Intermediate Fiction Writing Workshop (a "B" or better in ENG 288 required)

ENG 389 Intermediate Poetry Writing Workshop (a "B" or better in ENG 289 required)

ENG 416 Advanced News and Article Writing (ENG 215 required)
ENG 417 Editorial and Opinion Writing (ENG 214 and 215 required)
ENG 422 Writing Theory and the Writing Process
ENG 425 Analysis of Scientific and Technical Writing (ENG 314, 331, 332 or 333 required)
ENG 426 Analyzing Style

⁶ **Additional Science & Math Electives** (take 9 credit hours) Courses may be selected from the Sci & Math Electives list. Students also can use up to 3 hours of AEC 450, BIO 230, BIO 269, BIO 310, BIO 416, BIO 418, BIO 432, BIO 444, BIO 456, BIO 492, BIO 493, BIO 498/499 (must complete both), BEC/BIT 463, BIT 477, MA 331, MB 470, GN 453, ZO 334, or ZO 486 toward this requirement. Students interested in graduate school or professional school should check the courses required for admission to the programs to which they plan to apply.

⁷ **IPN Electives** (take 9 credit hours)

Select from the following list. Students can use up to 3 hours of BIO 492 or BIO 493 or ALS 499 toward IPN Electives.

AEC/FW 515 Fish Physiology
ANS 220/221 Reproductive Physiology and Lab
ANS/NTR/PO 415 Comparative Nutrition
BIO 310 Quantitative Approaches to Biological Problems
BIO 361 Developmental Biology
BIO 418 Cell Biology Research Laboratory
BIO 421 Advanced Human Anatomy & Physiology
BIO 422 Biological Clocks
BIO 432 Evolutionary Medicine
BIO 444 Biology of Love and Sex
BIO 456 Epigenetics, Development, and Disease
BIO 478 Research Fundamentals in Behavioral Neuroscience
BIO 483 Capstone in Integrative Physiology and Neurobiology
BIO 426 Advanced Human Anatomy & Physiology Lab
BIO 492 External Learning Experience (Physiology/Neuroscience focused)
BIO 493 Special Topics in Biology (Physiology/Neuroscience focused)
BIO 518 Experience and the Brain
BIT 564 Protein Purification
BIT 471 RNA Interference and Model Organisms
BIT 478/578 Mapping the Brain
BIT 566 Animal Cell Culture Techniques
ENT 503 Insect Morphology and Physiology
GN 434 Genes and Development
GN 441 Human and Biomedical Genetics
GN 453 Personal Genomics
GN 456 Epigenetics, Development, and Disease
MB 441 Immunology
NTR 419 Human Nutrition and Chronic Disease
PO 404/504 Avian Anatomy and Physiology
PSY 502 Physiological Psychology
TOX 401/501 Principles of Toxicology
ZO 503 General Physiology I
ZO 504 General Physiology II
ZO 513 Comparative Physiology
AEC 515 Fish Physiology
ZO 524 Comparative Endocrinology

⁸***Supraorganismal Elective*** (take one of the following)

AEC 400 Applied Ecology
AEC 450 Conservation Genetics
BIO/MEA 220 Marine Biology
BIO 317 Primate Ecology and Evolution
BIO/PB 330 Evolutionary Biology
BIO 333 Captive Animal Biology
BIO 350 Animal Phylogeny and Diversity
BIO 353 Wildlife Management
BIO 432 Evolutionary Medicine
BIO/PB 360 Ecology
BIO 402 Invertebrate Biology
BIO 410 Animal Behavior
AEC 419 Limnology
BIO/ENT 425 General Entomology
AEC 441 –and- AEC 442 Biology of Fishes and Biology of Fishes Lab
AEC 460 Field Ecology and Methods
MB 409 Microbial Diversity
NR 406 Conservation of Biological Diversity
PB 222 Kingdom of Fungi
PB 360 –and- PB 365 Introduction to Ecology and Ecology Lab
PB 400 Plant Structure and Diversity
PB 403 Systematic Botany
PB 405 Wetland Flora
PB 544 Plant Geography
PB 565 Plant Community Ecology
AEC 501 Ornithology
ZO 542 Herpetology
ZO 544 Mammology

⁹***Cell Biology Requirement***

BIO/PB 414 Cell Biology
BIO 416 Cancer Cell Biology

***General Education Program (GEP) requirements and GEP Footnotes**

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at <http://oucc.dasa.ncsu.edu/general-education-program/>.

A. Introduction to Writing: ENG 101 (4 credit hours with a C- or better) *Must be taken during the first year.*

B. Mathematical Sciences (6 credit hours; one course with MA or ST prefix)

In IPN, this GEP requirement is met through the Major course requirements.

C. Natural Sciences (7 credit hours; include one laboratory course or course with a lab)

In IPN, this GEP requirement is met through the Major course requirements.

D. Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list. Some courses on this list will also meet the U.S. Diversity or Global Knowledge co-requisites.

E. Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Social Sciences course list. Some courses on this list will also meet the U.S. Diversity or Global Knowledge co-requisites.

F. Health & Exercise Studies (2 credit hours; at least one 100-level Fitness and Wellness Course)

Choose from the University approved GEP Physical Education/Healthy Living course list.

G. Additional Breadth (3 credit hours)

Choose from the University approved GEP Humanities course list or the GEP Social Sciences course list or the GEP Visual & Performing Arts course list. Some courses on this list will also meet the U.S. Diversity or Global Knowledge co-requisites.

H. Interdisciplinary Perspectives (5 credit hours)

In IPN, 2 credit hours of this GEP requirement is met through Major course requirements. For the remaining 3 credit hours, choose from the University approved GEP Interdisciplinary Perspectives course list. Some courses on this list will also meet the U.S. Diversity or Global Knowledge co-requisites.

The following **Co-Requisites** must be satisfied to complete the General Education Program requirements

I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

J. Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

K. Foreign Language proficiency Proficiency at the FL_102 level is required for graduation.