# Biology (PhD)

# **Degree Requirements**

Students may choose from the degree tracks below to complete coursework within a focus area.

# Degrees earned will be distributed as: "Doctor of Philosophy in Biology" without track specifications.

Cod	de	Title	Hours
Core Courses   AEC 502 Introduction to Biological Research   PHI 816 Introduction to Research Ethics		3	
A	AEC 502	Introduction to Biological Research	
F	PHI 816	Introduction to Research Ethics	
Ado	ditional Cours	ses	69
"Additional Courses" are determined in conjunction with the academic committee to meet the 72 total hours			
Total Hours		72	

# **Aquaculture and Aquatic Sciences Track**

Сс	ode	Title	Hours	
Qı	Quantitative Requirement 3			
Se	Select one of the following courses:			
	ST 511	Statistical Methods For Researchers I		
	or ST 512	Statistical Methods For Researchers II		
	BIT 815	Advanced Special Topics <sup>2</sup>		
	AEC 510	Machine Learning Approaches in Biological Sciences		
	ST 505	Applied Nonparametric Statistics		
	BMA 567	Modeling of Biological Systems		
Re	stricted Electi	ve	6	
Se	elect two of the f	following courses:		
	AEC/ENT 509	Ecology and Conservation of Freshwater Invertebrates		
	AEC 515	Fish Physiology		
	AEC 519	Freshwater Ecology		
	AEC 624	Advanced Fisheries Science		
	AEC 592	Special Topics in Applied Ecology (Managemen Small Impoundments)	t of	
	AEC 592	Special Topics in Applied Ecology (Aquatic Plan Ecology)	t	
	AEC 592	Special Topics in Applied Ecology (Advanced Biology of Fishes)		
	AEC 624	Advanced Fisheries Science		
	AEC 710			
	AEC 726			
	BMA 772	Biomathematics II: Stochastic Models in Biology		
	FW 511	Human Dimensions of Wildlife and Fisheries		
	MEA 549	Principles of Biological Oceanography		
	NR 595	Special Topics in Natural Resources		
	TOX 715	Environmental Toxicology		
	ZO 524			
То	Total Hours 9			

<sup>2</sup> BIT 815 or any Bioinformatics course determined in conjunction with the academic committee.

# Molecular, Cellular and Developmental Biology Track

Code		Title	Hours
Quanti	tative Biol	ogy Requirement	3
Select one of the following courses:			
ST 5	11	Statistical Methods For Researchers I	
or	ST 512	Statistical Methods For Researchers II	
BIT 8	315	Advanced Special Topics <sup>2</sup>	
AEC	510	Machine Learning Approaches in Biological Sciences	
Restric	ted Electi	ve	3
Select one course from the following:			
BIO	592	Topical Problems (Capstone Course in Molecula Cellular, and Developmental Biology)	ar,
GN 7	701	Molecular Genetics	
GN 7	702	Cellular and Developmental Genetics	
GN 7	750		
Biotechnology Requirement 4			4
Select one course below determined in conjunction with the academic committee based on thesis research			
BIT (	510	Core Technologies in Molecular and Cellular Biology	
BIT	595	Special Topics	
Total Hours 1			10

<sup>2</sup> BIT 815 or any Bioinformatics course determined in conjunction with the academic committee.

# **Ecology and Evolution Track**

Code	Title	Hours
Quantitative Rec	luirement	3
ST 511	Statistical Methods For Researchers I	
or ST 512	Statistical Methods For Researchers II	
AEC 510	Machine Learning Approaches in Biological Sciences	
ST 505	Applied Nonparametric Statistics	
BMA 567	Modeling of Biological Systems	
Ecology Require	ement	3
AEC 503	Foundations of Ecology	
AEC 519	Freshwater Ecology	
AEC 718	Community Ecology	
AEC 761	Conservation and Climate Science	
BIO/BMA 560	Population Ecology	
MEA 752	Marine Plankton Ecology	
Evolution Requirement		3
BIO 570	Evolutionary Ecology	
ENT 591	Special Topics In Entomology	
GN 703	Population and Quantitative Genetics	
GN 713	Quantitative Genetics and Breeding	

Total Hours		
PB 545	Paleobotany	
PB 503	Systematic Botany	
GN 757	Quantitative Genetics Theory and Methods	
GN 740		

#### **Forensic Sciences Track**

Code	Title	Hours
Restricted Electives		4
BIO 520	Skeletal Biological Laboratory Methods in Huma Identification & Cold Cases	an 3
BIO 811	Forensic Sciences Seminar	1
Quantitative Requirements		9
ST 511	Statistical Methods For Researchers I	
ST 512	Statistical Methods For Researchers II	
ST 540	Applied Bayesian Analysis	
Total Hours		

#### **OTHER REQUIREMENTS**

- Every student is required to complete training logs. Many of the modules can be completed while taking the BIO 520 course. Please contact the Forensic Sciences Concentration Chair for additional information.
- Students are also required to start the Training Case Record Form after their first year and/or after taking BIO 520, whichever comes first. Please contact the Forensic Sciences Concentration Chair for additional information.
- Forensic Anthropology Society of Europe Level II Certification is strongly recommended but not required- costs associated with this exam are the student's responsibility.

#### **Physiology and Behavior Track**

C	ode	Title H	lours
Q	Quantitative Biology Requirement     3		
	ST 511	Statistical Methods For Researchers I	
	or ST 512	Statistical Methods For Researchers II	
	BIT 815	Advanced Special Topics <sup>1</sup>	
	AEC 510	Machine Learning Approaches in Biological Sciences	
	ST 505	Applied Nonparametric Statistics	
	BMA 567	Modeling of Biological Systems	
R	estricted Electi	ves	6
Se	elect two of the f	following courses:	
	AEC/ENT 509	Ecology and Conservation of Freshwater Invertebrates	
	AEC 515	Fish Physiology	
	AEC 519	Freshwater Ecology	
	AEC 624	Advanced Fisheries Science	
	AEC 592	Special Topics in Applied Ecology (Management Small Impoundments)	of
	AEC 592	Special Topics in Applied Ecology (Aquatic Plant Ecology)	
	AEC 592	Special Topics in Applied Ecology (Advanced Biology of Fishes)	

AEC 624	Advanced Fisheries Science		
AEC 710			
AEC 726			
BMA 772	Biomathematics II: Stochastic Models in Biology		
FW 511	Human Dimensions of Wildlife and Fisheries		
MEA 549	Principles of Biological Oceanography		
NR 595	Special Topics in Natural Resources		
TOX 715	Environmental Toxicology		
ZO 524			
Additional Courses		63	
Additional courses are determined in conjunction with the academic			
committee to meet the 72 total hours			
Total Hours			

<sup>1</sup> Students may take PHI 816 Introduction to Research Ethics or equivalent to meet this requirement.

### **Integrative Biology Track**

This concentration is open to MS and PhD students who do not fit academically within the other Biology concentrations, or who integrate across multiple concentrations. Coursework is determined in consultation with your PhD mentor and committee and is approved by the DGP.

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Carolyn Jane Mattingly David Muddiman Heather B. Patisaul Luis Alonso Ramirez-Ulate Ann Helen Ross Bruce A Schulte Mary Higby Schweitzer David R. Tarpy Scott M. Belcher Shobhan Gaddameedhi Adam Hartstone-Rose Randall Brian Langerhans John Edward Meitzen Nanette M. Nascone-Yoder Marianne Niedzlek-Feaver Antonio Planchart Reade Bruce Roberts Jie Cao Khara Deanne Grieger Nathan James Hostetter Kurt Marsden Jamian Krishna Pacifici Seema Nayan Sheth Caitlin Suzanne Smukowski Heil Joy Little Snowden Bradley William Taylor Christopher Scott Walker Elsa Youngsteadt Jennifer L. Campbell Louis Broaddus Daniel III Miles Dean Engell Miriam G. Ferzli Jesse Robert Fischer **Terry Allen Gates** William Miller Johnstone III Jane L. Lubischer

Erin Alison McKenney Lisa M. Paciulli Lisa D. Parks Martha Burford Reiskind Damian Shea Adrian Alan Smith Lindsay E. Zanno Peter T. Bromley Billy J. Copeland Frederick T. Corbin Phillip D. Doerr William C. Grant Robert M. Grossfeld Thurman L. Grove Harold F. Heatwole Joseph E. Hightower Richard A. Lancia Richard L. Noble Kenneth H. Pollock James Alan Rice Jr. John F. Roberts Damian Shea Theodore R. Simons Herbert A. Underwood John G. Vandenbergh Thomas G. Wolcott Robert R. Anholt Tyler Ray Black Arthur E. Bogan Heather Evans John G. Boreman Jr. David T. Cobb Louis Broaddus Daniel III Mitchell J. Eaton John Jeffrey Govoni Nicholas M. Haddad

Andrew Bittinger Heckert Ryan J. Heise Guohong Cui Corinne J. Kendall Reid W. Laney Trudy F. MacKay Alexa J. McKerrow Gerard McMahon James Adiel Morris Jr. Jennifer R Runkle Megan Elizabeth Serr Rowland M. Shelley Kyle W. Shertzer Adrian Alan Smith Seth Patrick Stapleton Bryan Lynn Stuart Adam J. Terando

#### **Assistant Professors**

Christa Baker

Carter K. Clinton

Alexandra Grace Duffy

Natalia Dugue-Wilckens

Corey Dunn

Nadya Rose Mamoozadeh

Maria L. Rodgers

Julie K Wesp

### **Adjunct Professors**

Michael Childress

Christian Farrell Kammerer

Carol Price

Candice Small

#### **Teaching Associate Professor**

Jennifer Landin

#### **Adjunct Associate Professor**