

SUBCOMMITTEE A – AGENDA

Via Zoom
January 18, 2024
1:30 p.m.

PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

1. Request to establish a **Bachelor of Science in Aquatic Ecology and Management** in the Department of Fisheries and Wildlife. The University Committee on Undergraduate Education (UCUE) recommended approval of this request at its November 30, 2023 meeting.

- a. **Background Information:**

The Department of Fisheries and Wildlife has offered an undergraduate degree program related to conservation of fish, wildlife, and water for more than 70 years. The program currently offers one Fisheries and Wildlife degree, with six concentrations – Conservation Biology, Fisheries Biology and Management, Wildlife Biology and Management, Water Sciences, Fish and Wildlife Disease Ecology and Management, and Pre-veterinary Medicine. The department proposes moving from a single bachelor's degree to offering four degrees, each of which builds on one of our four concentrations with the highest enrollments– Applied Conservation Biology, Fish Ecology and Management, Wildlife Ecology and Management, and Aquatic Ecology and Management.

As the department developed these proposed new majors, they updated the degree requirements (as compared to the existing degree and concentration requirements), to meet the interests and needs of students, and to address the feedback from and demands of employers, so that the program stays competitive and remains a leader among similar programs in Michigan and across the U.S. The academic programs in Fisheries and Wildlife at MSU are recognized within the discipline as being among the top programs across the nation, and the adjustments that have been made to program requirements will help maintain that stature. These adjustments include increased emphasis on global climate change, natural resources policy, and diversity, equity and inclusion. Also added are two new courses: a first-year skills-based 1-credit course, and a 3-credit senior capstone course (filling a gap in the curriculum in terms of synthesis).

The implementation of the four proposed degrees also will help prospective students find fisheries and wildlife earlier in their academic careers. Many students who have changed majors to Fisheries and Wildlife share they hadn't thought they would be interested in Fisheries and Wildlife. By adding majors in Applied Conservation Biology, and Aquatic Ecology and Management, the department will better attract those students as they enroll at MSU, which will promote more timely degree progress for these students.

This proposed major and the other three proposed new majors will continue to be unique among degree programs at MSU, due to the integration of fundamental sciences (biology, ecology, chemistry, geology, etc), management and decision-making techniques, and human dimensions. The department's breadth of research and partnerships, and location in the greater Lansing area, give the program an additional advantage in that it incorporates personnel from several state and federal natural resource agencies (all potential employers of students) into classes and into student experiential opportunities.

There are no accrediting bodies for fisheries and wildlife, but the American Fisheries Society, The Wildlife Society, and the Ecological Society of America all have certification requirements. The curriculum is intentionally designed so that students can choose courses that will allow them to successfully apply for certification upon graduation, if that is what they desire. Students not desiring certification have even broader course options within topic categories.

The department has a strong and successful tradition of offering undergraduate degrees in this field. Many department alumni gain employment with Michigan natural resource agencies (and more broadly) with whom we have strong partnerships. Given the complex and increasingly apparent effects of climate change on natural resources, the program is timelier than ever.

- b. **Academic Programs Catalog Text:**

The Bachelor of Science in Aquatic Ecology and Management is designed for students interested in examining the biological, physical, chemical, geological and hydrological aspects of lakes and ponds, rivers and streams, wetlands and groundwaters, with an emphasis on water quality. This

major provides students with the understanding and skills needed for careers related to protecting and restoring water resources around the North American Great Lakes region and the world.

Admission as a Junior

To be considered for admission to the major, the student must:

1. Complete at least 56 credits.
2. Complete the following courses with a minimum grade of 2.0 in each course:

FW	101	Fundamentals of Fisheries and Wildlife Ecology and Management	3
FW	101L	Fundamentals of Fisheries and Wildlife Ecology and Management Lab	2
FW	293	Undergraduate Seminar in Fisheries and Wildlife	1
3. Pass the following courses:
 - a.

FW	102	Succeeding in Fisheries and Wildlife – New Student Seminar	1
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 - b. One of the following courses:

MTH	124	Survey of Calculus I	3
MTH	132	Calculus I	3
LB	118	Calculus I	4

Requirements for the Bachelor of Science Degree in Aquatic Ecology and Management

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Aquatic Ecology and Management.

The University's Tier II writing requirement for the Aquatic Ecology and Management major is met by completing Fisheries and Wildlife 497 referenced in item 3. below.

Students who are enrolled in the Aquatic Ecology and Management major leading to the Bachelor of Science degree in the Department of Fisheries and Wildlife may complete an alternative track to Integrative Studies in Biological and Physical Sciences by completing BS 161, BS 162 and CEM 141 below. The completion of BS 171 or BS 172 and CEM 161 satisfies the laboratory requirement. Completion of items 3. a., 3. b., and 3. c. below will be counted toward both the alternative track and the requirements for the major.

The completion of the College of Agriculture and Natural Resources mathematics requirement may also satisfy the University mathematics requirement.

2. The requirements of the College of Agriculture and Natural Resources for the Bachelor of Science degree.

Certain courses referenced in requirement 3. below may be counted toward College requirements as appropriate. The completion of item 3. d. and 3. e. below satisfies the College's mathematics requirement.

Students must earn a 2.0 or higher in all FW courses taken to complete major requirements in item 3. below.

Only credits in courses graded on the numerical or Pass-No Grade system may be counted toward the requirements for the major. Students may not enroll in courses required for the major, including courses in other department, on a Credit-No Credit basis. Only elective courses can be enrolled on a Credit-No Credit basis.

3. The following requirements for the major:

				CREDITS
a. All of the following courses (28 credits):				
BS	161	Cell and Molecular Biology		3
BS	162	Organismal and Population Biology		3
FW	101	Fundamentals of Fisheries and Wildlife Ecology and Management		3
FW	101L	Fundamentals of Fisheries and Wildlife Ecology and Management Lab		2

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	FW	102	Fundamentals of Fisheries and Wildlife – New Student Seminar	1
	FW	293	Undergraduate Seminar in Fisheries and Wildlife	1
	FW	334	Human Dimensions of Fisheries and Wildlife Management	3
	FW	364	Ecological Problem Solving	3
	FW	497	Capstone in Fisheries and Wildlife: Conservation and Management Decision Making (W)	3
	IBIO	355	Ecology	3
	MMG	201	Fundamentals of Microbiology	3
b.	Two of the following courses (5 credits):			
	CEM	141	General Chemistry	4
	CEM	161	Chemistry Laboratory	1
	LB	171	Principles of Chemistry	4
	LB	171L	Principles of Chemistry Laboratory I	1
c.	One of the following courses (2 credits):			
	BS	171	Cell and Molecular Biology Laboratory	2
	BS	172	Organismal and Population Biology Laboratory	2
d.	One of the following courses (3 or 4 credits):			
	LB	273	Physics I	4
	PHY	221	Studio Physics for Life Scientists I	4
	PHY	231	Introductory Physics I	3
e.	One of the following courses (3 or 4 credits):			
	MTH	124	Survey of Calculus I	3
	MTH	132	Calculus I	3
	LB	118	Calculus I	4
f.	One of the following courses (3 or 4 credits):			
	STT	201	Statistical Methods	4
	STT	224	Introduction to Probability and Statistics for Ecologists	3
	STT	231	Statistics for Scientists	3
	STT	421	Statistics I	3
	STT	464	Statistics for Biologists	3
g.	One of the following courses (3 or 4 credits):			
	CSUS	310	History of Environmental Thought and Sustainability	3
	FW	439	Conservation Ethics	3
	HST	391	Environmental History of North America	3
	PHL	340	Ethics	3
	PHL	342	Environmental Ethics	3
	PHL	380	Nature of Science	3
	PHL	442	Ethics and Animals	3
	PHL	480	Philosophy of Science	4
h.	Two of the following courses (6 or 7 credits):			
	COM	100	Human Communication	3
	COM	225	An Introduction to Interpersonal Communication	3
	COM	240	Introduction to Organizational Communication	4
	COM	275	Effects of Mass Communication	3
	CSUS	433	Grant Writing and Fund Development	3
	JRN	472	Environmental, Science and Health Reporting	3
	WRA	331	Writing in the Public Interest (W)	3
	WRA	333	Writing in Corporate Contexts	3
	WRA	335	Writing in Scientific Contexts	3
	WRA	337	Writing and Public Policy	3
	WRA	453	Grant and Proposal Writing	3
i.	Two of the following courses (6 credits):			
	CSUS	354	Water Resources Management	3
	FW	207	Great Lakes: Biology and Management	3
	FW	416	Marine Ecology and Management	3
	FW	417	Wetland Ecology and Management	3
j.	Two of the following courses (6 or 7 credits):			
	FW	420	Stream Ecology	3
	FW	472	Limnology	3
	GLG	303	Oceanography	3
	IBIO	353	Marine Biology (W)	4
	MMG	425	Microbial Ecology	3

k.	One of the following courses (3 or 4 credits):			
	EPI	390	Disease in Society: Introduction to Epidemiology and Public Health	4
	FW	423	Principles of Fish and Wildlife Disease	3
	FW	431	Ecophysiology and Toxicology of Fishes	3
	FW	463	Wildlife Disease Ecology	3
l.	One of the following courses (3 or 4 credits):			
	CSS	455	Environmental Pollutants in Soil and Water	3
	GEO	411	Stream Systems and Landforms	3
	GLG	411	Hydrogeology	3
	GLG	421	Environmental Geochemistry	4
m.	One of the following courses (3 or 4 credits):			
	FOR	419	Applications of Geographic Information Systems to Natural Resources Management	4
	FW	474	Field and Laboratory Techniques for Aquatic Studies	3
	FW	479	Fish Population Analysis and Management	3
	GEO	221	Introduction to Geographic Information and	3
	GEO	221L	Introduction to Geographic Information Laboratory	1
	GLG	446	Ecosystems Modeling, Water and Food Security	3
n.	One of the following courses (3 credits):			
	CSUS	464	Environmental and Natural Resource Policy in Michigan	3
	CSUS	465	Environmental and Natural Law	3
	FOR	466	Natural Resource Policy	3
	FW	445	Biodiversity Conservation Policy and Practice	3
	FW	481	Global Issues in Fisheries and Wildlife	3
	IBIO	446	Environmental Issues in Public Policy	3
	MC	450	International Environmental Law and Policy	3
o.	One of the following courses (3 credits):			
	ANP	443	Human Adaptability	3
	ANP	486	Environmental Archaeology	3
	FOR	360	Forest Ecosystems, Carbon and Climate Change	3
	GEO	409	Global Climate Change and Variability	3
	IBIO	357	Global Change Biology (W)	3
	SOC	478	Climate Change and Society	3
p.	Complete a minimum of 3 credits from the following courses (3 or 4 credits):			
	FW	480	International Studies in Fisheries and Wildlife	1 to 3
	FW	490	Independent Study in Fisheries and Wildlife	1 to 3
	FW	493	Professional Internship in Fisheries and Wildlife	1 to 3
	FW	499	Senior Thesis in Fisheries and Wildlife	4

Effective Fall 2024.

2. Request to establish a **Bachelor of Science in Applied Conservation Biology** in the Department of Fisheries and Wildlife. The University Committee on Undergraduate Education (UCUE) recommended approval of this request at its November 30, 2023 meeting.

a. **Background Information:**

The Department of Fisheries and Wildlife has offered an undergraduate degree program related to conservation of fish, wildlife, and water for more than 70 years. The program currently offers one Fisheries and Wildlife degree, with six concentrations – Conservation Biology, Fisheries Biology and Management, Wildlife Biology and Management, Water Sciences, Fish and Wildlife Disease Ecology and Management, and Pre-veterinary Medicine. The department proposes moving from a single bachelor's degree to offering four degrees, each of which builds on one of our four concentrations with the highest enrollments– Applied Conservation Biology, Fish Ecology and Management, Wildlife Ecology and Management, and Aquatic Ecology and Management.

As the department developed these proposed new majors, they updated the degree requirements (as compared to the existing degree and concentration requirements), to meet the interests and needs of students, and to address the feedback from and demands of employers, so that the program stays competitive and remains a leader among similar programs in Michigan and across

the U.S. The academic programs in Fisheries and Wildlife at MSU are recognized within the discipline as being among the top programs across the nation, and the adjustments that have been made to program requirements will help maintain that stature. These adjustments include increased emphasis on global climate change, natural resources policy, and diversity, equity and inclusion. Also added are two new courses: a first-year skills-based 1-credit course, and a 3-credit senior capstone course (filling a gap in the curriculum in terms of synthesis).

The implementation of the four proposed degrees also will help prospective students find fisheries and wildlife earlier in their academic careers. Many students who have changed majors to Fisheries and Wildlife share they hadn't thought they would be interested in Fisheries and Wildlife. By adding majors in Applied Conservation Biology, and Aquatic Ecology and Management, the department will better attract those students as they enroll at MSU, which will promote more timely degree progress for these students.

This proposed major and the other three proposed new majors will continue to be unique among degree programs at MSU, due to the integration of fundamental sciences (biology, ecology, chemistry, geology, etc), management and decision-making techniques, and human dimensions. The department's breadth of research and partnerships, and location in the greater Lansing area, give the program an additional advantage in that it incorporates personnel from several state and federal natural resource agencies (all potential employers of students) into classes and into student experiential opportunities.

There are no accrediting bodies for fisheries and wildlife, but the American Fisheries Society, The Wildlife Society, and the Ecological Society of America all have certification requirements. The curriculum is intentionally designed so that students can choose courses that will allow them to successfully apply for certification upon graduation, if that is what they desire. Students not desiring certification have even broader course options within topic categories.

The department has a strong and successful tradition of offering undergraduate degrees in this field. Many department alumni gain employment with Michigan natural resource agencies (and more broadly) with whom we have strong partnerships. Given the complex and increasingly apparent effects of climate change on natural resources, the program is timelier than ever.

b. Academic Programs Catalog Text:

The Bachelor of Science in Applied Conservation Biology focuses on the science of analyzing and conserving the earth's biological diversity drawing from the biological, physical and social sciences, economics, and the practice of natural resource conservation and management.

Admission as a Junior

To be considered for admission to the major, the student must:

1. Complete at least 56 credits.
2. Complete the following courses with a minimum grade of 2.0 in each course:

FW	101	Fundamentals of Fisheries and Wildlife Ecology and Management	3
FW	101L	Fundamentals of Fisheries and Wildlife Ecology and Management Lab	2
FW	293	Undergraduate Seminar in Fisheries and Wildlife	1
3. Pass the following courses:
 - a.

FW	102	Succeeding in Fisheries and Wildlife – New Student Seminar	1
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 - b. One of the following courses:

MTH	124	Survey of Calculus I	3
MTH	132	Calculus I	3
LB	118	Calculus I	4

Requirements for the Bachelor of Science Degree in Applied Conservation Biology

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Applied Conservation Biology.

The University's Tier II writing requirement for the Applied Conservation Biology major is met by completing Fisheries and Wildlife 497 referenced in item 3. below.

Students who are enrolled in the Applied Conservation Biology major leading to the Bachelor of Science degree in the Department of Fisheries and Wildlife may complete an alternative track to Integrative Studies in Biological and Physical Sciences by completing BS 161, BS 162 and CEM 141 below. The completion of BS 171 or BS 172 and CEM 161 satisfies the laboratory requirement. Completion of items 3. a., 3. b., and 3. c. below will be counted toward both the alternative track and the requirements for the major.

The completion of the College of Agriculture and Natural Resources mathematics requirement may also satisfy the University mathematics requirement.

2. The requirements of the College of Agriculture and Natural Resources for the Bachelor of Science degree.

Certain courses referenced in requirement 3. below may be counted toward College requirements as appropriate. The completion of item 3. d. and 3. e. below satisfies the College's mathematics requirement.

Students must earn a 2.0 or higher in all FW courses taken to complete major requirements in item 3. below.

Only credits in courses graded on the numerical or Pass-No Grade system may be counted toward the requirements for the major. Students may not enroll in courses required for the major, including courses in other department, on a Credit-No Credit basis. Only elective courses can be enrolled on a Credit-No Credit basis.

3. The following requirements for the major:

				CREDITS
a.	All of the following courses (31 credits):			
	BS	161	Cell and Molecular Biology	3
	BS	162	Organismal and Population Biology	3
	FW	101	Fundamentals of Fisheries and Wildlife Ecology and Management	3
	FW	101L	Fundamentals of Fisheries and Wildlife Ecology and Management Lab	2
	FW	102	Fundamentals of Fisheries and Wildlife – New Student Seminar	1
	FW	293	Undergraduate Seminar in Fisheries and Wildlife	1
	FW	334	Human Dimensions of Fisheries and Wildlife Management	3
	FW	364	Ecological Problem Solving	3
	FW	444	Conservation Biology	3
	FW	445	Biodiversity Conservation Policy and Practice	3
	FW	497	Capstone in Fisheries and Wildlife: Conservation and Management Decision Making (W)	3
	IBIO	355	Ecology	3
b.	One of the following courses (2 credits):			
	BS	171	Cell and Molecular Biology Laboratory	2
	BS	172	Organismal and Population Biology Laboratory	2
c.	Two of the following courses (5 credits):			
	CEM	141	General Chemistry	4
	CEM	161	Chemistry Laboratory	1
	LB	171	Principles of Chemistry	4
	LB	171L	Principles of Chemistry Laboratory I	1
d.	One of the following courses (3 or 4 credits):			
	MTH	124	Survey of Calculus I	3
	MTH	132	Calculus I	3
	LB	118	Calculus I	4
e.	One of the following courses (3 or 4 credits):			
	STT	201	Statistical Methods	4
	STT	224	Introduction to Probability and Statistics for Ecologists	3
	STT	231	Statistics for Scientists	3
	STT	421	Statistics I	3
	STT	464	Statistics for Biologists	3
f.	One of the following courses (3 or 4 credits):			

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	CSUS	310	History of Environmental Thought and Sustainability	3
	FW	439	Conservation Ethics	3
	HST	391	Environmental History of North America	3
	PHL	340	Ethics	3
	PHL	342	Environmental Ethics	3
	PHL	380	Nature of Science	3
	PHL	442	Ethics and Animals	3
	PHL	480	Philosophy of Science	4
g.	Two of the following courses (6 or 7 credits):			
	COM	100	Human Communication	3
	COM	225	An Introduction to Interpersonal Communication	3
	COM	240	Introduction to Organizational Communication	4
	COM	275	Effects of Mass Communication	3
	CSUS	433	Grant Writing and Fund Development	3
	JRN	472	Environmental, Science and Health Reporting	3
	WRA	331	Writing in the Public Interest (W)	3
	WRA	333	Writing in Corporate Contexts	3
	WRA	335	Writing in Scientific Contexts	3
	WRA	337	Writing and Public Policy	3
	WRA	453	Grant and Proposal Writing	3
h.	One of the following courses (3 credits):			
	FW	424	Wildlife Population Analysis and Management	3
	FW	479	Fisheries Population Analysis and Management	3
i.	One of the following courses (3 or 4 credits):			
	FOR	419	Applications of Geographic Information Systems to Natural Resources Management	4
	FW	413	Wildlife Research and Management Techniques	3
	FW	474	Field and Laboratory Techniques for Aquatic Studies	3
	GEO	221	Introduction to Geographic Information	3
	And			
	GEO	221L	Introduction to Geographic Information Laboratory	1
j.	One of the following courses (3 or 4 credits):			
	CSS	350	Introduction to Plant Genetics	3
	IBIO	341	Fundamental Genetics	4
k.	One of the following courses (3 or 4 credits):			
	IBIO	445	Evolution (W)	3
	GLG	304	Physical and Biological History of the Earth	4
	GLG	434	Evolutionary Paleobiology	4
l.	One of the following courses (3 or 4 credits):			
	FOR	340	Forest Ecology	3
	FW	420	Stream Ecology	3
	FW	472	Limnology	3
	IBIO	353	Marine Biology (W)	4
	IBIO	485	Tropical Biology	3
	PLB	441	Plant Ecology	3
m.	One of the following courses (3 credits):			
	CSUS	464	Environmental and Natural Resource Policy in Michigan	3
	CSUS	465	Environmental and Natural Law	3
	FOR	466	Natural Resource Policy	3
	FW	481	Global Issues in Fisheries and Wildlife	3
	IBIO	446	Environmental Issues in Public Policy	3
	MC	450	International Environmental Law and Policy	3
n.	One of the following courses (3 credits):			
	FOR	413	Wildland Fire Ecology and Management	3
	FW	410	Upland Ecology and Management	3
	FW	416	Marine Ecology and Management	3
	FW	417	Wetland Ecology and Management	3
	FW	423	Principles of Fish and Wildlife Disease	3
	FW	463	Wildlife Disease Ecology	3
	PLB	443	Restoration Ecology	3
o.	One of the following courses (3 credits):			
	ANP	443	Human Adaptability	3
	ANP	486	Environmental Archaeology	3
	FOR	360	Forest Ecosystems, Carbon and Climate Change	3

	GEO	409	Global Climate Change and Variability	3
	IBIO	357	Global Change Biology (W)	3
	SOC	478	Climate Change and Society	3
p.	Two of the following courses (6 to 8 credits):			
	ENT	404	Fundamentals of Entomology	4
	ENT	422	Aquatic Entomology	3
	FOR	204	Forest Vegetation	3
	FW	471	Ichthyology	4
	IBIO	306	Invertebrate Biology	4
	IBIO	360	Biology of Birds	4
	IBIO	365	Biology of Mammals	4
	IBIO	384	Biology of Amphibians and Reptiles (W)	4
	PLB	218	Plants of Michigan	3
	PLB	418	Plant Systematics	3
q.	Complete a minimum of 3 credits from the following courses (3 or 4 credits):			
	FW	480	International Studies in Fisheries and Wildlife	1 to 3
	FW	490	Independent Study in Fisheries and Wildlife	1 to 3
	FW	493	Professional Internship in Fisheries and Wildlife	1 to 3
	FW	499	Senior Thesis in Fisheries and Wildlife	4

Effective Fall 2024.

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a. **Background Information:**

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As the department developed these proposed new majors, they updated the degree requirements (as compared to the existing degree and concentration requirements), to meet the interests and needs of students, and to address the feedback from and demands of employers, so that the program stays competitive and remains a leader among similar programs in Michigan and across the U.S. The academic programs in Fisheries and Wildlife at MSU are recognized within the discipline as being among the top programs across the nation, and the adjustments that have been made to program requirements will help maintain that stature. These adjustments include increased emphasis on global climate change, natural resources policy, and diversity, equity and inclusion. Also added are two new courses: a first-year skills-based 1-credit course, and a 3-credit senior capstone course (filling a gap in the curriculum in terms of synthesis).

The implementation of the four proposed degrees also will help prospective students find fisheries and wildlife earlier in their academic careers. Many students who have changed majors to Fisheries and Wildlife share they hadn't thought they would be interested in Fisheries and Wildlife. By adding majors in Applied Conservation Biology, and Aquatic Ecology and Management, the department will better attract those students as they enroll at MSU, which will promote more timely degree progress for these students.

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b. **Academic Programs Catalog Text:**

The Bachelor of Science in Fish Ecology and Management is designed for students interested in the research and management of fish populations, other freshwater and marine organisms, and the ecosystems that sustain them.

Admission as a Junior

To be considered for admission to the major, the student must:

1. Complete at least 56 credits.
2. Complete the following courses with a minimum grade of 2.0 in each course:

FW	101	Fundamentals of Fisheries and Wildlife Ecology and Management	3
FW	101L	Fundamentals of Fisheries and Wildlife Ecology and Management Lab	2
FW	293	Undergraduate Seminar in Fisheries and Wildlife	1
3. Pass the following courses:
 - a.

FW	102	Succeeding in Fisheries and Wildlife – New Student Seminar	1
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 - b. One of the following courses:

MTH	124	Survey of Calculus I	3
MTH	132	Calculus I	3
LB	118	Calculus I	4

Requirements for the Bachelor of Science Degree in Fish Ecology and Management

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Fish Ecology and Management.

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Students who are enrolled in the Fish Ecology and Management major leading to the Bachelor of Science degree in the Department of Fisheries and Wildlife may complete an alternative track to Integrative Studies in Biological and Physical Sciences by completing BS 161, BS 162 and CEM 141 below. The completion of BS 171 or BS 172 and CEM 161 satisfies the laboratory requirement. Completion of items 3. a., 3. b., and 3. c. below will be counted toward both the alternative track and the requirements for the major.

The completion of the College of Agriculture and Natural Resources mathematics requirement may also satisfy the University mathematics requirement.

2. The requirements of the College of Agriculture and Natural Resources for the Bachelor of Science degree.

Certain courses referenced in requirement 3. below may be counted toward College requirements as appropriate. The completion of item 3. d. and 3. e. below satisfies the College's mathematics requirement.

Students must earn a 2.0 or higher in all FW courses taken to complete major requirements in item 3. below.

Only credits in courses graded on the numerical or Pass-No Grade system may be counted toward the requirements for the major. Students may not enroll in courses required for the major, including courses in other department, on a Credit-No Credit basis. Only elective courses can be enrolled on a Credit-No Credit basis.

3. The following requirements for the major:
- | | | | CREDITS |
|----|--|---|---------|
| a. | All of the following courses (35 credits): | | |
| | BS 161 | Cell and Molecular Biology | 3 |
| | BS 162 | Organismal and Population Biology | 3 |
| | FW 101 | Fundamentals of Fisheries and Wildlife Ecology and Management | 3 |
| | FW 101L | Fundamentals of Fisheries and Wildlife Ecology and Management Lab | 2 |
| | FW 102 | Fundamentals of Fisheries and Wildlife – New Student Seminar | 1 |
| | FW 293 | Undergraduate Seminar in Fisheries and Wildlife | 1 |
| | FW 334 | Human Dimensions of Fisheries and Wildlife Management | 3 |
| | FW 364 | Ecological Problem Solving | 3 |
| | FW 471 | Ichthyology | 4 |
| | FW 474 | Field and Laboratory Techniques for Aquatic Studies | 3 |
| | FW 479 | Fish Population Analysis and Management | 3 |
| | FW 497 | Capstone in Fisheries and Wildlife: Conservation and Management Decision Making (W) | 3 |
| | IBIO 355 | Ecology | 3 |
| b. | One of the following courses (2 credits): | | |
| | BS 171 | Cell and Molecular Biology Laboratory | 2 |
| | BS 172 | Organismal and Population Biology Laboratory | 2 |
| c. | Two of the following courses (5 credits): | | |
| | CEM 141 | General Chemistry | 4 |
| | CEM 161 | Chemistry Laboratory | 1 |
| | LB 171 | Principles of Chemistry | 4 |
| | LB 171L | Principles of Chemistry Laboratory I | 1 |
| d. | At least 7 credits from the following courses: | | |
| | CEM 142 | General and Inorganic Chemistry | 3 |
| | CEM 162 | Chemistry Laboratory II | 1 |
| | CEM 143 | Survey of Organic Chemistry | 4 |
| | CEM 251 | Organic Chemistry I | 3 |
| | CSS 210 | Fundamentals of Soil Science | 3 |
| | FOR 419 | Applications of Geographic Information Systems to Natural Resources Management | 4 |
| | GEO 203 | Introduction to Meteorology | 3 |
| | GEO 206 | Physical Geography | 3 |
| | GEO 208 | Physical Geography of the National Parks | 2 |
| | GEO 221 | Introduction to Geographic Information | 3 |
| | GEO 221L | Introduction to Geographic Information Laboratory | 1 |
| | GEO 333 | Geography of Michigan and the Great Lakes Region | 3 |
| | GEO 411 | Stream Systems and Landforms | 3 |
| | GLG 201 | The Dynamic Earth | 4 |
| | GLG 411 | Hydrogeology | 3 |
| | LB 172 | Principles of Chemistry II | 3 |
| | LB 172L | Principles of Chemistry II – Reactivity Laboratory I | 1 |
| | LB 271 | Organic Chemistry | 3 |
| | LB 273 | Physics I | 4 |
| | PHY 221 | Studio Physics for Life Scientists I | 4 |
| | PHY 231 | Introductory Physics I | 3 |
| | PHY 251 | Introductory Physics Laboratory I | 1 |
| | Students who select FOR 419 to fulfill this requirement may not also use GEO 221 and 221L. | | |
| e. | One of the following courses (3 or 4 credits): | | |
| | MTH 124 | Survey of Calculus I | 3 |
| | MTH 132 | Calculus I | 3 |
| | LB 118 | Calculus I | 4 |
| f. | One of the following courses (3 or 4 credits): | | |
| | STT 201 | Statistical Methods | 4 |

PART I - NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES – continued - 11
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	STT	224	Introduction to Probability and Statistics for Ecologists	3
	STT	231	Statistics for Scientists	3
	STT	421	Statistics I	3
	STT	464	Statistics for Biologists	3
g.	One of the following courses (3 or 4 credits):			
	CSUS	310	History of Environmental Thought and Sustainability	3
	FW	439	Conservation Ethics	3
	HST	391	Environmental History of North America	3
	PHL	340	Ethics	3
	PHL	342	Environmental Ethics	3
	PHL	380	Nature of Science	3
	PHL	442	Ethics and Animals	3
	PHL	480	Philosophy of Science	4
h.	Two of the following courses (6 or 7 credits):			
	COM	100	Human Communication	3
	COM	225	An Introduction to Interpersonal Communication	3
	COM	240	Introduction to Organizational Communication	4
	COM	275	Effects of Mass Communication	3
	CSUS	433	Grant Writing and Fund Development	3
	JRN	472	Environmental, Science and Health Reporting	3
	WRA	331	Writing in the Public Interest (W)	3
	WRA	333	Writing in Corporate Contexts	3
	WRA	335	Writing in Scientific Contexts	3
	WRA	337	Writing and Public Policy	3
	WRA	453	Grant and Proposal Writing	3
i.	One of the following courses (3 credits):			
	CSUS	464	Environmental and Natural Resource Policy in Michigan	3
	CSUS	465	Environmental and Natural Law	3
	FOR	466	Natural Resource Policy	3
	FW	445	Biodiversity Conservation Policy and Practice	3
	FW	481	Global Issues in Fisheries and Wildlife	3
	IBIO	446	Environmental Issues in Public Policy	3
	MC	450	International Environmental Law and Policy	3
j.	Two of the following courses (6 credits):			
	CSUS	354	Water Resources Management	3
	FW	416	Marine Ecology and Management	3
	FW	417	Wetland Ecology and Management	3
	FW	420	Stream Ecology	3
	FW	472	Limnology	3
	GLG	303	Oceanography	3
k.	One of the following courses (3 or 4 credits):			
	PLB	218	Plants of Michigan	3
	PLB	418	Plant Systematics	3
	ENT	404	Fundamentals of Entomology	4
	ENT	422	Aquatic Entomology	3
	IBIO	306	Invertebrate Biology	4
l.	One of the following courses (3 or 4 credits):			
	FW	423	Principles of Fish and Wildlife Disease	3
	FW	431	Ecophysiology and Toxicology of Fishes	3
	FW	463	Wildlife Disease Ecology	3
	IBIO	313	Animal Behavior	3
	IBIO	328	Comparative Anatomy and Biology of Vertebrates	4
	IBIO	341	Fundamental Genetics	4
	IBIO	483	Environmental Physiology	3
m.	One of the following courses (3 credits):			
	ANP	443	Human Adaptability	3
	ANP	486	Environmental Archaeology	3
	FOR	360	Forest Ecosystems, Carbon and Climate Change	3
	GEO	409	Global Climate Change and Variability	3
	IBIO	357	Global Change Biology (W)	3
	SOC	478	Climate Change and Society	3
n.	Complete a minimum of 3 credits from the following courses (3 or 4 credits):			
	FW	480	International Studies in Fisheries and Wildlife	1 to 3

FW	490	Independent Study in Fisheries and Wildlife	1 to 3
FW	493	Professional Internship in Fisheries and Wildlife	1 to 3
FW	499	Senior Thesis in Fisheries and Wildlife	4

Effective Fall 2024.

4. Request to establish a **Bachelor of Science in Wildlife Ecology and Management** in the Department of Fisheries and Wildlife. The University Committee on Undergraduate Education (UCUE) recommended approval of this request at its November 30, 2023 meeting.

a. **Background Information:**

The Department of Fisheries and Wildlife has offered an undergraduate degree program related to conservation of fish, wildlife, and water for more than 70 years. The program currently offers one Fisheries and Wildlife degree, with six concentrations – Conservation Biology, Fisheries Biology and Management, Wildlife Biology and Management, Water Sciences, Fish and Wildlife Disease Ecology and Management, and Pre-veterinary Medicine. The department proposes moving from a single bachelor’s degree to offering four degrees, each of which builds on one of our four concentrations with the highest enrollments– Applied Conservation Biology, Fish Ecology and Management, Wildlife Ecology and Management, and Aquatic Ecology and Management.

As the department developed these proposed new majors, they updated the degree requirements (as compared to the existing degree and concentration requirements), to meet the interests and needs of students, and to address the feedback from and demands of employers, so that the program stays competitive and remains a leader among similar programs in Michigan and across the U.S. The academic programs in Fisheries and Wildlife at MSU are recognized within the discipline as being among the top programs across the nation, and the adjustments that have been made to program requirements will help maintain that stature. These adjustments include increased emphasis on global climate change, natural resources policy, and diversity, equity and inclusion. Also added are two new courses: a first-year skills-based 1-credit course, and a 3-credit senior capstone course (filling a gap in the curriculum in terms of synthesis).

The implementation of the four proposed degrees also will help prospective students find fisheries and wildlife earlier in their academic careers. Many students who have changed majors to Fisheries and Wildlife share they hadn’t thought they would be interested in Fisheries and Wildlife. By adding majors in Applied Conservation Biology, and Aquatic Ecology and Management, the department will better attract those students as they enroll at MSU, which will promote more timely degree progress for these students.

This proposed major and the other three proposed new majors will continue to be unique among degree programs at MSU, due to the integration of fundamental sciences (biology, ecology, chemistry, geology, etc), management and decision-making techniques, and human dimensions. The department’s breadth of research and partnerships, and location in the greater Lansing area, give the program an additional advantage in that it incorporates personnel from several state and federal natural resource agencies (all potential employers of students) into classes and into student experiential opportunities.

There are no accrediting bodies for fisheries and wildlife, but the American Fisheries Society, The Wildlife Society, and the Ecological Society of America all have certification requirements. The curriculum is intentionally designed so that students can choose courses that will allow them to successfully apply for certification upon graduation, if that is what they desire. Students not desiring certification have even broader course options within topic categories.

The department has a strong and successful tradition of offering undergraduate degrees in this field. Many department alumni gain employment with Michigan natural resource agencies (and more broadly) with whom we have strong partnerships. Given the complex and increasingly apparent effects of climate change on natural resources, the program is timelier than ever.

b. **Academic Programs Catalog Text:**

The Bachelor of Science in Wildlife Ecology and Management is for students interested in understanding and managing terrestrial habitats and animals including game, non-game, and endangered species.

Admission as a Junior

To be considered for admission to the major, the student must:

1. Complete at least 56 credits.
2. Complete the following courses with a minimum grade of 2.0 in each course:

FW	101	Fundamentals of Fisheries and Wildlife Ecology and Management	3
FW	101L	Fundamentals of Fisheries and Wildlife Ecology and Management Lab	2
FW	293	Undergraduate Seminar in Fisheries and Wildlife	1
3. Pass the following courses:
 - a.

FW	102	Succeeding in Fisheries and Wildlife – New Student Seminar	1
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 - b. One of the following courses:

MTH	124	Survey of Calculus I	3
MTH	132	Calculus I	3
LB	118	Calculus I	4

Requirements for the Bachelor of Science Degree in Wildlife Ecology and Management

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Wildlife Ecology and Management.

The University's Tier II writing requirement for the Wildlife Ecology and Management major is met by completing Fisheries and Wildlife 497 referenced in item 3. below.

Students who are enrolled in the Wildlife Ecology and Management major leading to the Bachelor of Science degree in the Department of Fisheries and Wildlife may complete an alternative track to Integrative Studies in Biological and Physical Sciences by completing BS 161, BS 162 and CEM 141 below. The completion of BS 171 or BS 172 and CEM 161 satisfies the laboratory requirement. Completion of items 3. a., 3. b., and 3. c. below will be counted toward both the alternative track and the requirements for the major.

The completion of the College of Agriculture and Natural Resources mathematics requirement may also satisfy the University mathematics requirement.

2. The requirements of the College of Agriculture and Natural Resources for the Bachelor of Science degree.

Certain courses referenced in requirement 3. below may be counted toward College requirements as appropriate. The completion of item 3. d. and 3. e. below satisfies the College's mathematics requirement.

Students must earn a 2.0 or higher in all FW courses taken to complete major requirements in item 3. below.

Only credits in courses graded on the numerical or Pass-No Grade system may be counted toward the requirements for the major. Students may not enroll in courses required for the major, including courses in other department, on a Credit-No Credit basis. Only elective courses can be enrolled on a Credit-No Credit basis.

3. The following requirements for the major:

				CREDITS
a.	All of the following courses (40 credits):			
	BS	161	Cell and Molecular Biology	3
	BS	162	Organismal and Population Biology	3
	CSS	210	Fundamentals of Soil Science	3
	FW	101	Fundamentals of Fisheries and Wildlife Ecology and Management	3
	FW	101L	Fundamentals of Fisheries and Wildlife Ecology and Management Lab	2
	FW	102	Fundamentals of Fisheries and Wildlife – New Student Seminar	1
	FW	293	Undergraduate Seminar in Fisheries and Wildlife	1

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	FW	334	Human Dimensions of Fisheries and Wildlife Management	3
	FW	364	Ecological Problem Solving	3
	FW	410	Upland Ecology and Management	3
	FW	413	Wildlife Research and Management Techniques	3
	FW	417	Wetland Ecology and Management	3
	FW	424	Wildlife Population Analysis and Management	3
	FW	497	Capstone in Fisheries and Wildlife: Conservation and Management Decision Making (W)	3
	IBIO	355	Ecology	3
b.	One of the following courses (2 credits):			
	BS	171	Cell and Molecular Biology Laboratory	2
	BS	172	Organismal and Population Biology Laboratory	2
c.	Two of the following courses (5 credits):			
	CEM	141	General Chemistry	4
	CEM	161	Chemistry Laboratory	1
	LB	171	Principles of Chemistry	4
	LB	171L	Principles of Chemistry Laboratory I	1
d.	One of the following courses (3 or 4 credits):			
	MTH	124	Survey of Calculus I	3
	MTH	132	Calculus I	3
	LB	118	Calculus I	4
e.	One of the following courses (3 or 4 credits):			
	STT	201	Statistical Methods	4
	STT	224	Introduction to Probability and Statistics for Ecologists	3
	STT	231	Statistics for Scientists	3
	STT	421	Statistics I	3
	STT	464	Statistics for Biologists	3
f.	One of the following courses (3 or 4 credits):			
	CSUS	310	History of Environmental Thought and Sustainability	3
	FW	439	Conservation Ethics	3
	HST	391	Environmental History of North America	3
	PHL	340	Ethics	3
	PHL	342	Environmental Ethics	3
	PHL	380	Nature of Science	3
	PHL	442	Ethics and Animals	3
	PHL	480	Philosophy of Science	4
g.	Two of the following courses (6 or 7 credits):			
	COM	100	Human Communication	3
	COM	225	An Introduction to Interpersonal Communication	3
	COM	240	Introduction to Organizational Communication	4
	COM	275	Effects of Mass Communication	3
	CSUS	433	Grant Writing and Fund Development	3
	JRN	472	Environmental, Science and Health Reporting	3
	WRA	331	Writing in the Public Interest (W)	3
	WRA	333	Writing in Corporate Contexts	3
	WRA	335	Writing in Scientific Contexts	3
	WRA	337	Writing and Public Policy	3
	WRA	453	Grant and Proposal Writing	3
h.	One of the following courses (3 credits):			
	CSUS	464	Environmental and Natural Resource Policy in Michigan	3
	CSUS	465	Environmental and Natural Law	3
	FOR	466	Natural Resource Policy	3
	FW	445	Biodiversity Conservation Policy and Practice	3
	FW	481	Global Issues in Fisheries and Wildlife	3
	IBIO	446	Environmental Issues in Public Policy	3
	MC	450	International Environmental Law and Policy	3
i.	Two of the following courses (8 credits):			
	FW	471	Ichthyology	4
	IBIO	360	Biology of Birds	4
	IBIO	365	Biology of Mammals	4
	IBIO	384	Biology of Amphibians and Reptiles	4
j.	One of the following courses (3 or 4 credits):			
	FOR	204	Forest Vegetation	3

	PLB	218	Plants of Michigan	3
	PLB	418	Plant Systematics	3
k.	One of the following courses (3 or 4 credits):			
	CSS	350	Introduction to Plant Genetics	3
	FOR	340	Forest Ecology	3
	GEO	201	Introduction to Plant Geography	3
	IBIO	485	Tropical Biology	3
	PLB	105	Plant Biology	3
	PLB	301	Introductory Plant Physiology	3
	PLB	402	Biology of Fungi	4
	PLB	441	Plant Ecology	3
	PLB	443	Restoration Ecology	3
i.	One of the following courses (3 or 4 credits):			
	CSS	411	Fire and Environmental Quality	3
	FOR	413	Wildland Fire Ecology and Management	3
	FOR	419	Applications of Geographic Information Systems to Natural Resources Management	4
	FW	423	Principles of Fish and Wildlife Disease	3
	FW	463	Wildlife Disease Ecology	3
	GEO	221	Introduction to Geographic Information and	3
	GEO	221L	Introduction to Geographic Information Laboratory	1
	IBIO	313	Animal Behavior	3
	IBIO	328	Comparative Anatomy and Biology of Vertebrates	4
	IBIO	341	Fundamental Genetics	4
	IBIO	483	Environmental Physiology	3
	SOC	452	Advanced Seminar in Environmental Sociology	3
m.	One of the following courses (3 credits):			
	ANP	443	Human Adaptability	3
	ANP	486	Environmental Archaeology	3
	FOR	360	Forest Ecosystems, Carbon and Climate Change	3
	GEO	409	Global Climate Change and Variability	3
	IBIO	357	Global Change Biology (W)	3
	SOC	478	Climate Change and Society	3
n.	Complete a minimum of 3 credits from the following courses (3 or 4 credits):			
	FW	480	International Studies in Fisheries and Wildlife	1 to 3
	FW	490	Independent Study in Fisheries and Wildlife	1 to 3
	FW	493	Professional Internship in Fisheries and Wildlife	1 to 3
	FW	499	Senior Thesis in Fisheries and Wildlife	4

Effective Fall 2024.

COLLEGE OF HUMAN MEDICINE

1. Request to change the requirements for the **Professional Program in Human Medicine** leading to the **Doctor of Medicine** (M.D.) degree. The University Committee on Graduate Studies (UCGS) will consider this request at its January 22, 2024 meeting.
 - a. Under the heading **PROGRAM IN HUMAN MEDICINE** make the following changes:
 - (1) Under the heading **Admission to the Program in Human Medicine** add the following to paragraph five:
 7. Be immunized per the CDC recommendations for health care providers.
 - (2) Under the **Requirements for the Doctor of Medicine Degree**, in item 4., make the following changes:
 - (1) Delete MED 635.
 - (2) Add the following course:

	NOP	630	Senior Clinical Elective in Neurology	6 to 12
(3)			Change the credits of PHD 604 from '6' to '3 to 12'.	

Effective Summer 2024.

PART II - NEW COURSES AND CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

- FW 102 Succeeding in Fisheries & Wildlife - New Student Seminar
Fall of every year. Spring of every year. 1(1-0) R: Open to undergraduate students in the Department of Fisheries and Wildlife.
- NEW Exploration of academic, social, personal and career decisions that students face in college, with a primary focus on succeeding in Fisheries and Wildlife; and the skills needed to be successful.
Request the use of the Pass-No Grade (P-N) system.
Effective Spring Semester 2024
- FW 497 Capstone in Fisheries and Wildlife: Conservation and Management Decision Making (W)
Fall of every year. Spring of every year. 3(3-0) P: (FW 334) and (CSUS 354 or FW 410 or FW 416 or FW 417 or FW 424 or FW 444 or FW 479) and Completion of Tier I Writing Requirement R: Open to seniors in the Department of Fisheries and Wildlife and open to seniors in the Lyman Briggs College.
- NEW Senior capstone. Emphasis on modes of decision making in natural resources conservation and management, role of models and uncertainty in decision making, and effective communication practices to overcome barriers to decision making.
Effective Fall Semester 2024
- FSC 816 ~~Codex Alimentarius – The Food Code~~
International Food Standards, Codex Alimentarius
Spring of every year. 3(3-0) RB: (FSC 810) or food science, law, food safety, international development or related disciplines. Not open to students with credit in LAW 810F.
How Codex Alimentarius formulates and harmonizes food standards for hygiene, contaminants, food additives, veterinary drugs, and pesticide residues, including its role in the World Trade Organization (WTO) Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) Agreements.
~~Effective Spring Semester 2024~~ Effective Spring Semester 2024
- FSC 821 ~~Wine, Beer, and Spirits Laws and Regulations~~
Beer, Wine and Spirits Laws and Regulations
~~Spring of every year.~~ Spring of every year. 3(3-0) RB: (FSC 811) or prior coursework in food safety, food laws, or food science Not open to students with credit in LAW 810Y.
Laws, regulations, and policies that govern alcoholic beverages in the United States.
~~Effective Summer Semester 2018~~ Effective Spring Semester 2024

COLLEGE OF ENGINEERING

- BE 475 International Studies in Biosystems Engineering
Fall of every year. Abroad Spring of every year. Abroad Summer of every year. Abroad 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department; application required.
- REINSTATEMENT Study abroad emphasizing biosystems and agricultural engineering issues affecting agriculture and natural resources in world, national, and local communities.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer Semester 2024
- CHE 433 Process Design and Optimization I
Fall of every year. ~~4(5-0)~~ 4(4-0) P: (CHE 311 and CHE 312 and CHE 321 and CHE 431) and completion of Tier I writing requirement R: Open to seniors in the Chemical Engineering Major.
Applications of chemical engineering principles in design calculations. Selection of optimum design. Influence of design on capital investment, operating cost, product loss and quality. Mathematical programming methods for optimization.
~~Effective Fall Semester 2014~~ Effective Fall Semester 2024

CSE 801C Introduction to Python Programming
Fall of every year. Spring of every year. 3(2-2) A student may earn a maximum of 3 credits in all enrollments for this course. R: Not open to students in the Department of Computer Science and Engineering. Not open to students with credit in CSE 231.

NEW Programming using Python. Design, implementation and testing of programs to solve problems such as those in engineering, mathematics and science. Programming fundamentals, functions, objects, and use of libraries of functions.
Effective Fall Semester 2024

EGR 494 Advanced Experiential Education II
Fall of every year. Spring of every year. Summer of every year. 1(1-0) A student may earn a maximum of 2 credits in all enrollments for this course. P: EGR 493 R: Open to undergraduate students in the College of Engineering.
~~Supporting students' fourth internship through assessment and reflection to enhance career understanding.~~ Supporting students' fourth internship through assessment and reflection to enhance career understanding. Second enrollments in this course are allowed with approval of the instructor.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
~~Effective Fall Semester 2020~~ Effective Fall Semester 2024

COLLEGE OF HUMAN MEDICINE

EPI 812 ~~Causal Inference in Epidemiology~~
Foundations of Population Health
Fall of every year. 3(3-0) ~~P: EPI 810~~ P: EPI 810 and EPI 829 or approval of department RB: LCS ~~829~~ R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
~~Causality in epidemiology. Application of theoretical concepts to the design, analysis, and assessment of epidemiologic research.~~ Fundamentals of population health research including prevention and intervention strategies for improving population health, and the disparities that exist in morbidity, mortality, and quality of life.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
SA: HM 812
~~Effective Fall Semester 2014~~ Effective Spring Semester 2023

EPI 836 Practicum in Epidemiological Methods
Fall of every year. 3(3-0) ~~P: (EPI 812 or concurrently) and (EPI 826 or concurrently)~~ P: EPI 810 and EPI 829 and EPI 851 and EPI 852 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Data management, analysis, interpretation and presentations using public data sets.
~~Effective Spring Semester 2018~~ Effective Fall Semester 2024

PH 102 Social Justice and Determinants of Health: United States
Fall of every year. Spring of every year. Summer of every year. 3(3-0) RB: PH 101

NEW Introduction to the role of social justice in public health, and the determinants of health, specifically the socio-economic, behavioral, biological, environmental, and other factors that impact human health and contribute to health disparities.
Effective Spring Semester 2024

PH 103 Social Justice and Health Equity: Global Perspectives
Fall of every year. Spring of every year. Summer of every year. 3(3-0) RB: PH 101 and PH 102
NEW In-depth multidisciplinary exploration of critical transnational challenges in global public health such as food insecurity, the refugee and migrant crisis, slums and the global housing crisis, population growth, complex humanitarian emergencies, global mental health, interpersonal violence, among others. Topics will be considered from a social justice and health equity perspective, including the influence of social, economic, political and environmental systems on global health outcomes.
Effective Fall Semester 2024

PH 825 Transition to Graduate Academic Writing
Fall of every year. Spring of every year. Summer of every year. 1(1-0) RB: completion of Tier 2 writing assignment or undergraduate degree R: Open to students in the Public Health Major and open to juniors or seniors or graduate students or approval of college.
Identify and analyze scholarly articles and published research studies to develop effective writing skills within the genre of academic writing and scholarship.
~~Request the use of the Pass No Grade (P-N) system.~~
SA: HM 825
Effective Spring Semester 2024

ANTR 350 Human Gross Anatomy for Pre-Health Professionals
Fall of every year. Spring of every year. Summer of every year. ~~3(4-0)~~ 4(4-0) P: BS 161 or BS 181H or LB 145 R: Not open to freshmen or approval of department.
Survey of human systemic gross anatomy with clinical illustrations. Structural basis of organ system physiology. Introduction to medical terminology and clinical language.
~~Effective Summer Semester 2015~~ Effective Fall Semester 2023

~~ANTR 355~~
ANTR 355L Human Gross Anatomy Laboratory
Fall of every year. ~~Grand Rapids, Grand Rapids, Grand Rapids~~ Grand Rapids Spring of every year. ~~Grand Rapids, Grand Rapids, Grand Rapids~~ Grand Rapids Summer of every year. ~~Grand Rapids, Grand Rapids, Grand Rapids~~ Grand Rapids 4(0-3) 2(0-4) P: ANTR 350 or concurrently R: ~~Approval of department.~~ Approval of department; application required.
Not open to students with credit in KIN 217.
Introductory, structured laboratory survey of human regional gross anatomy using dissections, medical imaging, and multimedia for students in allied medical fields.
Correct usage and pronunciation of medical terminology.
SA: ANTR 381
~~Effective Spring Semester 2018~~ Effective Spring Semester 2022

ANTR 485 Directed Study in Human Prosection
Fall of every year. Spring of every year. Summer of every year. ~~2(0-6)~~ 3(0-6) ~~A student may earn a maximum of 14 credits in all enrollments for this course. A student may earn a maximum of 12 credits in all enrollments for this course.~~ P: ANTR 350 or IBIO 328 or KIN 217 or IBIO 320 ~~R: Open to juniors or seniors. Approval of department.~~ R: Open to juniors or seniors. Approval of department; application required.
Prosection of selected regions and isolated structures of preserved human cadavers.
~~Effective Fall Semester 2016~~ Effective Spring Semester 2023

ANTR 585 Directed Study in Human Prosection
Fall of every year. Spring of every year. Summer of every year. 1 to 5 credits. A student may earn a maximum of 15 credits in all enrollments for this course. ~~P: ANTR 551 or ANTR 510~~ P: ANTR 510 or OST 510 R: Open to human medicine students or osteopathic medicine students.
Approval of department.
Prosection of selected regions and isolated structures of preserved human cadavers.
Oral presentation.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
~~Effective Summer Semester 2015~~ Effective Fall Semester 2023

ANTR 590 Independent Study in Clinical Human Morphology
Fall of every year. Spring of every year. Summer of every year. 1 to 5 credits. A student may earn a maximum of 10 credits in all enrollments for this course. P: OST 510 or ANTR 510 RB: Admission to the College of Human Medicine or the College of Osteopathic Medicine or graduate program in the College of Nursing R: Open to human medicine students and open to osteopathic medicine students and open to graduate students in the College of Nursing. Approval of department.
Independent study of a specific topic from gross anatomy, histology, radiological anatomy, cytology, neuroscience, or embryology.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
~~Effective Summer Semester 2014~~ Effective Spring Semester 2024

ANTR 880 Advanced Human Gross Anatomy for Education or Research
~~Fall of even years. Spring of odd years. 5(4-4) 5(3-4)~~ R: Approval of department.
Human gross anatomy using prosections, medical imaging, and multimedia resources.
~~Effective Fall Semester 2019~~ Effective Spring Semester 2025

COLLEGE OF NATURAL SCIENCE

BS 182H Honors Organismal and Population Biology
Fall of every year. 3(3-0) ~~Interdepartmental with Plant Biology~~ Not open to students with credit in LB 144.
Diversity and basic properties of organisms, with emphasis on genetic principles, ecological interactions, and the evolutionary process. Historical approach to knowledge discovery.
SA: BS 148H, BS 110
~~Effective Summer Semester 2022~~ Effective Summer Semester 2023

BS 192H Honors Organismal and Population Biology Laboratory
Fall of every year. 2(1-3) ~~Interdepartmental with Plant Biology~~ P: BS 182H or concurrently Not open to students with credit in LB 144.
Nature and process of organismal biology, including experimental design and statistical methods, hypothesis testing, genetics, ecology, and evolution.
SA: BS 158H, BS 110
~~Effective Summer Semester 2022~~ Effective Summer Semester 2023

GLG 200 Introduction to Environmental Science and Global Change
Fall of every year. Spring of every year. 4(3-2)
NEW Tools and knowledge to understand our earth systems and current issues in the environmental sciences and global change. Use of geology, physics, chemistry, and biology to explore concepts and case studies across local, regional, and global scales. Build the environmental science foundation for communicating and working across disciplines to solve problems in society.
Effective Spring Semester 2024

GLG 201 ~~The Dynamic Earth~~
Introduction to Earth and Planetary Sciences
Fall of every year. Spring of every year. 4(3-2) Not open to students with credit in GLG 301.
~~Physical and chemical processes related to the past, present and future behavior of the earth system, and the energy systems that drive these processes. A study of the earth's materials, the earth's surface and the earth's interior.~~ Physical and chemical processes related to the past, present, and future behavior of Earth systems, and the energy systems that drive them. Earth and planetary materials, interior and surface processes, and associated natural resources and hazards.
~~Effective Fall Semester 2017~~ Effective Fall Semester 2023

- GLG 203 Geology of the Great Lakes Region
Spring of every year. 3(3-0) P: (PHY 183 or PHY 231 or PHY 193H or PHY 221) and (CEM 141 or CEM 151 or LB 171 or CEM 181H) RB: Physical science, environmental engineering, civil engineering R: Open to undergraduate students in the Department of Civil and Environmental Engineering. Not open to students with credit in GLG 201 or GLG 301.
- NEW Geological, physical and chemical processes related to the origin and evolution of the Earth, North American continent, and the Great Lakes environment. Soils, hydrology, Earth structure and materials, geologic hazards.
Effective Fall Semester 2023
- GLG 203L Geology of the Great Lakes Region Supplementary Laboratory
On Demand. 1(0-2) P: (GLG 203 or concurrently) or (GLG 301 or concurrently) Not open to students with credit in GLG 201.
- NEW Laboratory investigation of physical, chemical, and biological phenomena and processes in Earth systems. Experiential study and tools for characterizing and describing Earth materials and observations.
Effective Fall Semester 2023
- GLG 380 Natural Resources, the Energy Transition, and the Environment
Fall of every year. 3(3-0) R: Not open to undergraduate students.
- NEW Introduction to natural resources in the context of the coming energy transition. Will provide an overview of the key concepts, challenges, and opportunities associated with natural resource origin, management, energy transition, and environmental sustainability.
Effective Fall Semester 2024
- GLG 401 Global Tectonics and Earth Structure (W)
Fall of every year. 4(3-2) P: ~~((GLG 304) and completion of Tier I writing requirement) and (MTH 414 or MTH 116 or MTH 124 or MTH 132 or MTH 152H or LB 118) and (PHY 183 or PHY 183B or PHY 231 or PHY 231C or LB 273 or PHY 103H) P: ((GLG 304) and completion of Tier I writing requirement) and (MTH 114 or MTH 116 or MTH 124 or MTH 132 or MTH 152H or LB 118) and (PHY 183 or PHY 183B or PHY 231 or PHY 231C or LB 273 or PHY 193H or PHY 173 or PHY 221 or PHY 241) R: Open to seniors or graduate students.~~ R: Open to undergraduate students or graduate students.
- Structural geology, geological and geophysical methods of studying the structure and dynamics of the earth and planets. Plate kinematics and global geodynamic processes, plate margin processes and evolution, marine geology. Field trip required.
SA: GLG 371
~~Effective Fall Semester 2017~~ Effective Fall Semester 2023
- GLG 412 Glacial Geology and the Record of Climate Change
Spring of every year. 4(3-2) ~~Interdepartmental with Geography~~ RB: GLG 201 or GEO 306 or GEO 408 or GLG 301 R: Not open to freshmen or sophomores.
In-depth analysis of glacial geology and the record of climate change, with emphasis on North America and Europe. Field trip required.
~~Effective Spring Semester 2018~~ Effective Fall Semester 2023
- GLG 422 Field Methods in Environmental Science
Fall of every year. 3(1-4) P: (GLG 201 or GEO 206 or IBIO 355) and (CEM 141 and CEM 161) and (STT 200 or STT 201 or STT 231) R: Open to undergraduate students.
- NEW Intro to field methods in enviro sciences, conceptual design, sample collection, and analysis. Make observations, pose research questions, collect, analyze data, & present findings. Field trips required. Offered first half of semester.
Effective Fall Semester 2024

GLG 444	<p>Cosmochemistry Spring of odd years. 3(2-2) Interdepartmental with Astronomy and Astrophysics. P: (GLG 201 or AST 208) and (MTH 124 or MTH 132 or MTH 152H or LB 118) and (CEM 142 or CEM 152 or CEM 182H or LB 172 or MSE 250) and (PHY 174 or PHY 184 or PHY 184B or PHY 222 or PHY 232 or PHY 232C or PHY 242 or PHY 294H or LB 274) R: Not open to freshmen or graduate students. Not open to students with credit in GLG 844.</p>
NEW	<p>Origin of the elements throughout the universe. History of the galaxy, solar system, and planet Earth as told by the materials that compose them. Study of meteorites and planetary samples theoretically and in the laboratory. Summarize state of field on directed topics. Effective Spring Semester 2024</p>
GLG 445	<p>Planetary Sciences Spring of even years. 3(3-0) Interdepartmental with Astronomy and Astrophysics. P: (GLG 201 or AST 208) and (CEM 142 or CEM 152 or CEM 182H or LB 172 or MSE 250) and (PHY 174 or PHY 184 or PHY 184B or PHY 222 or PHY 232 or PHY 232C or PHY 242 or PHY 294H or LB 274) and (MTH 124 or MTH 132 or MTH 152H or LB 118) R: Not open to freshmen or graduate students. Not open to students with credit in GLG 845.</p>
NEW	<p>Survey of planetary sciences including planetary interiors, surface processes, atmospheres and magnetospheres. Origin and dynamics of planetary systems. Habitability and astrobiology. History and future of space exploration. Design the scientific investigation of a future space mission. Effective Spring Semester 2024</p>
GLG 828	<p>Biogeochemical Cycles Through Time Fall of even years. 3(3-0) RB: Introductory chemistry or equivalent R: Not open to undergraduate students.</p>
NEW	<p>Introduction to chemical tracers for elucidating biogeochemical process on multiple timescales. This includes an overview of modern spatiotemporal biogeochemical gradients, pathways of their geologic preservation, and records of biogeochemical cycles across key events in Earth history. Effective Fall Semester 2024</p>
GLG 844	<p>Graduate Cosmochemistry Spring of odd years. 3(2-2) Interdepartmental with Astronomy and Astrophysics. RB: Introductory chemistry (CEM 142 or equivalent), introductory physics (PHY 174 or equivalent), calculus 1 (MTH 124 or equivalent), and introductory earth or planetary science (GLG 201 or AST 208 or equivalent) R: Not open to undergraduate students. Not open to students with credit in GLG 444.</p>
NEW	<p>Chemical composition of the universe, the Sun, the planets, and their building blocks. Origin of the elements, astrophysical sites of nucleosynthesis, and their galactic chemical evolution. Chemically and isotopically trace cosmic genetic relationships, date important events such as formation of the first solids in the Solar System. Processes that segregate elements and isotopes into different astrophysical and planetary reservoirs. Observe primitive and evolved meteoritic and planetary materials in the laboratory. Synthesize current research on directed topic Effective Spring Semester 2024</p>
GLG 845	<p>Graduate Planetary Sciences Spring of even years. 3(3-0) RB: Introductory chemistry (CEM 142 or equivalent), introductory physics (PHY 174 or equivalent), calculus 1 (MTH 124 or equivalent), and introductory earth or planetary science (GLG 201 or AST 208 or equivalent) R: Not open to undergraduate students. Not open to students with credit in GLG 445.</p>
NEW	<p>Surface and internal properties and processes of planets and their natural satellites, asteroids, and comets. Origin, composition, structure, tectonics, volcanism, impact phenomena, atmospheric evolution, atmosphere-surface interactions, habitability, and history of solar system bodies. Results of recent space exploration programs and missions. Design the scientific investigation of a future space mission using methods from the peer-reviewed literature. Effective Spring Semester 2024</p>

- MTH 396 Capstone in Mathematics for Secondary Education (W)
~~Fall of every year. Spring of every year. 3(3-0) P: (MTH 309 or MTH 317H or approval of department) and (MTH 310 or MTH 418H or approval of department) and (MTH 320 or MTH 327H or approval of department) and Completion of Tier I Writing Requirement P: (MTH 309 or MTH 317H or approval of department) and (MTH 310 or MTH 418H or approval of department) and (MTH 320 or MTH 327H) and Completion of Tier I Writing Requirement R: Approval of department. R: Open to students in the Mathematics-Secondary Education Major. Not open to students with credit in MTH 496.~~
A capstone course for secondary education math majors. High school mathematics from an advanced viewpoint.
~~Effective Fall Semester 2013~~ Effective Fall Semester 2024
- MTH 483 Mathematical Machine Learning
Spring of every year. 3(3-0) P: (MTH 309 or MTH 314 or MTH 317H) and (CSE 231 or CMSE 201)
NEW Regression, clustering, dimension reduction, density estimation, anomaly detection, classification, and related methods (e.g., k-nearest neighbors, support vector machines, neural networks, decision trees, random forests), autoencoders, generative adversarial networks, and existing machine learning tools, training methods, and software.
Effective Fall Semester 2024
- MTH 929 Complex Analysis II
Spring of even years. 3(3-0) RB: MTH 828 and MTH 829 R: Open to doctoral students in the College of Natural Science or approval of department.
REINSTATEMENT Continuation of MTH 829. Topics include Phragmen-Lindelof method, Analytic continuation and Riemann surfaces, Hadamard's theorem, Runge's theorem, Weierstrass factorization theorem, Mittag-Leffler theorem, Picard's theorem, Hp-spaces, Blaschke products.
Effective Spring Semester 2024
- MTH 989 Representation Theory II
Spring of even years. 3(3-0) P: MTH 988 or approval of department
REINSTATEMENT Basic objects and notions of representation theory: associative algebras, algebras defined by generators and relations, group algebras, quivers and path algebras, basic general results of representation theory, representations of finite dimensional algebras and semi simple algebras, extensions of representations, representations of quivers.
Effective Spring Semester 2024
- PLB 499 Senior Seminar (W)
Spring of every year. 1(1-0) ~~P: (PLB 499) and completion of Tier I writing requirement P: (PLB 498 or PLB 495) and completion of Tier I writing requirement~~
A capstone experience that focuses on current developments and issues in plant biology. Scientific writing and oral presentation.
SA: BOT 499
~~Effective Fall Semester 2015~~ Effective Spring Semester 2024

COLLEGE OF NURSING

- NUR 914 Biostatistics for the APRN
Fall of every year. Spring of every year. 3(3-0)
NEW The application of descriptive statistics, bivariable and multivariable inferential statistics (parametric and non-parametric), and essential epidemiological concepts
Effective Fall Semester 2024

COLLEGE OF OSTEOPATHIC MEDICINE

- OST 582 ~~Transitions I: Board Preparation~~
~~Preclerkship Board Preparation~~
~~Spring of every year. Summer of every year. 6 credits. 4(4-0)~~ R: Open to graduate-professional students in the College of Osteopathic Medicine.
Selected topics in preparation for licensure board exams.
Request the use of the Pass-No Grade (P-N) system.
~~Effective Summer Semester 2020~~ Effective Spring Semester 2024
- OST 591 ~~Medical Case Study Journal Review~~
~~Medical Case Studies~~
Fall of every year. Spring of every year. Summer of every year. 1(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine.
Analysis and presentation of published clinical case reports in the context of basic science principles and biomedical concepts.
Request the use of the Pass-No Grade (P-N) system.
~~Effective Spring Semester 2020~~ Effective Fall Semester 2023
- OST 595 Modern Applications of Osteopathic Science
Fall of every year. Spring of every year. 1(1-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to osteopathic medicine students in the College of Osteopathic Medicine.
- NEW pOsteopathic Science is a 1 credit hour course that provides students with an opportunity to consider aspects of Osteopathic care that are separate from Osteopathic Manipulation. This will help Osteopathic medical students form a category for their distinctive place in healthcare. Osteopathic Science is the body of clinical research that supports the tenets of Osteopathy. It focuses specifically on mechanisms of self-healing in the physical, emotional, mental, and spiritual realms of health.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2024
- OST 597 Biomedical Research Structure and Methods
Spring of every year. 2(2-0) ~~P: OST 598~~ P: OST 598 or OST 520
Intensive review of biomedical research methods and statistical analyses for mentored clinical research projects.
Request the use of the Pass-No Grade (P-N) system.
~~Effective Spring Semester 2020~~ Effective Spring Semester 2024