ATTACHMENT D

MICHIGAN STATE
UNIVERSITY

November 20, 2023

MEMORANDUM

TO: Dr. Mark Largent, Vice Provost for Undergraduate Education and Dean of Undergraduate Studies

FROM: Joy Speas, University Curriculum Administrator

RE: Request for a New Bachelor of Science Degree in Fish Ecology and Management

For Transmittal to the University Committee on Undergraduate Education (UCUE)

The request referenced above is being sent to the University Committee on Undergraduate Education (UCUE) in accordance with the *Bylaws for Academic Governance*, 4.4.

UCUE Response Requested:

Please ask the committee to consider the request referenced above and provide consultative commentary. Please mail the related materials referenced under the heading Attachments at the end of this memorandum to the committee members.

After receiving the committee's consultative response, the Provost will make a determination to forward or not to forward the request to the University Committee on Curriculum for its approval of curriculum and degree requirements.

If you have any questions, please email me at ucc@msu.edu.

Thank you.

Attachments:

1. Request to Establish a New Academic Program form dated September 21, 2023: Bachelor of Science Degree in Fish Ecology and Management and attachments.

s:\share\ucuefishecmgtbs

University Curriculum and Catalog

Hannah Admin. Building
426 Auditorium Road
Suite 430
East Lansing, MI 48824

517-355-8420
Fax: 517-355-9601

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

1. Request to establish a **Bachelor of Science** in **Fish Ecology and Management** in the Department of Fisheries and Wildlife. The University Committee on Undergraduate Education (UCUE) will consider 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 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
   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

CREDITS

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.

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

   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:
   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 ad 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
	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.

Michigan State University Office of the Registrar

View a Program

Joy Speas, Office of the Registrar — Wednesday, 10/11/2023

Program Name: Fish Ecology and Management
Degree: BS Sequence Number: 1

Program Request ID: 5001

Effective Dates: Spring 2024 - Open Status: Interim Initial Action: New

Requested Date: 4/8/2023 2:24:45 PM

1. Department/School/College:

10002344 .... Department of Fisheries and Wildlife

2. Name of Program:

Fish Ecology and Management

3. Name of Degree:

BS

4. Type of Program:

Major

5. Effective Start Semester:

Fall ~~Spring~~ 2024

6. Target student audience for the program:

7. Enrollment:

What is the expected enrollment per year: 50

What is the minimum enrollment acceptable: 5

8. Source of budget for the program:

To align academic planning and curricular change, ALL requests for NEW funds must be included in the College's annual planning letter. Provost approval of new funds and the effective date for the new program must align. If funding is not approved, then the program request will not be forwarded to Faculty Senate.

Internal reallocation

If new funds, was this request included in the College's annual planning letter? Indicate yes or no. If no, then this is a department or college fund reallocation (If the program is implemented, no additional resources are required.).

9. Projected Costs as compared to other programs in unit:

Same

10. Staff requirement:

How many additional staff will be required: 0

Who will provide the primary instruction. Describe any external linkages(industry, government, etc.):

11. Will additional equipment be required:

Approximate cost: 0

Source of funding:

12. Will additional library materials be required:

Approximate cost: 0

Source of funding:

13. Will additional space be required:

Type:

Approximate amount:

14. If the program requirements contain a named concentration, do you wish for the concentration to be noted on the student's transcript?:

No

15. Detailed Description:

15. **Detailed description:**

a. Background information including the considerations which precipitated the development of the program, and its relationship to similar programs offered at MSU and by other educational institutions. Supply a copy of standards of accrediting agencies and federal regulations related to the request as appropriate.

Why New Majors?

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. We're moving from a single BS 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 we developed these proposed new majors, we updated the degree

requirements (as compared to our 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 our program stays competitive and remains a leader among similar programs in Michigan and across the U.S. Our academic programs in Fisheries and Wildlife at MSU are recognized within our discipline as being among the top programs across the nation, and the adjustments we have 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. We've also added two new courses: a first-year skills-based 1-credit course, and a 3-credit senior capstone course (filling a gap in our curriculum in terms of synthesis). The implementation of the four proposed degrees also will help prospective students find us earlier in their academic careers. Many students who have changed majors to Fisheries and Wildlife tell us they hadn't thought they would be interested in Fisheries and Wildlife. By adding majors in Applied Conservation Biology, and Aquatic Ecology and Management, we will better attract those students as they enroll at MSU, which will promote more timely degree progress for these students.

Relationship to other programs at MSU

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

Corresponding accreditation

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. We have intentionally designed our proposed new degrees so that our 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.

b. Rationale for offering the program at MSU.

See response to question #1 above. We have a strong and successful tradition of offering undergraduate degrees in this field. Many of our 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, our program is more timely than ever.

c. Rationale for the program being housed in the primary administrative unit.

See response to question #1 above. Our department's academic, research, and outreach/engagement strengths are in the integration of science, human dimensions, and decision making. For the management of wild animal populations, their ecosystems, and their human beneficiaries, our faculty members' expertise makes us the most appropriate department to offer these degrees.

d. Educational objectives of the program and their relationship to those of the college and the University.

Please refer to the learning outcomes assessment components further below for more details of our seven undergraduate learning goals, and their close relationship to college and University learning goals. Our department seeks to educate students who, upon completion of their undergraduate degree, will be prepared to successfully enter a job market or obtain entry into graduate school, and who will continue to contribute their perspectives, skills and talent to conservation and resource stewardship throughout their lives. The seven learning goals provide an operational framework for our Department's undergraduate educational mission. These goals provide the foundational structure for our undergraduate curriculum, incorporating basic sciences, human dimensions, decision making, communication and policy for a solid foundation in the management and conservation of wild animals and ecosystems.

e. Faculty who were instrumental in developing the program and faculty who will be responsible for implementing the program (see item 10).

Drs. Mary Tate Bremigan and Gary Roloff, as well as Mr. Jim Schneider, authored this new program, with assistance from the Fisheries and Wildlife curriculum committee spanning two academic years. All faculty in the Department of Fisheries and Wildlife participated in numerous discussions throughout the development of these proposed majors, and had many opportunities to provide input. The department faculty voted and unanimously approved the creation and structure of these new majors. Drs. Mary Tate Bremigan and Gary Roloff, as well as Mr. Jim Schneider will oversee implementation of this new program.

f. Plan for evaluating the program. Plan for assessing student outcomes. For academic major programs, indicate the learning objectives/goals for students and how outcomes will be assessed . Visit http://www.reg.msu.edu/UCC/assessment.aspx to complete the outcomes assessment form and include with the program submission.

Michigan State University
Assessing Student Outcomes

College: College of Agriculture and Natural Resources
Department: Fisheries and Wildlife
Program or Major: Bachelor of Science in Fish Ecology and Management
Program Level: Undergraduate
Contact Person: Mary Tate Bremigan and Jim Schneider

1. **List the student learning outcomes for this program. Learning outcomes are statements which describe what students should know or be able to do when they complete the program.**

In concise form, the learning outcomes for the proposed BS in Fish Ecology and Management major are the following. Our graduates will:

1) Aapply knowledge of socio-ecological systems to develop natural resource management strategies
2) Integrate social values and philosophies into scientific management

3) Possess a broad scientific foundation
4) Value and apply science for natural resource decision-making
5) Apply quantitative tools to natural resources research and management
6) Demonstrate awareness of field, lab and computer techniques used in our discipline and apply specific ones
7) Effectively communicate with diverse audiences

A more detailed document presenting these learning outcomes can be accessed here: https://www.canr.msu.edu/fw/uploads/files/FW-Undergraduate-Goals-April_2018.pdf (https://www.canr.msu.edu/fw/uploads/files/FW-Undergraduate-Goals-April_2018.pdf)

Note that the Fisheries and Wildlife Department is proposing 4 new majors, including the Fish Ecology and Management major. Each of the 4 majors is grounded in the same broad learning outcomes but will differ from each other in more specific ways (e.g., techniques used to capture fish differ from those used to capture terrestrial or avian animals; different emphasis on game and non-game species; etc)

Below are the institutional level Undergraduate Learning Goals and their associated dimensions. Check the boxes which align with the learning outcomes for this program. (If this program is a graduate program, skip to the next question).

Analytical Thinking
X Acquires, analyzes, and evaluates information from multiple sources (http://learninggoals.undergrad.msu.edu/dimension/multiple-sources)
X Synthesizes and applies information within and across disciplines (http://learninggoals.undergrad.msu.edu/dimension/synthesizes-information)
X Identifies and applies, as appropriate, quantitative methods for defining and responding to problems (http://learninggoals.undergrad.msu.edu/dimension/problem-response)
X Identifies the credibility, use and misuse of scientific, humanistic and artistic methods (http://learninggoals.undergrad.msu.edu/dimension/identifies-credibility)
Cultural Understanding
X Reflects on experiences with diversity to demonstrate knowledge and sensitivity (http://learninggoals.undergrad.msu.edu/dimension/diversity-sensitivity)
X Demonstrates awareness of how diversity emerges within and across cultures (http://learninggoals.undergrad.msu.edu/dimension/diversity-awareness)
Effective Citizenship
X Understands the structures of local, national, and global governance systems and acts effectively within those structures in both individual and collaborative ways. (http://learninggoals.undergrad.msu.edu/dimension/governance-systems)
X Applies knowledge and abilities to solve societal problems in ethical ways. (http://learninggoals.undergrad.msu.edu/dimension/societal-problems)
Effective Communication
X Identifies how contexts affect communication strategies and practices (http://learninggoals.undergrad.msu.edu/dimension/communication-strategies)
X Engages in effective communication practices in a variety of situations and with a variety of media. (http://learninggoals.undergrad.msu.edu/dimension/effective-communication)
Integrated Reasoning
X Critically applies liberal arts knowledge in disciplinary contexts and disciplinary knowledge

in liberal arts contexts (http://learninggoals.undergrad.msu.edu/dimension/liberal-arts-knowledge)

X Uses a variety of inquiry strategies incorporating multiple views to make value judgments, solve problems, answer questions, and generate new understanding (http://learninggoals.undergrad.msu.edu/dimension/inquiry-strategies)

Briefly explain how the student learning outcomes for the program align with and support the institutional Undergraduate Learning Goals.

Learning outcomes of the **Fish Ecology and Management major** align well with all University Undergraduate Learning Goals, although our FW learning outcomes are more specifically worded in terms of our discipline. Analytical thinking, quantitative analyses, and integrated reasoning are paramount to scientific understanding of interactions among wild animal populations, their ecosystems, and humans. Therefore, MSU's 'Analytical Thinking' and 'Integrated Reasoning' goals are evidenced in our FW outcomes 1, 3, 4 and 5. MSU's 'Cultural Understanding' goal is incorporated in the **Fish Ecology and Management major** in several ways, but particularly in the emphasis on understanding the values, beliefs, goals, and actions of the wide diversity of human users of natural resources (FW outcome 2). MSU's goal of 'Effective Citizenship' links to all FW learning outcomes given our emphasis on understanding how humans affect natural resources (wild animal populations and their ecosystems) and identifying the management and conservation actions through which goals may be achieved. Finally, both MSU and FW specify Effective Communication across a variety of audiences and contexts as a learning goal.

2. Describe how you will assess each learning outcome listed in question 1. Include a description of the evidence you will collect as well as when the assessment will take place. (Evidence should be learning a student demonstrates and might include a set of questions from an examination, a course assignment, a final project in a capstone course, a national licensure exam, a senior thesis or project, an evaluation of student work at an internship or clinical site, auditions, performances, etc).

For the first phase of our assessment of student learning, we will draw on curricular mapping emphasizing the 400-level FW courses associated with this major, and linking course-specific learning outcomes to our seven learning outcomes for the major. Most of the 400-level courses in the major are offered by the Fisheries and Wildlife Department. We are identifying course-specific assignments and exam questions that align with each of the 7 broad learning outcomes. Each semester we will gather data on student performance on these particular assessment items, each of which will be linked to a specific component of one of our 7 learning outcomes for the major. We also will incorporate learning outcomes assessment in our new senior capstone course, which we are adding as a new required component of our undergraduate majors, including **Fish Ecology and Management**. We will include an assignment at the beginning of the semester with questions that are linked to the 7 learning outcomes allowing us an additional view of student attainment of the learning outcomes at the start of their final semester. We will assess student synthesis of learning outcomes through the final project in the new capstone course.

Based on the above learning outcomes assessment, if some learning outcomes, content areas, or skills are generally associated with poorer student performance than others, then in a later phase of learning outcomes assessment, we will begin to trace back the acquisition of the learning outcomes with poorer

terminal performance among students. This 'backwards design' to assessment approach will allow us to identify bottlenecks in student learning, and/or gaps in content or skill building between courses.

g. Program description including statement and specific requirements of the program **as they will appear in the University catalog.** Information contained in the catalog represents a University contract with students. **Any deviation from college and University policies must be specifically requested.**

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:
    a. FW 101
    b. FW 101L
    c. FW 293
3. Pass the following courses:
    a. FW 102
    b. MTH 124, MTH 132 or LB 118

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.

    The University's Tier II writing requirement for the ~~Fisheries and Wildlife~~ major is met by completing Fisheries and Wildlife 497 referenced in item 4. below.

    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 4.a., 4.b., and 4.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 4. below may be counted toward College requirements as appropriate. The completion of item 4. e. and 4. f. below satisfy the College's mathematics requirement.

3. Additional Graduation requirements of the major

1. Students must earn a 2.0 or higher in all FW courses taken to complete major requirements (item 4 below).
2. Only credits in courses graded on the numerical or Pass-No Grade system may be counted toward the requirements for the Fish Ecology and Management major. Fish Ecology and Management students may not enroll in courses required for the major, including courses in other departments, on a Credit-No Credit basis. Only elective courses.

4. The following requirements for the major:
   a. All of the following courses (35 credits):

BS	161	Cell and Molecular Biology	3
BS	162	Organismal and Population Biology	3
IBIO	355	Ecology	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	Succeeding in 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

   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 following courses (5 credits):

CEM	141	General Chemistry	4
CEM	161	Chemistry Laboratory I	1

LB 171 Principles of Chemistry I 4
LB 171L Principles of Chemistry Laboratory I 1

d. At least 7 credits from the following courses (7 credits):
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
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
FOR 419 Applications of Geographic Information Systems to Nat Res Mgt 4
LB 172 Principles of Chemistry II 3
LB 172L Principles of Chemistry II – Reactivity Laboratory 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

Maximum of 4 credits allowed from GEO 221 & GEO 221L or FOR 419 for this requirement.

e. ONE of the following courses (3 to 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 to 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 to 4 credits):

FW 439 Conservation Ethics 3

HST 391 Environmental History of North America 3

CSUS 310 History of Environmental Thought and Sustainability 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 credits):

COM 100 Human Communication 3

COM 225 An Introduction to Interpersonal Communication 3

COM 240 Introduction to Organizational Communication 3
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 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 Resource Law 3
FW 445 Biodiversity Conservation Policy and Practice 3
FW 481 Global Issues in Fisheries and Wildlife 3
FOR 466 Natural Resource Policy 3
IBIO 446 Environmental Issues and 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 to 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 (3 to 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
IBIO 357 Global Change Biology 3
FOR 360 Forest Ecosystems, Carbon and Climate Change 3
GEO 409 Global Climate Change and Variability 3
SOC 478 Climate Change and Society 3

n. At least 3 credits from the following courses (3 to 4 credits):
FW 480 International Studies in Fisheries and Wildlife 1-3

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

h. If the program will be offered in a location other than the main campus in East Lansing, specify the location (s).

Only offered on the main campus in East Lansing

i. List the name and describe any certificate program that is associated with a new or extant degree program.
a. – Explain the relationship between the certificate program and a new or extant degree program.
b. – If a certificate program is being proposed that is to related to a degree program, please explain how the department/school/college will learn that the supervising faculty have endorsed the potential certificate holders as possessing specified skills or competency levels that render them eligible to receive the certificate and the degree.

None

j. Other information that will assist the Provost and the University-level committees in evaluating the request.

16. Are there admissions requirements for this program?:

Grade or grade-point average requirements and if so in which course(s), portfolio requirement, audition, essay, etc. If there are not admission requirements other than those required by the University policy indicate "none".
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: a. FW 101 b. FW 101L c. FW 293; 3. Pass the following courses: a. FW 102 b. MTH 124, MTH 132 or LB 118

DEPARTMENT LEVEL APPROVAL STATUS

Approved: Department of Fisheries and Wildlife
9/8/2023 10:20:25 AM by James Schneider for Gary Roloff, Chairperson

SIGNOFFS STATUS

Signed Off: Department of Anthropology
9/8/2023 1:20:16 PM by Todd Fenton for Todd Fenton, Chairperson

Signed Off: Department of Community Sustainability
9/8/2023 10:24:41 AM by Michael Everett for Rebecca Jordan, Chairperson

Signed Off: Department of Earth and Environmental Sciences
9/11/2023 8:05:27 AM by Jeffrey Freymueller for Jeffrey Freymueller, Chairperson

Signed Off: Department of Entomology
9/8/2023 11:28:24 AM by Heather Lenartson-Kluge for Hannah Joy Burrack, Chairperson

Signed Off: Department of Forestry
9/8/2023 11:52:54 AM by Justin Kunkle for Richard K. Kobe, Chairperson

Signed Off: Department of Geography, Environment, and Spatial Sciences
9/12/2023 3:20:03 PM by Ryan Shadbolt for Ashton Shortridge, Chairperson

Signed Off: Department of History
9/11/2023 2:05:12 PM by Emily Tabuteau for Lisa Fine, Chairperson

Signed Off: Department of Integrative Biology
9/20/2023 4:29:35 PM by Lisa Craft for Tom Getty, Chairperson

Signed Off: Department of Philosophy
9/8/2023 11:56:12 AM by Frederick Rauscher for Matthew McKeon, Chairperson

Signed Off: Department of Sociology
9/8/2023 12:01:26 PM by Aaron McCright for Aaron McCright, Chairperson

Signed Off: Department of Statistics and Probability
9/8/2023 3:26:54 PM by Leonard Johnson for Lyudmila Sakhanenko, Chairperson

Signed Off: Department of Writing, Rhetoric, and Cultures
9/12/2023 11:54:54 AM by Kate Fedewa for Danielle De Voss, Chairperson

COLLEGE LEVEL APPROVAL STATUS

Approved: College of Agriculture and Natural Resources
9/21/2023 11:52:24 AM by Dorcia Chaison for Kelly Millenbah, Associate Dean

Speas, Joy

From: Judge, Jeffrey
Sent: Wednesday, October 11, 2023 5:54 PM
To: Schneider, Jim; Speas, Joy
Subject: FW: URGENT - Approval needed for courses in new FW majors

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Jim and Joy:

James Madison approves.

Jeff

From: Stein-Roggenbuck, Susan <steinrog@msu.edu>
Date: Wednesday, October 11, 2023 at 11:06 AM
To: Judge, Jeffrey <judgej@msu.edu>, Racioppi, Linda <racioppi@msu.edu>
Subject: RE: URGENT - Approval needed for courses in new FW majors

Jeff,
This seems completely fine with me – and it is just the one course. Go ahead and email Joy and Jim.

Susan

Susan Stein-Roggenbuck (she/her/hers)
Associate Professor
Faculty Excellence Advocate
James Madison College
Michigan State University

Michigan State University occupies the ancestral, traditional, and contemporary Lands of the Anishinaabeg – Three Fires Confederacy of Ojibwe, Odawa and Potawatomi peoples. The University resides on Land ceded in the 1819 Treaty of Saginaw.

From: Judge, Jeffrey <judgej@msu.edu>
Sent: Wednesday, October 11, 2023 9:54 AM
To: Racioppi, Linda <racioppi@msu.edu>; Stein-Roggenbuck, Susan <steinrog@msu.edu>
Subject: Fwd: URGENT - Approval needed for courses in new FW majors

Another item for CCC .

Jeff

From: Schneider, Jim <schne181@msu.edu>
Sent: Thursday, October 12, 2023 12:17:58 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>; Rudolph, Niki <niki@msu.edu>; Collins, Alyse <alyse@msu.edu>; Judge, Jeffrey

<judgej@msu.edu>; Chadwick, Brian <chadwic4@msu.edu>; Freedman, Eric <freedma5@msu.edu>; Warren, Timothy <warre155@msu.edu>; Franklin, Brenda <frankl78@msu.edu>; Turner, Monique <mmturner@msu.edu>; Chrisinske, Thomi <tmc@msu.edu>; Zepf, Stephen <zepf@msu.edu>; Cords, Catherine <cordsc@msu.edu>; Vos, Tim <tpvos@msu.edu>; DeSantis, Betsy <desant39@msu.edu>
Cc: Speas, Joy <Jlspeas@msu.edu>
Subject: URGENT - Approval needed for courses in new FW majors

Hi

The Department of Fisheries and Wildlife is in the process of updating our curriculum. We're proposing going from 1 FW major with 6 concentrations to 4 new majors – Applied Conservation Biology; Aquatic Ecology and Management; Fish Ecology and Management; and Wildlife Ecology and Management (the most popular of the 6 previous concentrations). Details on the 4 new majors are attached.

We've traditionally listed courses from your programs for our FW degree, but Joy Speas (from AACC-UCC) says that since we're creating new programs/majors we need your OK again to list your courses. Details below. While we're hoping these changes increases our majors, we're not anticipating a significant increase.

If you approve our continued use of your courses for our 4 new majors, please send Joy Speas (jlspeas@msu.edu) and myself (schne181@msu.edu) a note to that affect. Please contact me if you have any problems with us again listing your courses.

Thanks

Jim Schneider

=

BIOLOGICAL SCIENCES – Continue listing BS 161 and BS 162; and only require 1 of the labs (BS 171 or BS 172) instead of both. Previously required BOTH labs.

- BS 161
- BS 162
- BS 171 OR BS 172

CHEMISTRY

- CEM 141 & 161 – required to be able to enroll in BS 161.

LYMAN BRIGGS

- LB 144, LB 145, LB 118, LB 171, LB 171L, and LB 273 – LB has always been good about allow LB courses to count for standard science and math requirements in other majors, in case the switch out of LB or pursue a coordinate major in LB. We intend to convert these 4 new majors as coordinate majors in LB, as we did with the FW degree.

MATHEMATICS

- MTH 124 or MTH 132

COMMUNICATIONS

- COM 100, COM 225, COM 240, and COM 275. Our students must complete 2 additional communication courses from a list of 11. We'd previously received approval to list COM 100, COM 225, and COM 275. Besides those 3, we'd also like to include COM 240 to our list of 11 options.

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- JRN 492 – Our students must complete 2 additional communication courses from a list of 11. We'd like to continue listing JRN 492 as one of our student's communication options. We've had a few students take this course, and you've been good about allowing our students to do so.

JAMES MADISON (MC)

- MC/FW 450 – This course is interdepartmental with FW and taught by a joint MC/FW faculty member, but we need MC's OK since MC is the admirative home.

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- PHY 231/231C or PHY 221 – we've traditionally required PHY 231 for all our majors, but we're now only requiring it for 1 of the 4 (Aquatic Ecology and Management). We'd also like to add the option of allowing the new PHY 221 course.

Jim Schneider, (he/him)
Director, Glassen Scholars Program
Undergraduate Program Coordinator
Senior Specialist – Advisor & Certified Wildlife Biologist ®

Michigan State University
Department of Fisheries and Wildlife
Natural Resources Building
480 Wilson Rd., Room 14
East Lansing, MI 48824
Phone: (517) 353-9091 | Direct: (517) 353-2979
Email: schne181@msu.edu | Website: fw.msu.edu

Michigan State University occupies the ancestral, traditional and contemporary lands of the Anishinaabeg – Three Fires Confederacy of Ojibwe, Odawa and Potawatomi peoples. The university resides on land ceded in the 1819 Treaty of Saginaw.

From: Speas, Joy <Jlspeas@msu.edu>
Date: Tuesday, October 10, 2023 at 10:25 AM
To: Schneider, Jim <schne181@msu.edu>
Subject: Applied Conservation Biology BS

Jim,

The following units were not requested for signoffs for listing their course(s) in this new program. Please forward the signoffs to me via email. Thank you.

BS, CEM, LB, MTH, COM, JRN, GLG, MC

Joy L. Speas
University Curriculum Administrator

Accreditation, Assessment, Curriculum, and Compliance
MICHIGAN STATE UNIVERSITY
Office of the Provost
Hannah Administration Building
426 Auditorium Road, Suite 430
East Lansing, MI 48824
Phone: 517-355-8420
Email: jlspeas@msu.edu

Speas, Joy

From: Rudolph, Niki
Sent: Wednesday, October 11, 2023 4:53 PM
To: Speas, Joy; Schneider, Jim
Cc: Collins, Alyse
Subject: FW: URGENT - Approval needed for courses in new FW majors
Attachments: BS in ACB FINAL.docx; BS in AEM FINAL.docx; BS in FEM FINAL.docx; BS in WEM FINAL.docx

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Joy,

Please consider this Lyman Briggs sign off on the 4 new majors proposed by Fish and Wildlife.

Best,
Niki

Niki J. Rudolph, Ph.D.
she/her/hers
Assistant Dean of Student Success and Advising
Lyman Briggs College
Michigan State University
919 E Shaw Lane, E27 Holmes
East Lansing, MI 48825
Phone: 517.353.6480
Virtual Office: https://msu.zoom.us/my/nikirudolph
Make an appointment at: student.msu.edu > Academic Progress > Advising/Tutoring Appointments

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Currently reading: *The Theory of Being* by Watt, Mahatmya, Mehebali, & Martin-Stanley
Currently listening to: *Sunshine for Syracuse* *https://spoti.fi/426FRwx*
Currently knitting: Color Woolstok Light Wrap by Virginia Sattler-Reimer

---

From: Schneider, Jim <schne181@msu.edu>
Sent: Wednesday, October 11, 2023 9:48 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>; Rudolph, Niki <niki@msu.edu>; Collins, Alyse <alyse@msu.edu>; Judge, Jeffrey <judgej@msu.edu>; Chadwick, Brian <chadwic4@msu.edu>; Freedman, Eric <freedma5@msu.edu>; Warren, Timothy <warre155@msu.edu>; Franklin, Brenda <frankl78@msu.edu>; Turner, Monique <mmturner@msu.edu>; Chrisinske, Thomi <tmc@msu.edu>; Zepf, Stephen <zepf@msu.edu>; Cords, Catherine <cordsc@msu.edu>; Vos, Tim <tpvos@msu.edu>; DeSantis, Betsy <desant39@msu.edu>
Cc: Speas, Joy <Jlspeas@msu.edu>

Subject: URGENT - Approval needed for courses in new FW majors
Importance: High

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Joy L. Speas
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Office of the Provost
Hannah Administration Building
426 Auditorium Road, Suite 430
East Lansing, MI 48824
Phone: 517-355-8420
Email: jlspeas@msu.edu

From: Holmstrom, Amanda
To: Schneider, Jim; Speas, Joy
Cc: Turner, Monique
Subject: Fw: URGENT - Approval needed for courses in new FW majors
Date: Wednesday, October 11, 2023 1:41:48 PM
Attachments: image001.png
BS in ACB FINAL.docx
BS in AEM FINAL.docx
BS in FEM FINAL.docx
BS in WEM FINAL.docx
image003.png

Hi Jim &Joy,

The Department of Communication approves these changes.

Mandy

Amanda Holmstrom, PhD
Professor & Director of Undergraduate Studies
Department of Communication
Faculty Excellence Advocate
College of Communication Arts & Sciences
Michigan State University

From: Schneider, Jim <schne181@msu.edu>
Sent: Wednesday, October 11, 2023 9:48 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>; Rudolph, Niki <niki@msu.edu>; Collins, Alyse <alyse@msu.edu>; Judge, Jeffrey <judgej@msu.edu>; Chadwick, Brian <chadwic4@msu.edu>; Freedman, Eric <freedma5@msu.edu>; Warren, Timothy <warre155@msu.edu>; Franklin, Brenda <frankl78@msu.edu>; Turner, Monique <mmturner@msu.edu>; Chrisinske, Thomi <tmc@msu.edu>; Zepf, Stephen <zepf@msu.edu>; Cords, Catherine <cordsc@msu.edu>; Vos, Tim <tpvos@msu.edu>; DeSantis, Betsy <desant39@msu.edu>
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Subject: Applied Conservation Biology BS

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Office of the Provost
Hannah Administration Building
426 Auditorium Road, Suite 430
East Lansing, MI 48824
Phone: 517-355-8420
Email: jlspeas@msu.edu

From: Zepf, Stephen
To: Schneider, Jim
Cc: Speas, Joy
Subject: Re: URGENT - Approval needed for courses in new FW majors
Date: Wednesday, October 11, 2023 10:28:52 AM
Attachments: image001.png
image003.png

Hi,
We in the Department of Physics and Astronomy are fine with having our courses listed as noted.

best regards,
Steve

Steve Zepf
Professor and Chairperson
Department of Physics and Astronomy
Michigan State University

From: Schneider, Jim <schne181@msu.edu>
Sent: Wednesday, October 11, 2023 9:47 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>; Rudolph, Niki <niki@msu.edu>; Collins, Alyse <alyse@msu.edu>; Judge, Jeffrey <judgej@msu.edu>; Chadwick, Brian <chadwic4@msu.edu>; Freedman, Eric <freedma5@msu.edu>; Warren, Timothy <warre155@msu.edu>; Franklin, Brenda <frankl78@msu.edu>; Turner, Monique <mmturner@msu.edu>; Chrisinske, Thomi <tmc@msu.edu>; Zepf, Stephen <zepf@msu.edu>; Cords, Catherine <cordsc@msu.edu>; Vos, Tim <tpvos@msu.edu>; DeSantis, Betsy <desant39@msu.edu>
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University Curriculum Administrator

Accreditation, Assessment, Curriculum, and Compliance
MICHIGAN STATE UNIVERSITY
Office of the Provost
Hannah Administration Building
426 Auditorium Road, Suite 430
East Lansing, MI 48824
Phone: 517-355-8420
Email: jlspeas@msu.edu

Speas, Joy

From: Vos, Tim
Sent: Wednesday, October 11, 2023 10:15 AM
To: Freedman, Eric; Schneider, Jim
Cc: Speas, Joy; Takahashi, Bruno; David Poulson; Miller, Barbara
Subject: Re: URGENT - Approval needed for courses in new FW majors

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Just to clarify – Jim's email mentions JRN 492 (which is our special topics number, for which topics rotate) and Eric responded about JRN 472, which seems to be the correct course. So, if it's 472, then yes the School of Journalism approves.
We're also happy to add our electronic approval if and when the form comes through.
Tim

Tim P. Vos, Ph.D. (he, him)
Professor and Director, School of Journalism
Communication Arts & Sciences,
Michigan State University
404 Wilson Road, Room 305
East Lansing, Michigan 48824
Contact the Director

From: Freedman, Eric <freedma5@msu.edu>
Date: Wednesday, October 11, 2023 at 10:07 AM
To: Schneider, Jim <schne181@msu.edu>, Stoltzfus, Jon <stoltzfu@msu.edu>, Rudolph, Niki <niki@msu.edu>, Collins, Alyse <alyse@msu.edu>, Judge, Jeffrey <judgej@msu.edu>, Chadwick, Brian <chadwic4@msu.edu>, Warren, Timothy <warre155@msu.edu>, Franklin, Brenda <frankl78@msu.edu>, Turner, Monique <mmturner@msu.edu>, Chrisinske, Thomi <tmc@msu.edu>, Zepf, Stephen <zepf@msu.edu>, Cords, Catherine <cordsc@msu.edu>, Vos, Tim <tpvos@msu.edu>, DeSantis, Betsy <desant39@msu.edu>
Cc: Speas, Joy <Jlspeas@msu.edu>, Takahashi, Bruno <btakahas@msu.edu>, David Poulson <poulsondavid@gmail.com>, Miller, Barbara <mille384@msu.edu>
Subject: RE: URGENT - Approval needed for courses in new FW majors

Jim – Thanks for reaching out. We've had some excellent FW majors in JRN 472 and would be happy to have it continue to be cross-listed.
You may also want to consider cross-listing JRN 372, which is a lecture course. This is the Registrar's description.
Eric

JRN 372 Environment, Science and Health Journalism Special Topics

Semester:
Fall of every year, Spring of every year
Credits:
Total Credits: 3 *Lecture/Recitation/Discussion Hours: 3*

Reenrollment Information:
A student may earn a maximum of 6 credits in all enrollments for this course.
Description:
Analyze and understand the context of environment, science and health events and issues for news coverage.

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Sent: Wednesday, October 11, 2023 9:48 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>; Rudolph, Niki <niki@msu.edu>; Collins, Alyse <alyse@msu.edu>; Judge, Jeffrey <judgej@msu.edu>; Chadwick, Brian <chadwic4@msu.edu>; Freedman, Eric <freedma5@msu.edu>; Warren, Timothy <warre155@msu.edu>; Franklin, Brenda <frankl78@msu.edu>; Turner, Monique <mmturner@msu.edu>; Chrisinske, Thomi <tmc@msu.edu>; Zepf, Stephen <zepf@msu.edu>; Cords, Catherine <cordsc@msu.edu>; Vos, Tim <tpvos@msu.edu>; DeSantis, Betsy <desant39@msu.edu>
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Importance: High

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- CEM 141 & 161 – required to be able to enroll in BS 161.

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- LB 144, LB 145, LB 118, LB 171, LB 171L, and LB 273 – LB has always been good about allow LB courses to count for standard science and math requirements in other majors, in case the switch out of LB or pursue a coordinate major in LB. We intend to convert these 4 new majors as coordinate majors in LB, as we did with the FW degree.

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From: Speas, Joy <Jlspeas@msu.edu>
Date: Tuesday, October 10, 2023 at 10:25 AM
To: Schneider, Jim <schne181@msu.edu>
Subject: Applied Conservation Biology BS

Jim,

The following units were not requested for signoffs for listing their course(s) in this new program. Please forward the signoffs to me via email. Thank you.

BS, CEM, LB, MTH, COM, JRN, GLG, MC

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From:	Chadwick, Brian
To:	Schneider, Jim; Speas, Joy
Subject:	Re: URGENT - Approval needed for courses in new FW majors
Date:	Wednesday, October 11, 2023 10:02:49 AM
Attachments:	image001.png image003.png

Math approves - thanks Jim!

–#*#

Brian Chadwick

Academic Advisor--Mathematics & Actuarial Science

Michigan State University

C221 Wells Hall

(O)517-353-5019 (F)517-432-1562

chadwic4@msu.edu

Schedule an appointment at https://student.msu.edu

(Academic Progress-Advising/Tutoring Appts--College of Natural Science)

From: Schneider, Jim <schne181@msu.edu>

Sent: Wednesday, October 11, 2023 9:47 AM

To: Stoltzfus, Jon <stoltzfu@msu.edu>; Rudolph, Niki <niki@msu.edu>; Collins, Alyse <alyse@msu.edu>; Judge, Jeffrey <judgej@msu.edu>; Chadwick, Brian <chadwic4@msu.edu>; Freedman, Eric <freedma5@msu.edu>; Warren, Timothy <warre155@msu.edu>; Franklin, Brenda <frankl78@msu.edu>; Turner, Monique <mmturner@msu.edu>; Chrisinske, Thomi <tmc@msu.edu>; Zepf, Stephen <zepf@msu.edu>; Cords, Catherine <cordsc@msu.edu>; Vos, Tim <tpvos@msu.edu>; DeSantis, Betsy <desant39@msu.edu>

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1819 Treaty of Saginaw.

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Subject: Applied Conservation Biology BS

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Speas, Joy

From: Onchiri, Sheba
Sent: Thursday, October 12, 2023 5:29 PM
To: Schneider, Jim
Cc: Speas, Joy
Subject: RE: URGENT - Approval needed for courses in new FW majors

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Hi Jim,
Chemistry has no problem listing CEM 141 & CEM 161 for your programs.

Thanks,

Sheba Onchiri

Sheba Onchiri (Ph.D)
Pronouns: *she/her/hers*
Academic advisor
Department of Chemistry
Michigan State University
Tel 517-353-1134
Email:onchiris@msu.edu
Advising Appointments: student.msu.edu

From: Schneider, Jim <schne181@msu.edu>
Sent: Thursday, October 12, 2023 2:16 PM
To: Onchiri, Sheba <onchiris@msu.edu>
Subject: FW: URGENT - Approval needed for courses in new FW majors

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To: Stoltzfus, Jon <stoltzfu@msu.edu>, Rudolph, Niki <niki@msu.edu>, Collins, Alyse <alyse@msu.edu>, Judge, Jeffrey <judgej@msu.edu>, Chadwick, Brian <chadwic4@msu.edu>, Freedman, Eric <freedma5@msu.edu>, Warren, Timothy <warre155@msu.edu>, Franklin, Brenda <frankl78@msu.edu>, Turner, Monique <mmturner@msu.edu>, Chrisinske, Thomi <tmc@msu.edu>, Zepf, Stephen <zepf@msu.edu>, Cords, Catherine <cordsc@msu.edu>, Vos, Tim <tpvos@msu.edu>, DeSantis, Betsy <desant39@msu.edu>
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Speas, Joy

From: Stoltzfus, Jon
Sent: Thursday, October 19, 2023 7:58 AM
To: Schneider, Jim; Speas, Joy
Cc: Posey, Lynmarie
Subject: RE: URGENT - Approval needed for courses in new FW majors

Jim,

Following conversations in the NatSci Dean's office, BioSci approves your continued use of our courses for your 4 new majors. We request that, if you do see increased enrollments in FW majors, you update us as soon as you see these trends so BioSci can plan accordingly and work to provide enough seats so that lack of open seats in BioSci courses does not become a roadblock for students.

Let me know if you have any additional questions or concerns.

Jon

****

Jon R. Stoltzfus, Ph.D.
BioSci Program Director
Associate Professor of Biochemistry and Molecular Biology
Michigan State University
Biological Sciences Program
STEM Room 1110
642 Red Cedar Road
East Lansing, MI 48824
(517) 432-3618
stoltzfu@msu.edu

From: Stoltzfus, Jon
Sent: Friday, October 13, 2023 11:53 AM
To: Schneider, Jim <schne181@msu.edu>
Cc: Posey, Lynmarie <poseyl@msu.edu>
Subject: RE: URGENT - Approval needed for courses in new FW majors

Jim,

Thanks for the additional information. I need to further consult with the Dean's office. BioSci recently decline a request from another NatSci unit because there was no clear from of funding for potential enrollment increases.

Jon

****

Jon R. Stoltzfus, Ph.D.
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Associate Professor of Biochemistry and Molecular Biology

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From: Schneider, Jim <schne181@msu.edu>
Sent: Friday, October 13, 2023 11:48 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>
Cc: Posey, Lynmarie <poseyl@msu.edu>
Subject: Re: URGENT - Approval needed for courses in new FW majors

We've been pretty steady for the past few years at 225 students (which includes some LB students that would take LB 144 & 145). We're not trying to double our numbers or anything. I believe we'd like to increase to something close to 300 (including LB-FW students). We'd be pleased if we could get there, but we don't anticipate that will happen right away. And I suspect that many of these students will potentially come from IBIO, so there shouldn't be that large of a net increase to BS 161 and BS 162. We also have a fairly larger number of transfer students, which come in with BS 161 & BS 162 credit, as well as students with BS AP credit. So again I personally don't believe the net increase to BS will be that substantial.

Let me know if you have any other questions.

We'd appreciate your support for our request.

Thanks

Jim

From: Stoltzfus, Jon <stoltzfu@msu.edu>
Date: Friday, October 13, 2023 at 11:08 AM
To: Schneider, Jim <schne181@msu.edu>
Cc: Posey, Lynmarie <poseyl@msu.edu>
Subject: RE: URGENT - Approval needed for courses in new FW majors

Jim,

I do have concerns about the statement, "While we're hoping these changes increases our majors, we're not anticipating a significant increase." Since BioSci courses are already at capacity and we are already having to add seats without compensation in order to meet current demand, any increase is significant for BioSci. Can your provide additional details about the actual numbers of students you are hoping for when you say you hope these changes will increase your majors?

Thanks,
Jon

****

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East Lansing, MI 48824
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stoltzfu@msu.edu

From: Schneider, Jim <schne181@msu.edu>
Sent: Friday, October 13, 2023 9:24 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>
Subject: FW: URGENT - Approval needed for courses in new FW majors
Importance: High

Hi Jon

Bio Sci is the last program we've yet to hear from. Can you confirm to Joy Speas and I, that FW can use the BS courses for our new majors.

Thanks

Jim

From: Schneider, Jim <schne181@msu.edu>
Date: Wednesday, October 11, 2023 at 9:47 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>, Rudolph, Niki <niki@msu.edu>, Collins, Alyse <alyse@msu.edu>, Judge, Jeffrey <judgej@msu.edu>, Chadwick, Brian <chadwic4@msu.edu>, Freedman, Eric <freedma5@msu.edu>, Warren, Timothy <warre155@msu.edu>, Franklin, Brenda <frankl78@msu.edu>, Turner, Monique <mmturner@msu.edu>, Chrisinske, Thomi <tmc@msu.edu>, Zepf, Stephen <zepf@msu.edu>, Cords, Catherine <cordsc@msu.edu>, Vos, Tim <tpvos@msu.edu>, DeSantis, Betsy <desant39@msu.edu>
Cc: Speas, Joy <Jlspeas@msu.edu>
Subject: URGENT - Approval needed for courses in new FW majors

Hi

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We've traditionally listed courses from your programs for our FW degree, but Joy Speas (from AACC-UCC) says that since we're creating new programs/majors we need your OK again to list your courses. Details below. While we're hoping these changes increases our majors, we're not anticipating a significant increase.

If you approve our continued use of your courses for our 4 new majors, please send Joy Speas (jlspeas@msu.edu) and myself (schne181@msu.edu) a note to that affect. Please contact me if you have any problems with us again listing your courses.

Thanks

Jim Schneider

=

BIOLOGICAL SCIENCES – Continue listing BS 161 and BS 162; and only require 1 of the labs (BS 171 or BS 172) instead of both. Previously required BOTH labs.

- BS 161
- BS 162
- BS 171 OR BS 172

CHEMISTRY

- CEM 141 & 161 – required to be able to enroll in BS 161.

LYMAN BRIGGS

- LB 144, LB 145, LB 118, LB 171, LB 171L, and LB 273 – LB has always been good about allow LB courses to count for standard science and math requirements in other majors, in case the switch out of LB or pursue a coordinate major in LB. We intend to convert these 4 new majors as coordinate majors in LB, as we did with the FW degree.

MATHEMATICS

- MTH 124 or MTH 132

COMMUNICATIONS

- COM 100, COM 225, COM 240, and COM 275. Our students must complete 2 additional communication courses from a list of 11. We'd previously received approval to list COM 100, COM 225, and COM 275. Besides those 3, we'd also like to include COM 240 to our list of 11 options.

JOURNALISM

- JRN 492 – Our students must complete 2 additional communication courses from a list of 11. We'd like to continue listing JRN 492 as one of our student's communication options. We've had a few students take this course, and you've been good about allowing our students to do so.

JAMES MADISON (MC)

- MC/FW 450 – This course is interdepartmental with FW and taught by a joint MC/FW faculty member, but we need MC's OK since MC is the admirative home.

PHYSICS – Physics is being dropped as a requirement from 3 of the 4 new majors. Physics will now only be required for the Aquatic Ecology and Management major.

- PHY 231/231C or PHY 221 – we've traditionally required PHY 231 for all our majors, but we're now only requiring it for 1 of the 4 (Aquatic Ecology and Management). We'd also like to add the option of allowing the new PHY 221 course.

Jim Schneider, (he/him)
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Michigan State University
Department of Fisheries and Wildlife
Natural Resources Building
480 Wilson Rd., Room 14
East Lansing, MI 48824
Phone: (517) 353-9091 | Direct: (517) 353-2979
Email: schne181@msu.edu | Website: fw.msu.edu

From: Speas, Joy <Jlspeas@msu.edu>
Date: Tuesday, October 10, 2023 at 10:25 AM
To: Schneider, Jim <schne181@msu.edu>
Subject: Applied Conservation Biology BS

Jim,

The following units were not requested for signoffs for listing their course(s) in this new program. Please forward the signoffs to me via email. Thank you.

BS, CEM, LB, MTH, COM, JRN, GLG, MC

Joy L. Speas
University Curriculum Administrator

Accreditation, Assessment, Curriculum, and Compliance
MICHIGAN STATE UNIVERSITY
Office of the Provost
Hannah Administration Building
426 Auditorium Road, Suite 430
East Lansing, MI 48824
Phone: 517-355-8420
Email: jlspeas@msu.edu

Speas, Joy

From: Posey, Lynmarie
Sent: Thursday, October 19, 2023 9:07 AM
To: Schneider, Jim
Cc: Stoltzfus, Jon; Speas, Joy
Subject: Re: URGENT - Approval needed for courses in new FW majors

Jim,

The College of Natural Science also signs off on the new majors in Fisheries and Wildlife. To reiterate Jon's request, it is critical that you communicate with NatSci if you are seeing signs that the number of students in your majors is growing so that we can secure the resources and arrange the staffing to offer the seats needed.

Regards,

Lynmarie
--
Lynmarie A. Posey
Associate Dean, College of Natural Science
Associate Professor of Chemistry
Michigan State University
288 Farm Lane
Natural Science Building, Room 101
East Lansing, MI 48824
(517) 353-1193
poseyl@msu.edu
Pronouns: she/her/hers

> On Oct 19, 2023, at 8:18 AM, Schneider, Jim <schne181@msu.edu> wrote:
>
> Will do Jon! Thank you!!
>
> Jim
>
> ---
>
> **From:** Stoltzfus, Jon <stoltzfu@msu.edu>
> **Date:** Thursday, October 19, 2023 at 7:58 AM
> **To:** Schneider, Jim <schne181@msu.edu>, Speas, Joy <Jlspeas@msu.edu>
> **Cc:** Posey, Lynmarie <poseyl@msu.edu>
> **Subject:** RE: URGENT - Approval needed for courses in new FW majors
>
> Jim,
>
> Following conversations in the NatSci Dean's office, BioSci approves your continued use of our courses for your 4 new majors. We request that, if you do see increased enrollments in FW majors, you update us as soon as you see these trends so BioSci can plan accordingly and work to provide enough seats so that lack of open seats in BioSci courses does not become a roadblock for students.

Let me know if you have any additional questions or concerns.

Jon

****

Jon R. Stoltzfus, Ph.D.
BioSci Program Director
Associate Professor of Biochemistry and Molecular Biology
Michigan State University
Biological Sciences Program
STEM Room 1110
642 Red Cedar Road
East Lansing, MI 48824
(517) 432-3618
stoltzfu@msu.edu

From: Stoltzfus, Jon
Sent: Friday, October 13, 2023 11:53 AM
To: Schneider, Jim <schne181@msu.edu>
Cc: Posey, Lynmarie <poseyl@msu.edu>
Subject: RE: URGENT - Approval needed for courses in new FW majors

Jim,

Thanks for the additional information. I need to further consult with the Dean's office. BioSci recently decline a request from another NatSci unit because there was no clear from of funding for potential enrollment increases.

Jon

****

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Associate Professor of Biochemistry and Molecular Biology
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From: Schneider, Jim <schne181@msu.edu>
Sent: Friday, October 13, 2023 11:48 AM
To: Stoltzfus, Jon <stoltzfu@msu.edu>
Cc: Posey, Lynmarie <poseyl@msu.edu>
Subject: Re: URGENT - Approval needed for courses in new FW majors

We've been pretty steady for the past few years at 225 students (which includes some LB students that would take LB 144 & 145). We're not trying to double our numbers or anything. I believe we'd like to increase to something close to 300 (including LB-FW students). We'd be pleased if we could get there, but we don't anticipate that will happen right away. And I suspect that many of these students will potentially come from IBIO, so there shouldn't be that large of a net increase to BS 161 and BS 162. We also have a fairly larger number of transfer students, which come in with BS 161 & BS 162 credit, as well as students with BS AP credit. So again I personally don't believe the net increase to BS will be that substantial.

Let me know if you have any other questions.

We'd appreciate your support for our request.

Thanks

Jim

From: Stoltzfus, Jon <stoltzfu@msu.edu>
Date: Friday, October 13, 2023 at 11:08 AM
To: Schneider, Jim <schne181@msu.edu>
Cc: Posey, Lynmarie <poseyl@msu.edu>
Subject: RE: URGENT - Approval needed for courses in new FW majors

Jim,

I do have concerns about the statement, "While we're hoping these changes increases our majors, we're not anticipating a significant increase." Since BioSci courses are already at capacity and we are already having to add seats without compensation in order to meet current demand, any increase is significant for BioSci. Can your provide additional details about the actual numbers of students you are hoping for when you say you hope these changes will increase your majors?

Thanks,
Jon

****

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Michigan State University occupies the ancestral, traditional and contemporary lands of the Anishinaabeg – Three Fires Confederacy of Ojibwe, Odawa and Potawatomi peoples. The university resides on land ceded in the 1819 Treaty of Saginaw.

From: Speas, Joy <Jlspeas@msu.edu>
Date: Tuesday, October 10, 2023 at 10:25 AM

To: Schneider, Jim <schne181@msu.edu>
Subject: Applied Conservation Biology BS

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Joy L. Speas
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Phone: 517-355-8420
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DRAFT

DEPARTMENT of FISHERIES and WILDLIFE

Gary Roloff, Chairperson

The Department of Fisheries and Wildlife strongly believes that conservation of natural resources and a healthy environment are vital to the future of humanity. The faculty, staff and students in the Department of Fisheries and Wildlife address global challenges that threaten the sustainability of Earth's ecosystems and their animal populations. Our mission is to build local, national, and international capacities to conserve ecosystems that support fish, wildlife, and society through integrated programs in research, education, and engagement. We strive for increasingly inclusive, positive influences on interdependent human-natural systems and foster a culture built on respect, inclusion, and good governance.

UNDERGRADUATE PROGRAMS

~~The Fisheries and Wildlife undergraduate major focuses on interactions between humans and the natural world through courses that link three foundational topics: (1) the ecology of Earth's ecosystems and their animal populations, (2) the diversity of ways in which people use and value natural resources, and (3) the application of management techniques, informed by scientific understanding and guided by human goals and values, to meet global challenges threatening the sustainability of Earth's ecosystems and their animal populations. The program of study includes course work in the life sciences, social sciences, and field, lab and analytic techniques; it also includes an experiential learning component, such as study abroad and/or professional internships. Our students value the relatively small class sizes and dedicated faculty instructors. This program prepares students with interests in the life sciences, social sciences, and environmental policy for rewarding careers in fisheries, wildlife, or water quality management, conservation biology, animal health, and applied ecology. Our graduates most typically find employment with state and federal natural resource agencies, non-profit environmental organizations, private companies and consulting firms, as well as universities and colleges.~~

~~Fisheries and wildlife undergraduates pursue their particular interests through completion of one of the following six concentrations, each of which delves more deeply into particular sub-components of this broad field.~~

The Fisheries and Wildlife undergraduate majors focus on interactions between humans and the natural world through courses that link three foundational topics: (1) the ecology of Earth's ecosystems and their animal populations, (2) the diversity of ways in which people use and value natural resources, and (3) the application of scientific understanding, using conservation and management techniques to meet global challenges threatening the sustainability of Earth's ecosystems and their animal populations.

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.

The program of study includes course work in the life sciences, social sciences, communication, climate change, environmental policy, and field, lab and analytic techniques; it also includes an experiential learning component, such as study abroad and/or professional internships. Our students value the relatively small class sizes and dedicated faculty instructors. This program prepares students with interests in the life sciences, social sciences, and environmental policy for rewarding careers in conservation biology, as well as fisheries biology, wildlife biology, animal health, and applied ecology. Our graduates most typically find employment with state and federal natural resource agencies, non-profit environmental organizations, private companies, and consulting firms, as well as universities and colleges.
Students who complete the requirements for the Applied Conservation Biology major and choose elective courses appropriately can also satisfy requirements for certification by the American Fisheries Society as an Associate Fisheries Scientist or the Wildlife Society as an Associate Wildlife Biologist.

DRAFT

~~Conservation Biology focuses on the science of analyzing and protecting the earth's biological diversity drawing from the biological, physical and social sciences, economics, and the practice of natural resource management.~~
~~Fisheries Biology and Management is designed for students interested in the research and management of fish, other freshwater and marine organisms, and the ecosystems that sustain them.~~

~~Wildlife Biology and Management is for students interested in understanding and managing terrestrial habitats and animals including game, non-game, and endangered species.~~

~~Water Sciences 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 including water quality. This concentration provides students with an understanding for protecting and restoring water resources around the Great Lakes and the world.~~

~~Fish and Wildlife Disease Ecology and Management is designed to provide students with an improved understanding of the emergence and spread of infectious diseases and the likely consequences that increased contact between fish and wildlife, and domestic animal and human populations have on these environmental problems.~~

~~Preveterinary is designed for students who are interested in careers in veterinary medicine and satisfies the course requirements for admission to Michigan State University's College of Veterinary Medicine. Dual advising at the College of Veterinary Medicine is required.~~

~~Students who complete the requirements for the Fisheries and Wildlife major and choose elective courses appropriately can also satisfy requirements for certification by: the American Fisheries Society as an Associate Fisheries Scientist; the Wildlife Society as an Associate Wildlife Biologist; the Society of Wetland Scientists as a Wetland Professional in training.~~

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.

The program of study includes course work in the life sciences, social sciences, communication, climate change, environmental policy, and field, lab and analytic techniques; it also includes an experiential learning component, such as study abroad and/or professional internships. Our students value the relatively small class sizes and dedicated faculty instructors. This program prepares students with interests in the life sciences, social sciences, and environmental policy for rewarding careers in water quality management, fisheries biology, conservation biology, animal and public health, and applied ecology. Our graduates most typically find employment with state and federal natural resource agencies, non-profit environmental organizations, private companies, and consulting firms, as well as universities and colleges.

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.

The program of study includes course work in the life sciences, social sciences, communication, climate change, environmental policy, and field, lab and analytic techniques; it also includes an experiential learning component, such as study abroad and/or professional internships. Our students value the relatively small class sizes and dedicated faculty instructors. This program prepares students with interests in the life sciences, social sciences, and environmental policy for rewarding careers in fisheries biology, water quality management, conservation biology, animal health, and applied ecology. Our graduates most typically find employment with state and federal natural resource agencies, non-profit environmental organizations, private companies and consulting firms, as well as universities and colleges.
Students who complete the requirements for the Fish Ecology and Management major and choose elective courses appropriately can also satisfy requirements for certification by the American Fisheries Society as an Associate Fisheries Scientist.

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.

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Students who complete the requirements for the Wildlife Ecology and Management major and choose elective courses appropriately can also satisfy requirements for certification by the Wildlife Society as an Associate Wildlife Biologist.

Inserts 1, 2, 3, 4

Insert 1

APPLIED CONSERVATION BIOLOGY

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
   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

CREDITS

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:

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 ad 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):

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 ad 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

Insert 2

AQUATIC ECOLOGY AND MANAGEMENT

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

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

CREDITS

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:

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 ad 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	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	3
	and			
	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

Insert 3

FISH ECOLOGY AND MANAGEMENT

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

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

CREDITS

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.

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

   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:

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 ad 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
	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

Insert 4

WILDLIFE ECOLOGY AND MANAGEMENT

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

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

CREDITS

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:

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 ad 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	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
l.	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	3
	and			
	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