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| For Academic Affairs and Research Use Only |
| CIP Code:  |  |
| Degree Code: |  |

**New Course Proposal Form**

**[X] Undergraduate Curriculum Council**

**[ ] Graduate Council**

|  |
| --- |
| **[X] New Course or [ ]Experimental Course (1-time offering) (Check one box)** |

Signed paper copies of proposals submitted for consideration are no longer required. Please type approver name and enter date of approval.

Email completed proposals to curriculum@astate.edu for inclusion in curriculum committee agenda.

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| David F. Gilmore 2/21/2019**Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**COPE Chair (if applicable)** |
| Travis D. Marsico 2/21/2019**Department Chair:**  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Head of Unit (If applicable)**   |
| David F Gilmore 2/22/2019**College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Undergraduate Curriculum Council Chair** |
| Anne A. Grippo 2/22/2019**College Dean** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Graduate Curriculum Committee Chair** |
|

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| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |

**General Education Committee Chair (If applicable)**   | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…**Vice Chancellor for Academic Affairs** |

1. Contact Person (Name, Email Address, Phone Number)

Virginie Rolland, vrolland@astate.edu, 870-972-3194

2. Proposed Starting Term and Bulletin Year

Fall 2019

3. Proposed Course Prefix and Number (Confirm that number chosen has not been used before. For variable credit courses, indicate variable range. *Proposed number for experimental course is 9*. )

BIO 4023

4. Course Title – if title is more than 30 characters (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).

Biometry

5. Brief course description (40 words or fewer) as it should appear in the bulletin.

An introduction to data analyses and effective data presentation, using spreadsheet software and real biological examples. Fall.

6. Prerequisites and major restrictions. (Indicate all prerequisites. If this course is restricted to a specific major, which major. If a student does not have the prerequisites or does not have the appropriate major, the student will not be allowed to register).

1. Yes Are there any prerequisites?
	1. If yes, which ones?

MATH 1023, College Algebra

* 1. Why or why not?

This is a general introduction to statistics and data presentation, tailored to applied fields of biology. This course can be used to replace Applied Statistics I (STAT 3233) which also requires College Algebra as a prerequisite.

1. Yes Is this course restricted to a specific major?
	1. If yes, which major? Wildlife and Fisheries Conservation, Biology with a Zoology or Botany emphasis, and Environmental Studies

7. Course frequency(e.g. Fall, Spring, Summer). *Not applicable to Graduate courses.*

Fall

8. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.

Lecture and Lab

9. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental, or other [please elaborate])

Standard letter

10. Yes Is this course dual listed (undergraduate/graduate)?

11. No Is this course cross listed?

*(If it is, all course entries must be identical including course descriptions. Submit appropriate documentation for requested changes. It is important to check the course description of an existing course when adding a new cross listed course.)*

**11.1** – If yes, please list the prefix and course number of cross listed course.

 Enter text...

**11.2** – **Yes / No** Are these courses offered for equivalent credit?

Please explain. Enter text...

12. No Is this course in support of a new program?

a. If yes, what program?

 Enter text...

13. No Does this course replace a course being deleted?

a. If yes, what course?

Enter text...

14. No Will this course be equivalent to a deleted course?

a. If yes, which course?

Enter text...

15. Yes Has it been confirmed that this course number is available for use?

 *If no: Contact Registrar’s Office for assistance.*

16. No Does this course affect another program?

If yes, provide confirmation of acceptance/approval of changes from the Dean, Department Head, and/or Program Director whose area this affects.

Enter text...

**Course Details**

17. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)

**Unit I - Planning**

 Week 1 – Introduction

 Week 2 – Basics (Variable, Sample, Hypothesis, etc.)

 Week 3 – Choose the appropriate test

**Unit II – Recording Data**

 Week 4 – Introduction to Excel

 Week 5 – Recording data (in a lab notebook, on a field sheet/journal)

**Unit III – Exploring Data**

 Week 6 – Descriptive statistics

 Week 7 – Graphs (which, when, how)

**Unit IV – Analyzing Data and Interpreting Results**

 Week 8 – T-tests

 Week 9 – Chi-square tests

 Week 10 – Correlation test

 Week 11 – Simple linear regression

 Week 12 – One-way ANOVA

**Unit V – Reporting Data**

 Week 13 – Reporting numbers and Tables (mean and uncertainty, level of precision, unit)

 Week 14 – Graphs II

18. Special features (e.g. labs, exhibits, site visitations, etc.)

N/A

19. Department staffing and classroom/lab resources

This course would require access to a computer lab

1. Will this require additional faculty, supplies, etc.?

 No

20. No Does this course require course fees?

 *If yes: please attach the New Program Tuition and Fees form, which is available from the UCC website.*

**Course Justification**

21. Justification for course being included in program. Must include:

 a. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain)

 In science, we conduct experiments to test hypotheses. Once our hypothesis is formulated, the challenge is to choose the most appropriate of many statistical approaches to test this hypothesis. After data is analyzed, we must write reports or papers to present our study results. Biology students are frequently asked to produce graphs for lab reports in their science classes, but because the stress is put on a concept rather than the product, students never really learn how to produce a meaningful graph. Also, when asked to do repetitive calculations, most students use their calculators and then report the result in the spreadsheet that will be used to make the graph, instead of doing the calculation directly in the spreadsheet. Although more advanced and flexible statistical and graphing software exists, Excel® spreadsheets are widely used to record data and produce quick graphs, and represent a user-friendly entry platform that students will likely have to use in their career. This program can also be used to run basic statistics. In this course, Excel will be used to store and manipulate data (taken from various fields of life sciences from health to ecology), perform calculations and basic analyses, and create professionally looking graphs and tables. This course should not only help them expand on their skills in writing lab reports and other scientific assignments, it should also reinforce their understanding of the scientific methods, specifically the phases of data recording, exploration (sorting, filtering), analysis, interpretation, and reporting.

b. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.

 The Department of Biological Sciences aims to provide high-quality education through, among other things, opportunities to develop critical scientific reasoning and communication skills. Formulating a hypothesis, choosing the appropriate analytical test, and interpreting the results are all phases of the scientific method that stimulate critical scientific reasoning. Presenting data and/or results in graphs and tables is an exercise that works on communication skills because graphs and tables must be carefully chosen and well presented to convey a given message.

c. Student population served.

This course is for students majoring in Wildlife and Fisheries Conservation, Biology with a Zoology emphasis, or Environmental studies. This course would represent an “endpoint” course for these really applied fields for which students would typically not receive more advanced statistical training, but they need to be able to conduct simple applied statistical tests to wildlife, environmental, or other field applications.

d. Rationale for the level of the course (lower, upper, or graduate).

As an endpoint, this course is for upper-level undergraduate students. This course can replace STAT 3233 Applied Statistics, although Wildlife and Zoology majors could still choose applied statistics to earn their degree. The 4000 level was chosen to accommodate a remedial course for graduate students in Biology through a dual situation.

**Assessment**

**Relationship with Current Program-Level Assessment Process**

22. What is/are the intended program-level learning outcome/s for students enrolled in this course? Where will this course fit into an already existing program assessment process?

Biology PLO3: Students should be able to construct hypothesis, design studies to test those hypotheses

23. Considering the indicated program-level learning outcome/s (from question #22), please fill out the following table to show how and where this course fits into the program’s continuous improvement assessment process.

*For further assistance, please see the ‘Expanded Instructions’ document available on the UCC - Forms website for guidance, or contact the Office of Assessment at 870-972-2989.*

|  |  |
| --- | --- |
| **Program-Level Outcome 1 (from question #22)** | Students should be able to construct hypothesis, design studies to test those hypotheses |
| Assessment Measure | Capstone exam  |
| Assessment Timetable | The capstone exam is administered at the end of the course BIO 4021 Biological Seminar that students must take in their graduating semester |
| Who is responsible for assessing and reporting on the results? | Dr. Than Boves, Department of Biology |

 *(Repeat if this new course will support additional program-level outcomes)*

 **Course-Level Outcomes**

24. What are the course-level outcomes for students enrolled in this course and the associated assessment measures?

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| **Outcome 1** | Identify the most appropriate test given a biological question |
| Which learning activities are responsible for this outcome? | In-class activities and homework assignments |
| Assessment Measure  | Quizzes and Exams  |

*(Repeat if needed for additional outcomes)*

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| **Outcome 2** | Carry out basic statistical analyses using Excel and interpret results properly |
| Which learning activities are responsible for this outcome? | In-class activities and homework assignments |
| Assessment Measure  | Quizzes and Exams  |

|  |  |
| --- | --- |
| **Outcome 3** | Make an appropriate and complete graph using Excel |
| Which learning activities are responsible for this outcome? | In-class activities |
| Assessment Measure  | Homework assignments and exams  |

**Bulletin Changes**

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| **Instructions**  |
| **Please visit** [**http://www.astate.edu/a/registrar/students/bulletins/index.dot**](http://www.astate.edu/a/registrar/students/bulletins/index.dot) **and select the most recent version of the bulletin. Copy and paste all bulletin pages this proposal affects below. Follow the following guidelines for indicating necessary changes.** **\*Please note: Courses are often listed in multiple sections of the bulletin. To ensure that all affected sections have been located, please search the bulletin (ctrl+F) for the appropriate courses before submission of this form.** - Deleted courses/credit hours should be marked with a red strike-through (~~red strikethrough~~)- New credit hours and text changes should be listed in blue using enlarged font (blue using enlarged font). - Any new courses should be listed in blue bold italics using enlarged font (***blue bold italics using enlarged font***)*You can easily apply any of these changes by selecting the example text in the instructions above, double-clicking the ‘format painter’ icon 🡪 , and selecting the text you would like to apply the change to.* *Please visit* [*https://youtu.be/yjdL2n4lZm4*](https://youtu.be/yjdL2n4lZm4) *for more detailed instructions.* |

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**BIO 3542. Plant Pathology**   Nature, cause, and control of diseases of orchard, garden, and field crops. Lecture two hours per week. Special course fees may apply. Prerequisites, BIO 1501 and BIO 1503. Spring, odd.

**BIO 3553. Economic Botany**   Economic plants and their use by man. Lecture three hours per week. Special course fees may apply. Prerequisites, BIO 1501 and BIO 1503. Summer, even every 4 years.

**BIO 3673. Human Dimensions of Natural Resources** Evolution of human perception of natural resources, sociocultural beliefs and practices of traditional societies, lessons for effective conservation/management plans of marine and terrestrial/freshwater systems, and global case studies. Fall, odd.

**BIO 4001. Laboratory Techniques in Electron Microscopy**   An introduction to the preparation of biological materials for viewing with the transmission and scanning electron microscope. Emphasis will be placed on preparative techniques that are commonly used in the laboratory. Lecture one hour per week. Special course fees may apply. Prerequisite, eight hours upper-level biology. Instructor permission required. Fall, even.

**BIO 4003. Laboratory Techniques in Electron Microscopy Laboratory**   Six hours per week. To be taken concurrently with BIO 4001. Special course fees may apply. Fall, even.

**BIO 4011. Microtechnique**   Methods of killing, fixing, staining, and mounting tissues. Lecture one hour per week. Special course fees may apply. Prerequisites, BIO 1501, BIO 1503, CHEM 3103, and CHEM 3101. Fall, odd.

**BIO 4012. Microtechnique Laboratory**   Four hours per week. To be taken concurrently with BIO 4011. Special course fees may apply. Fall, odd.

**BIO 4013. Population Genetics**   This course will investigate the theories describing the temporal nature of the genetic structure of populations. There will be an emphasis on problem solving applying statistical tools. Intended for students entering the disciplines of systematics, conservation, agriculture, and wildlife and fisheries sciences. Special course fees may apply. Fall, even years.

**BIO 4021. Biological Seminar** Conferences, readings, and reports on material relevant to the biological sciences. Required of all department majors. Open only to biology department majors with 16 hours or more of course work in the subject area. Special course fees may apply. Fall, Spring, Summer.

BIO 4023. **Biometry** An introduction to data analyses and effective data presentation, using spreadsheet software and real biological examples. Prerequisite, MATH 1023. Fall.

**BIO 4033. Bioinformatics and Applications** Provides a basic understanding of computational methods used in bioinformatics, including hands on training to access and use biological data sources to analyze nucleotide/amino acid sequences and three-dimensional atomic structures of proteins, nucleic acids allowing interpretations of biological processes. Lecture three hours per week. Prerequisite, BIO 3013. Spring.

**BIO 4053. Applications in Biotechnology** A capstone course which focuses on real world applications of biotechnology presented as case studies and utilizing current literature reviews. Medical, agricultural, environmental and industrial biotechnology and their ethical, legal and social implications covered. Prerequisite, BIO 3013. Spring.

**BIO 4063. Biosafety and Ethics in Research** Biosafety in the workplace, including chemical and radiation safety. Examination of moral and ethical issues in the laboratory and in research, including the concepts of transgenics, intellectual property and writing in research. Lecture three hours per week. Prerequisite, BIO 2013. Fall.

**BIO 403V. Special Problems in Biology**   Specific area with the topic and mode of inquiry agreed upon by student and instructor. Registration may be repeated with various topics. Registration must be approved by the program director. Special course fees may apply. Demand.

**BIO 404V. Special Topics in Biological Sciences**   Topical or technique driven seminar relating to the biological sciences that will lead to the training of students in a body of work, such as newly developed research technique and approach. Number of credit hours will vary. Special course fees may apply. Permission of Instructor required. May be repeated for a total credit of 6 hours. Fall, Spring.

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**Major in Biological Sciences**

**Bachelor of Science**

**Emphasis in Botany**

A complete 8-semester degree plan is available at https://www.astate.edu/info/academics/degrees/

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| **University Requirements:**  |
| See University General Requirements for Baccalaureate degrees (p. 44)  |
| **First Year Making Connections Course:** **Sem. Hrs.**  |
| BIO 1013, Making Connections - Biology **3**  |
| **General Education Requirements:** **Sem. Hrs.**  |
| See General Education Curriculum for Baccalaureate degrees (p. 89) **35** **Students with this major must take the following:** *MATH 1023, College Algebra or MATH course that requires MATH 1023 as a prerequisite CHEM 1013* ***AND*** *1011, General Chemistry I and LaboratoryBIO 2013* ***AND*** *2011, Biology of the Cell and LaboratoryCOMS 1203, Oral Communication (Required Departmental Gen. Ed. Option)*  |
| **Language Requirement:** **Sem. Hrs.**  |
| *A student must complete the foreign language requirements before being considered a Biological Sciences Major. (Refer to Department of Biological Sciences Foreign Language Requirement).*  |
| **Major Requirements:** **Sem. Hrs.**  |
| BIO 1303 **AND** 1301, Biology of Animals and Laboratory 4  |
| BIO 1503 **AND** 1501, Biology of Plants and Laboratory 4  |
| BIO 3013 **AND** 3011, Genetics and Laboratory 4  |
| BIO 3023, Principles of Ecology 3  |
| BIO 4021, Biological Seminar 1  |
| CHEM 1023 **AND** 1021, General Chemistry II and Laboratory 4  |
| CHEM 3103 **AND** 3101, Organic Chemistry I and Laboratory 4  |
| CHEM 3113 **AND** 3111, Organic Chemistry II and Laboratory 4  |
| MATH 2194, Survey of Calculus **OR** 4 MATH 2204, Calculus I  |
| PHYS 2054, General Physics I 4  |
| PHYS 2064, General Physics II 4  |
| **Sub-total 40**  |
| **Emphasis Area (Botany):** **Sem. Hrs.**  |
| BIO 3033, Evolution 3  |
| BIO 3303 **AND** 3301, General Entomology and Laboratory **OR** 4 BIO 3313 **AND** 3311, Economic Entomology and Laboratory  |
| BIO 3542 **AND** 3541, Plant Pathology and Laboratory **OR** 3 BIO 4542 **AND** 4541, Mycology and Laboratory **OR**BIO 4552 **AND** 4551, Medical Mycology and Laboratory  |
| BIO 4104, Microbiology 4  |
| BIO 4513, Plant Physiology 3  |
| BIO 4522 **AND** 4521, Wetland Plant Ecology and Laboratory 3  |
| BIO 4704, Plant Systematics 4  |
| STAT 3233, Applied Statistics I **OR** BIO 4023, Biometry **OR** 3 CHEM 4243, Biochemistry  |
| **Sub-total 27**  |
| **Electives:** **Sem. Hrs.**  |
| Electives (two hours must be upper-level) **15**  |
| **Total Required Hours: 120**  |

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**Major in Biological Sciences**

**Bachelor of Science
Emphasis in Zoology**A complete 8-semester degree plan is available at https://www.astate.edu/info/academics/degrees/

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| **University Requirements:**  |  |
| See University General Requirements for Baccalaureate degrees (p. 44)  |  |
| **First Year Making Connections Course:**  | **Sem. Hrs.**  |
| BIO 1013, Making Connections - Biology  | **3**  |
| **General Education Requirements:**  | **Sem. Hrs.**  |
| See General Education Curriculum for Baccalaureate degrees (p. 89) **Students with this major must take the following:** *MATH 1023, College Algebra or MATH course that requires MATH 1023 as a prerequisite CHEM 1013* ***AND*** *1011, General Chemistry I and LaboratoryBIO 2013* ***AND*** *2011, Biology of the Cell and LaboratoryCOMS 1203, Oral Communication (Required Departmental Gen. Ed. Option)*  | **35**  |
| **Language Requirement:**  | **Sem. Hrs.**  |
| *A student must complete the foreign language requirements before being considered a Biological Sciences Major. (Refer to Department of Biological Sciences Foreign Language Requirement).*  |  |
| **Major Requirements:**  | **Sem. Hrs.**  |
| BIO 1303 **AND** 1301, Biology of Animals and Laboratory  | 4  |
| BIO 1503 **AND** 1501, Biology of Plants and Laboratory  | 4  |
| BIO 3013 **AND** 3011, Genetics and Laboratory  | 4  |
| BIO 3023, Principles of Ecology  | 3  |
| BIO 4021, Biological Seminar  | 1  |
| CHEM 1023 **AND** 1021, General Chemistry II and Laboratory  | 4  |
| CHEM 3103 **AND** 3101, Organic Chemistry I and Laboratory  | 4  |
| CHEM 3113 **AND** 3111, Organic Chemistry II and Laboratory  | 4  |
| MATH 2194, Survey of Calculus **OR** MATH 2204, Calculus I  | 4  |
| PHYS 2054, General Physics I  | 4  |
| PHYS 2064, General Physics II  | 4  |
| **Sub-total**  | **40**  |
| **Emphasis Area (Zoology):**  | **Sem. Hrs.**  |
| BIO 3302 **AND** 3312, Comparative Anatomy and Laboratory  | 4  |
| BIO 3303 **AND** 3301, General Entomology and Laboratory **OR** BIO 3322 **AND** 3332, Invertebrate Zoology and Laboratory  | 4  |
| BIO 3323 **AND** 3321, Animal Physiology and Laboratory  | 4  |
| BIO 4332 **AND** 4342, Animal Histology and Laboratory  | 4  |
| BIO 4343 **AND** 4341, Animal Embryology and Laboratory  | 4  |
| STAT 3233, Applied Statistics I **OR** BIO 4023, Biometry **OR** CHEM 4243, Biochemistry  |  |

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**Major in Wildlife, Fisheries and Conservation**

**Bachelor of Science
Emphasis in Fisheries**A complete 8-semester degree plan is available at https://www.astate.edu/info/academics/degrees/

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| **University Requirements:**  |  |
| See University General Requirements for Baccalaureate degrees (p. 44)  |  |
| **First Year Making Connections Course:**  | **Sem. Hrs.**  |
| BIO 1013, Making Connections - Biology  | **3**  |
| **General Education Requirements:**  | **Sem. Hrs.**  |
| See General Education Curriculum for Baccalaureate degrees (p. 89) **Students with this major must take the following:** *Students with this major must take the following:MATH 1054, Precalculus Mathematics or MATH course that requires MATH 1023* *as a prerequisiteCHEM 1013* ***AND*** *1011, General Chemistry I and LaboratoryBIO 2013* ***AND*** *2011, Biology of the Cell and LaboratoryCOMS 1203, Oral Communication (Required Departmental Gen. Ed. Option)*  | **36**  |
| **Language Requirement:**  | **Sem. Hrs.**  |
| *A student must complete the foreign language requirements before being considered a Major in Wildlife, Fisheries and Conservation Major. (Refer to Department of Biological Sci- ences Foreign Language Requirement).*  |  |
| **Major Requirements:**  | **Sem. Hrs.**  |
| See emphasis area below.  | **-**  |
| **Emphasis Area (Fisheries):**  | **Sem. Hrs.**  |
| AGST 3543, Fundamentals of GIS/GPS  | 3  |
| BIO 1303 **AND** 1301, Biology of Animals and Laboratory  | 4  |
| BIO 1503 **AND** 1501, Biology of Plants and Laboratory  | 4  |
| BIO 3013 **AND** 3011, Genetics and Laboratory  | 4  |
| BIO 3023, Principles of Ecology  | 3  |
| BIO 3033, Evolution **OR** BIO 4333, Marine Biology  | 3  |
| BIO 4021, Biological Seminar  | 1  |
| BIO 4301 AND 4302, Aquatic Entomology and Laboratory  | 3  |
| BIO 4312 AND 4311, Fisheries Biology and Laboratory  | 3  |
| BIO 4362, Applied Aquaculture **OR** BIO 4372, Applied Fisheries  | 2  |
| BIO 4402 AND 4401, Ichthyology and Laboratory  | 3  |
| BIO 4443, Fisheries Program Internship  | 3  |
| BIO 4603 AND 4601, Limnology and Laboratory  | 4  |
| CHEM 1023 AND 1021, General Chemistry II and Laboratory  | 4  |
| MATH 2194, Survey of Calculus **OR** MATH 2204, Calculus I  | 4  |
| PHYS 2054, General Physics I  | 4  |
| PHYS 2064, General Physics II  | 4  |
| STAT 3233, Applied Statistics I **OR** BIO 4023, Biometry | 3  |
| **Select two of the following:** BIO 3673, Human Dimensions of Natural Resources BIO 4613, Conservation BiologyPOSC 4533, Environmental Law and Administration  |  |

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**Major in Wildlife, Fisheries and Conservation**

**Bachelor of Science**

**Emphasis in Wildlife**

A complete 8-semester degree plan is available at https://www.astate.edu/info/academics/degrees/

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| **University Requirements:**  |  |
| See University General Requirements for Baccalaureate degrees (p. 44)  |  |
| **First Year Making Connections Course:**  | **Sem. Hrs.**  |
| BIO 1013, Making Connections - Biology  | **3**  |
| **General Education Requirements:**  | **Sem. Hrs.**  |
| See General Education Curriculum for Baccalaureate degrees (p. 89) **Students with this major must take the following:** *Students with this major must take the following:MATH 1054, Precalculus Mathematics or MATH course that requires MATH 1023* *as a prerequisiteCHEM 1013* ***AND*** *1011, General Chemistry I and LaboratoryBIO 2013* ***AND*** *2011, Biology of the Cell and LaboratoryCOMS 1203, Oral Communication (Required Departmental Gen. Ed. Option)*  | **36**  |
| **Language Requirement:**  | **Sem. Hrs.**  |
| *A student must complete the foreign language requirements before being considered a Major in Wildlife, Fisheries and Conservation Major. (Refer to Department of Biological Sci- ences Foreign Language Requirement).*  |  |
| **Major Requirements:**  | **Sem. Hrs.**  |
| See emphasis area below.  | **-**  |
| **Emphasis Area (Wildlife):**  | **Sem. Hrs.**  |
| AGST 3543, Fundamentals of GIS/GPS  | 3  |
| BIO 1303 **AND** 1301, Biology of Animals and Laboratory  | 4  |
| BIO 1503 **AND** 1501, Biology of Plants and Laboratory  | 4  |
| BIO 3013 **AND** 3011, Genetics and Laboratory  | 4  |
| BIO 3023, Principles of Ecology  | 3  |
| BIO 4021, Biological Seminar  | 1  |
| BIO 4311 **AND** 4312, Fishery Biology and Laboratory **OR** BIO 4402 **AND** 4401, Ichthyology and Laboratory **OR** BIO 4603 **AND** 4601, Limnology and Laboratory  | 3-4  |
| BIO 4373 **AND** 4371, Animal Ecology and Laboratory  | 4  |
| BIO 4413, Wildlife Program Internship **OR** BIO 403V, Special Problems in Biology  | 3  |
| BIO 4653 **AND** 4651, Wildlife Management and Laboratory  | 4  |
| BIO 4663 **AND** 4661, Wildlife Management Investigational Techniques and Laboratory  | 4  |
| BIO 4704, Plant Systematics  | 4  |
| CHEM 1023 **AND** 1021, General Chemistry II and Laboratory  | 4  |
| GEOL 1003 **AND** 1001, Environmental Geology and Laboratory **OR** PSSC 2813 **AND** 2811, Soils and Laboratory  | 4  |
| MATH 2194, Survey of Calculus **OR** MATH 2204, Calculus I  | 4  |
| STAT 3233, Applied Statistics I **OR** BIO 4023, Biometry | 3  |