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

**New Course Proposal Form**

**[ ] Undergraduate Curriculum Council**

**[X] Graduate Council**

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| **[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](mailto: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** |
| |  |  | | --- | --- | | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | 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](mailto: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 5023

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 experimental design, basic data analyses, and effective data presentation, using spreadsheet software and real biological examples.

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. No Are there any prerequisites?
   1. If yes, which ones?

Enter text...

* 1. Why or why not?

This course is for graduate students who have had little exposure to statistics and experimental design. Students will have adequate exposure to math from their undergraduate degrees .

1. No Is this course restricted to a specific major?
   1. If yes, which major? Although not restricted, the course targets graduate programs in biological (BIO), environmental (EVS), and molecular (MBS) sciences.

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 are analyzed, we must write reports or papers to present our study results. At the graduate level, biology students are expected to have enough background to design and conduct their own research. However, students have various backgrounds and are not equally prepared. This course should not only introduce them to experimental design, it should also reinforce their understanding of the scientific methods, specifically the phases of data recording, 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.

Graduate students in Biology, Molecular Biological Sciences, and Environmental Sciences who have no or inadequate prior statistical background before taking graduate-level advanced statistics courses.

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

This is a 5000-level course to accommodate graduate students who come with little to no statistical background. Unlike undergraduate students, graduate students taking this dual course will have to read a short book (178 pages with references) about experimental design and produce a term paper that includes the experimental design they plan to follow for their research project.

**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?

1. Understand that science is a process as well as a body of knowledge
2. Demonstrate the importance of research by designing and conducting a scientific study
3. Prepare, communicate and defend original research in writing and in an oral presentation
4. Demonstrate an understanding of professional ethics in the conduct of a scientific study
5. Acquire the skills and knowledge needed for employment or advanced graduate study in discipline-related areas

This course will fit in the existing program assessment process of all these outcomes because it reiterates that science is a process by going through each phase of the scientific method and it covers how to design an experiment and address scientific questions. In this course, we will also spend time on how to report statistics and present the data to effectively communicate results and we will discuss ethical issues, such as data falsification. Overall, this course will clearly provide the minimum knowledge and skills expected by many jobs in Biology.

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.*

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| **All Program-Level Outcomes (from question #22)** | Students should be able to   1. Understand that science is a process as well as a body of knowledge 2. Demonstrate the importance of research by designing and conducting a scientific study 3. Prepare, communicate and defend original research in writing and in an oral presentation 4. Demonstrate an understanding of professional ethics in the conduct of a scientific study 5. Acquire the skills and knowledge needed for employment or advanced graduate study in discipline-related areas |
| Assessment Measure | Final project/thesis/dissertation |
| Assessment  Timetable | When the students defend their final product at the end of their degree. |
| Who is responsible for assessing and reporting on the results? | Dr. Jennifer Bouldin, Department of Biology  Dr. Tanja McKay, Program Director for EVS and MBS |

*(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, Exams, and Term project |

*(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, Exams, and Term project |

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

**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.* |

Page 381

**COLLEGE OF SCIENCES AND MATHEMATICS**

**DEPARTMENT OF BIOLOGICAL SCIENCES**

For each laboratory course taken, both the lecture and laboratory portions must be passed before credit for graduation is assigned.

**Biology (BIO)**

**BIO 5001. 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. Prerequisites: eight hours upper-level biology coursework and permission of professor.

**BIO 5003. Laboratory for Laboratory Techniques in Electron Microscopy** Six hours per week. To be taken concurrently with BIO 5001. Special course fees may apply.

**BIO 5013. Population Genetics** This course will investigate the theories describing the genetic structure of populations. There will be an emphasis on problem solving applying statistical tools. Intended for graduate students entering the disciplines of preprofessional, conservation, agriculture, and wildlife and fisheries sciences. Prerequisites: BIO 3013, BIO 3011.

***BIO 5023. Biometry An introduction to experimental design, basic data analyses, and effective data presentation, using spreadsheet software and real biological examples.***

**BIO 5033. 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. Prerequisites, BIO 3013 or permission of instructor.

**BIO 504V. Special Topics in the 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/approach. Number of credit hours will vary. Prerequisites: consent of the instructor.

**BIO 5053. Applications in Biotechnology** 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. Prerequisites, BIO 3013.

**BIO 5063. 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. Prerequisites, BIO 3013.

**BIO 5103. Virology** The structure, function, and classification of viruses, and their impact on modern society and the biological world. Lecture three hours per week. Prerequisites: BIOL 2103 or BIO 3013 or BIO 4104 or BIO 4133.

**BIO 5104. Microbiology** Morphology, physiology, taxonomy, and cultivation of bacteria and other microorganisms with an emphasis on medically relevant bacteria. Two hours of lecture and four hours of lab per week.

**BIO 5113. Immunology** Study of the human immune system. Topics include innate and acquired immunity, complement fixation and disorders of the immune system. Lecture 3 hours per week.