

# NEW COURSE PROPOSAL

PROGRAM AREA \_\_\_\_\_

- 1. Catalog Description of the Course.** *[Include the course prefix, number, full title, and units. Provide a course narrative including prerequisites and corequisites. If any of the following apply, include in the description: Repeatability (May be repeated to a maximum of \_\_\_\_ units); time distribution (Lecture \_\_\_\_ hours, laboratory \_\_\_\_ hours); non-traditional grading system (Graded CR/NC, ABC/NC). Follow accepted catalog format.]*

**BIOL 430. RESEARCH DESIGN AND DATA ANALYSIS (3)**

Threes hour of laboratory per week

Prerequisite: BIOL 202 with a grade of C or better or MATH 352

Discussion of experimental design, sampling methods, data collection, and methods of data analysis related to scientific fields.

Same as CHEM 430, MATH 430.

GenEd: B2, B3 and Interdisciplinary

**CHEM 430. Research Design and Data Analysis (3)**

Threes hour of laboratory per week

Prerequisite: BIOL 202 with a grade of C or better or MATH 352

Discussion of experimental design, sampling methods, data collection, and methods of data analysis related to scientific fields.

Same as BIOL 430, MATH 430.

GenEd: B2, B3 and Interdisciplinary

**MATH 430. Research Design and Data Analysis (3)**

Threes hour of laboratory per week

Prerequisite: BIOL 202 with a grade of C or better or MATH 352

Discussion of experimental design, sampling methods, data collection, and methods of data analysis related to scientific fields.

Same as CHEM 430, BIOL 430.

GenEd: B2, B3 and Interdisciplinary

**2. Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	_____	_____	_____
Seminar	_____	_____	_____
Laboratory	3	1	24
Activity	_____	_____	_____

- 3. Justification and Learning Objectives for the Course.** (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

This is a required course for Biology majors. The course will cover the three phases of biological research projects: experimental design, data collection, and data analysis using specialized computer statistical software. The focus will be on general research methods such as the concept of scientific methods, the logic of research design and applicability of theoretical and experimental approaches in the biological sciences. Through this course, students will be able to:

1. apply quantitative problem-solving skills to biological problems and issues;
2. determine and design sound research methods appropriate for studying and analyzing biological phenomena;
3. select, apply and interpret appropriate statistical analyses of biological data;
4. reason both inductively and deductively with quantitative information and data;
5. use statistical software to conduct appropriate data analysis,
6. write the results of a research study in the appropriate journal format.

4. Is this a General Education Course ☒ YES ☐ NO

If Yes, indicate GE category:

A (English Language, Communication, Critical Thinking)	
B (Mathematics & Sciences)	B2, B3
C (Fine Arts, Literature, Languages & Cultures)	
D (Social Perspectives)	
E (Human Psychological and Physiological Perspectives)	

5. Course Content in Outline Form. [Be as brief as possible, but use as much space as necessary]

Need for quantitative methods in science in general and biology in specific  
Statistical methods as ways to reason inductively and deductively in a quantitative framework  
Basics of experimental design and the logic of experimentation  
Types of research designs most used in biology and allied disciplines  
ANOVA models from a research perspective  
Regression models from a research perspective  
Proportion models from a research perspective  
Simple spreadsheet methods for data description and analysis  
Computer analysis of complex biological data using SPSS

6. References. [Provide 3 - 5 references on which this course is based and/or support it.]

George, D., & Mallery, P. (2002). *SPSS for Windows step by step: A simple guide and reference* (4<sup>th</sup> ed.). New York: Allyn & Bacon.

Jackson, S. L. (2003). *Research methods and statistics: A critical thinking approach*. Pacific Grove, CA: Thompson.

Norman, G. R., & Streiner, D. L. (2000). *Biostatistics: The bare essentials* (2<sup>nd</sup> ed.). London: B. C. Decker.

Rosner, B. (2000). *Fundamentals of biostatistics with data disk* (5<sup>th</sup> ed.). Pacific Grove, CA: Thompson.

Maxwell, S. (2000). *Designing experiments and analyzing data: A model comparison approach*. New Jersey: Erlbaum.

7. List Faculty Qualified to Teach This Course.

Biology faculty

8. Frequency.

a. Projected semesters to be offered: Fall ☒ Spring ☒ Summer ☐

9. New Resources Required.

- a. Computer (data processing), audio visual, broadcasting needs, other equipment
- b. Library needs
- c. Facility/space needs

10. Consultation.

Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

\_\_\_\_Harley Baker/Ching-Hua Wang\_\_\_\_1-3-03\_\_\_\_  
Proposer of Course Date