

NEW COURSE PROPOSAL

Courses must be submitted by October 15, 2011, and finalized by the end of the fall semester for the next catalog production.

Use YELLOWED areas to enter data.

DATE (*Change if modified and redate file with current date*)

11 FEB 2014, 4/9/2014

PROGRAM AREA(S)

MATH

1. Course Information. *[Follow accepted catalog format.]*

Prefix(es) (Add additional prefixes if cross-listed) and **Course No.** MATH 398

Title: ADVANCED RESEARCH INVESTIGATIONS **Units:** 3

Prerequisites

Corequisites

X Consent of Instructor Required for Enrollment

Catalog Description (Do not use any symbols): Students will explore an interdisciplinary mathematical, statistical, or computational research question in independent groups. With faculty mentoring, students develop their own research plans drawing on multiple disciplines and the multiple approaches to research. Students will disseminate results through a research paper and presentations on campus. In addition, students will be encouraged to identify and apply to relevant summer research programs, internships, and scholarships.

Grading Scheme:

X A-F Grades

Credit/No Credit

Optional (Student Choice)

Repeatability:

X Repeatable for a maximum of 6 units

Total Completions Allowed

Multiple Enrollment in Same Semester

Course Level Information:

X Undergraduate

Post-Baccalaureate/Credential

Graduate

Mode of Instruction/Components (*Hours per Unit are defaulted*).

	Units	Hours per Unit	Benchmark Enrollment	Graded Component	CS & HEGIS # (Filled in by the Dean)
Lecture		1			
Seminar	3	1	20	Y	
Laboratory		3			
Activity		2			
Field Studies					
Indep Study					
Other Blank					

Leave the following hours per week areas blank. The hours per week will be filled out for you.

hours lecture per week

hours blank per week

Is this course delivered online? Yes____ No_X__

2. Course Attributes:

General Education Categories: All courses with GE category notations (including deletions) must be submitted to the GE website: <http://summit.csuci.edu/geapproval>. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

A (English Language, Communication, Critical Thinking)

A-1 Oral Communication

A-2 English Writing

X A-3 Critical Thinking

B (Mathematics, Sciences & Technology)

B-1 Physical Sciences

■ B-2 Life Sciences – Biology
x B-3 Mathematics – Mathematics and Applications

■ B-4 Computers and Information Technology

C (Fine Arts, Literature, Languages & Cultures)

■ C-1 Art

■ C-2 Literature Courses

■ C-3a Language

■ C-3b Multicultural

D (Social Perspectives)

E (Human Psychological and Physiological Perspectives)

UDIGE/INTD Interdisciplinary

Meets University Writing Requirement

Meets University Language Requirement

■ **American Institutions, Title V Section 40404:** ■ Government ■ US Constitution ■ US History

Refer to website, Exec Order 405, for more information: <http://senate.csuci.edu/comm/curriculum/resources.htm>

■ **Service Learning Course** (Approval from the Center for Community Engagement must be received before you can request this course attribute).

NOTE: All MATH 398 courses will meet outcomes A-3 and B-3. The content of these courses will vary based on the chosen topic and faculty expertise, and so particular offerings of 398 may also meet specified outcomes in GE Goals 5, 6, or 7 (calibrated to the current CSU A-E for purposes of transfer). The total number of outcomes will remain within GE Program policies, and the additional outcomes will be formalized by processes specified by the GE Committee within normal windows for course planning and scheduling.

3. Justification and Requirements for the Course. (Make a brief statement to justify the need for the course)

A. Justification: UNIV 498 and various Capstone courses provide excellent research opportunities for upper division students. Unfortunately, many of our students are not ready to perform research by the time they are junior or seniors. MATH 398 is the mathematics-specific version of the existing UNIV 398 course, which is part of a stepladder of courses 198/298/398/498 to build student research skills from early on in the college experience. Funding for development of the stepladder has been provided by the Keck Foundation. Research shows that students who engage in research projects early in their college careers are more likely to remain in school and graduate with higher GPAs than students who do not. Students from under-represented groups are particularly impacted by earlier involvement in research.

The initial MATH 398 course offering will be **Statistical Modeling and Data Visualization**, which will be a requirement of the newly proposed minor in Statistics. This course focuses on the computer and statistical methods of data analysis starting from variable types, study types, distributions, data organization, database creation, linear regression, data modeling and visualization techniques. Students will use of appropriate statistical software applications for large data sets. With increasing information and data collection in every area of human endeavour this course will provide students with state-of-the-art statistical analysis tools and modeling techniques. Students will address an open-ended, real-world research question that could provide the foundation for an undergraduate research project.

Upon completion of the course, the student will be able to:

1. Evaluate, organize and search various data sets and databases.
2. Apply statistical methods and software to analyze various data.
3. Discuss, visualize and describe various statistical properties of data sets.
4. Apply various data searches and make decisions based on the statistical models.
5. Independently build models and apply appropriate methods to particular data analysis projects to answer a research question.
6. Present the results in visual, oral and written form.
7. Assess and critique in writing various aspects of data analysis and differences in models and results.

Course Content:

1. Variable types, study types, data collection and sharing methods
2. Data organization, databases, storage and visualization techniques
3. Statistical distributions and modeling
4. Linear modeling, testing and other data reduction methods
5. Data mining, exploratory clustering, and software applications for large data sets
6. Generalized linear modeling and further methods of data analysis applied to an open-ended research question

- B. Degree Requirement: X Requirement for the Stats Minor **Note: Submit Program Modification if this course changes your program.**
 X Elective for the Major/Minor
 Free Elective

4. Student Learning Outcomes. *(List in numerical order. You may wish to use the following resource in utilizing measurable verbs: <http://senate.csuci.edu/comm/curriculum/resources.htm>)*

Upon completion of the course, the student will be able to:

1. Find, critically evaluate, and effectively use information (Goal 3)
2. Understand the physical universe, scientific methodology, and mathematical concepts, and use quantitative reasoning. (Goal 4)
3. Additional outcomes may be identified according to the focus of particular MATH 398 offerings.

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

1. Identification of research problems; formation of research groups.
2. Development of individual research plans related to the group goal.
3. Identification, collection, and evaluation of research sources and data.
4. Integration of individual projects; written and public presentation of research results.

Does this course content overlap with a course offered in your academic program? **Yes** ☐ **No** ☒

If YES, what course(s) and provide a justification of the overlap.

Does this course content overlap a course offered in another academic area? **Yes** ☐ **No** ☒

If YES, what course(s) and provide a justification of the overlap.

Overlapping courses require Chairs' signatures.

6. Cross-listed Courses *(Please note each prefix in item No. 1)*

A. List Cross-listed Courses (Signature of Academic Chair(s) of the other academic area(s) is required).

List each cross-listed prefix for the course:

B. Program responsible for staffing: MATH

7. References. *[Provide 3 - 5 references]*

Mansilla, V., Duraisingh, E., Wolfe, C., et al. "Targeted Assessment Rubric: An Empirically Grounded Rubric for Interdisciplinary Writing." *Journal of Higher Education* 80.3 (2009): 334-353.

Newell, J., Newell, H., Dahm, K., "Rubric Development for Assessment of Undergraduate Research: Evaluating Multidisciplinary Team Projects", *Chemical Engineering Education*, 37 no. 3.

Alan Agresti, *An Introduction to Categorical Data Analysis*, Wiley 2007.

John P. Hoffmann, *Generalized Linear Models: An Applied Approach*, Pearson Education 2004.

Agostino Di Ciaccio, Mauro Coli, Jose Ibanez, *Advanced Statistical Methods for the Analysis of Large Data-Sets*, Springer 2012.

Michael Milton, *Head First Data Analysis*, O'Reilly Media, 2009.

8. Tenure Track Faculty Qualified to Teach This Course.

9. Requested Effective Date:

First semester offered: Fall 2014

10. New Resources Requested. Yes No X

If YES, list the resources needed.

A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)

X

B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)

X

C. Facility/Space/Transportation Needs

X

D. Lab Fee Requested (please refer to Dean's Office for additional processing) Yes  No X

E. Other



11. Will this new course alter any degree, credential, certificate, or minor in your program? Yes No X

If, YES attach a program update or program modification form for all programs affected.

Priority deadline for New Minors and Programs: **October 1, 2011** of preceding year.

Priority deadline for Course Proposals and Modifications: **October 15, 2011**, of preceding year.

Last day to submit forms to be considered during the current academic year: **April 15th**.


Ivona Grzegorzcyk , Jorge Garica, Kathryn Leonard

Proposer of Course (Type in name. Signatures will be collected after Curriculum approval)

Date

Approval Sheet

Program/Course:

If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
Program Chair		
	Signature	Date
General Education Chair		
	Signature	Date
Center for International Affairs Director		
	Signature	Date
Center for Integrative Studies Director		
	Signature	Date
Center for Multicultural Engagement Director		
	Signature	Date
Center for Civic Engagement Director		
	Signature	Date
Curriculum Chair		
	Signature	Date
AVP		
	Signature	Date