I. Basic Course Information

A. Course Number and Title: ENVI-202 Geographic Information Systems

B. New or Modified Course: New Course

C. Date of Proposal: Semester: Spring Year: 2011

D. Sponsoring Department: Science & Engineering

E. Semester Credit Hours: 3

F. Weekly contact Hours: Lecture: 3 Lab: 0

G. Prerequisite: ENVI-101 Introduction to Environmental Studies or BIOL-231 General Ecology or GEOG-101Introduction to Physical Geography

H. Laboratory Fees: Yes

I. name and Telephone Number or E-Mail Address of Department Chair: Margaret Czerw mczerw@raritanval.edu

II. Catalog Description

Prerequisite: ENVI-101 Introduction to Environmental Studies or BIOL-231 General Ecology or GEOG-101Introduction to Physical Geography.

Geographic Information Systems are mapping technologies that are used in a variety of professional fields to evaluate spatial information. In this course, students will acquire basic GIS application skills using ESRI ArcGIS software, with a focus on GIS application to Environmental Science. The class will emphasize practical, real-world exercises that will enable students to gain experience and skills using the software for data manipulation, interpretation and display. A strong computer background is recommended. A final project is required.

III. Statement of Course Need

This course offers students the opportunity to gain technical skills in one of the most widely used professional GIS software packages. These skills will be introduced in conjunction with geographic concepts that provide the basis for scientific inquiry into the spatial component of Environmental Science and other fields of research. Students will learn basic GIS applications, including data organization, map display, basic query functions, basic data analysis, metadata creation, and map layout. More advanced concepts taught will include: how to create and manipulate data, ArcEditor, ArcToolbox, and Spatial Analyst functions, geoprocessing, geocoding, digitizing, and various spatial analyses. The course will culminate in a spatial analysis and mapping project in the field of Environmental Science, allowing students to develop the basic skills associated with all aspects of the scientific research process; i.e., literature research, study design, proposal writing, data collection, analysis and interpretation, and report writing and presentation. The course content and
expectations are comparable to entry level GIS courses in Geography, Environmental Studies, Continuing Education and Certificate Programs at other institutions.

IV. Place of Course in College Curriculum

A. Free Elective
B. This course satisfies an Environmental Science (lab) Elective for Environmental Science A.S. and an Environmental Science Elective for the Liberal Arts - Environmental Studies Option A.A..
C. Course transferability: For New Jersey schools go to the NJTransfer website, www.njtransfer.org. For all other colleges and universities go to individual websites.

V. Outline of Course Content

A. Geographic Concepts
   1. Geographic Information Systems
   2. Spatial data reference
   3. Raster and vector data models
   4. Spatial data interpretation and analysis techniques
   5. Cartography
B. ArcGIS Software
   1. Components: ArcMap, ArcCatalog, ArcToolbox
   2. Metadata creation
   3. Data acquisition and management
   4. Editing data layers
   5. Extracting information from data
   6. Displaying data and map layout
C. Application to Environmental Science
   1. Invasive Species
   2. Pollution
   3. Land Use / Land Cover
   4. Open Space Planning / Preservation
   5. Species Distributions
   6. Other Applications

VI. Educational Goals and Learning Outcomes

A. Educational Goals:

The students will:

1. identify spatial components of problems in Environmental Science, and collect, quantify and interpret spatial data using field devices and computer programs to research those problems. (GE-NJ 2, 3,4)

2. effectively display and communicate research results in a critical and methodological manner with a written report, oral presentation and map poster created with computer software. (GE-NJ 1,4)

B. Learning Outcomes:

The student will be able to:
1. demonstrate ArcGIS software skills to display, interpret and analyze spatial data in a meaningful way to communicate geographic information.

2. understand geographic data concepts and conduct geographic data acquisition, management and mapping.

3. compare and discuss relevant literature in the combined fields of Geographic Science and Environmental Science.

4. formulate a spatial research project with an Environmental Science topic and employ GIS software and data analysis skills to perform the research.

5. prepare a written report and give an oral, poster presentation in a standard scientific format.

VII. Modes of Teaching and Learning

Given the goals and outcomes described above, the following may be used in the course:

A. Lecture/Discussion
B. Computer-Assisted Instruction
C. Small Group Work
D. Field Data Collection
E. Independent Study
F. Student Collaboration

VIII. Papers, Examinations and Other Assessment Instruments

Given the outcomes described above, the following assessment methods may be used:

A. Computer Laboratory Products
B. Reaction Papers
C. Quizzes
D. Homework Assignments

IX. Grade Determinants

The following may be used to determine the final grade:

A. Computer Laboratory Products
B. Reaction Papers
C. Quizzes
D. Homework Assignments
E. Exams
F. Final Project and Presentation
G. Participation
H. Service Learning

X. Texts and Materials

The following types of course materials may be used:

A. Articles from scientific journals and periodicals
B. Current event articles or media
C. Textbook (to be decided)
D. Data download resources
E. Software or technology user manuals
F. Computer station and software in Laboratory
G. GPS devices

(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

XI. Resources

A. Computer Laboratory and Equipment
B. ArcGIS Software Licenses
C. GPS devices
D. Library databases and other library resources
E. Natural areas on campus
F. Data-sharing websites (NJDEP, NJDOT, USGS, NJGIN, etc.)