I. Basic Course Information

A. Course Number and Title: ENVI-201: Applied Research in Environmental Science

B. New or Modified Course: Modified Course

C. Date of Proposal: Semester: Fall Year: 2016

D. Effective Term: Fall 2017

E. Sponsoring Department: Science & Engineering

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 4
   Lecture: 2
   Laboratory: 2
   Out of class student work per week: 5

H. Prerequisites/Corequisites: ENVI 102 or BIOL 231

I. Laboratory Fees: Yes

J. Name and Telephone Number or E-Mail Address of Department Chair at time of approval: Sarah Imbriglio, Ext 8241, sarah.imbriglio@raritanval.edu

II. Catalog Description

Prerequisites: ENVI 102 or BIOL 231. Offered in spring semester only.

An interdisciplinary study of research and field methods related to the science of environmental issues. Students will develop basic scientific research skills, from literature review to analysis and presentation of results, and will gain hands-on experience with various types of field research methods, including sediment and water quality testing, plant and wildlife surveys, ecological restoration and planning, and remote sensing and GIS. Students will also learn basic skills of environmental communication and outreach needed to increase public understanding and engagement with environmental problems in our community. Regular class trips during labs and one weekend field trip required.

III. Statement of Course Need

A. This course offers the formal opportunity for students to integrate the concepts and skills learned from ecology, environmental science, and related fields to the study of
local environmental issues. This course is the capstone course required for students in their fourth semester of study in the Environmental Science Option. Students will apply the knowledge and skills learned in these disciplines to answer questions by conducting literature and field research, and will 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. One weekend field trip required.

B. Laboratory experience is essential for students to develop professional skills with using field research equipment to collect real-world environmental data, as well as the research and communication skills needed to apply data and concepts to understanding, developing and presenting solutions to local environmental problems.

C. Transferability of this course
   1. This course does not transfer as a General Education course.
   2. This course may transfer as an ecology or environmental science program requirement, for those that require field methods or research methods courses.
   3. This course generally transfers as an ecology or environmental science elective.

IV. Place of Course in College Curriculum
   A. Free Elective
   B. This course does not serve as a General Education course.
   C. This course is a required course for the Environmental Science A.S. and an elective for the Environmental Studies A.A.
   D. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content
   A. Research Methodology
      1. Literature research and review
         a. Historical data sources and perspectives
         b. Library resources and literature citation
         c. Synthesis of background knowledge
         d. Framing research questions
      3. Data analysis and interpretation
         a. Statistical analysis and testing
         b. Hypothesis testing and causal explanation
      4. Environmental communication and outreach
         a. Report preparation and poster presentations
         b. Oral presentations and civic engagement
   B. Field Methods and Applications
      1. Environmental Monitoring and Analysis
         a. Soil and Water Quality
            i. Identifying local sources of heavy metal contamination
            ii. Microplastics in the marine environment
         b. Plant and Wildlife Studies
i. Reconstructing precolonial forest composition
ii. Rare plant and animal species surveys
c. Remote sensing and GIS
   i. Satellite and aerial imagery
   ii. Topographic profiles and spatial analysis
   iii. Map construction and presentation

2. Environmental Planning and Restoration
   a. Environmental management plans
      i. Analysis of management planning and practice (forests, coasts)
      ii. Developing solutions to improve ecosystem health
   b. Environmental remediation and restoration
      i. Technical solutions
      ii. Policy solutions
c. Public outreach

3. Student Research Projects

VI. General Educational and Course Learning Outcomes

A. General Educational Learning Outcomes:
   Students will be able to:
   1. Communicate and collaborate with others in a clear, logical manner about environmental issues (GE-NJ1)
   2. Use technological tools for environmental research, information analysis, problem solving, decision making, and creative production (GE-NJ IL)
   3. Apply quantitative reasoning to interpret data and solve environmental problems (GE-NJ3 *)
      *embedded critical thinking

B. Learning Outcomes
   The student will be able to:
   1. demonstrate awareness of local environmental problems and the scientific methods used to study and address them
   2. use standard field methods and equipment to collect a variety of environmental data;
   3. compare and contrast results in relation to other studies in a critical manner;
   4. develop and present solutions to environmental problems;

C. Assessment Instruments
   Given the outcomes described above, the following assessment methods may be used:
   A. laboratory products
   B. research papers
   C. essays
   D. demonstrations

VII. Grade Determinants
   The following may be used to determine the final grade:
   A. research project (required)
   B. presentations
Given the goals and outcomes described above, the following methods for teaching and learning may be used in the course:

A. lecture/discussion
B. small-group work
C. computer-assisted instruction (GIS, remote sensing, statistical software)
D. guest speakers
E. laboratory and field work
F. student oral presentations
G. student collaboration
H. independent study

VIII. Texts and Materials
The following types of course materials may be used:

A. Articles from scientific journals and periodicals
B. Books and Book Reviews
C. Films and Documentaries
D. Internet Databases and Information Sources
E. Library Article Databases
F. Laboratory Equipment

(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.)

IX. Resources
A. RVCC van and/or bus rental;
B. Library databases and other library resources;
C. Natural areas on campus and elsewhere;
D. RVCC greenhouse and related supplies;
E. Environmental monitoring, GPS, and forest ecology field equipment;
F. Computers with Excel, ArcMAP (GIS), and SAS-JMP statistical software;
G. Field guides, literature, films and documentaries from RVCC Science Library;

X. Honors Option
Not applicable.