DEPARTMENT OF

# Environmental & Health Sciences

## DEGREE PROGRAMS

**B.A. Biology: Field Naturalist**
**B.A. Outdoor Education**
**B.S. Biology**
**B.S. Environmental Science/Natural Resources**
**B.S. Integrated Environmental Science**
**B.S. Health Sciences**

**Minors:**
- **Adventure Education**
- **Biology**
- **Chemistry**
- **Environmental Education**
- **Natural Resources**

**Licensure Programs:**
- **Life Science** *(7-12)*
- **Physical Education** *(K-6, 7-12, K-12)*
- **Physical Science** *(7-12)*

**Other:**

Johnson State College has a Reciprocal Agreement with Plymouth State University of New Hampshire whereby JSC graduates may be able to obtain athletic training certification (NATA). For specific information about this competitive program, please refer to the health science program information provided in this section of the catalog.

## FACULTY / STAFF

- Tania Bacchus, *Professor*
- Kenneth Burrill, *Professor*
- Elizabeth Dolci, *Professor*
- Robert Genter, *Professor*
- Leslie Kanat, *Professor*
- Karen Uhlendorf, *Professor*
- John Wrazen, *Professor*
- Brad Moskowitz, *Associate Professor*
- John Pellerin, *Associate Professor*
- Hans Haverkamp, *Assistant Professor*
- Susan Mann, *Administrative Assistant*

# BIOLOGY

The study of biology serves all college majors and professionals by preparing them to understand and deal with the many biological concepts, issues and problems in their fields. Our program is designed to introduce the core subdisciplines of biology and to offer advanced studies in organismal, human, molecular and environmental biology. Microbiologists, physiologists, zoologists, molecular biologists, field naturalists, ecologists, marine biologists, agricultural scientists, foresters, wildlife managers, physicians, therapists, nutritionists, toxicologists, science writers and teachers are a sample of the professionals who commonly begin as biology majors.

Students in the biology program explore outdoor laboratories ranging from the College's Babcock Nature Preserve to areas as diverse as tropical ecosystems and the American west. On campus, our program is supported by teaching laboratories, a greenhouse, an animal care facility, an artificial stream laboratory, a cellular and molecular laboratory, and extensive herbarium and vertebrate museum collections.

The research activity of the faculty include understanding cell behavior at the molecular level, classification of plants, improving teaching in biology, vertebrate ecology and studying environmental pollution.

# Bachelor of Science in Biology

The B.S. program is designed for students who desire a comprehensive training in the life sciences leading to areas in education, research, or medicine. Students who complete the required education courses for secondary licensure are eligible to teach life sciences for grades 7-12 in the public schools.

## LEARNING OUTCOMES FOR BIOLOGY MAJORS

**The B.S. in the biology program seeks to produce graduates who:**

• Demonstrate basic knowledge: Students will understand the fundamental concepts of each of the following biological disciplines
and the relationships among them: organismal biology, ecology, cellular/molecular biology, and evolution.

• Apply the scientific method: Students will design and carry out a research study that incorporates the major steps in the scientific method of investigation.

• Communicate in science: Students will communicate effectively both in scientific writing and oral presentations.

• Have values and ethics: Students will apply ethical guidelines in professional and societal behavior.

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| BIO-1211 | Introductory Biology: Ecology & Evolution+ | 4 | _____ |
| BIO-1212 | Introductory Biology: Cells & Genetic Basis of Life*+ | 4 | _____ |
| BIO-2340 | Fundamentals of Ecology* | 4 | _____ |
| BIO-3220 | Genetics* | 4 | _____ |
| BIO-3720 | Current Topics in Biology | 1 | _____ |
| BIO-4920 | Senior Thesis | 3 | _____ |
| CHE-1031 | General Chemistry I*+ | 4 | _____ |
| CHE-1032 | General Chemistry II* | 4 | _____ |
| CHE-3111 | Organic Chemistry I* | 4 | _____ |
| CHE-3112 | Organic Chemistry II* | 4 | _____ |
| MAT-1531 | Calculus I*+ | 4 | _____ |
| PHY-1041 | Physics I*+ | 4 | _____ |
| PHY-1042 | Physics II* | 4 | _____ |

**Electives** ***(Select a minimum of one course from each set)***

**Set 1: Mathematics**

| | | | |
|---|---|---|---|
| MAT-2030 | Probability & Statistics+ | 3 | _____ |
| MAT-2532 | Calculus II+ | 4 | _____ |
| MAT-XXXX | Inferential Statistics | 3 | _____ |

***(Continued on next page)***

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| **Set 2: Cell/Molecular Biology** | | | |
| BIO-3125 | Introduction to Biological Chemistry | 3 | _____ |
| BIO-3130 | Cellular Biology: A Molecular Approach* | 4 | _____ |
| BIO-3140 | Microbiology* | 4 | _____ |
| **Set 3: Organismal Biology** | | | |
| BIO-2011 | Human Anatomy and Physiology I | 4 | _____ |
| BIO-2012 | Human Anatomy and Physiology II | 4 | _____ |
| BIO-2145 | Plant Biology | 4 | _____ |
| BIO-2310 | Invertebrate and Vertebrate Zoology | 4 | _____ |
| BIO-3160 | Animal Behavior | 4 | _____ |
| BIO-3170 | Mammalogy | 4 | _____ |
| BIO-3320 | Ornithology | 4 | _____ |
| **Set 4: Ecology/Evolution** | | | |
| BIO-3260 | Limnology | 4 | _____ |
| BIO-3280 | Environmental Toxicology* | 4 | _____ |
| BIO-3290 | Conservation Biology | 3 | _____ |
| **TOTAL** | | **61-64** | |

**These courses also fulfill requirements in the ENV, HSC, OER, and WAM programs.*

*+These courses also fulfill the General Education Core Curriculum requirements.*

# Bachelor of Arts in Biology: Field Naturalist

The B.A. in biology is designed for students who want to become a Field Naturalist. Field Naturalists have a broad knowledge of ecology, organismal biology, field geology, environmental chemistry, conservation biology, and wildlife management. Field Naturalist majors are particularly well qualified for environmental education and research positions for state or federal environmental conservation agencies, private conservation organizations, consulting firms, and environmental education institutions.

## *LEARNING OUTCOMES FOR BIOLOGY MAJORS*

**The B.A. in the field naturalist program seeks to produce graduates who:**

- Critically read, evaluate, and synthesize information from relevant biological and environmental literature;
- Observe, identify, and measure the living and physical aspects of the natural environment using scientific methods; and
- Are able to articulate in written, oral, and graphical form the characteristics of natural environments and human interactions with them.

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| BIO-1211 | Introductory Biology: Ecology & Evolution+ | 4 | _____ |
| BIO-1212 | Introductory Biology: Cells & Genetic Basis of Life*+ | 4 | _____ |
| BIO-2145 | Plant Biology | 4 | _____ |
| BIO-2310 | Invertebrate and Vertebrate Zoology | 4 | _____ |
| BIO-2340 | Fundamentals of Ecology* | 4 | _____ |
| BIO-3720 | Current Topics in Biology | 1 | _____ |
| BIO-4810 | Internship in Biology ***OR*** | | |
| BIO-4920 | Senior Thesis | 3-12 | _____ |
| CHE-1031 | General Chemistry I*+ | 4 | _____ |
| CHE-1032 | General Chemistry II* | 4 | _____ |
| ENV-1050 | Introduction to Earth Science*+ | 4 | _____ |
| ENV-1110 | Introduction to Environmental Problems* | 3 | _____ |
| ENV-2050 | The Natural History of Vermont* | 3 | _____ |
| **Electives** ***(select a minimum of 4 courses from the following)*** | | | |
| BIO-3110 | Field Ornithology* | 3 | _____ |
| BIO-3260 | Limnology | 4 | _____ |
| BIO-3290 | Conservation Biology | 3 | _____ |
| BIO-3310 | Wildlife Field Methods* | 4 | _____ |
| BIO-4220 | Wildlife Ecology and Management* | 4 | _____ |
| ENV-3220 | Environmental Interpretation* | 3 | _____ |
| GEY-3120 | Field Geology* | 4 | _____ |
| **TOTAL** | | **54-67** | |

**These courses also fulfill requirements in the ENV, HSC, OER, and WAM programs.*

*+These courses also fulfill the General Education Core Curriculum requirements.*

## LICENSURE IN LIFE SCIENCE *(7-12)*

Students interested in obtaining licensure in life science must submit passing scores on Praxis I and II, complete the B.S. degree in biology and the following courses:

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| EDU-2110 | Introduction to Exceptional Populations | 3 | _____ |
| EDU-2170 | Adolescent Development | 3 | _____ |
| EDU-2320 | Engaged in Creative Teaching and Learning | 3 | _____ |
| EDU-3020 | Educational Psychology | 3 | _____ |
| EDU-3240 | Literacy Development in the Content Areas | 3 | _____ |
| EDU-4850 | Secondary Education Student Teaching | 12 | _____ |
| SCI-4020 | Science Methods | 3 | _____ |
| **TOTAL** | | **30** | |

**Please see other important licensure requirements outlined on pages 34-41 of this catalogue.*

# ENVIRONMENTAL SCIENCE

The environmental science discipline offers students both a natural resources program and an integrated science program. The environmental science/natural resources program prepares students for job opportunities in business, education, and government, primarily in the management of natural resources and the development of public policy. The integrated environmental science program, by offering students a curriculum that focuses more heavily on laboratory and field courses, prepares students for more technically-orientated positions in the environmental field and for graduate programs in the sciences.

## Bachelor of Science in Environmental Science/ Natural Resources

### *LEARNING OUTCOMES FOR ENVIRONMENTAL SCIENCE/NATURAL RESOURCES MAJORS*

**The B.S. in environmental sciences/natural resources seeks to produce graduates who:**

- Critically read, evaluate, and synthesize information from relevant geological and biological literature that addresses the complexity of factors relating to human interaction with the environment
- Work individually, and with others, to evaluate the economic, social, ethical, and scientific aspects of environmental problems
- Make observations and construct hypotheses to account for the observations
- Articulate, in oral, written, and graphical form (using computer software), the causes, scale, and relative importance of emergent and persistent environmental problems, environmental change, and sustainable human practices.

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| BIO-1210 | Introduction to Biology | 4 | _____ |
| BIO-2340 | Fundamentals of Ecology | 4 | _____ |
| CHE-1031 | General Chemistry I | 4 | _____ |
| ENV-1050 | Introduction to Earth Science | 4 | _____ |
| ENV-1110 | Introduction to Environmental Problems | 3 | _____ |
| ENV-3030 | Water Resources | 3 | _____ |
| ENV-3040 | Energy and Mineral Resources | 3 | _____ |
| ENV-3210 | Current Topics in Environmental Science | 1 | _____ |
| ENV-4730 | Senior Seminar | 3 | _____ |
| **Electives** ***(Select five of the following)*** | | | |
| BIO-4220 | Wildlife Ecology and Management | 4 | _____ |
| ENV-3010 | Land Use Planning | 3 | _____ |
| ENV-3020 | Environmental Law | 3 | _____ |

***(Continued on next page)***

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| ENV-3130 | Environmental Geology | 4 | _____ |
| ENV-3150 | Toxic and Solid Waste Management | 3 | _____ |
| ENV-3160 | Coastal and Marine Resources | 3 | _____ |
| ENV-3220 | Environmental Interpretation | 3 | _____ |
| ENV-3230 | National Parks and Wilderness Management | 3 | _____ |
| ENV-3240 | Fundamentals of Soil Science | 4 | _____ |
| ENV-3250 | Meteorology/Climatology | 4 | _____ |
| ENV-3310 | Applications in GIS | 4 | _____ |
| ENV-4010 | Global Environmental Issues | 3 | _____ |
| ENV-4020 | Remote Sensing | 4 | _____ |
| ENV-4810 | Environmental Internship | 6 | _____ |
| GEY-3120 | Field Geology | 4 | _____ |
| **Additional Requirements** | | | |
| ECO-2020 | Macroeconomics | 3 | _____ |
| ECO-3010 | Environmental Economics | 3 | _____ |
| PHI-1040 | Introduction to Ethics ***OR*** | | |
| POS-3050 | Environmental Ethics and Politics | 3 | _____ |
| POS-1020 | American Politics and Government ***OR*** | | |
| POS-1010 | Introduction to Political Science | 3 | _____ |
| **TOTAL** | | **56-63** | |

Students are encouraged, but not required, to complete an internship. Recent placements have included the Vermont Fish and Wildlife Department, U.S. Soil Conservation Service, U.S. Fish and Wildlife Service, the Vermont Youth Corps, Vermont State Legislature, regional planning commissions, and various state and national parks.

# Bachelor of Science in Integrated Environmental Science

### *LEARNING OUTCOMES FOR INTEGRATED ENVIRONMENTAL SCIENCE MAJORS*

**The B.S. in integrated environmental science seeks to produce graduates who:**

- Critically read, evaluate, and synthesize information from relevant geological, biological, and chemical literature related to environmental problems
- Work individually, and with others, to identify and evaluate environmental problems
- Apply appropriate tools, analytical equipment, and concepts from mathematics, physics, chemistry, geology, and biology, including the use of computer software, to evaluate environmental problems
- Observe and measure in the field and laboratory, the organic, inorganic, and physical aspects of environmental problems while applying the methods of science
- Design a research project to test hypotheses and draw conclusions based on knowledge of the sciences
- Articulate, in oral, written, and graphical form (using computers), assessments of environmental problems.

# ENVIRONMENTAL & HEALTH SCIENCES

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| BIO-1210 | Introduction to Biology ***OR*** | | |
| BIO-1211 | Introduction to Biology: Ecology and Evolution ***OR*** | | |
| BIO-1212 | Introduction to Biology: Cells & The Genetic Bases of Life | 4 | _____ |
| BIO-2340 | Fundamentals of Ecology | 4 | _____ |
| CHE-1031 | General Chemistry I | 4 | _____ |
| CHE-1032 | General Chemistry II | 4 | _____ |
| ENV-1050 | Introduction to Earth Science | 4 | _____ |
| ENV-3240 | Fundamentals of Soil Science | 4 | _____ |
| ENV-3250 | Meteorology/Climatology | 4 | _____ |
| ENV-4720 | Senior Thesis | 3 | _____ |
| GEY-3110 | Hydrogeology | 4 | _____ |
| GEY-3120 | Field Geology | 4 | _____ |
| PHY-1041 | Physics I | 4 | _____ |
| **Choose one course from each of the following sets of courses:** | | | |
| **Set 1** | | | |
| ENV-3310 | Applications in GIS | 4 | _____ |
| ENV-4020 | Remote Sensing | 4 | _____ |
| **Set 2** | | | |
| BIO-3130 | Cellular Biology: A Molecular Approach | 4 | _____ |
| BIO-3140 | Microbiology | 4 | _____ |
| CHE-3111 | Organic Chemistry I | 4 | _____ |
| **Set 3** | | | |
| BIO-3260 | Limnology | 4 | _____ |
| BIO-3280 | Environmental Toxicology | 4 | _____ |
| ENV-3130 | Environmental Geology | 4 | _____ |
| **Set 4** | | | |
| MAT-1531 | Calculus I | 4 | _____ |
| PHY-1042 | Physics II | 4 | _____ |
| **TOTAL** | | **59** | |

## LICENSURE IN PHYSICAL SCIENCE *(7-12)*

Students interested in obtaining licensure in physical science must submit passing scores on Praxis I and II, complete the B.S. degree in environmental science or integrated environmental science and the following courses:

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| EDU-2110 | Introduction to Exceptional Populations | 3 | _____ |
| EDU-2170 | Adolescent Development | 3 | _____ |
| EDU-2320 | Engaged in Creative Teaching and Learning | 3 | _____ |
| EDU-3020 | Educational Psychology | 3 | _____ |
| EDU-3240 | Literacy Development in Content Areas | 3 | _____ |
| EDU-4850 | Secondary Education Student Teaching | 12 | _____ |
| SCI-4020 | Science Methods | 3 | _____ |

**In addition, students are required to complete the following courses** (some of which are required in the major):

| | | | |
|---|---|---|---|
| CHE-1031 | General Chemistry I | 4 | _____ |
| CHE-1032 | General Chemistry II | 4 | _____ |
| PHY-1041 | Physics I | 4 | _____ |
| PHY-1042 | Physics II | 4 | _____ |

**Please see other important licensure requirements outlined on pages 34-41 of this catalogue.*

# HEALTH SCIENCES

The health sciences major is designed for students wishing to pursue careers in health, fitness, and physical education. The program trains students in the basic sciences, including biology, chemistry, anatomy and physiology; assessment of health status; the disease process; health, fitness, and physical education; and cardiac and pulmonary assessment and rehabilitation. The health sciences program prepares students for a wide variety of career options and, with the current increases in lifestyle-related disease and the growing elderly population, students will be poised to take advantage of new prospects in the health field.

# Bachelor of Science in Health Sciences

### *LEARNING OUTCOMES FOR HEALTH SCIENCE MAJORS*

**The B.S. in the health sciences program seeks to produce graduates who:**

- Demonstrate through both speaking and writing an understanding of biological, physical, and social sciences related to human movement, sport, exercise, and contemporary health issues.
- Identify and describe challenges to the natural homeostatic mechanisms of the body and mind and how both adapt to these challenges.
- Apply knowledge to prevent and control diseases in diverse populations related to lifestyle, behaviors, physical activity, and nutrition.
- Use both qualitative and quantitative methods to appraise risk factors, health status, fitness, and physical skills, and then design safe and effective programs to target these areas in various populations.
- Effectively communicate health, exercise, fitness, sport and physical activity information through a variety of teaching techniques.
- Demonstrate an ability to apply theoretical knowledge, research skills, use of technology, and professionally appropriate and ethical behaviors in workplace settings.

# ENVIRONMENTAL & HEALTH SCIENCES

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| **Core Program** | | | |
| AHS-1010 | Contemporary Health Issues | 3 | _____ |
| AHS-2040 | Advanced First Aid & Emergency Care | 4 | _____ |
| AHS-2130 | Programs for Lifetime Health & Fitness | 3 | _____ |
| AHS-3120 | Kinesiology | 3 | _____ |
| AHS-3230 | Physiology of Exercise | 4 | _____ |
| AHS-4030 | Psychology of Sports and Exercise | 3 | _____ |
| BIO-1210 | Introduction to Biology | 4 | _____ |
| BIO-2011 | Anatomy & Physiology I | 4 | _____ |
| BIO-2012 | Anatomy & Physiology II | 4 | _____ |
| BIO-3180 | Nutrition | 3 | _____ |
| PSY-1010 | Introduction to Psychology | 3 | _____ |
| | | | |
| **Health & Exercise Science Requirements** | | | |
| AHS-4060 | Cardiopulmonary Assessment, Rehabilitation & Training | 3 | _____ |
| AHS-4110 | Psychophysiology of Stress | 3 | _____ |
| AHS-4810 | Internship ***OR*** | | |
| AHS-4911 | Senior Research | 3-6 | _____ |
| CHE-1031 | General Chemistry I | 4 | _____ |
| CHE-1032 | Chemistry II | 4 | _____ |

**Electives**

In addition to completing the core program and health and exercise science requirements above, each student must choose 6-7 credits from the following courses in consultation with his/her advisor about career goals. At least one of these must be a 3- or 4-credit course.

Fitness Courses : 0.5 or 1.0 credits each

| | | | |
|---|---|---|---|
| PED-1010 | Aerobics, Spinning, Water Aerobics, Weight Training, Weight Training for Women, Winter Sports Conditioning, Yoga or | | |
| AHS-1080 | Lifetime Fitness | 6-7 | _____ |
| | | | |
| AHS-3043 | Care and Prevention of Athletic Injuries | 4 | _____ |
| AHS-3050 | Introduction to Pharmacology | 3 | _____ |
| BIO-3125 | Biological Chemistry (offered every 3 years) | 4 | _____ |
| BIO-3130 | Cellular Biology: A Molecular Approach (offered every 3 years) | 4 | _____ |
| BIO-3140 | Microbiology (offered every 3 years) | 4 | _____ |
| CHE-3111 | Organic Chemistry I | 4 | _____ |
| **TOTAL** | | **59.5-66** | |

*(Total Exclusive of General Education Requirements 50-54 Cr.)*

### NOTE:

Students interested in pursuing medical school following completion of their bachelor's degree should take these standard prerequisite courses: BIO-1211 Introduction to Biology: Ecology and Evolution, BIO-1212 Introduction to Biology: Cells and Genetic Basis of Life, CHE-1031 General Chemistry I, CHE-1032 General Chemistry II, CHE-3111 Organic Chemistry I, CHE -3112 Organic Chemistry II, PHY-1041 Physics I, PHY-1042 Physics II. Required or suggested by some medical schools are the following courses: BIO-3125 Biological Chemistry, BIO-3220 Genetics, MAT-1531 Calculus I, MAT-2532 Calculus II.

### ATHLETIC TRAINING, A RECIPROCAL AGREEMENT WITH PLYMOUTH STATE UNIVERSITY

Students who graduate from Johnson State College may obtain athletic training certification (NATA) through a reciprocal agreement with Plymouth State University of New Hampshire. Under this agreement Plymouth will accept up to two students per year who have an undergraduate degree from Johnson and who meet the entry standards for their Masters of Education Athletic Training. This academic program is competitive, limited, and is not guaranteed even to those who meet the minimum requirements. Students must verify that they can comply with the program's Technical Standards. A four-semester clinical experience is required as part of this program. Students successfully completing this program will be eligible to sit for the NATA-BOC certification exam. Plymouth State University's Athletic Training program has been granted accreditation by the Commission of Accreditation of Allied Health Education Programs (CAAHEP).

Students from Johnson interested in pursuing this reciprocal opportunity should work very closely with an academic advisor in the health science program at Johnson and include all or as many as possible of the following Johnson courses and internship hours in their undergraduate degree program:

**Minimum of 100 hours observation under direct supervision of NATA-BOC Certified Athletic Trainer.**
**Minimum grade of C in the following college/university courses:**
Anatomy (w/lab) 4 credits
Physiology (w/lab) 4 credits
Kinesiology 3 credits
Exercise Physiology 3 credits
Nutrition 3 credits
Health Issues 3 credits
First Aid and CPR (and current certification) 4 credits

## LICENSURE IN PHYSICAL EDUCATION *(K-6, 7-12, K-12)*

All students pursuing licensure in physical education must complete the B.S. in health sciences core with the physical education concentration, and the appropriate licensure courses listed below. To be recommended for EDU-4835, Physical Education Student Teaching, students must pass Praxis I, have a GPA of 3.0 or better, and earn at least a B- in all licensure courses. Recommendation for Vermont teacher licensure requires a successful review of the student's professional portfolio and an overall GPA of at least a 3.0. Beginning October 2004, students applying for an initial licensure in physical education (K-6, 7-12, or K-12) must also submit passing scores on the Praxis II content knowledge examination.

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| **Health Sciences Core** | | | |
| AHS-1010 | Contemporary Health Issues | 3 | _____ |
| AHS-2040 | Advanced First Aid & Emergency Care | 4 | _____ |
| AHS-2130 | Programs for Lifetime Health & Fitness | 3 | _____ |
| AHS-3120 | Kinesiology | 3 | _____ |

*(Continued on next page)*

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| AHS-3230 | Physiology of Exercise | 4 | _____ |
| AHS-4030 | Psychology of Sports & Exercise | 3 | _____ |
| BIO-1210 | Introduction to Biology | 4 | _____ |
| BIO-2011 | Anatomy & Physiology I | 4 | _____ |
| BIO-2012 | Anatomy & Physiology II | 4 | _____ |
| BIO-3180 | Nutrition | 3 | _____ |
| PSY-1010 | Introduction to Psychology | 3 | _____ |
| **Physical Education Requirements** | | | |
| DAN-1010 | Fundamentals of Dance | 3 | _____ |
| OER-2140 | Ropes Course Leadership | 2 | _____ |
| PED-1150 | Foundations of Physical Education | 3 | _____ |
| PED-2030 | Educational Games, Dance, & Gymnastics | 2 | _____ |
| PED-2040 | Team Sports | 2 | _____ |
| PED-2110 | Individual, Dual, & Lifetime Activities | 2 | _____ |
| PED-3120 | Measurement & Evaluation | 3 | _____ |
| **Choose 1 of the following in consultation with advisor:** | | 3-4 | _____ |
| AHS-3043 | Care & Prevention of Athletic Injuries | 4 | _____ |
| AHS-4110 | Psychophysiology of Stress | 3 | _____ |
| OER-3010 | Learning in the Outdoors | 4 | _____ |
| **Licensure Requirements** | | | |
| EDU-2040 | Child Development (for K-6 licensure) | 3 | _____ |
| EDU-2110 | Introduction to Exceptional Populations | 3 | _____ |
| EDU-2170 | Adolescent Development (for 7-12 licensure) | 3 | _____ |
| EDU-2320 | Engaged in Creative Teaching and Learning | 3 | _____ |
| EDU-3020 | Educational Psychology | 3 | _____ |
| EDU-3120 | Methods in Health & Physical Education for Elementary School Teachers (for K-6 licensure) | 2 | _____ |
| EDU-3240 | Literacy Development in the Content Areas | 3 | _____ |
| EDU-4835 | Physical Education Student Teaching | 12 | _____ |
| PED-2810 | Internship in Elementary Physical Education (for K-6 licensure) | .5 | _____ |
| PED-2810 | Internship in Physical Education for Exceptional Populations | .5 | _____ |
| PED-3140 | Methods of Teaching Secondary School Physical Education (for 7-12 licensure) | 4 | _____ |
| **LICENSURE REQUIREMENTS TOTAL FOR:** | | | |
| **Grades K-6 Licensure** | | **30** | |
| **Grades 7-12 Licensure** | | **31.5** | |
| **Grades K-12 Licensure** | | **37** | |
| **TOTAL** | | **88-96** | |

**Please see other important licensure requirements outlined on pages 34-41 of this catalog.*

*(Total Exclusive of General Education Requirements 75-83 credits)*

# OUTDOOR EDUCATION

## Bachelor of Arts in Outdoor Education

The outdoor education major is highly experiential and leads to diverse careers working with a variety of populations in outdoor settings. The program consists of a core and two concentrations: one in adventure education and wilderness leadership and the other in environmental education. The major offers students technical training in outdoor pursuits/adventure leadership and environmental education in combination with cross-disciplinary study in education, psychology and biology, and prepares students for a career or graduate study in outdoor education, outdoor recreation, or environmental education.

Students must earn a grade of C- (1.7) or better in all required courses in the degree program. Prior to the required internship, students must complete OER-3010, have junior or senior standing, and obtain a recommendation from the outdoor education faculty. Students should meet with their advisors early in their program for specific details regarding the internship process.

### *LEARNING OUTCOMES FOR OUTDOOR EDUCATION MAJORS*

The B.A. in outdoor education program seeks to produce graduates who can demonstrate:

- Knowledge of the historical and philosophical foundations of the field, human development, learning theories, experiential education, natural history, and environmental issues,
- The ability to critically read, evaluate, and synthesize literature in the field of outdoor education and carry out an original research project,
- Pedagogical skills and practical experience organizing, teaching, and leading diverse populations through experiential, field-based learning opportunities,
- Knowledge of professional practices including program administration, program development, risk management, emergency procedures, and awareness of industry standards, current issues and trends,
- Knowledge and skills specific to outdoor adventure pursuits and/or environmental education.

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| **One of the following human development courses*:** | | | |
| EDU-2040 | Child Development | | |
| EDU-2170 | Adolescent Development | | |
| PSY-2070 | Developmental Psychology | 3 | _____ |
| EDU-3020 | Educational Psychology | 3 | _____ |
| ENV-1110 | Introduction to Environmental Problems | 3 | _____ |
| ENV-2050 | The Natural History of Vermont ***OR*** | | |
| BIO-2130 | Natural History of the Yellowstone Plateau | 3 | _____ |
| OER-1000 | Introduction to Outdoor Education | 4 | _____ |
| OER-3010 | Learning in the Outdoors | 4 | _____ |
| OER-3020 | Program Planning in Outdoor Education | 3 | _____ |
| OER-4900 | Research in Outdoor Education | 3 | _____ |
| PSY-1010 | Introduction to Psychology | 3 | _____ |

**Adventure Education and Wilderness Leadership majors must select either EDU-2170 or PSY-2070.*

| | | |
|---|---|---|
| OER-4810 | Outdoor Education Internship | 6 –12 |
| **TOTAL** | | **35-41** |

## ADVENTURE EDUCATION & WILDERNESS LEADERSHIP CONCENTRATION

Students in this concentration will be prepared for work in the fast-growing field of educational and recreational outdoor programs. Employers of these graduates might include adventure outfitters and guide services, outdoor education centers and camps that include programs in outdoor living/travel and ropes courses, and outdoor leadership development programs. Graduating students could also pursue advanced degrees in outdoor education, outdoor recreation or outdoor therapeutic recreation.

Students in this concentration must document at least 25 days of wilderness or adventure leadership experiences when they apply for their required internship. Leadership opportunities are offered through various courses, the Outing Club, and local schools and agencies. Students should consult with their advisor early in their program to obtain details about this requirement.

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| **Outdoor Education Skills Courses** | | | |
| Select six of the following: (0.5-3.0 credits each) | | 2-7 | _____ |
| Fly-fishing, Hiking & Camping, Rock Climbing I, Advanced Rock Craft, Ice Climbing, Orienteering, Ropes Course, Cross-Country Skiing, Snowshoeing, Introduction to River Kayaking, Whitewater Kayaking, Coastal Kayaking, Winter Expedition, Teaching Assistant Internship, or activity-based special topics course, such as Wilderness Canoe Towing. | | | |
| OER-1061 | Backpacking | 1 | _____ |
| OER-2062 | Advanced Backpacking | 2 | _____ |
| OER-2050 | Rock Climbing Instructor ***OR*** | | |
| OER-1165 | Coastal Kayak Guide Training | 2 | _____ |
| OER-2060 | Wilderness First Responder | 4 | _____ |
| | (or proof of equivalent or higher level certification) | | |
| OER-2140 | Ropes Course Leadership | 2 | _____ |
| OER-3070 | Adventure Education Theory and Practice | 3 | _____ |
| OER-4030 | Wilderness Leadership Techniques | 4 | _____ |
| PSY-2420 | Group Process: Theory and Practice | 3 | _____ |
| **TOTAL** | | **23-28** | |

## ENVIRONMENTAL EDUCATION CONCENTRATION

Students in this concentration will be prepared for employment in a variety of settings, including working at outdoor education, environmental, and nature centers; as naturalists or interpreters in federal, state, or local parks; conducting nature or environmentally-oriented activities for municipal or community recreation programs; as summer camp nature specialists; and as school and college workshop leaders and curriculum consultants. Students can also pursue advanced degrees in outdoor education and environmental education.

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| BIO-1210 | Introduction to Biology ***OR*** | | |
| BIO-1211 | Introduction to Biology: Ecology & Evolution | 4 | _____ |
| BIO-2340 | Fundamentals of Ecology | 4 | _____ |
| ENV-1050 | Introduction to Earth Science | 4 | _____ |
| ENV-3220 | Environmental Interpretation | 3 | _____ |
| ENV-3230 | National Parks and Wilderness Management | 3 | _____ |
| ENV-4010 | Global Environmental Issues | 3 | _____ |
| **Natural Science Field Course (Choose one of the following)** | | | |
| BIO-2145 | Plant Biology | 4 | _____ |
| BIO-3110 | Field Ornithology | 3 | _____ |
| BIO-3310 | Wildlife Field Methods | 4 | _____ |
| GEY-3120 | Field Geology | 4 | _____ |
| **TOTAL** | | **24-25** | |

# Minors

## ADVENTURE EDUCATION

| REQUIRED COURSES | CREDITS |
|---|---|
| **Minimum of Two OER Basic Skills Courses** (1000-level, 0. 5-1.0 credit each) | 1-2 |
| *Choice of: Snowshoeing, Cross-Country Skiing, Intro to River Kayaking, Fly-fishing, Hiking & Camping, Backpacking, Rock Climbing, Ropes Course, Orienteering, Whitewater Kayaking, Coastal Kayaking, Ice Climbing* | |
| **Two OER Advanced Skills Courses** | 4-5 |
| (2000-3000 level, 2-3 credits each, at least one of which must be instructor-level) | |
| *Choice of: Advanced Backpacking, Advanced Rock Craft, Rock Climbing Instructor, Ropes Course Leadership, Coastal Kayak Guide Training, Winter Expedition* | |

***(Continued on next page)***

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| OER-1000 | Introduction to Outdoor Education | 3-4 | _____ |
| OER-2060 | Wilderness First Responder | 4 | _____ |
| OER-3070 | Adventure Education Theory & Practice | 3 | _____ |
| OER-4030 | Wilderness Leadership Techniques | 4 | _____ |
| **TOTAL** | | **19-22*** | |

## BIOLOGY

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| BIO-2145 | Plant Biology | 4 | _____ |
| BIO-2310 | Invertebrate and Vertebrate Zoology | 4 | _____ |
| BIO-2340 | Fundamentals of Ecology | 4 | _____ |
| BIO-3130 | Cellular Biology: A Molecular Approach | 4 | _____ |
| BIO-3220 | Genetics | 4 | _____ |
| One additional upper-level BIO course | | 3-4 | _____ |
| **TOTAL** | | **23-24** | |

## CHEMISTRY

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| CHE-1031 | General Chemistry I | 4 | _____ |
| CHE-1032 | General Chemistry II | 4 | _____ |
| CHE-XXXX | Two additional upper-level CHE courses | 8 | _____ |
| ENV-1110 | Introduction to Environmental Problems | 3 | _____ |
| **TOTAL** | | **19** | |

*A chemistry minor is not allowed for students who are seeking a B.S. degree in: 1) Integrated Environmental Science or 2) Biology.*

## ENVIRONMENTAL EDUCATION

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| ENV-1050 | Introduction to Earth Science | 4 | _____ |
| ENV-1110 | Introduction to Environmental Problems | 3 | _____ |
| ENV-3220 | Environmental Interpretation | 3 | _____ |

***(Continued on next page)***

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| ENV-4010 | Global Environmental Issues | 3 | _____ |
| ENV-XXXX | One additional upper-level ENV course | 3 | _____ |
| OER-3010 | Learning in the Outdoors | 4 | _____ |
| **TOTAL** | | **20** | |

## NATURAL RESOURCES

| REQUIRED COURSES | | CREDITS | SEMESTER |
|---|---|---|---|
| ENV-1050 | Introduction to Earth Science | 4 | _____ |
| ENV-1110 | Introduction to Environmental Problems | 3 | _____ |
| ENV-3030 | Water Resources | 3 | _____ |
| ENV-3040 | Energy and Mineral Resources | 3 | _____ |
| ENV-XXXX | Two additional upper-level ENV courses | 6 | _____ |
| **TOTAL** | | **19** | |

The Department of Environmental and Health Sciences offers courses with the following designators: AHS (allied health science), BIO (biology), CHE (chemistry), ENV (environmental science), GEY (geology) OER (outdoor education and recreation), PED (physical education), PHY (physics), and SCI (science). See full course descriptions beginning on page 97.