## Board of Trustees of the Nebraska State Colleges

Meeting Date**: November 12, 2026**

Agenda Item: **2.4**

**ITEMS FOR DISCUSSION AND ACTION:**

Committee: **Academic & Personnel Committee**

---

Action Item: **Addition of Organismal Biology and Ecology Option to the Comprehensive Major in Biology B.S. degree and Removal of the Biological Resources Option - CSC**

---

Chadron State College (CSC) proposes to modify the Comprehensive Major in Biology by adding an option in Organismal Biology and Ecology and removing the Biological Resources Option. This results in a broader and more flexible approach to prepare students to pursue a career in biological resources.

While working on the Biology Assessment for the 2025-2026 academic year, the faculty discussion included not only a review of the department's learning outcomes and course offerings but also program offerings, looking at viability, currency and future-focus, and marketability. The current biology options in Organismal Biology and Biological Resources were specialized and focused in intent, which prepares students well for graduate program specialization, but faculty felt they were underenrolled. Further discussions highlighted a lack of understanding of how these options differed in career-path focus, recruitment, and visibility. A 50% overlap in the course requirements between the two previous options was noted, and that created a confusing divergent focus in recruiting student enrollment. As the faculty reviewed future career opportunities for students and the importance of critical analysis from broader perspectives in an AI-permeated world, we determined that a systems biology degree is more appropriate at the undergraduate level for the world our students will enter as professionals.

The current Comprehensive major in Biology with a focus in Organismal Biology was modified by about 15% in coursework, with no new courses proposed. By concurrently deleting the Option in Biological Resources, non-duplication and confusing redundancy would be eliminated. This redesign is meant to be more clearly marketable to prospective students' enrollment and help prepare students for a changing and more versatile work environment. This decision to combine options should also increase the efficiency and currency of our options while still allowing students to focus in their primary area of interest.

The System Office recommends approval of the addition of the Organismal Biology and Ecology Option and Removal of the Biological Resources Option at Chadron State College

**ATTACHMENTS:**

- Addition of Organismal Biology and Ecology Option

# Chadron State College
# Proposal to Add Organismal Biology and Ecology Option to the Comprehensive Major in Biology B.S. degree

**1. Descriptive Information**

A. Name of Institution: Chadron State College

B. Name of Program: Biology

C. Degrees/credentials to be awarded graduates of the program:
- Comprehensive Major in Biology
- Comprehensive Major in Health Sciences

D. Other programs offered in this field by the institution:
- Field Endorsement in Biology
- Biology Minor
- Human Biology Minor
- Plant Sciences
- Organismal Biology Minor (to be replaced with Biological Ecology Minor)

E. CIP code: 26.0101

F. Administrative units for the program: Department of Biology – School of Business, Math, and Science

G. Proposed delivery site(s) and type(s) of delivery, if applicable: Chadron State College Campus

H. Proposed date (term/year) the program will be initiated: Fall 2027

I. Description of Program:

**Change to be Made** – Modify the current Comprehensive Major in Biology with an Organismal Biology Option to a Comprehensive Major in Biology with a Organismal Biology and Ecology Option. We are deleting the Biological Resources Option as the Organismal Biology Option is being modified to be broader and flexible to also prepare students pursuing a career in biological resources.

**Rationale:** While working on our Biology Assessment for the 2025-2026 academic year, our faculty discussion included not only a review of the department's learning outcomes and course offerings but also our program offerings, looking at viability, currency and future-focus, and marketability. The current biology options in Organismal Biology and Biological Resources were specialized and focused in intent, which prepares students well for graduate program specialization, but we felt they were underenrolled. Further discussions highlighted the lack of understanding how these options differed in career path focus, in recruitment, and in visibility. We noted around 50% overlap in the course requirements between the two previous options, and thus a confusing divergent focus in recruiting student enrollment. As the faculty reviewed future career opportunities for our students and the importance of critical analysis involving broader perspectives in our approaching AI-permeated world, we discerned that a degree that focused on systems biology is more appropriate at the undergraduate level for the world in which our students will become professionals.

We determined that merging the two options into a single option, with some adjustment in course requirement, would better meet needs of future students. The modification of the current Comprehensive major in Biology with a focus in Organismal Biology was modified by about 15% in coursework, with no new courses being proposed. We would concurrently delete the Option in Biological Resources to ensure non-duplication and confusing redundancy. This redesign is meant to be more clearly marketable to prospective students enrollment and help prepare students for a changing and more versatile work environment. This decision to combine options should also increase the efficiency and currency of our options while still allowing for students to focus in their primary area of interest.

# The Degree of Bachelor of Science with a Comprehensive Major in Biology

| | |
|---|---|
| Core Requirements | |
| BIOL 101 | GENERAL BIOLOGY I |
| & 101L | and GENERAL BIOLOGY I LABORATORY |
| BIOL 102 | GENERAL BIOLOGY II |
| & 102L | and GENERAL BIOLOGY II LABORATORY |
| BIOL 332 | GENETICS |
| & 332L | and GENETICS LABORATORY |
| BIOL 458 | BIOLOGICAL EVOLUTION |
| Complete 4 credits of the following (see degree option for specific requirements): | |
| CHEM 131 | COLLEGE CHEMISTRY I |
| & 131L | and COLLEGE CHEMISTRY I LABORATORY |
| CHEM 140 | SURVEY OF CHEMISTRY |
| & 140L | and SURVEY OF CHEMISTRY LAB |
| Complete 3 credits of the following (talk with your advisor about which one is most appropriate): | |
| BIOL 499 | BIOLOGY CAPSTONE |
| CHEM 310 | CAPSTONE I: RESEARCH SEMINAR |
| & CHEM 401 | and CAPSTONE II: SENIOR RESEARCH |
| & CHEM 410 | and CAPSTONE III: SENIOR RESEARCH/THESIS |
| Select one of the following degree options: | |
| Biological Resources | |
| General Biology | |
| Human Biology | |
| Molecular Biology | |
| Organismal Biology | |
| **Total Credits** | |

## Organismal Biology and Ecology Option

| Code | Title |
|---|---|
| Core Requirements (must complete CHEM 131/131L): | |
| BIOL 243 | BOTANY |
| & 243L | and BOTANY LABORATORY |
| BIOL 244 | ZOOLOGY |
| & 244L | and ZOOLOGY LABORATORY |
| BIOL 336 | GENERAL ECOLOGY |
| & 336L | and GENERAL ECOLOGY LABORATORY |
| BIOL 390 | INTERNSHIP IN BIOLOGY |
| or | |
| BIOL 409 | SENIOR BIOLOGY RESEARCH |
| BIOL 438 | TAXONOMY OF PLANTS |
| & 438L | and TAXONOMY OF PLANTS LABORATORY |
| CHEM 132 | COLLEGE CHEMISTRY II |
| & 132L | and COLLEGE CHEMISTRY II LABORATORY |
| GEOS 322 | INTRODUCTION TO GIS |
| | |
| Select 11 credits of the following: | |
| BIOL 241 | MICROBIOLOGY |
| & 241L | and MICROBIOLOGY LABORATORY |
| BIOL 337 | ENVIRONMENTAL MANAGEMENT |
| BIOL 339 | COMPARATIVE ANATOMY AND PHYSIOLOGY |
| & 339L | and COMPARATIVE ANATOMY AND PHYSIOLOGY LABORATORY |
| BIOL 343 | PARASITOLOGY |
| & 343L | and PARASITOLOGY LABORATORY |
| BIOL 347 | CRYPTOGAMIC BOTANY |
| & 347L | and CRYPTOGAMIC BOTANY LABORATORY |
| BIOL 401 | ORNITHOLOGY |
| & 401L | and ORNITHOLOGY LABORATORY |
| BIOL 428 | BIOINFORMATICS |

| Code | Title |
|---|---|
| BIOL 431 | ENTOMOLOGY |
| & 431L | and ENTOMOLOGY LABORATORY |
| BIOL 435 | MAMMALOGY |
| & 435L | and MAMMALOGY LABORATORY |
| BIOL 439 | PLANT PHYSIOLOGY |
| & 439L | and PLANT PHYSIOLOGY LABORATORY |
| BIOL 444 | FRESHWATER ECOLOGY |
| & 444L | and FRESHWATER ECOLOGY LABORATORY |
| BIOL 446 | REGIONAL FLORA |
| BIOL 447 | PLANT PHYLOGENY |
| & 447L | and PLANT PHYLOGENY LABORATORY |
| BIOL 453 | ENVIRONMENTAL REMEDIATION AND TOXICOLOGY |
| CHEM 231 | SURVEY OF ORGANIC CHEMISTRY |
| & 231L | and SURVEY OF ORGANIC CHEMISTRY LAB |
| CHEM 335 | BIOCHEMISTRY I |
| & 335L | and BIOCHEMISTRY LABORATORY |
| CHEM 433 | ENVIRONMENTAL CHEMISTRY |
| & 433L | and ENVIRONMENTAL CHEMISTRY LABORATORY |
| **Total Credits** | |

Course List

### BIOL 101 GENERAL BIOLOGY I3 Credits

A survey of cellular principles, including biological chemistry, cell structures and function, cellular metabolism (including photosynthesis), genetic expression, cell division, and an introduction to multicellularity and cell signaling.

**Co-requisites:** BIOL 101L

### BIOL 101L GENERAL BIOLOGY I LABORATORY1 Credit

Laboratory experience to explore cellular principles to integrate with BIOL 101, including scientific inquiry and data analysis skills to investigate biological chemistry, cell structure and function, cellular metabolism, genetic expression, and cell division. Scientific inquiry, microscopic image analysis, and use of manipulative, observational, and case study learning will be utilized.

**Co-requisites:** BIOL 101

### BIOL 102 GENERAL BIOLOGY II3 Credits

Exploration of the diversity and origin of life, classification of living organisms and their interrelatedness, and ecology. Major topics include evolution, speciation, classification, morphology, reproduction, structure and function, and ecology.

**Co-requisites:** BIOL 102L

### BIOL 102L GENERAL BIOLOGY II LABORATORY1 Credit

Laboratory experience in major animal, plant, fungal, and other eukaryotic groups along with their morphology, phylogeny, ecology, and importance. Most activities will involve microscope use, observations, drawings, and identification..

**Co-requisites:** BIOL 102

### BIOL 332L GENETICS LABORATORY1 Credit

Laboratory experience in inheritance, molecular genetic analysis, and genomic studies, including the use of biotechnology to detect or alter genetic sequences.

**Co-requisites:** BIOL 332

### BIOL 458 BIOLOGICAL EVOLUTION3 Credits

Study of the fundamental theory of evolution, including phylogeny and earth history, macro-evolutionary patterns, micro-evolutionary processes, and application, using popular and scientific literature in discussions. Primary literature reading and technical writing are required for this course.

**Prerequisites:** BIOL 332 and 332L or GEOS 234 and 234L or GEOS 337 and 337L

### CHEM 131 COLLEGE CHEMISTRY I3 Credits

First of a two semester sequence of courses in General Chemistry for science majors. Detailed study of matter and measurement, structure of atoms molecules and ions, stoichiometric relationships, electronic structure of atoms, chemical periodicity, chemical bonding, thermochemistry, and properties of gases, liquids and solids.

**Prerequisites:** High school chemistry or CHEM 121 and high school algebra or MATH 142
**Co-requisites:** CHEM 131L
**Notes:** Enrollment in this course assumes competencies in math and chemistry equivalent to those accrued in high school algebra or MATH 142 and high school chemistry or CHEM 121.

### CHEM 131L COLLEGE CHEMISTRY I LABORATORY1 Credit

Laboratory experience in basic chemical concepts, including concentrations, reaction mechanisms, stoichiometric relationships, molecular structure, properties of gases, liquids, and solids, and spectroscopy.

**Co-requisites:** CHEM 131

### CHEM 140 SURVEY OF CHEMISTRY3 Credits

Survey of chemistry principles and applications for science majors requiring a one semester freshman chemistry course. Topics covered include: matter and measurement, atoms ions and molecules, periodicity, chemical bonding, reaction stoichiometry, energy, phases of matter, solution chemistry, chemical kinetics, equilibrium, and electrochemistry.

**Prerequisites:** High school chemistry or CHEM 121 and high school algebra or MATH 142
**Co-requisites:** CHEM 140L
**Notes:** Does not duplicate CHEM 131 and is not a prerequisite for CHEM 132.

### CHEM 140L SURVEY OF CHEMISTRY LABORATORY1 Credit

Laboratory experiences in basic chemical processes and mechanisms. Basic chemistry laboratory operations.

**Co-requisites:** CHEM 140

### CHEM 310 CAPSTONE I: RESEARCH SEMINAR1 Credit

The student will choose a topic for research and conduct a literature survey of that topic. Preliminary results and a plan for conducting further independent research on the topic will be presented in oral and written form during the semester.

**Prerequisites:** CHEM 132, 132L, and sophomore or above status

**Notes:** Normally taken during the student's Junior year.

### CHEM 401 CAPSTONE II: SENIOR RESEARCH1 Credit

Independent research projects based on the results presented in CHEM 310. Data collection, analysis, and presentation of scientific papers.

**Prerequisites:** CHEM 310 and Junior or above status

**Notes:** May be repeated for a total of up to six hours of credit.

### CHEM 410 CAPSTONE III: SENIOR RESEARCH/THESIS1 Credit

Research thesis is completed and presented at the Nebraska Academy of Sciences or other regional or national scientific forum approved by the faculty. Required field trip in late April.

**Prerequisites:** CHEM 401 and Junior or above status

### BIOL 243 BOTANY3 Credits

A survey of the plant kingdom, with a focus on flowering plants. Phylogeny, anatomy, cellular and organismal physiology, and plant importance to humans and role in climate moderation and responses to climate change will be studied.

**Prerequisites:** BIOL 101, 101L, 102, and 102L

**Co-requisites:** BIOL 243L

**Notes:** The class and the laboratory provide complementary, non-overlapping content with a common grade assigned for both class and lab.

### BIOL 243L BOTANY LABORATORY1 Credit

Laboratory inquiry experience in a survey of the plant kingdom, with a focus on flowering plants. Phylogeny, anatomy, cellular and organismal physiology, and plant importance to humans and role in climate moderation and responses to climate change will be studied.

**Co-requisites:** BIOL 243

### BIOL 244 ZOOLOGY3 Credits

The physiology, behavior, ecology, and phylogenetic treatment of vertebrate and invertebrate animals, living and extinct. Primary literature reading and technical writing are required in this course.

**Prerequisites:** BIOL 101, 101L, 102, 102L

**Co-requisites:** BIOL 244L

### BIOL 244L ZOOLOGY LABORATORY1 Credit

Laboratory experience in the phylogenetic relationships of animals, including identification of major groups and their characteristics and exploration of structure and function during dissections.

**Prerequisites:** BIOL 101, 101L, 102, 102L

**Co-requisites:** BIOL 244

### BIOL 336 GENERAL ECOLOGY2 Credits

The structure and function of nature with emphasis on biomes, ecosystems, communities, and populations.

**Prerequisites:** At least 6 credits from any of the following: BIOL 101, BIOL 101L, BIOL 102, BIOL 102L, AGRI 141

**Co-requisites:** BIOL 336L

### BIOL 336L GENERAL ECOLOGY LABORATORY1 Credit

Laboratory experience in describing and quantifying organismal populations. Field techniques, data collection, and data interpretation are embedded within this laboratory experience.

**Co-requisites:** BIOL 336

### BIOL 390 INTERNSHIP IN BIOLOGY1-12 Credits

Provides practical experience as a biologist in government, business, or industry. Open to upper division students majoring in the area of biology.

**Add Consent:** Department Consent

**Notes:** Interested students should contact the Internship and Career Services office to secure application materials; application should be made prior to the semester the internship will be started; the amount of credit will be based on the availability of a suitable work position, the qualifications of the applicant, and the work hours.

### BIOL 409 SENIOR BIOLOGY RESEARCH1-3 Credits

Original investigation in biology under a biology faculty member's supervision and guidance. A public presentation of results will occur.

**Add Consent:** Instructor Consent

**Notes:** May be repeated up to four times, for no more than 6 credits total.

### BIOL 438 TAXONOMY OF PLANTS2 Credits

Applied taxonomy of vascular plants, with emphasis on families of flowering plants in the northern Great Plains.

**Prerequisites:** BIOL 243 and 243L or AGRI 141 or AGRI 339 and 339L

**Co-requisites:** BIOL 438L

**Requirements:** Field trips required.

### BIOL 438L TAXONOMY OF PLANTS LABORATORY1 Credit

Laboratory experience in collecting, identifying and preparing vascular plant specimens, with emphasis on family recognition. A student plant collection project is required.

**Co-requisites:** BIOL 438

### CHEM 132 COLLEGE CHEMISTRY II3 Credits

Second of a two semester sequence of courses in General Chemistry for science majors, with a focus on the topics of solution chemistry, chemical kinetics, principles and applications of equilibrium, chemical thermodynamics and electrochemistry.

**Prerequisites:** CHEM 131 and CHEM 131L

**Co-requisites:** CHEM 132L

### CHEM 132L COLLEGE CHEMISTRY II LABORATORY1 Credit

Laboratory experience focusing on studies of principles and applications of chemical kinetics, equilibrium, acid-base chemistry, thermodynamics and electrochemistry.

**Co-requisites:** CHEM 132

### GEOS 322 INTRODUCTION TO GIS3 Credits

Principles and applications of geographic information systems with emphasis on Arcview* software. Students will address solutions to real-world problems using Geographic Information Systems.

**Prerequisites:** Sophomore or above status

**Notes:** Field trips my be required; recommended prerequisite: GEOS 321. * Registered Trademark

### BIOL 241 MICROBIOLOGY3 Credits

A survey of microorganisms - including ecological and metabolic integration relating to microbial growth and survival, genetics of prokaryotes and viruses, phylogenetic diversity of eukaryotic microorganisms, and an introduction to immunology and infectious diseases.

**Prerequisites:** BIOL 101, 101L

**Co-requisites:** BIOL 241L

### BIOL 241L MICROBIOLOGY LABORATORY1 Credit

Laboratory inquiry experience in a survey of microorganisms - including techniques for isolating and studying bacteria, genetic modification of bacteria, eukaryote and pathogen identification, white blood cell differentials, and antimicrobial sensitivity.

**Co-requisites:** BIOL 241

### BIOL 337 ENVIRONMENTAL MANAGEMENT3 Credits

Ecosystem management, environmental planning, history of environmental protection, the roles of federal and state agencies, environmental law, environmental ethics, and professional skills relevant to those interested in land-management related careers in the public and private sector.

**Prerequisites:** 9 credits from AGRI, BIOL, CHEM and/or GEOS

### BIOL 339 COMPARATIVE ANATOMY AND PHYSIOLOGY3 Credits

A systemic approach to vertebrate anatomy and physiology examining how structures and organ systems have evolved through the different vertebrate groups from fish to mammals. The structure and function of vertebrate organ systems will be discussed in the context of developmental and evolutionary history.

**Prerequisites:** 6 credits from AGRI, BIOL, CHEM, GEOS, and/or PHYS

**Co-requisites:** BIOL 339L

### BIOL 339L COMPARATIVE ANATOMY AND PHYSIOLOGY LABORATORY1 Credit

Investigation of vertebrate anatomy and physiology through dissection of a variety of vertebrates and microscopic examination of selected histological preparations of tissues.

**Co-requisites:** BIOL 339

### BIOL 343 PARASITOLOGY2 Credits

Taxonomy, morphology, physiology, life history, and control of the parasitic protozoans, helminthes, and arthropods. Primary literature reading and technical writing are required in this course.

**Prerequisites:** BIOL 244 and 244L

**Co-requisites:** BIOL 343L

### BIOL 343L PARASITOLOGY LABORATORY1 Credit

Laboratory experience in identifying and understanding parasites of living systems.

**Co-requisites:** BIOL 343

### BIOL 347 CRYPTOGAMIC BOTANY2 Credits

Phylogeny and ecology of bacteria, algae and fungi.

**Prerequisites:** BIOL 243 and 243L or 9 hours from AGRI courses

**Co-requisites:** BIOL 347L

### BIOL 347L CRYPTOGAMIC BOTANY LABORATORY1 Credit

Laboratory survey of bacteria, algae and fungi.

**Co-requisites:** BIOL 347

### BIOL 401 ORNITHOLOGY2 Credits

Biology of birds, including their classification, anatomy, physiology, life history, behavior, ecology, and identification with emphasis on local species.

**Prerequisites:** BIOL 244 and 244L or 9 credits of AGRI courses

**Co-requisites:** BIOL 401L

### BIOL 401L ORNITHOLOGY LABORATORY1 Credit

Laboratory and field experience in anatomy, behavior, and identification of birds. Field trips and a field notebook project is required.

**Co-requisites:** BIOL 401

### BIOL 428 BIOINFORMATICS3 Credits

Introduction to the use of bioinformatics data and methods to study DNA and protein sequences and evaluate differences in gene expression between cells. Methods taught in this class are useful for studies in biotechnology, genetics, nutrition, molecular biology, microbiology, epidemiology, pharmacology, and ecology. Students will learn to use available information and databases to ask complex biological questions using a project-based approach.

**Prerequisites:** BIOL 332, 332L and MATH 232

### BIOL 431 ENTOMOLOGY2 Credits

Taxonomy, morphology, physiology, life history, behavior, ecology and economic importance of insects. Lecture, laboratory and field trips. Primary literature reading and technical writing are required in this course.

**Prerequisites:** 6 credits of BIOL and/or AGRI

**Co-requisites:** BIOL 431L

### BIOL 431L ENTOMOLOGY LABORATORY1 Credit

Laboratory and field experience in insect morphology and taxonomy. Activities include collecting, identifying, and preparing insect specimens following standard methods, with

discussion about conservation. Emphasis on order and family recognition is included. A student insect project is required.

**Co-requisites:** BIOL 431

### BIOL 435 MAMMALOGY2 Credits

Systematics, life history, physiology, and behavior of mammals.

**Cross-Listed:** AGRI445/BIOL435

**Prerequisites:** BIOL 244 and 244L or 9 credits of AGRI

**Co-requisites:** AGRI 445L or BIOL 435L

### BIOL 435L MAMMALOGY LABORATORY1 Credit

Laboratory experience in mammal structure and function.

**Cross-Listed:** AGRI445L/BIOL435L

**Co-requisites:** AGRI 445 or BIOL 435

### BIOL 439 PLANT PHYSIOLOGY2 Credits

Physiological and developmental processes occurring in cells, tissues, and organs of plants, with emphasis on hormonal, environmental and other control mechanisms of plant processes and development.

**Prerequisites:** BIOL 243 and 243L or AGRI 141 or AGRI 339 and 339L and either CHEM 131 and 131L or CHEM 140 and 140L

**Co-requisites:** BIOL 439L

### BIOL 439L PLANT PHYSIOLOGY LABORATORY1 Credit

Laboratory experience in plant structure and function, with an emphasis on applied plant biochemistry. Data collection and interpretation with technical writing is required.

**Co-requisites:** BIOL 439

### BIOL 444 FRESHWATER ECOLOGY2 Credits

Biological, chemical, and physical studies of inland surface waters. Includes both classic Limnology and Ichthyology. Primary literature reading and technical writing are required in this course.

**Prerequisites:** BIOL 102 and 102L and either CHEM 131 and 131L or CHEM 140 and 140L or 9 credits of AGRI

**Co-requisites:** BIOL 444L

**Requirements:** Field trips required.

### BIOL 444L FRESHWATER ECOLOGY LABORATORY1 Credit

Laboratory and field experience in biological, chemical, and physical studies of inland surface waters. Includes both classic Limnology and Ichthyology. Field trips required.

**Co-requisites:** BIOL 444

### BIOL 446 REGIONAL FLORA3 Credits

The plants and plant communities of the region. Field trips required.

**Prerequisites:** BIOL 243 and 243L or instructor consent

### BIOL 447 PLANT PHYLOGENY1 Credit

The phylogenetic treatment of green plants, living and extinct.

**Prerequisites:** BIOL 243 and 243L or 9 credits of AGRI

**Co-requisites:** BIOL 447L

### BIOL 447L PLANT PHYLOGENY LABORATORY2 Credits

Survey of green plant groups, with emphasis on the taxonomy and ecology of bryophytes.

**Co-requisites:** BIOL 447

### BIOL 453 ENVIRONMENTAL REMEDIATION AND TOXICOLOGY3 Credits

This course covers the physical, chemical, and biological methods for environmental remediation. An emphasis is on toxicology and bioremediation, including mechanisms behind biodegradation, biotransformation, uptake, and detoxification of heavy metals and organic pollutants, with incorporation of related cased studies.

**Prerequisites:** BIOL 241, 241, CHEM 132, 132L

**Notes:** This course will replace BIOL 327/327L Environmental Remediation and Lab, when approved.

### CHEM 231 SURVEY OF ORGANIC CHEMISTRY3 Credits

Survey of organic chemistry principles and applications for students requiring one semester of Organic Chemistry. The nomenclature, structure, physical and chemical properties and reactions of the principle families of organic compounds are covered. Carbohydrates, lipids, enzymes, amino acids and protein synthesis are also covered at an introductory level.

**Prerequisites:** CHEM 132 and CHEM 132L or CHEM 140 and CHEM 140L

**Co-requisites:** CHEM 231L

### CHEM 231L SURVEY OF ORGANIC CHEMISTRY LABORATORY1 Credit

Principle laboratory operations of organic chemistry, organic synthesis, and spectroscopy.

**Co-requisites:** CHEM 231

### CHEM 335 BIOCHEMISTRY I3 Credits

Introductory course covering the components and reactions of living matter. Topics include structure and function of major macromolecules including carbohydrates, lipids, proteins, and nucleic acids. The basics of enzyme functions and regulation will be studied. A brief introduction to metabolic pathways will be included.

**Prerequisites:** CHEM 231 and CHEM 231L or CHEM 333 and CHEM 333L and Sophomore or above status

**Notes:** Concurrent enrollment in CHEM 335L is recommended.

### CHEM 335L BIOCHEMISTRY LABORATORY1 Credit

Laboratory experience in purification, quantitation, and characterization of biological molecules.

**Prerequisites:** CHEM 335

**Co-requisites:** CHEM 335 (can be taken as either a pre-requisite or a co-requisite)

### CHEM 433 ENVIRONMENTAL CHEMISTRY3 Credits

Study of the chemical processes that influence the environment, including processes which affect the quality and use of land, water, and atmosphere, as well as influence of anthropogenic effects on them. Focuses on topics of current concern.

**Prerequisites:** CHEM 132 and CHEM 132L or CHEM 140 and CHEM 140L

**CHEM 433L ENVIRONMENTAL CHEMISTRY LABORATORY1 Credit**

Laboratory experience in environmental chemical analysis of environmental samples.

**Prerequisites:** CHEM 433 (can be taken as either a pre-requisite or a co-requisite)

**2. Centrality to Role and Mission**

The Chadron State College biology program has a long and storied history, with graduates employed in industry, government, technological innovations, medicine, environmental consulting, education, research, and more. The College mission to provide accessible and transformative education, support student success, and strengthen the people and places it serves through innovation, partnerships, and service is evident in this program. The biology program has an extremely active Herbarium (plant research and museum), invertebrate research collection, access literally across the street for human-modified and natural habitats, and close connection to the Chadron State Park and Pine Ridge area for refugia habitats, migratory pathways, and relict populations of plants and animals. This option will focus on understanding natural systems in their complexity, integrating field and laboratory study and leveraging critical analyses of habitats in the semi-arid region of the High Plains, an area sensitive to climate change, biodiversity challenges, and anthropological impact.

**3. Evidence of Need and Demand**

*A.* Need for the program:

Traditional biology degrees have historically provided increased specialization as students moved through their program, yielding students with deep knowledge in fairly narrow career paths. However, the recent abundance of web-based information has strengthened the need for broadly-trained individuals who understand systems biology, with core knowledge in broader disciplines to be able to leverage our ever-increasing knowledge and understandings with critical analysis and application.

The new Organismal Biology and Ecology Option aims to produce more broadly-trained biologists with the skillset to adapt to a variety of specializations and needs, both present and future. Based on projections, especially involving issues like global warming, loss of biodiversity, and increased challenges in ecosystem management foci, the demand for such broadly-trained biologists is expected to increase in the future.

The US Bureau of Labor Statistics indicates that ecological biology careers are projected to grow faster than average, with some roles seeing 13-14% growth through then next decade, driven by climate change mitigation, biodiversity conservation, and environmental policy need. The High Plains Area of Nebraska sits at the conflux of northern-southern and eastern-western plant and animal species plus contains many microecological regions; monitoring change of vegetation and invertebrates as well as larger animals will help to monitor climate change and the impact of these changes.

B. Demand for the Program:

The prior demand for the program was a small focused cohort, but we anticipiate with additional marketing and the focus on natural systems biology this more focused option will be desirable by additional students.

Need for Environmental Scientists and Specialists: The U.S. Bureau of Labor Statistics (BLS) projects 6% growth from 2025–2035, faster than the average for all occupations, with about 7,300 openings annually U.S. Bureau of Labor Statistics (U.S. Bureau of Labor Statistics). This includes ecological research, habitat restoration, and environmental monitoring. Additional career paths for this option can include wildlands ecological management, research, graduate programs, game and fisheries management, government and state agencies, and more.

**4. Adequacy of Resources**

A. Faculty and Staff Resources:

No new faculty or staff will be required. Current faculty on staff include the following:

- Ann Buchmann, Ph. D. Molecular biology, cell biology, and biomedical research
- Mathew Brust, Ph.D. Taxonomy and Ecology of Insects, especially Lepidoptera, Acrididae, Cicindelidae, and Coccinellidae
- Joyce Phillips Hardy, Ph.D. Physiological Ecologist of Grasslands; Biogeographical Distribution of High Plains plants, with specialization in grasslands, anthropologic impacts, and rare habitats
- Steven Rolfsmeir, M.S. Plant taxonomic and distribution, with specialization of vascular, lower vascular, and cryptogamic species
- Will Soto, Ph.D. Bacterial genetics and evolution, immunology.
- Additionally, Susan Rolfsmeier, Ph.D. (community expert) is affilitated with our program, bringing her expertise in plant taxonomy with specialization in especially the Boraginaceae as well as museum management to our collective expertise

B. Physical Facilities:

No new courses will be proposed or taught, so no additional physical facilities are needed.

C. Instructional Equipment and Informational Resources:

No new courses will be proposed or taught, so additional equipment or informational resources are needed.

D. Budget Projections for the first five years of program:

Because no new courses will be proposed or taught, no budgetary changes are expected.

**5. Avoidance of Unnecessary Duplication**

Removes the duplication of two similar options with similar career path potential, consolidating the credential into more more flexible yet still defined option focused on natural biological systems

**6. Program Differentiation**

The B.S. with a Comprehensive Major in Biology, focus in Organismal Biology and Ecology option further distinguishes the biology program's scientific systems ecology approach from the managerial approach of somewhat similar degree options offered in Agriculture. The core courses are designed to build a strong foundation in biological science while the specific courses in the option are each somewhat specialized to develop a particular expert skill set reflecting student interest while allowing for broader understandings of natural systems complexity. The diversity among the electives allow adaptation depending on the set of carrer paths a student wishes to pursue, providing an effective yet economically efficient curriculum.

**7. Accreditation, Quality Assurance, and Regulatory Considerations**

No accreditation or regulatory oversight change required; Option will continue to be assessed through the annual biology program assessment.

**8. Consistency with the Comprehensive Statewide Plan for Postsecondary Education**

This change aligns with the following strategic priorities:

This change aligns with the following strategic priorities:

1. Affordable Excellence
    a. The proximity of our institution to natural lands – literally across the street to diverse regions within 10 miles of campus – result in our field biology program offering substantial outdoor skills training and experience without the cost of transportation or overnight field trips. Our program remains economically competitive and is staffed by faculty recognized regionally and even broader as the experts in their respective fields.
2. Retention-Driven Excellence and Engaged Degree Attainment
    a. Engaging students in real learning of natural systems complexity, both in the field and in the laboratory, fosters curiosity, builds skills and competencies, and strengthens self-confidence. These core features drive student retention and success in our natural sciences program.
3. Open Access and Supportive Pathways
    a. Faculty within the program, especially S. Rolfsmeier and M Brust, frequently have grant-funded research within the High Plains area that are appropriate for student involvement. The student researchers work closely with supervising faculty, perfect field and data collection techniques, and are engaged in natural science museum acquisitioning processes.
4. Workforce Development and Leadership
    a. The students who will complete this minor are often employed as summer ecology technicians, seek employment in government and conservation agencies, and/or pursue graduate coursework.