Assessment Plan

B.S. Biology, B.S. Earth Science
School of Environmental and Life Science
College of Natural, Applied and Health Sciences
Kean University

SELS Mission: The Mission of the faculty in the Biology and Earth Science Programs within School of Environmental and Life Sciences (SELS) at Kean University is to provide research-based training and experiences necessary for the next generation of environmental and life scientists to be able to:

- recognize the complex and integrated nature of environmental, ecological, and health-related issues and questions facing the world today and in the future;
- to address these issues and questions using the most current knowledge in their discipline, a multi-scale and trans-disciplinary approach, and a keen awareness of the needs/concerns of society with respect to the sciences;
- be successful in graduate school, other post-baccalaureate professional schools, or jobs in their respective scientific disciplines; and
- will, ultimately, be the next generation of environmental and life scientists that have the ability to respond to immediate and future challenges through critical scientific thinking and analysis supported by excellence in scholarship and communication.

SELS Assessment Approach: Data will be collected from the courses that are common for all SELS B.S. Degree majors. These courses provide the backbone of the theoretical knowledge, skills, technical expertise the students need for research design, implementation, data analysis and interpretation; and to communicate science effectively (written and oral) to public and professional audiences. As these courses are the key building blocks for all SELS B.S. Degree students in both Biology and Earth Science Programs, they are used as the primary target for assessing student’s knowledge and abilities in the content and basic skills (technical and analytic) appropriate for undergraduate science majors. These courses include SELS 1000—Scientific Integrity; SELS Sections of GE2024—Research and Technology; a newly designed course SELS 2XXX—Research Methods in the Environmental Science (not through the curriculum committee yet); and a new Capstone experience, SELS 4XXX Senior Research that is not through the curriculum committee yet. We will also assess, separately, the success achieved in our entry-level courses common for all BS Biology majors and entry-level courses common for all BS Earth Science majors—specifically these are BIOS 1200, 2201, 2202 and GEOS 1100 and 2101. For both the courses common to all SELS majors and those common to the Biology or to the Earth Science programs, we will apply the GE oral and written rubrics to written assignments and oral presentations in these classes to assess student’s ability to critically read, think, analyze, and present about the sciences. We will also assess student performance on the lab components of the entry level sequence courses, common SELS courses (as appropriate) and select upper division courses that focus on research methods. Specifically, we will focus on student abilities to identify questions or problems and pose hypotheses; design and implement research projects; analyze data; draw appropriate conclusions; identify next research steps.

In order to provide evidence for students demonstrating growth in content knowledge we will a multiple tool approach. We will use previously used, but recent, ACT science assessment tools, and current science subject-specific ETS national assessment tools. All SELS Freshmen will take an old ACT subject exam to gauge the level of preparedness of the students for university-level science. We will also administer a ‘before and after’ assessment strategy by giving all SELS Freshmen the appropriate ETS National Subject Exam. This assessment will also be given upon completion of the entry level sequences to gauge the level of improvement in student knowledge after completing the sequence. This assessment will also be given to new Transfer students entering Kean. Any Transfer student or Kean direct entry students who scores below the national 50th percentile on any of the different areas of knowledge will need to complete an individually developed IEP (Individual Education Plan) in the summer in order to take
upper division courses. We will also give the ETS specific subject assessments to all SELS seniors in the Senior Research course to determine the level of retention of the basic concepts in the environmental and life sciences.

We will use Graduating Student Surveys to provide evidence for the level of success the students feel they have achieved on such items as the ability to demonstrate basic knowledge as unifying principles; the ability to identify interconnections among disciplines; the ability to design and conduct research; the ability to apply the latest computation and lab methods; the interconnections among scientific disciplines; the biotic and abiotic processes of the environment and how these can change due to natural and anthropogenic disturbances; the ability to communicate scientific results; and the ability to demonstrate a global perspective of science.

**SELS Program Student Learning Outcomes (SLOs)**: *Students who graduate with a BS Degree from SELS will be able to:*

**SLO #1**: Demonstrate an understanding of the basic mechanisms and processes associated with biological, atmospheric, geologic, hydrologic, and geographic systems as unifying principles of contemporary environmental and life science, and the ability to apply these to a research environment that includes basic principles, theories, methods, and protocols for scientific discovery and problem-solving. (KU 1, KU 4) (GE K1, K3; S1, S2, S3, S4, S5, V1)

Direct Measure: Use GE rubric to derive data from written and oral research assignments in courses common to all SELS majors, to those common to Biology majors, and to those common to Earth Science Majors, to assess student's ability to critically read, think, analyze, and present about the sciences.

Direct Measure: Assess evidence for students demonstrating content knowledge using previously used, but recent, ACT science assessment tools, and science subject-specific ETS national assessment tools to Freshmen, students completing the entry level Biology and Earth Science sequences, and to new Transfer students

Indirect Measure: Implement the Graduating Student Survey

**SLO #2**: Identify the interconnections among scientific disciplines and the multiple dynamic biotic and abiotic system processes associated with the various components of the environment, the ecosphere and human/societal systems at individual, local to global levels. Identify how these processes and components can change under varying environmental conditions (both natural and anthropogenic); and apply these relationships to scientific investigation. (KU 1, 2, 3, 4) (GE K1, K3; S1, S2, S3, S4, S5, V1).

Direct Measure: Use GE rubric to derive data from written and oral research assignments in courses common to all SELS majors, to those common to Biology majors, and to those common to Earth Science Majors, to assess student's ability to critically read, think, analyze, and present about the sciences.

Indirect Measure: Implement the Graduating Student Survey

**SLO #3**: Design and conduct efficient and targeted scientific studies of contemporary problems in the life and environmental sciences. Analyze data using current, appropriate and efficient laboratory, field, appropriate software, and statistical methods in order to identify and visualize the discoveries and knowledge resulting from research projects that provide an understanding of causes, solutions, prediction of outcomes, etc. associated with these contemporary problems. (KU 1, KU 2, KU 3, KU 4) (GE K1, K2, K3, K4; S1, S2, S3, S4, S5, V1, V5)
Direct Measure: Use GE rubric to derive data from written and oral research assignments in courses common to all SELS majors, to those common to Biology majors, and to those common to Earth Science Majors, to assess student’s ability to critically read, think, analyze, and present about the sciences.

Direct Measure: Use data from scores on the lab portions of courses

Indirect Measure: Implement the Graduating Student Survey

SLO #4: Communicate scientific research findings and other information efficiently and convincingly to professional and community audiences using oral and written methods. (KU 1, KU4) (GE K1, K3, K4, S1, S2, S3, S4, S5, V1).

Direct Measure: Use GE rubric to derive data from written and oral research assignments in courses common to all SELS majors, to those common to Biology majors, and to those common to Earth Science Majors, to assess student’s ability to critically read, think, analyze, and present about the sciences.

Indirect Measure: Implement the Graduating Student Survey

SLO#5: Demonstrate a global perspective of the environmental and life sciences and how they are connected to a global society. (KU 1, KU 2, KU 3, KU 4) (GE K1, K2, K3; S1, S2, S3, S4, S5, V1, V2, V4)

Direct Measure: Use GE rubric to derive data from written and oral research assignments in courses common to all SELS majors, to those common to Biology majors, and to those common to Earth Science Majors, to assess student’s ability to critically read, think, analyze, and present about the sciences.

Indirect Measure: Implement the Graduating Student Survey

Kean University Student Learning Outcomes:

(KU 1) Think critically, creatively and globally
(KU 2) Adapt to changing social, economic, and technological environments.
(KU 3) Serve as active and contributing members of their communities.
(KU 4) Advance their knowledge in the traditional disciplines and enhance their skills in professional areas.

General Education Student Learning Outcomes

Student Learning Outcomes – Knowledge

Students will demonstrate proficiency in knowledge and content by:
1) applying the scientific method to understand natural concepts and processes (GEK1)
2) evaluating major theories and concepts in social sciences (GEK2)
3) relating literature to historical context (GEK3)
4) evaluating major theories and concepts in the fine arts (GEK4)

Student Learning Outcomes – Skills

Students will demonstrate the skills and technology necessary to:
1) write to communicate and clarify learning (GES1)
2) communicate effectively through speech (GES2)
3) solve problems using quantitative reasoning (GES3)
4) think critically about concepts in multiple disciplines (GES4)
5) demonstrate information literacy (GES5)

*Student Learning Outcomes – Values*

*Students will exhibit a set of values that demonstrates:*

1) personal responsibility (GEV1)
2) ethical and social responsibility (GEV2)
3) social and civic engagement (GEV3)
4) respect for diverse cultures and perspectives (GEV4)
5) life-long learning (GEV5)