**Program SLOs:**

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)

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. Identify how these 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).

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)

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).

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)

<table>
<thead>
<tr>
<th>Program Level Student Learning Outcomes (Add rows for additional SLOs)</th>
<th>Assessment Measure(s) (Add rows if necessary)</th>
<th>Assessment Criteria (Describe how data is collected--rubric, survey, etc.)</th>
<th>Results of Assessment (Specific to Data Collected)</th>
<th>Action Taken (Closing the Loop: New action or follow up from last Assessment Report)</th>
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<tbody>
<tr>
<td>SLO #1</td>
<td>Direct #1: Use data from written and oral research assignments to assess student’s ability to critically read, think, analyze, and present about the sciences</td>
<td>Data will be collected using the GE oral and written rubrics and to written assignments and oral presentations for: a) Common Courses for all of SELS</td>
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students:
  • SELS 1000—Scientific Integrity
  • SELS Sections of GE2024—Research and Technology.
  • SELS 2XXX—Research Methods in the Environmental Science (not through the CNAHS curriculum committee yet).
  • SELS 4XXX Senior Research new Capstone that is not through the CNAHS curriculum committee yet.

b) Entry-level courses common for all BS Biology majors and entry-level courses common for all BS Earth Science majors:
  • BIOS 1200, 2201, 2202
  • GEOS 1100 and 2101

Direct Measure #2: Assess evidence for students demonstrating content knowledge using previously used, but recent, ACT science assessment tools, and science subject-specific ETS national assessment

a) For all SELS Freshmen beginning in Fall 2012, we will have them take an old ACT subject exam to gauge the level of preparedness of
tools

the students for university-level science.

b) In the Fall of 2012, we will also begin administering a ‘before and after’ assessment strategy by giving all SELS the Freshmen the appropriate ETS National Subject Exam. This assessment will also be given assessment upon completion of the entry level sequences. Our interest is to gauge the level of improvement in student knowledge after completing the sequence.

c) Beginning in Summer, 2013, new Transfer students entering Kean will also need to take this exam. Transfer students and Kean direct entry students at that time who score 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.

d) 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.

| Indirect: Graduating Student Survey | We will focus on the responses of students to the following questions, with mean scores of 1.5 (I being the best score, 5 being the lowest):

- the ability to demonstrate basic knowledge as |
<table>
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<tr>
<th><strong>SLO #2</strong></th>
<th><strong>Direct #1: Use data from written and oral research assignments to assess student’s ability to critically read, think, analyze, and present about the sciences</strong></th>
<th><strong>Data will be collected from the same classes mentioned above for SLO #1 Direct Measure #1, using the GE oral and written rubrics and to written assignments and oral presentations. However, we will add to this rubric specific components to assess for students abilities to identify the:</strong></th>
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|  |  | • interconnections among scientific disciplines;  
|  |  | • the biotic and abiotic processes of the environment;  
|  |  | • how these can change due to |
natural and anthropogenic disturbances;
• how to apply these relationships to scientific investigation

| Indirect: Graduating Student Survey | We will focus on the responses of students to the following questions, with mean scores of 1.5 (1 being the best score, 5 being the lowest):
| • 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 ability to communicate scientific results;
| • and demonstrate a global perspective of science |

| SLO #3 | Direct #1: Use data from written and oral research assignments to assess student’s ability to critically read, think, |
| Data will be collected from the same classes mentioned above for SLO #1 Direct Measure #1, using the GE oral |
analyze, and present about the sciences and written rubrics and to written assignments and oral presentations. However, we will add to this rubric specific components to assess for students abilities concerning:

- Research project identification, design and implementation;
- Data analysis;
- Ability to identify critical results from the data and apply these to an understanding of causes, possible solutions, and prediction of outcomes associated with these contemporary problems.

| Direct Measure #2: Use data from scores on the lab portions of courses | We will assess student performance on the lab component of the entry level sequence courses, common SELS courses (as appropriate) and select upper division courses that focus on research methods. We will use a rubric that assesses the different components necessary for the students to understand in order to conduct scientific |
research. 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.

SLO #3 Indirect Measure #1. We will use the Graduating Student Survey. We will focus on the responses of students to the following questions, with mean scores of 1.5 (1 being the best score, 5 being the lowest), that are the most relevant to being able to show success in this SLO:

- the ability to design and conduct research;
- the ability to apply the latest computation and lab methods;
- the ability to communicate scientific results.
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<th>SLO #4</th>
<th>Direct Measure #1: Use data from written and oral research assignments to assess student’s ability to critically read, think, analyze, and present about the sciences</th>
<th>Data will be collected from the same classes mentioned above for SLO #1 Direct Measure #1, using the GE oral and written rubrics and to written assignments and oral presentations. However, we will add to this rubric specific components to assess for students abilities to identify, address and communicate environmental and life science issues, research results, and solutions to problems and questions in writing and oral presentations at an appropriate level.</th>
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| Indirect Measure #1. We will use the Graduating Student Survey. | We will focus on the responses of students to the following questions, with mean scores of 1.5 (1 being the best score, 5 being the lowest), that are the most relevant to being able to show success in this SLO:  
• the ability to design and conduct research;  
• the ability to |
| **SLO #5** | Direct #1: Use data from written and oral research assignments to assess student’s ability to critically read, think, analyze, and present about the sciences | Data will be collected from the same classes mentioned above for SLO #1 Direct Measure #1, using the GE oral and written rubrics and to written assignments and oral presentations. However, we will add to this rubric specific components to assess for students abilities to

- identify, address and communicate environmental and life science issues that are of a global concern;
- understand and visualize local, regional, national and global patterns associated with the environment, and the effects of human/animal and environmental interactions; |
| Indirect Measure #1. We will use the Graduating Student Survey. | We will focus on the responses of students to the question of their ability to demonstrate a global perspective of science. We will target a mean score of 1.5 (1 being the best score, 5 being the lowest). |  |  |