
Program Name(s) | FACT Faculty Fellow | Department Chair
---|---|---
GEOG BA/BS | Michael Lee | David Larson

[NOTE: Items A, B, C, and D are identical to your Page 2 on your Annual Report for CAPR. Please simply cut and paste from there. Item E is unique to the CLASS FACT Project.]

A. Program Student Learning Outcomes

<table>
<thead>
<tr>
<th>SLO 1</th>
<th>SLO 2</th>
<th>SLO 3</th>
<th>SLO 4</th>
<th>SLO 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>demonstrate a broad and deep understanding of the fundamental concepts and techniques of the discipline of Geography;</td>
<td>prepare, use, and interpret maps and other spatial data with and without the aid of computers;</td>
<td>communicate geographic ideas, perspectives and conclusions clearly and persuasively orally, in writing and through maps and graphics;</td>
<td>think critically and apply analytical and quantitative reasoning to assess problems across local, national and global geographic scales and to effect practical and sustainable solutions both as an individual and within a team;</td>
<td>demonstrate their knowledge of the characteristics and cultures of two world regions in addition to their own.</td>
</tr>
</tbody>
</table>

B. Program Student Learning Outcome(s) Assessed

SLO 3 communicate geographic ideas, perspectives and conclusions clearly and persuasively orally, in writing and through maps and graphics;

C. Summary of Assessment Process

The assessment plan for Geography BA/BS program identified SLO3 to be the focus of assessment for 2014-15: “communicate geographic ideas, perspectives and conclusions clearly and persuasively orally, in writing and through maps and graphics”.

Year 3: 2014-2015
1. Which SLO(s) to assess = SLO3
2. Assessment indicators = We will use “direct” indicator (weekly assignments, GIS maps, and term project paper) for this SLO assessment.
3. Sample (courses/# of students) = Geography 4605: Applications of GIS (9 students)
4. Time (which quarter(s)) = Spring, 2014
5. Responsible person(s) = Gary Li
6. Ways of reporting (how, to who) = Term project report, to the instructor
7. Ways of closing the loop= Results are checked against the goals layout in the syllabus.

The course vehicle chosen for this was the advanced geographical information systems class GEOG 4605 Applications of GIS (see Appendix 1 for the syllabus). GEOG 4605 requires a major mapping analysis.
project by each student culminating in a final presentation in which the students attempt to communicate their conclusions in an oral presentation of their graphical products and results (Appendix 2). These presentations were video-captured by the instructor, Gary Li, and reviewed by the GEOG SLO review committee (Larson, Lee and Woo) to provide an assessment of the student performance and ability to communicate their ideas clearly and persuasively.

D. Summary of Assessment Results

The results of the review are listed in Table 1 below. The grading criteria used by Prof. Li was modified into a rubric to assess each of the student presentations as to the degree to which the student achieved “mastery”, “proficiency” or “not attained” status with respect to SLO3 (see Appendix 3). A score of 1.5 or lower means that the student got a preponderance of “mastery” judgments for the attributes evaluated using the rubric, hence the higher designation is applied. A score of 1.5 to 2.5 suggests a preponderance of proficient scores with the odd developing score not balanced by a mastery score, thus the proficient designation is applied. A value greater than or equal to 2.5 suggests a preponderance of developing or lacking development scores (3 & 4) and thus the lower designation (SLO not yet attained by the student) is warranted. This shows that of the five majors (our of 9 students taking the class), four had met the standards of the SLO articulated through the rubric and one had not.

Table 1 Evaluation of Student Performance re. SLO3

<table>
<thead>
<tr>
<th>Major</th>
<th>Mastery &lt;1.5</th>
<th>Proficiency &gt;=1.5 &amp;&lt;2.5</th>
<th>Developing/Lacking Development &gt;=2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>1.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 2</td>
<td></td>
<td>2.32</td>
<td></td>
</tr>
<tr>
<td>Student 3</td>
<td></td>
<td>1.94</td>
<td></td>
</tr>
<tr>
<td>Student 4</td>
<td></td>
<td>2.41</td>
<td></td>
</tr>
<tr>
<td>Student 5</td>
<td></td>
<td></td>
<td>2.73</td>
</tr>
</tbody>
</table>

E. Suggestions and Recommendations for the CLASS FACT Project in the Future

It should be noted that assessment is an ongoing, slowly evolving and improving process in the GEOG BA/BS program. Thus, this year’s SLO evaluation was more a piloting of an assessment procedure than an assessment of the SLO itself per se. With a change over of FACT and the absence on research leave of the GEOG 4605 instructor, there was no process, a priori, developed for this SLO at the time the class being used to assess it was offered. Thus the rubric used by the assessment committee and the FACT was developed a posteriori and had not been shared with the students performing the work or used as background by the instructor advising the students. Moreover, the rubric was developed by the FACT assuming that a copy of the PPT and the videotaped presentation would be available; however, only the video was examined and thus some of the rubric elements were not applied. These limitations notwithstanding, the conclusion of the assessment committee was that the rubric for this SLO was clear.
and relatively easy to apply. Note that no weighting of the different attributes were applied – each was considered equal to the other.

The use of this rubric for the first time did raise a number of questions that the program as a whole needs to resolve. They include the following:

What constitutes satisfaction of the SLO at the required level; i.e. what are expectations - are we expecting all students to meet the highest of the benchmarks – mastery – or just proficiency?

How should the attributes listed in the rubric correspond to the grades being offered in the class? – Clearly the class covers a larger variety of components including coursework, participation, and so forth whereas the rubric relates only to the final assignment product.

We decided that we need to get all the faculty together and to enter into a larger debate about our assessment rubrics and how they should be used. A basic issue to resolve is that if the mastery is akin to an A and if we equate that with course grades, we’d only be giving 10-20% of our majors the mastery level for the SLO if we adopt a normal distribution grading approach. But if it’s not akin to an A grade but represents the end goal for ALL students, then we need to be sure to include the rubric with whatever assignment is used to provide the SLO assessment and make it clear to all students that if they meet it, they can get an A. Depending on the broader grading structure for the course and on the degree to which students comport to the attributes required, we will have to accept that for the course in question (and this will be true, presumably, for other courses in which SLOs are assessed and an SLO attainment rubric is used), we might end up giving every student an A – i.e. the idea of a normal distribution and grade curve would need to be rejected. This would not constitute grade inflation because it would be based on a set of objective standards that each student, presumably, could meet.

Note that although the results of the assessment for this course was that only one of five students assessed achieved close to mastery level, the committee considered that if they had received the rubric a priori i.e. if it had been implicit in their assignment, then they would have been capable of meeting the higher level above proficiency. Thus, the committee resolved that in future assessments of this SLO, the FACT and Chair should enter into dialogue with the instructor of GEOG 4605 (currently Gary Li) to further refine the rubric so that it can be used both for the SLO assessment and for grading of the final project and presentation. We believe it should be provided a priori to students enrolled in the class along with the assignment details to give them a set of normative goals for their projects. We think it should be the objective of the program for all majors to gain mastery for a given SLO and if they do so in the context of a course assignment, this should be equivalent to a high A grade. We concluded that the rubric is a suitable tool for assessing the SLO, and that in future evaluations, the oral (videotaped) presentation, the PowerPoint file, and the final graphical product should be made available to the assessment committee for this SLO. Additionally, general major advising should be systematized to ensure that to the greatest extent possible, GEOG 4605 be taken as a capstone class in the sub-area of cartography and GIS i.e. majors take it just prior to graduation and/or once they have completed all other geospatial classes. While it is accepted that not all majors will have the same number and combination of cartography and GIS classes, since not all majors pursue a Certificate in Cartography and GIS, they should all have taken those classes before enrolling in GEOG 4605. The instructor of 4605 should check with all enrolled students to ascertain this fact once the class list is available (he/she should consult with the major advisor who will maintain the major checks detailing each major’s course progression).
2015-16 Plan

Note that for academic year 2015-16, we will assess SLO2 “prepare, use, and interpret maps and other spatial data with and without the aid of computers” in Fall 2015 through the course GEOG 3410 Air Photo Interpretation. Consultation with Prof. Woo indicates that the SLO is best judged by students’ ability to execute prescribed tasks e.g. plot flight plan, correctly interpret stereoscopic features, etc. Scoring rubrics will be developed over the summer that map to proficiency levels: mastery, proficiency, and developing (see Appendix 4). Proficiency and above will be considered evidence that SLOs have been achieved by majors. Assessment of this outcome will likely not require additional committee review. The same discussion of the relationship of the course grades to the SLO assessment instrument outcomes will be held with the course instructor, Prof. Woo.
Appendix 1 GEOP 4605 Course Syllabus

**Geography 4605: ENVIRONMENTAL APPLICATIONS OF GIS**

Number of Units: 5
Classroom location: MI 3032
Pre-requisites: Geog 3030 or with instructor’s permission.
Gary Li, Professor Dept. of Geography & Environmental Studies
Office: RO 212 Office Hours: 6:00 - 6:30 pm.
Phone: 885-3165 Email: gary.li@csueastbay.edu

Course Learning Objectives:

- Familiar with the ways that GIS was used in dealing with environment related issues.
- Develop individual experience in the use of ArcGIS in solving environment related problems.
- Develop analytical skills in the spatial and numerical analysis in environment, social, and natural studies.
- Develop spatial predictive skills in habitat analysis and spatial modeling.
- Understand and develop weighting coefficient in spatial numerical modeling.
- Examine vulnerable community and corresponding contributing factors.
- Understand 3D modeling and its applications in water resources analysis.
- Improve our understanding of the spatial relationship between spatial variables and applications of such relationship in real world applications.

**Material:** Published papers will be used as reading material. Topics include but not limited to the following environmental issues and methods:

- Species Distribution Prediction
- Habitats Modeling
- Non-point Source Pollution
- Wildfire prevention
- Community Vulnerability
- Other topics chosen by you.

**Course Format:** Combination of discussions/lectures, labs, and term project. In lecture/discussion sessions, we will review published applications of GIS in real world situations.

**Detailed Paper Review**

Each of you will review one published work selected by you. You need to hand in a detailed written review, about 4-5 pages long, double-spaced. Your review should include but not limited to 1) description of problem(s); 2) data acquisition and editing; 3) GIS procedures used by authors (and equivalent ArcGIS procedure or functions if possible); 4) results; and 5) your comments.
Use PowerPoint to present your review in class in about 20 minutes. Email me both of your review (in Word format) and the PPT file on the day of your review presentation. There will be a sign up sheet for your presentation date.

Recommended:

**CSUEB Library’s GeoBase or MetaSearch**
You can use online Geobase of the library service to search for published works. You will most likely receive a PDF file of the paper. Email the rest of the class, including me, the PDF file of the paper that you are going to review at least 2 days in advance.

Some recommended literatures:

<table>
<thead>
<tr>
<th>Tentative Topic Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
</tr>
<tr>
<td>Week 2</td>
</tr>
<tr>
<td>Week 3</td>
</tr>
<tr>
<td>Week 4</td>
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<tr>
<td>Week 5</td>
</tr>
<tr>
<td>Week 6</td>
</tr>
<tr>
<td>Week-7</td>
</tr>
</tbody>
</table>

**Lab Exercises:** There will be seven lab exercises for the first seven weeks. Data and general exercise procedures will be given.

<table>
<thead>
<tr>
<th>Tentative Lab Assignments</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Geoprocessing</td>
</tr>
<tr>
<td>Week 2</td>
<td>Spatial Analysis</td>
</tr>
<tr>
<td>Week 3</td>
<td>Community Emergency Management</td>
</tr>
<tr>
<td>Week 4</td>
<td>Watershed Delineation.</td>
</tr>
<tr>
<td>Week 5</td>
<td>Dumping Site Selection</td>
</tr>
<tr>
<td>Week 6</td>
<td>Earthquake Damage Analysis</td>
</tr>
<tr>
<td>Week 7</td>
<td>Water Surface Change Analysis</td>
</tr>
<tr>
<td>Week 8-9</td>
<td>Term Project</td>
</tr>
</tbody>
</table>

**Term Project:**
The purpose of the term project is to use GIS to solve a spatial problem that we may encounter in dealing with environmental issues. You need to set up a goal on how to solve an environmental problem using methods introduced in this class. To reach that goal, you need to obtain/input/edit a set of GIS data on which spatial/environmental analysis will be conducted.

The project should include (but not limited to) environmental/GIS data acquisitions, spatial/environment analysis, output design, and report writing. The results will be presented in our last day of the quarter, using PPT and projector. You have about 10 minutes for your term project presentation.

Your PPT and the written report should include (1) explanation of problem(s) or issue(s); (2) data acquisition and processing; (3) procedures of ArcGIS in spatial/environmental analysis; (4) results and conclusions (may include maps and tables); and (5) statement of your comments.

Your project idea and conclusions should be communicated clearly in oral presentations, writing reports, and your final result maps.

The written report will normally be about 4-5 pages long (use double space) and is due on June 10th.

**Grading:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seven Labs</td>
<td>60%</td>
</tr>
<tr>
<td>Paper reviews</td>
<td>10%</td>
</tr>
<tr>
<td>Discussion and Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Term Project and Report</td>
<td>20%</td>
</tr>
</tbody>
</table>

Letter grades will be based on the weighted average specified above and assigned as follows: A=90-100%, B=80-90%, C=70-80%, D=60-70%, and F<60%. There will not be incomplete grades in this course.

**Attendance:**
You are expected to attend ALL lectures. Any single absence will result in a 2-point deduction from your total score.

**Note:**
By enrolling in this class the student agrees to uphold the standards of academic integrity described in the catalog at [http://www.csueastbay.edu/ecat/current/i-120grading.html#section12](http://www.csueastbay.edu/ecat/current/i-120grading.html#section12).
If you have a documented disability and wish to discuss academic accommodations, or if you would need assistance in the event of an emergency evacuation, please contact me as soon as possible. Students with disabilities needing accommodation should speak with the Accessibility Services.

Information on what to do in an emergency situation (earthquake, electrical outage, fire, extreme heat, severe storm, hazardous materials, and terrorist attack) may be found at: http://www.aba.csueastbay.edu/EHS/emergency_mgmt.htm. Please be familiar with these procedures. Information on this page is updated as required. Please review the information on a regular basis.
Appendix 2 GIS Assignment

INSTRUCTIONS GIVEN TO STUDENTS

You need to set up a goal on how to solve an environmental problem using methods introduced in this class. To reach that goal, you need to obtain/input/edit a set of GIS data on which spatial/environmental analysis will be conducted. The project should include (but not limited to) environmental/GIS data acquisitions, spatial/environmental analysis, output design, and report writing. The results will be presented in our last day of the quarter, using PPT and projector. You have about 10 minutes for your term project presentation. Your PPT and the written report should include (1) explanation of problem(s) or issue(s); (2) data acquisition and processing; (3) procedures of ArcGIS in spatial/environmental analysis; (4) results and conclusions (may include maps and tables); and (5) statement of your comments.

Your project idea and conclusions should be communicated clearly in oral presentations, writing reports, and your final result maps.

The written report will normally be about 4-5 pages long (use double space) and is due on June 10th.

CRITERIA USED BY INSTRUCTOR IN GRADING ASSIGNMENT

Term projects are judged based on
1. explanation of problem(s) or issue(s);
2. data acquisition and processing;
3. procedures of ArcGIS in spatial/environmental analysis;
4. results and conclusions (may include maps and tables).
5. clearness of oral presentations, writing reports, and final result maps.
## Appendix 3 SLO3 Evaluation Rubric

### Clarity of oral presentation

<table>
<thead>
<tr>
<th>D/4 - Lacking development (Amateurish, unpolished)</th>
<th>C/3 - Developing</th>
<th>B/2 - Proficient</th>
<th>A/1 - Advanced (Highly professional and polished)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lacking organization, no logical sequence of information, difficult to follow.</td>
<td>Somewhat organized sequence of information but a little jumbled or with unnecessary repetition.</td>
<td>Logical sequence of information that is easy to follow with no repetition.</td>
<td>Logical, interesting sequence of information that maintains audience engagement and attention</td>
</tr>
</tbody>
</table>

### Organization

- Was the flow of information in the presentation logically organized so as to maintain audience interest?
  - Lacking organization, no logical sequence of information, difficult to follow.
  - Somewhat organized sequence of information but a little jumbled or with unnecessary repetition.
  - Logical sequence of information that is easy to follow with no repetition.
  - Logical, interesting sequence of information that maintains audience engagement and attention

### Graphics

- Were the graphic elements of the presentation well chosen and appropriate to the subject matter?
  - Uses superfluous graphics, poor quality graphics, or no graphics
  - Occasionally uses graphics but they only somewhat support the text and the subject material
  - Appropriate use of graphics that relate adequately to the text and oral delivery
  - Careful and thoughtful use of graphics to forcefully explain and reinforce the screen text and oral delivery

### Slide Design and Consistency

- Were the slides well designed using an attractive and consistent style?
  - Visually flawed and distracting design theme with varied, poor choice of backgrounds, layout, and/or font sizes and styles, etc. (i.e. visually ugly/too busy)
  - Varied design theme with some mild visual flaws (such as poor foreground/background contrasts or unnecessary cuteness, busyness, etc.)
  - Mostly consistent design theme with visually acceptable and easy to interpret elements
  - Consistent design theme with visually pleasing and easy to interpret elements (i.e. visually appealing/elegant)

### Text Elements

- Were the text elements well chosen relative to the oral delivery and appropriately formatted for comprehension?
  - Too wordy, text too small and crowded, same content as oral presentation
  - Not concise enough or else too cryptic, same content as oral presentation or requires too much attention to absorb while listening
  - Text elements are clear with only minor repetition of oral delivery and/or difficulty in full absorption
  - Has clear, well-chosen text elements that balance and reinforce the oral delivery

### Mechanics

- Were the slides professionally edited with no errors?
  - Lacks sufficient editing; has four or more obvious typo, spelling, grammar or other errors
  - Careless editing; has several typos, spelling, grammar or other errors that should have been caught
  - Presentation has one or two hard to spot errors that more meticulous editing would have corrected
  - Presentation has no typos, misspellings or grammatical errors

### Eye Contact

- Was the presenter's interaction with the audience confident and engaging?
  - Presenter reads directly from notes or from screen projection with little to no deliberate eye contact
  - Presenter makes occasional deliberate eye contact, but still reads most of oral delivery and/or looks frequently at screen
  - Presenter maintains steady eye contact most of the time but occasionally returns to notes/screen for support
  - Presenter maintains steady eye contact with audience, seldom returning to notes or looking at the screen showing...
<table>
<thead>
<tr>
<th>Clarity of oral presentation</th>
<th>D/4 - Lacking development (Amateurish, unpolished)</th>
<th>C/3 - Developing</th>
<th>B/2 - Proficient</th>
<th>A/1 - Advanced (Highly professional and polished)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>that he/she knows what the visual content is and needs no support.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Elocution</strong> - was the oral delivery clear, confident and aurally comprehensible?</td>
<td>Presenter mumbles, incorrectly pronounces terms, and/or speaks too quietly for those in the back of room to hear.</td>
<td>Presenter's voice is uninteresting, monotone, presenter stumbles over certain terms, and/or audience members have occasional difficulty hearing the presentation.</td>
<td>Presenter's voice is clear and engaged. Presenter pronounces most words correctly and fluidly. Most audience members can easily hear presentation.</td>
<td>Presenter uses a clear, enthused and engaging voice with correct, precise pronunciation of terms so that all audience members can fully hear and enjoy the presentation.</td>
</tr>
<tr>
<td><strong>Timing</strong> - was the timing good – neither too short nor too long and well-paced?</td>
<td>Poor timing - a) finished &gt;3 mins short of allotted time, b) uncomfortably rushed to finish up material and/or truncated presentation, c) finished &gt;3 min over allotted time.</td>
<td>Less than adequately timed: within +/- 3 min of allotted time but apparent change of pace to stay within +/- 3 min of allotted time</td>
<td>Adequately timed: within +/- 3 min of allotted time, no apparent change of pace to fit allotted time</td>
<td>Well timed: +/- 1 min of allotted time and evenly paced</td>
</tr>
</tbody>
</table>

### Presentation Content Rubric

<p>| Explanation of problem(s) or issue(s) | Audience lacks clear understanding of the problem or issue that was the subject of the GIS analysis - not clear how or why a GIS was suitable or necessary. Audience left with lots of unanswered questions. | The problem or issue being tackled was stated but wasn't fully explained and thus it was a little unclear how and why a GIS analysis had been used to examine or assess it; the audience had several questions. | The problem or issue being tackled was adequately explained; it was quite clear how and why a GIS analysis had been used to examine or assess it and the audience had only one or two minor questions. | The problem or issue being tackled was very thoroughly explained; it was crystal clear how and why a GIS analysis had been used to examine or assess it. |</p>
<table>
<thead>
<tr>
<th>Clarity of oral presentation</th>
<th>D/4 - Lacking development (Amateurish, unpolished)</th>
<th>C/3 - Developing</th>
<th>B/2 - Proficient</th>
<th>A/1 - Advanced (Highly professional and polished)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data acquisition and processing (assumes audience familiarity with spatial data sets)</td>
<td>The presenter did not explain what data was used in creating the GIS or how it was acquired or manipulated.</td>
<td>The audience lacks a clear idea of what data was used, how it was acquired and in what format, what it represented and how it was processed or manipulated for use in the GIS.</td>
<td>The audience has a good general understanding of the data aspects of the project but one of the following aspects was a little unclear; how the data was acquired, in what format, what it represented, and what types of processing or manipulation was required for use in the GIS.</td>
<td>The audience gained a clear understanding of how the data was acquired, in what format, what it represented, and what types of processing or manipulation was required for use in the GIS.</td>
</tr>
<tr>
<td>Procedures of ArcGIS in spatial/environmental analysis (assumes audience familiarity with this software)</td>
<td>The presenter did not explain the ArcGIS procedures and tools that were used in the project.</td>
<td>The audience lacks a clear idea of what the ArcGIS procedures and tools that were used to produce the final products and to answer the questions posed concerning the problem or issue.</td>
<td>The audience has a good general understanding of the computational aspects of the project but some aspects of the ArcGIS procedure and tool uses needed further explanation.</td>
<td>The audience was given a clear explanation of the ArcGIS procedures and tools that were used to produce the final products and to answer the questions posed concerning the problem or issue.</td>
</tr>
<tr>
<td>Clarity of final result maps</td>
<td>The maps were difficult to interpret due to fundamental flaws in the design such as color shading, labeling, scale and so forth combined with a lack of adequate narrative explanation. It is hard to relate them to the problem or issue they are supposed to analyze.</td>
<td>The maps produced using the GIS don't clearly illustrate the outcomes of the spatial/environmental analysis and communicate the results effectively to the audience; they are either hard to visually interpret or the narrative explanation is vague and confusing.</td>
<td>The maps produced using the GIS adequately illustrate the outcomes of the spatial/environmental analysis and communicate the results effectively to the audience. The audience only has a few minor uncertainties as to the results of the analysis.</td>
<td>The maps produced using the GIS clearly illustrate the outcomes of the spatial/environmental analysis and communicate the results effectively to the audience.</td>
</tr>
</tbody>
</table>
Appendix 4 SLO2 Prescribed Task Areas

Criteria and Rubrics in the Assessment of GEOG3410 (Air Photo Interpretation) to Determine the Mastery of the SLO2

SLO2: “be able to prepare, use and interpret maps and other spatial data with and without the aid of computers”

1) Be able to apply image scale and stereoscopic measurement to calculate target size, length, and height in aerial photographs
   * Student performance in lab 1 “Basic Measurements in Aerial Photography” (10 pts)
     - 10 – 9 pts ................. Mastery
     - 8 – 7 pts .................. Proficiency
     - 6 – 5 pts .................. Developing
     - < 5 pts ..................... Not yet developed

2) Be able to calculate and prepare scaled flight plans (maps) for the purpose of aerial survey
   * Student performance in lab 2 “Mission Planning” (10 pts)
     - 10 – 9 pts ................. Mastery
     - 8 – 7 pts .................. Proficiency
     - 6 – 5 pts .................. Developing
     - < 5 pts ..................... Not yet developed

3) Be able to perform stereoscopic analysis to identify and interpret geomorphologic features from aerial photographs
   * Student performance in lab 3 “Photo Interpretation I: Landform Analysis” (10 pts)
     - 10 – 9 pts ................. Mastery
     - 8 – 7 pts .................. Proficiency
     - 6 – 5 pts .................. Developing
     - < 5 pts ..................... Not yet developed

4) Be able to use aerial photographs to remotely identify and interpret land use features on the ground.
   * Student performance in lab 4 “Photo Interpretation II: Cultural Land Use” (20 pts)
     - 20 – 18 pts ................. Mastery
     - 17 – 15 pts .................. Proficiency
     - 14 – 11 pts .................. Developing
     - < 11 pts ..................... Not yet developed