STUDENT LEARNING ASSESSMENT PROGRAM SUMMARY FORM *AY2023-2024*

Program Name: Professional Science Masters in Geographic Information Science (PSM in GIScience)
Dept: Geology/Geography
College: College of Liberal Arts and Sciences
Submitted by: David Viertel, Program Coordinator

Part 1:
The learning objectives for the PSM in GIScience program presented on the following pages are classified by CGS learning goal. Objectives are assessed in the classroom, as well as in reports, presentations, and professional settings if the situation allows (for instance both internship reports and assessment of any conference presentations). Data collection methods include the following assessments:

1. **Classroom Evaluations**
   When possible, learning goals are assessed through the evaluation of select student classroom work. For instance, when students complete a research paper, their work is assessed and reported via the standard Geography Paper Assessment Evaluation instrument (See Appendix A). Likewise, if students are required to perform a class presentation, their work is assessed on the Geography Speech Assessment instrument (See Appendix B). Most other classroom evaluation is assessed based on ***embedded content questions*** in essay exams. This allows students to demonstrate a broader understanding of geospatial fundamentals. For standardization purposes, all classroom work is assessed on a likert scale ranging from 1 (No discernible ability), to 2 (Minimal ability), to 3 (Satisfactory ability), to 4 (Significant ability), and finally 5 (Superior ability).

2. **Final GIS (Internship) Written Report**
   When students complete the Certificate of Comprehensive Knowledge requirement of the EIU graduate school, they are required to submit a ***written report*** of a GIS research or professional project. In practice this report tends to be linked to the student's required internship activities (though the option to complete supervised research exists as well). This objective is typically completed immediately prior to graduation, though may be completed during the last two semesters of the program. The written report is required to be comprehensive and succinct, demonstrating professionalism and ethical responsibility. Research and methods references must be appropriately cited and sourced. Project reports are currently evaluated by the Graduate Coordinator as well as one other graduate faculty member (either Barry Kronenfeld or Chris Laingen, as time allows). Work is evaluated quickly with the opportunity for feedback and revision.

3. **Final GIS (Internship) Project Presentation**
   In conjunction with the written report, GIScience PSM students are required to complete a professional presentation on the same internship or research project, in front of faculty and fellow students. At this juncture, students are expected to clearly communicate the purpose, context, and background of their work. Their presentations should be professional and comprehensive, explaining purpose, process, challenges, achievements, analysis, limitations of their work, and future directions or needs. Project presentations are evaluated by all attending faculty (at least two GIScience graduate faculty must be in attendance) and feedback is provided to students with the opportunity to address suggested changes in their written work (see above).

Note: In the 2023-24 academic year the PSM in GIScience had ***no students*** graduate, leading to ***fewer assessment opportunities outside the classroom environment*** (Elements 2 and 3 above). This lack of graduates and the future of the program will be addressed following reports on the individual learning goals.

CGS Learning Goal #1 A depth of content knowledge	**Program Learning Goal(s): #1a** **Manage data workflow (create, edit, convert, filter, document) in various GIS formats (vector and raster)**
How are learners assessed?	Final project report on internship experience (CCK) as well as classroom assessment questions. Classroom results are collected by individual professors and compiled on a semester basis, while attending professors evaluate student internship final projects.
What are the expectations for the students?	Students will provide evidence of identifying and acquiring multiple relevant data sources, perform appropriate editing, conversion and filter tasks, and properly document and justify their data processing steps.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).
What were the results?	Classroom assessments in two classes (n=11) yielded a weighted mean of 4.5. This would represent a ***significant*** level of understanding for this skill.
How are the results shared? How will these results be used?	Student status and overall content mastery are reviewed in a graduate faculty meeting on a semester-by-semester basis. Results are used to update and focus course curriculum and redesign Intro to GIS (GEO5810), Remote Sensing I (GEO5820) and Remote Sensing II (GEO5870) courses.

CGS Learning Goal #1 A depth of content knowledge	**Program Learning Goal(s): #1b** **Construct and visualize data products (maps, interactive databases) to effectively communicate information**
How are learners assessed?	Results are measured based upon maps and flow charts associated with term project work collected by individual professors as well as solicited from attending professors at final project presentations (CCK).
What are the expectations for the students?	Students will use thematic maps and interactive visualization tools to effectively communicate results and analysis. Graphic representation should be self-explanatory, with a clear message and appropriate symbolization.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).
What were the results?	Assessment of student abilities to communicate via visualization products was assessed in two classes (n=17) over the term of this assessment. The mean value yielded by professor evaluations was a 4.94. This would represent a ***superior*** level of understanding for this skill. We were happy to see these results since visualization products are a vital part of professional geography skills.
How are the results shared? How will these results be used?	Student status and overall content mastery are reviewed in a graduate faculty meeting on a semester-by-semester basis. We see this improvement as a dividend paid by our 2022 redesign of a graduate Cartography and Visualization course which all students are required to take. Scores have climbed since this point.

CGS Learning Goal #1 A depth of content knowledge	**Program Learning Goal(s): #1c** **Design frameworks and procedures to support GIS data collection, management and analysis.**
How are learners assessed?	Final project report on internship experience (CCK) as well as classroom assessment questions. Results are collected by individual professors and compiled on a semester basis, while attending professors evaluate student internship final projects.
What are the expectations for the students?	Students will demonstrate the ability to construct relational geodatabases, procedural geoprocessing models, and/or python scripts to accomplish specific data compilation goals, processing procedures and analysis.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).

What were the results?	Two classroom assessments (n=11) of the ability to produce value-added products from raw spatial data yielded a mean 4.48. This would represent a ***significant*** ability in this category. This represents an increase from the mean score the previous year.
How are the results shared? How will these results be used?	Student status and overall content mastery are reviewed in a graduate faculty meeting on a semester-by-semester basis. Feedback from earlier results has led to changes in the GEO5810 and GEO5820 foundational classes to include greater focus on methodology as well as greater focus on project design in the GEO5000 seminar course.

CGS Learning Goal #2: Critical thinking and problem-solving skills	**Program Learning Goal(s): #2a** **Derive higher-order spatial information from base (raw survey, GPS, satellite/aerial, or other sensor) data sources**
How are learners assessed?	Final project report on internship experience (CCK) as well as classroom assessment questions. Results are collected by individual professors and compiled on a semester basis, while attending professors evaluate student internship final projects.
What are the expectations for the students?	Students will clearly define the scope and objectives of their project, including spatial data requirements and appropriate analysis techniques.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).
What were the results?	Assessments of this ability to produce value-added products from raw spatial data across three separate classes (n=13) yielded a mean 4.61. This would represent a ***significant*** leaning towards ***superior*** ability in this category.
How are the results shared? How will these results be used?	Student status and overall content mastery are reviewed in a graduate faculty meeting on a semester-by-semester basis. Feedback from these results has led to shifts in the final project requirements in GEO5820, GEO5825, and GEO5870 classes.

CGS Learning Goal #2: Critical thinking and problem-solving skills	**Program Learning Goal(s): #2b** **Place project within correct organizational context and justify expense (both temporal and monetary).**
How are learners assessed?	Results are solicited from attending professors at final project presentations (CCK).
What are the expectations for the students?	Students will be able to explain how their internship or research project benefits and supports the cooperating organization and discuss limitations in terms of data quality, time, and available resources.

What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale)
What were the results?	While no students have matriculated this year, one did complete an internship project with the Peoria County Emergency Management Agency (EMA) and presented results. Dr. Kronenfeld and Dr. Viertel assessed this individual's work to be exemplary, showing careful attention to detail from start to finish. We both assessed the results ***superior***.
How are the results shared? How will these results be used?	Student status and overall content mastery will be reviewed in a graduate faculty meeting yearly.

CGS Learning Goal #3: Effective oral and written communication skills	**Program Learning Goal(s): #3a** **Communicate all aspects of GIS work from process to analysis in a clear, concise <u>written</u> form.**
How are learners assessed?	Professors requiring research projects assess students based on the Geography Paper Assessment Evaluation instrument (See Appendix A). Additionally, supervising professors evaluate student final project written reports.
What are the expectations for the students?	Students will present well-organized, clearly-written reports of process as well as coherent justification and analysis in their work.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).
What were the results?	Written communication was assessed in three classes (n=14) throughout the year where term papers were expected. The mean for these assessments 4.17 indicating a ***significant*** level of written communication skill for assessed students.
How are the results shared? How will these results be used?	Student status and overall written communication ability are reviewed in a graduate faculty meeting on a semester-by-semester basis. Writing skills were slightly lower compared to last year (4.17 vs. 4.23). Though this is a slight drop-off the overall number of students assessed dropped, making the measure more sensitive to outliers. Future results will be monitored to ensure this does not indicate a trend.

CGS Learning Goal #3: Effective oral and written communication skills	**Program Learning Goal(s): #3b** **Present and verbally relate work and analysis in an organized, professional, and coherent manner.**

How are learners assessed?	Professors requiring research projects assess students based on the Geography Speech Assessment instrument (See Appendix B). Additionally, supervising professors evaluate student final project oral reports.
What are the expectations for the students?	Students will effectively and professionally deliver an interactive oral presentation explaining project justification, process and analysis.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale)
What were the results?	Oral communication and presentation skills were assessed in three classes (n=14) during the assessment period. The mean of this measure was 3.71, indicating a ***satisfactory leaning towards significant*** communication ability amongst students.
How are the results shared? How will these results be used?	Student status and overall verbal communication ability are reviewed in a graduate faculty meeting on a semester-by-semester basis. Students continue to struggle with this particular expectation and more work is warranted to improve oral communication abilities (the score fell from 3.93 last year to 3.71 this year). The faculty, while not instituting a requirement, have informally been encouraging students to consider taking a communication course as part of their graduate studies.

CGS Learning Goal #4: Evidence of advanced scholarship through research and/or creative activity.	**Program Learning Goal(s): #4** **Appropriately utilize high-quality research sources and methods in the application and analysis of geospatial problems.**
How are learners assessed?	Professors requiring research projects and/or project design (for instance a programming course) evaluate student performance. Additionally, student internship/research reports are evaluated for research and methodological support by supervising professors.
What are the expectations for the students?	Students should be able to identify and obtain high-quality theoretical and procedural literature to support their methods. Analytical methods should show robust support and a strong theoretical underpinning.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).
What were the results?	Learning goal 4 was assessed in two classes and one CCK presentation (n=10) during the term in question. The mean result for all students assessed was a 4.75. This indicates a ***significant*** leaning towards ***superior*** level of research ability for assessed students.
How are the results shared? How will these results be used?	Student status and overall content mastery are reviewed in a graduate faculty meeting yearly. An emphasis on assessing sources has been added to GEO5000 (PSM Seminar) and

	more attention has been added to this skill in individual courses. The average this year improved from 4.38 to 4.75. While not statistically significant given the numbers, the faculty were still enheartened to see improvement in research and analysis skills.

CGS Learning Goal #5: Ethics and Professional Responsibility	**Program Learning Goal(s): #5a** **Identify and discuss emerging trends in GIS-related technology, regulations, standards and norms and their impacts on society.**
How are learners assessed?	Results are collected by individual professors and compiled on a semester basis (as appropriate PSM seminar or other topical seminars are offered). Additionally, attending professors evaluate student internship final projects (CCK).
What are the expectations for the students?	Students will demonstrate an understanding of emerging web technologies, open source software and volunteered geographic information and be able to discuss the need for spatial data infrastructure as well as controversies regarding data privacy.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).
What were the results?	Students were assessed on their understanding of the state of technology, the importance of open standards, and how these matters impact society in one class (n=2). The mean for this class 5.0 indicating a ***superior*** level of achievement in this goal.
How are the results shared? How will these results be used?	Student status and overall content mastery are reviewed in a graduate faculty meeting yearly. This feedback has been used to sharpen the subject matter of both the GEO5000 Seminar and other Seminar offerings. Though an extremely small sample, the results in GEO5000 this last year indicate the overall excellence of the two students to join the program in Fall 2023.

CGS Learning Goal #5: Ethics and Professional Responsibility	**Program Learning Goal(s): #5b** **Identify and model ethical behavior in the professional realm**
How are learners assessed?	Students are assessed in the PSM seminar course (where these matters are discussed explicitly) as well as in their internship or research (final project) report.
What are the expectations for the students?	Students will interact with others in a professional manner while adhering to ethical standards of data stewardship, objective analysis, and transparent research practices.
What are the expectations for the program?	Avg. student achievement will rank significant to superior (4-5 on a 5 point likert scale).

What were the results?	PSM seminar students (students in their first semester) in the Fall of 2024 were assessed for their ability to identify ethical behavior and data-handling standards, and their ability to present themselves professionally. The students again (as above) ranked at an exemplary 5.0 or ***superior*** standard of professionalism. In addition, the singular student to present on their internship showed ***superior*** awareness of ethics and professionalism, including an entire section of their report on the work done to mask potentially identifying data collected in disaster response situations.
How are the results shared? How will these results be used?	Student status and overall ethical performance is reviewed in a graduate faculty meeting yearly. Again, though numbers were quite small, the results were much better than the unacceptable results seen last year.

Part 2

Describe what your program's assessment accomplishments since your last report was submitted. Discuss ways in which you have responded to the Graduate Assessment Summary Response from last year's report or simply describe what assessment work was initiated, continued, or completed.

Though we continue to assess students' skills and characteristics to better understand the functioning of our program, I must sadly report the Geography program has decided to suspend new admissions to the PSM in GIScience after Fall 2024. The program will be sunset after the final students graduate (tentatively in Fall 2025).

Low numbers of students (as once again evidenced in the data above) were the driving force of this decision. Though our students themselves have shown admirable outcomes after finishing the degree (100% employment rate, success in chosen career field), the lack of new applicants has led to the realization that there is too much competition from other universities online to sustain a quality program in the future.

The applicant pool continues to show mostly international students looking for US residency. The funding to support these students is often lacking. COVID forced a change to online delivery and a moratorium on international students. While this allowed a small group of local Illinois working professionals to flourish in our program, their numbers are only enough to sustain the current low enrollment, not to grow the program. As such, the decision was made to allow the program to reach its natural end.

Part 3

Summarize changes and improvements in curriculum, instruction, and learning that have resulted from the implementation of your assessment program. How have you used the data? What have you learned? In light of what you have learned through your assessment efforts this year and in past years, what are your plans for the future?

Seeing the program come to an end, the plans for the future include seeing the eight active students through to the end of their degrees (again, this might be as soon as Fall 2025). In addition, there are two students who have largely completed the program, but have a very few credits left to go (both of them out of state). I will endeavor to find a way for them to finish if they so desire.

In the spirit of reflective assessment and transparency, we will continue to collect data and report it as long as the program remains active. With ever-dwindling numbers, it may be somewhat difficult to report meaningful data, but several of our grad courses will continue in order to support other programs (Environmental Sustainability, MBA, Political Science, Biology) as well as a graduate certificate in GIScience.

Assessment data, and the work contacting our graduates recently have helped reinforce that while difficult, winding things down is the correct decision. We wish to express our gratitude to the graduate council and assessment committee for the feedback and advice over the past ten years.

Appendix A

Geography Program Paper Assessment Evaluation

Student: **Semester:**

Topic: **Course:**

Length/Formatting: Length and formatting (font/margins) appropriate

5 4 3 2 1 0

Organization: Ideas clearly organized, use of intro/conclusion, material flows

5 4 3 2 1 0

Critical Thinking: Proper support of arguments, analysis of concepts and theory

5 4 3 2 1 0

Information Presented: Facts understandable, accurate, and assignment relates to class/geography

5 4 3 2 1 0

Language (Style and Grammar): Appropriate tense, proper language, relevant punctuation

5 4 3 2 1 0

Graphics: Effective use of graphical materials, maps, charts and other visual devices

5 4 3 2 1 0

Citations: Proper use of reference, parenthetical citation or footnotes, etc.

5 4 3 2 1 0

Overall Grade:

5 4 3 2 1 0

Comments:

5 ***The student demonstrates a superior ability in written communication***

4 ***The student demonstrates a significant ability in written communication***

3 ***The student demonstrates a satisfactory ability in written communication***

2 ***The student demonstrates a less than satisfactory in written communication***

1 ***The student demonstrates no discernible ability in written communication***

Appendix B

Geography Program Speech Assessment Evaluation

Presenter: **Semester:**

Topic: **Course:**

Time of Presentation: Time requirements met by the student.

5 4 3 2 1 0

Presentation Organization: Ideas clearly organized, presenter prepared, flow of presentation

5 4 3 2 1 0

Information Presented: Understandable, accurate, assignment relates to class/geography

5 4 3 2 1 0

Presentation Style: Language used, articulate, eye contact, use of notes, pitch, free of fillers, professionalism

5 4 3 2 1 0

Graphics: Use of visual aids ex: (maps, graphs, pictures, charts)

5 4 3 2 1 0

Overall Grade:

5 4 3 2 1 0

5 ***The student demonstrates a superior ability to communicate research ideas***

4 ***The student demonstrates a significant ability to communicate research ideas***

3 ***The student demonstrates a satisfactory ability to communicate research ideas***

2 ***The student demonstrates a less than satisfactory ability to communicate research***

1 ***The student demonstrates no discernible ability to communicate research***