***STUDENT LEARNING ASSESSMENT PROGRAM***

Please complete a separate worksheet for each academic program (major, minor) at each level (undergraduate, graduate) in your department. Worksheets are due to CASA this year by

**June 15, 2018**. Worksheets should be sent electronically to [kjsanders@eiu.edu](mailto:kjsanders@eiu.edu) and should also be submitted to your college dean. For information about assessment or help with your assessment plans, visit the Assessment webpage at <http://www.eiu.edu/~assess/> or contact Karla Sanders in CASA at 581-6056.

***SUMMARY FORM AY 2017-2018***

**Degree and**

**Program Name:** Professional Science Master's in Geographic Information Science (PSM in GIScience)

# **Submitted By:** Barry J Kronenfeld

**Please use size 10 font or larger.**

**PART ONE**

The PSM in GIScience program's objectives are listed in the table on the following page. Nine specific objectives are designated within three broader program goals. Each objective is assessed on the basis of the following assessment instruments:

**1. Internship Reports**

The internship is conducted in the second year of the degree and requires a proposal outlining the goals of the internship, registration (3-credits) and academic supervision. Currently the PSM Coordinator serves as default academic supervisor for all internships, but internships may be supervised by other EIU approved graduate faculty members with permission of the PSM Coordinator. Students are required to keep a journal and submit a written report documenting the objectives and accomplishments of their internship. Internship site coordinators agree to provide feedback by phone and/or e-mail during and immediately following the internship.

In the past two years, five graduating students performed internships in a municipal government office (Danville, Mount Prospect, Charleston), a university recruitment office (Northwestern), a university grounds maintenance office (EIU).

**2. Final GIS Project Reports**

Students are required to submit both a written report and oral presentation of a GIS research or professional project related to fulfill the Certificate of Comprehensive Knowledge requirement of the graduate school. This is typically conducted just prior to graduation, and is often the last requirement to be completed by a student. Projects may be performed as part of the internship or separately. Project reports & presentations are currently evaluated by a committee consisting of the PSM Coordinator and one other faculty member, and this evaluation occurs as soon as both the written report is submitted and the oral presentation is completed (not necessarily in that order).

In the past two years, students have completed projects related to automation of pollution effluent data processing for federal reporting, development of a tree geodatabase to support university grounds maintenance and recruitment, development of cartographic products to support local trail and recreation activities, site selection and design of recreational trails, and analysis of spatial patterns of crime in Chicago and their co-location with different population measures (resident, ambient) and land use types.

**3. Exit Interviews/Alumni Surveys**

We have kept track of students as they graduate and are able to document where all but 2-3 alumni are or have been working. We have also had occasion to meet several of our alumni over the course of the past year and inquire about their professional development.

As explained in Part 2 below, results for this year are based on informal assessment by the program coordinator. Part 2 details the development of formal assessment instruments to be used in subsequent years.

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| What are the learning objectives? | How, where, and when are they assessed?\* | What are the expectations? | What are the results? | Committee/ person responsible? How are results shared? |
| **GOAL: GIS/RS Technical Competence** | | | | |
| TC1. Manage (create, edit, convert, filter, document) raster and vector GIS data in various formats. | Final Project,  Alumni Survey | Students will provide evidence of identifying and acquiring multiple data sources relevant to their project goals, perform appropriate editing, conversion and filtering tasks, and properly document their data and processing steps. | All five students' final projects demonstrated the ability to find, edit, convert and filter geospatial data. Discussions with alumni indicate that students are quite fluent in this area. | Results were compiled by the PSM Director. |
| TC2. Symbolize data & construct map products that effectively communicate information. | Final Project,  Alumni Survey | Students will present thematic maps that effectively communicate the data and analysis results of their final project. Maps will be self-explanatory, with a clear message and intuitive symbolization that is appropriate to the data being presented. | While one o five students' projects involved production of a high-quality cartographic product, other projects demonstrate the ability to create professional map layouts but lack the added "oomph" of a well-crafted cartographic visualization. Alumni have reported that the lack of a focused cartography course is a weakness of our program. | Results were compiled by the PSM Director. |
| TC3. Design structures and procedures to support GIS data collection, management and analysis. | Final Project,  Alumni Survey | Students will demonstrate the ability to construct relational geodatabases, procedural geoprocessing models and/or python scripts to accomplish specific, documented GIS data compilation, processing or analysis tasks. | Three of five student projects this year have demonstrated strength in this area, either implementing python scripts to automate data processing and analysis or developing relational geodatabase structures to support efficient data collection and management. Alumni have reported that python scripting and other procedural tools have been instrumental in their first jobs. | Results were compiled by the PSM Director. |
| **GOAL: Spatial Analysis** | | | | |
| SA1. Derive higher level spatial information from raw survey, GPS, satellite and other sensor data sources | Final Project,  Internship Report | Students will demonstrate the ability to identify and classify features from aerial photographs, satellite images, field surveys and other data collection methods. | Three of five projects involved derivation of GIS data from GPS survey and/or aerial photos, and one project involved substantial research into third party compilation of population data from a variety of sources. Internships have involved aerial photo interpretation and GPS data collection. | Results were compiled by the PSM Director. |
| SA2. Measure and describe various types of spatial pattern in geographic features | Final Project,  Internship Report | Students will be able to identify and describe patterns of clustering, spatial correlation and co-location at different scales of analysis. | Two student projects and one internship involved substantial analysis of spatial pattern, including patterns of crime, public recreational land use, and student recruitment. However, statistically rigorous methods were used in only one student project. | Results were compiled by the PSM Director. |
| SA3. Identify and assess causal relations between geographic phenomenon | Final Project,  Internship Report | Students will be able to perform and interpret statistical tests of spatial pattern, such as geographically weighted regression, Ripley's K-function and co-location quotients. | One student project involved assessment of causal relations between patterns of land use and crime. Assessment of causal relations was not a topic of any internship. | Results were compiled by the PSM Director. |
| **GOAL: Professional Skills and Knowledge** | | | | |
| PSK1. Define spatial problems, research questions and professional project goals | Final Project, Internship Report | Students will clearly define the scope and objectives of their internship experience, including spatial data and analysis requirements. | All students defined a clear research problem or professional project objective for their final project. The development of a clearly defined project was more problematic for internships. Two or three internships involved clearly defined projects, but some internship sites were unclear as to their own objectives or sought to have students perform various menial tasks without focusing on larger objectives. | Results were compiled by the PSM Director. |
| PSK2. Place GIS projects within organizational context and justify their effort & expense | Internship Report,  Alumni Survey | Students will be able to explain how their internship project benefits the organization and discuss limitations in terms of spatial data quality, time and available resources. | Students varied in their ability to articulate the merit of their internship projects and its value to the organization, with some students doing an excellent job, some a poor job and others somewhere in the middle. Feedback from alumni did not touch upon this goal. | Results were compiled by the PSM Director. |
| PSK3. Discuss emerging trends in GIS-related technology, regulations, standards and norms and their effects on society | Internship Report,  Alumni Survey | Students will demonstrate an understanding of the roles of emerging web technologies, open source software and volunteered geographic information in today's GIS industry, and be able to discuss the need for spatial data infrastructure and controversies regarding spatial data privacy. | Several students reported increased awareness of the need to learn new and varied GIS tools and technologies through their internship. Alumni have been similarly eager to share their familiarity with new products, web-based tools, etc. It has been more difficult to engage students and alumni in discussion of regulations, standards and societal impacts. | Results were compiled by the PSM Director. |

\* The timing of each assessment is described in the *Part 1* text preceding the table.

**PART TWO**

Describe your program’s assessment accomplishments since your last report was submitted. Discuss ways in which you have responded to the CASA Director’s comments on last year’s report or simply describe what assessment work was initiated, continued, or completed.

This is the first assessment report submitted for the PSM. We have to this point focused on developing formal assessment methods and rubrics. The goal is to initiate implementation of these assessment instruments starting in Fall 2018. The following assessment methods/instruments are being developed:

* a formal rubric to evaluate student achievement in their internships, to be completed by the academic internship supervisor on the basis of the student's internship report and feedback from the internship site coordinator
* a formal rubric to evaluate the final project report and presentation
* exit interview questions to obtain program feedback from our graduating students while the program is still fresh in their minds
* an alumni survey to assess the impact of the degree program on professional development

The above documents are in draft form and under discussion by faculty members. Our goal is to finalize these instruments and have them ready to use for students graduating as early as Fall 2018.

**PART THREE**

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?

Although the assessment process has just begun, we have taken action in two areas to enhance student outcomes in the goals outlined in Part 1. The first area is to provide better guidance to students in terms of identifying and completing internships and GIS Research and Professional Projects. The second area is to enhance the PSM curriculum to remedy weaknesses and shore up strengths.

**Guidance on Internships and GIS Projects**

Regarding the internship, a new internship agreement form was developed to conform to graduate school guidelines, and to ensure that internships meet program standards to allow students opportunity to engage in meaningful GIS project work. The new form requires designation of specific internship goals, outcomes and activities, stipulates that students must keep a weekly journal and submit a final report of their activities, and that internship site supervisors agree to provide timely feedback on student performance.

Formal guidelines were also developed for the final GIS Research or Professional Project, to fulfill the graduate school's Certificate of Comprehensive Knowledge requirement. Previously, this requirement was the source of much confusion for students. The new guidelines stipulate that the final project must involve a focused GIS research or professional project, and include project motivation, problem statement, needs assessment, data acquisition and quality assessment, methodology, results and assessment. It also provides examples of acceptable projects, and details the procedure for proposing and reporting on a project.

**Curriculum Enhancements**

To ensure that these guidelines are received and that students start on the right course, Drs. Viertel and Kronenfeld are planning to run a 1-credit seminar course in Fall 2018 for all incoming PSM students. The course will discuss the expectations of the program, how to find internships, and the process of identifying, developing and carrying out a GIS research or professional project. By the end of the course, students will develop and present a proposal for a GIS Project that could be conducted to meet program requirements.

Another curriculum addition that is planned for the spring of 2019 is the offering of a new seminar course on Spatial Statistics. The course will be team-taught by Drs. Gatrell and Kronenfeld and will cover fundamental problems and techniques in spatial statistical analysis. It is hoped that this course will help to improve outcomes related to the program's Spatial Analysis goals, particularly SA2 and SA3.

Other curriculum improvements are planned for discussion in the coming year. One major point of discussion is how to better infuse cartographic principles and techniques into the curriculum. Unfortunately, faculty resources are already stretched to the limit, and it is not clear at this point how we will achieve this goal. A second change that has been suggested by our advisory board is to make the current GIS Programming elective a mandatory course, to consolidate student success in applying procedural scripting skills in the workplace. This and other curricular adjustments will be discussed by the external PSM Advisory Board and the on-campus academic oversight board (PSM Board).