Assessment Plan – Year 0 Report

College: Letters and Science

Department: Earth Sciences

Submitted by:

Year 0 Assessment Plan Report is due September 15th.

Majors/Minors/Certificate	Options
Geographic Information Science (GIS) Minor (Non-Teaching)	

Part 1: Program Learning Outcomes (PLOs):

All students in the Geographic Information Science (GIS) Minor (Non-teaching) will be able to…

1. Understand the principles and concepts of GIS, including spatial data models, coordinate systems, and map projections. Demonstrate proficiency in using GIS software for spatial data analysis and visualization.

2. Develop skills in applying spatial analysis techniques to solve real-world problems. Learn to use GIS tools for querying, spatial statistics, and geoprocessing to interpret and analyze geographic data.

3. Acquire knowledge in methods of collecting, storing, and managing spatial data. Understand the processes of data creation, including GPS data collection, remote sensing, and digitization of maps and images.

4. Explore the applications of GIS across different disciplines in the Earth Sciences. Understand how GIS is used for hypothesis-testing, decision-making, and policy development in these fields.

5. Demonstrate proficiency in emerging GIS fields, such as web-based GIS, mobile GIS, and spatial big data analytics. Develop an understanding of how these advancements are shaping the future of geographic information science and technology.

6. Develop skills in collecting geospatial data and assessing remotely-sensed geospatial data.

Part 2: Development of Assessment Plan

2a. Curriculum Map

ASSESSMENT PLANNING CHART						
Program Learning Outcomes	**Course Alignments: Include rubric, number and course title**	**Identification of Assessment Artifact**				
1	GPHY 284	Lab exercise; exam question/lab exercise				
2	GPHY 384	Lab exercise; final project				
3	GPHY 357	Lab exercise; exam question/lab exercise				
4	GPHY 484R	Research project				
5	GPHY 484R	Research project				
6	GPHY 426	Lab exercise; exam question/lab exercise				
PLO	**Courses**	**2024-2025**	**2025-2026**	**2026-2027**	**2027-2028**	**2028-2029**
1	GPHY 284	X				
2	GPHY 384		X			
3	GPHY 357			X		
4	GPHY 484R				X	
5	GPHY 484R				X	
6	GPHY 426					X

Part 3: Program Assessment:

1) How will assessment artifacts be identified?

At least 5 artifacts will be collected by course instructors at the end of each course listed in Part 2a. The course instructor must randomize their selections. We suggest instructors use the RAND function in Excel to select 5 artifacts from an alphabetized class list.

2) How will they be collected (and by whom)?

Artifacts will be collected by course instructors when assignments are due, preferably in a digital format. Course instructors will upload (or deliver hard copies if necessary) to a shared box folder coordinated by the Curriculum Committee.

3) Who will be assessing the artifacts?

The Curriculum Committee will assess the artifacts using established assessment rubrics in Part 4. These data will be compiled and summarized by the Assessment Team.

Part 4: Program Assessment Plan:

PLO #1				**Threshold Values**
Indicators	**Level 1**	**Level2**	**Level 3**	80% of students will meet or exceed Level 2 competency
Understand the principles and concepts of GIS, including spatial data models, coordinate systems, and map projections. Demonstrate proficiency in using GIS software for spatial data analysis and visualization.	Spatial Data Models: Basic understanding and identification. Coordinate Systems & Map Projections: Elementary knowledge; struggles with application. GIS Software: Performs simple tasks; limited in data analysis and visualization.	Spatial Data Models: Solid understanding; applies in standard scenarios. Coordinate Systems & Map Projections: Good understanding; capable of practical application. GIS Software: Competent use; effective in basic data analysis and visualization.	Spatial Data Models: In-depth understanding; creative application in complex scenarios. Coordinate Systems & Map Projections: Comprehensive knowledge; adept in diverse applications. GIS Software: High proficiency; conducts advanced analysis and sophisticated visualizations independently.	

PLO #2				**Threshold Values**
Indicators	**Level 1**	**Level2**	**Level 3**	80% of students will meet or exceed Level 2 competency
Develop skills in applying spatial analysis techniques to solve real-world problems. Learn to use GIS tools for querying, spatial statistics, and	Spatial Analysis Techniques: Basic application in solving simple problems. GIS Tools Proficiency: Limited use of GIS tools for querying and basic geoprocessing.	Spatial Analysis Techniques: Competent application in a variety of scenarios. GIS Tools Proficiency: Effective use of GIS tools for querying,	Spatial Analysis Techniques: Advanced application in complex, real-world problems. GIS Tools Proficiency: Expert use of GIS tools for advanced querying, spatial	

geoprocessing to interpret and analyze geographic data.	Interpretation & Analysis: Elementary ability to interpret and analyze geographic data.	spatial statistics, and geoprocessing. Interpretation & Analysis: Good skills in interpreting and analyzing geographic data with some complexity.	statistics, and sophisticated geoprocessing. Interpretation & Analysis: Exceptional ability to interpret and analyze complex geographic data, providing insightful solutions.	

PLO #3				**Threshold Values**
Indicators	**Level 1**	**Level2**	**Level 3**	80% of students will meet or exceed Level 2 competency
Acquire knowledge in methods of collecting, storing, and managing spatial data. Understand the processes of data creation, including GPS data collection, remote sensing, and digitization of maps and images.	Data Collection Methods: Basic understanding of collecting spatial data, including GPS and remote sensing. Data Storage & Management: Elementary knowledge of storing and managing spatial data. Data Creation Processes: Basic grasp of digitization processes for maps and images.	Data Collection Methods: Competent in various spatial data collection methods, including effective use of GPS. Data Storage & Management: Good skills in storing and managing spatial data efficiently. Data Creation Processes: Solid understanding of remote sensing and proficient in digitization techniques.	Data Collection Methods: Expertise in advanced spatial data collection methods, including sophisticated GPS and remote sensing techniques. Data Storage & Management: Advanced skills in managing large and complex spatial datasets. Data Creation Processes: In-depth knowledge and skill in creating high-quality digital maps and images.	

PLO #4				**Threshold Values**
Indicators	**Level 1**	**Level2**	**Level 3**	80% of students will meet or exceed Level 2 competency
Explore the applications of GIS across different disciplines in the Earth Sciences. Understand how GIS is used for hypothesis-testing, decision-making, and policy development in these fields.	GIS Applications in Earth Sciences: Basic awareness of GIS applications in various Earth Science disciplines. Hypothesis-Testing and Decision-Making: Elementary understanding of using GIS for basic hypothesis-testing and decision-making. Policy Development: Limited insight into the role of GIS in policy development within Earth Sciences.	GIS Applications in Earth Sciences: Good knowledge of GIS applications across different Earth Science disciplines. Hypothesis-Testing and Decision-Making: Competent in applying GIS for hypothesis-testing and informed decision-making. Policy Development: Solid understanding of GIS's contribution to policy development in Earth Sciences.	GIS Applications in Earth Sciences: In-depth understanding of diverse GIS applications in Earth Sciences. Hypothesis-Testing and Decision-Making: Expert use of GIS for complex hypothesis-testing, decision-making, and problem-solving. Policy Development: Comprehensive grasp of GIS's strategic role in policy development, including innovative approaches in Earth Sciences.	

PLO #5				Threshold Values
Indicators	**Level 1**	**Level2**	**Level 3**	80% of students will meet or exceed Level 2 competency
Demonstrate proficiency in emerging GIS fields, such as web-based GIS, mobile GIS, and spatial big data analytics. Develop an understanding of how these advancements are shaping the future of geographic information science and technology.	Emerging GIS Fields: Basic proficiency in web-based GIS, mobile GIS, and spatial big data analytics. Understanding Advancements: Elementary understanding of the impact of these advancements on geographic information science and technology.	Emerging GIS Fields: Good proficiency in using web-based GIS, mobile GIS, and conducting spatial big data analytics. Understanding Advancements: Solid understanding of how these emerging fields are influencing the future of geographic information science and technology.	Emerging GIS Fields: High-level proficiency and innovative application in web-based GIS, mobile GIS, and spatial big data analytics. Understanding Advancements: Comprehensive and insightful understanding of the transformative impact of these advancements on the field of geographic information science and technology.	

PLO #6				Threshold Values
Indicators	**Level 1**	**Level2**	**Level 3**	80% of students will meet or exceed Level 2 competency
Develop skills in collecting geospatial data and assessing remotely-sensed geospatial data.	Geospatial Data Collection: Basic ability to collect geospatial data. Assessment of Remotely-Sensed Data: Elementary skills in assessing remotely-sensed geospatial data.	Geospatial Data Collection: Competent in collecting geospatial data using standard methods. Assessment of Remotely-Sensed Data: Good skills in assessing and interpreting remotely-sensed geospatial data.	Geospatial Data Collection: Expertise in advanced techniques for collecting geospatial data. Assessment of Remotely-Sensed Data: Advanced capability in assessing, interpreting, and applying remotely-sensed geospatial data in complex scenarios.	

Part 5: Program Assessment Plan:

1) How will annual assessment be communicated to faculty within the department? How will faculty participating in the collecting of assessment data (student work/artifacts) be notified?

The Assessment Team will communicate to the Department Head. The Department Head will communicate to faculty via email in August, November, and May to remind faculty the assessment is happening, which artifacts are needed and when the assessment material should be delivered (end of Spring term). All documents will be stored in a shared box folder.

2) When will the data be collected and reviewed, and by whom?

At least 5 artifacts will be collected by course instructors at the end of each course listed in Part 2a and uploaded (or deliver hard copies if necessary) to a shared box folder coordinated by the Curriculum Team. The Curriculum Team will evaluate the artifacts using indicator rubric laid out in Part 4.

3) Who will be responsible for the writing of the report?
The Curriculum Team will deliver the assessment rubrics and summary results to the Department Head. The Department Head will then write the final report.

4) How, when, and by whom, will the report be shared?
Course artifacts will be delivered to the Curriculum Team by the end of the Spring semester. The Curriculum Team will evaluate the artifacts in May and will deliver these results to the Department Head by June 30. The Department Head will write the report and email it to Faculty by August 1. At the first August faculty meeting, the report will be reviewed and discussed.

5) How will past assessments be used to inform changes and improvements? (How will Closing the Loop be documented)?
The faculty will review and discuss the assessment report at the first August faculty meeting. The Department, as a whole, will discuss overall needs that may entail course content, curriculum changes (e.g., timeline, more intro courses, etc.), or resource needs (e.g., writing center, etc.). The Department Head will report back to faculty with the final report, noting any changes that were made. The Curriculum Team will document change over time using Excel or other software. Any changes that are made to courses and curriculum will be discussed during the August meeting in the relevant assessment year.

6) Other Comments:

Submit report to programassessment@montana.edu