Form AP-C

UNIVERSITY OF CENTRAL ARKANSAS
Proposal for Change in Assessment Plans/Processes

NOTE: Changes in assessment plans/processes can be reviewed only during the regular academic year. Action-item proposals must be received by the Academic Assessment Committee at least one month before action is desired.

Department: Geography Date: 2/25/2025

Program for which the change is proposed: BS - Geography; BS - Geography-Geospatial Technology

Action Item	Information Item
Select area(s) of change:	Select area(s) of change:
☑ New assessment plan	☐ Minor change of wording
☐ Assessment plan revision	☐ Minor change in assessment criteria
☐ Alternative reporting method	☐ Rubric updates
☐ Other	☐ Curriculum/Curriculum Map Update
	☐ Other

Description of change:

Implementation of new program assessment for Geography BS programs. New industry standards for geospatial competencies have been published by external groups and these provide appropriate guidelines by which the Department can measure outcomes of student success in our programs.

Reason for change:

Existing program assessment dated from 2011 and had not been substantially improved or revised in recent years and a new plan done in the current UCA format was needed.

Effective date of change: 05/01/2025

Change recommended by (for action items) or noted by (for information items)

	DEPARTMENT CHAIR	02/25/2025 DATE
College Curriculum and Assessment Committee	COMMITTEE CHAIR	3/18/25 DATE
	COLLEGE DEAN	3/18/25 DATE
Academic Assessment Committee	COMMITTEE CHAIR	DATE

Rev. Oct. 2021

UNIVERSITY OF CENTRAL ARKANSAS
ACADEMIC ASSESSMENT PLAN
Requirements, Template, and Example

Requirements

1. *Submit with New Program Proposal*
    a. *Programs are encouraged to consult with the Office of University Assessment.*
    b. *Contact information assessment@uca.edu*
2. *Send copy of Assessment Plan to the Office of University Assessment, Wingo 215.*
3. *Update the Program Assessment Plan based upon EAPR or Accreditation Cycles.*

Basic Information

Program Name: Geography BS / Geography-Geospatial Technology BS

College: Science and Engineering

Department: Geography

Program Level (check all that apply)

- ☐ Associate's
- X Bachelor's
- ☐ Undergraduate Certificate
- ☐ Master's
- ☐ Doctoral
- ☐ Graduate Certificate

Date Plan Submitted: February 15, 2025

College Dean & email: Stephen Addison saddison@uca.edu
College Curriculum Committee Chairperson & Email: Will Flatley wflatley@uca.edu
Department Chairperson & email: Stephen O'Connell soconnell@uca.edu
Department Curriculum Committee Chairperson & email: Will Flatley wflatley@uca.edu

1. **Introduction** (identify college, unit, and degree programs)

The Department of Geography in the College of Science and Engineering offers Bachelor of Science degrees in Geography and Geography-Geospatial Technology. This assessment plan is designed to apply to both programs and span all courses applicable in the undergraduate Geography bulletin. The intent is to establish measurable outcomes for students and provide faculty with tools to assess course and program effectiveness.

The goals of the Geography Program are (1) to increase student awareness and understanding of geographical concepts and principles relative to the organization of people, places, and environments on the earth's surface; (2) to provide students with a fundamental background in spatial analysis, human-environmental interrelationships and areal differentiation in preparation for responsible citizenship, lifelong learning, and productive employment in a global economy; (3) to prepare students in the use of maps and other geographical representations, tools, and technologies to acquire, process, and report information from a

spatial perspective; and (4) to prepare students for advanced study in geography and related careers.

The Geography Department at the University of Central Arkansas is dedicated to fostering a comprehensive spatial understanding of our world. We do so through mentoring of students in our degree programs, performing applied research in diverse Geographic subjects, and promoting an appreciation for Geography and Spatial Analysis within our College, across the UCA campus, and throughout Arkansas.

2. Student Outcomes

The Geography Department at UCA has identified four essential skills essential to a practical understanding of spatial science and applications across the breadth of the discipline. Despite the diversity of topical focus within Geography—from physical and environmental processes to cultural landscapes and economic patterns—these skills are seen as universal. These skills were distilled from competencies listed in the Geospatial Competency Model, which will be discussed in Part 4.

Spatial Thinking: Students will be able to explain spatial patterns and relationships of both physical and cultural landscapes and processes using appropriate spatial theories.

Human-Environment Interaction: Students will be able to apply relevant geographic information to explain the relationships and linkages between society and the natural world.

Geospatial Data Management: Students will be able to collect, manage, and analyze spatial data for use within an appropriate geospatial technology tool.

Cartographic Techniques: Students will be able to create meaningful spatial representations (maps, visualizations, charts, etc.) using appropriate methods.

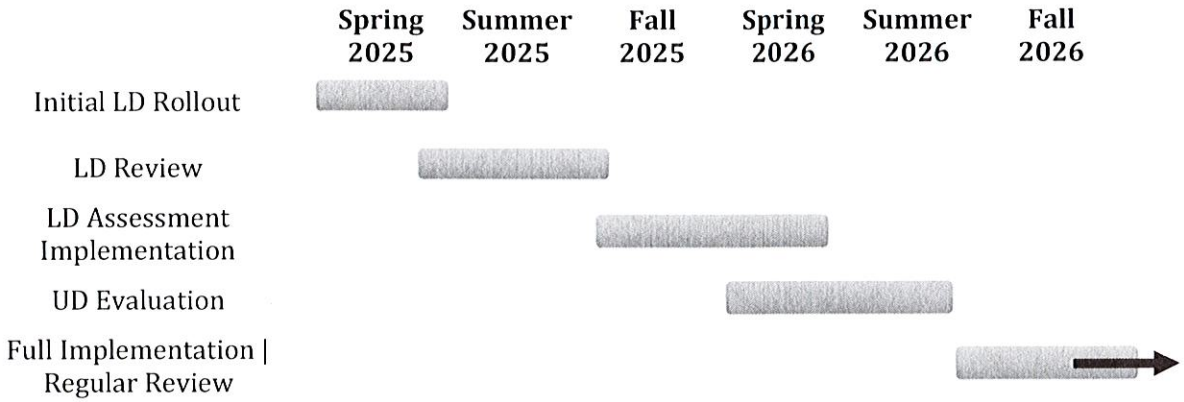
3. Assessment Cycle

The Geography Program Assessment plan target the primary lower-division courses within the major: GEOG 1320 – Human Geography and GEOG 1400 – Earth Systems Science. These courses are offered in multiple sections every semester during the standard academic year; GEOG 1320 is periodically offered during summer terms. These are typically the courses where majors are first introduced to the basic concepts of the discipline. The initial rollout will test the efficacy of the assessment measures, including the selected artifacts and outcome rubric. The initial review will take place at the end of the Spring 2025 semester with evaluation of the results of the review informing modifications during Summer 2025.

Full implementation of assessment of the LD core courses for the Geography program will take place during the 2025-2026 academic year. GEOG 1320 and 1400 will be assessed during both terms. Preliminary considerations for a review of select UD course assessments will be undertaken during the spring and summer of 2026 with modifications made to the assessment materials before further implementation of the assessment program in the following academic year.

In the 2026-2027 academic year, the Geography Assessment program may be expanded to additional lower- and upper-division courses, as needed and if indicated by the initial LD course

assessment. A review of lower-division assessment results and measures will be undertaken during the spring and summer of Year One of the program and a review of upper-division assessment results and measures will be undertaken during the spring and summer of Year Two of the program. Changes to the overall program construction will be made every two years.



4. Curriculum Map

The Geography Department consulted the Geospatial Competency Model, a framework created by the GeoTech Center and industry professionals. The full model includes several hundred skills ranging from building blocks like reading and professionalism to specific technical skills related to the application of geospatial techniques. Members of the department identified 11 foundational skills that could be distilled into four essential outcomes for all majors: Spatial Thinking, Human-Environment Interaction, Geospatial Data Management, Cartographic Techniques. These are described in Part 2. Each of these 11 skills and four outcomes were then aligned with the courses included in the Geography major, first with just a presence or absence of the respective skills in a course and after the creation of a suitable outcome rubric, by the expected outcome score(s) at the conclusion of the course.

See attached Curriculum map for the full list GEOG courses aligned to competency skills and expected outcomes.

5. Assessment Methods and Measures (Formative and Summative recommended)

A preliminary outcome rubric was developed by members of the Geography Department based on the skills distilled from the Geospatial Competency Model and adapted to language used in the assessment rubrics used in UCA Core courses. Outcomes are rated from a high of four (4), where students show complex understanding and/or application of the specific skills, to a low of one (1) where students display limited ability in the context of the respective skills; a zero (0) is possible for students that do not attempt responses in any specific skill. See attached Outcome Rubric for details on the specific learning outcomes for each skill.

The direct measures to be used in the program assessment plan come primarily from course assignments in the designated courses. For lower-division courses (GEOG 1320 and GEOG 1400), these will include lab exercises, short writing responses, and other formative assessments that result in actionable feedback to students, as well as results of summative assessments of specific questions on exams and quizzes. Upper-division courses such as GEOG

4390 will primarily utilize individual or group research projects and the related materials produced in the course of building those projects for outcome assessment, should they be utilized in future rounds of assessment beyond the first two years. These may include both formative materials that serve as stepping stones to the final project as well as an assessment of the final product. Examples of direct measures for the initial LD course selections can be found in the Appendix.

Indirect measures to be used in the program assessment will include overall course grades for students in selected courses, including an evaluation of DWI rates for lower-division courses. In conjunction with student course evaluations, DWI rates (and trends in DWI rates in a particular course) can be helpful in identifying areas for instructional improvement. Exit surveys for graduating students and alumni surveys conducted by the University will add valuable data points that will assist in assessment plan review and revision.

6. Data Collection and Review

All courses selected for review include elements that capture each of the four essential outcomes for majors, so these elements will be assessed during every semester the selected courses are offered. After the initial rollout phase, this process will allow for a process of continuous review and improvement throughout the plan. For most lower-division courses, materials reflecting individual outcomes occur throughout the semester, however collection of relevant materials will be limited to the final three weeks of the semester of review, ending with the Friday following the grade reporting deadline of that term. A shared digital collection method will be employed to facilitate data management, allowing for faculty to upload scored artifacts and assessment materials at the end of each semester. This shared folder will also contain assessment scoring sheets that will be used to tally results by course and semester.

Outcomes assessed in lower-division courses are expected to score as 1 or 2 out of a maximum of 4 since the key concepts and ideas expressed in the four outcomes will have only be introduced to students in these introductory courses. Students assessed in UD courses or the program capstone course should score a 3 or 4 in all measured outcome as these skills should be mastered by a student's graduation. Evaluation done during intermediate semesters or in courses midway through the program sequence should result in mid-range outcomes.

7. Participation in Assessment Process

All Department faculty will participate in course and program assessment, coordinated by the Chair with assistance from the Chair of the Department Curriculum Committee. Individual instructors will identify appropriate measures contained within targeted courses and will collect designated samples during the semesters of review noted in the assessment plan. As noted previously, a shared digital directory will be used to collect and manage submitted materials. Faculty without course assessment responsibilities during any particular semester will be tasked with independent evaluation of selected assessment materials during the review period. This may include periodic revision to the Department's outcome rubric and tests for alignment with industry standards, as reflected in the Geospatial Competency Model or similar models.

8. Data Analysis

After completion of the review period each year, a summary report will be written by the Department Chair and Chair of the Department Curriculum Committee. This report will provide an overview of the outcomes by skill and by course using both quantitative data generated from the rubrics as well as qualitative data from course and graduate surveys. Recommendations for revisions or adjustments to the assessment plan will be presented as part of this report. All members of the Department are expected to provide feedback following the distribution of the report with attention given to trends in student outcome scores and the efficacy of assessment materials, including course-specific assignments and rubric structure.

9. Plan for Using Assessment Results to Improve Program

Following the release of the yearly report of outcome scores, the Department Chair will evaluate all assessment materials, rubrics, or outcomes measures in the context of current best practices in the discipline. Revision or modification of program goals will be initiated as needed following this review.

10. What are the plans to evaluate students' post-graduate success?

Regular post-graduation surveys, conducted by the Office of Institutional Research, will compliment internal graduate exit surveys and regular communication with alumni. Post-graduation job placement, industry classification, career progression, and post-graduate education will all be considered as measures of effectiveness for the Geography Programs. After several years of internal data collection on student outcomes in program courses, the Department will reevaluate the program mission and goals in the context of outcome alignment and current status of alumni.

11. What are the plans to evaluate teaching effectiveness?

Following the initial rollout and lower-division review in the first academic year of the plan, the Chair will work in coordination with the Department Curriculum Committee to identify gaps in knowledge that may be attributable to teaching effectiveness. These will be informed by additional information from student course evaluation surveys and other measures of faculty curriculum development. Where applicable, additional resources focused on improving teaching effectiveness will be sought from internal sources, such as CETAL, or external sources, such as regional or national organizations focused on best practices in Higher Education and Geography Education.

12. Appendices

Appendix A – Curriculum Map | Geography
Appendix B – Student Outcomes Rubric
Appendix C – Selected Assessment Measures
- GEOG 1400 – Course Assignment Sample
- GEOG 1320 – Course Assignment Sample

13. Submit Assessment Plan

- Send completed form electronically to assessment@uca.edu

For questions or concerns please contact:
Dr. Jacob Held 450-5307 jmheld@uca.edu
Alyson McEntire 450-5086 amcentire@uca.edu

2.4 Geography: Understanding the science of place and space. Knowing how to ask and discover where things are located on the surface of the earth, why they are located where they are, how places differ from one another, and how people interact with the environment.	Intro/LD Core			Methods		Geospatial Tech								Regional						Upper Division Physical								Upper Division Human					Cap.
	Principles	Human	Earth Systems Science	Quantitative Methods	Research Methods	GIS I	GIS II	Python for GIS	Field Techniques	Bus GIS	Env GIS	Rem Sensing	Adv Rem Sensing	World Regional	Latin America	Arkansas	Russia & Europe	China & East Asia	Historical US	Conservation	Water Resources	Biogeography	Soils	Oceanography	Hazards	Weather & Climate	Landforms	Urban & Regional Planning	Urban Geography	Recreation & Tourism	Political Geography	Economic Geography	Research Seminar
GEOG Program Alignment: G - req for both programs, Y - req for Geospatial Tech, P - potential Elective									Choose 1									Choose 1														
2.4.1 Subject-specific Geographic Knowledge	1305	1320	1400	2330	2331	2475	3403	3404	3319	4307	4309	3306	4406	3300	3315	3380	3335	3345	4390	3301	4304	3318	4305	4308	3333	3351	3361	3325	3371	4313	3381	3305	4391
2.4.1.1 Human-Environment Interaction: Know and apply geographic information about relationships between nature and society (e.g., pollution from industrial development, economic effects of drought)	1	1	1						2		2			3	3	3	3	3	3	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4			3/4			3/4
2.4.1.2 Regional Geography: Know and apply knowledge of the physical and human geography of a specific country or world region	1	1	1											3/4	3/4	3/4	3/4	3/4	3/4										3/4		3/4	3/4	3/4
2.4.1.3 Physical Geography: Know and apply geographic information about the processes that shape physical landscapes; weather, climate and atmospheric processes; ecosystems and ecological processes; and natural hazards	1		1								2	2	2	3	3	3	3	3	3	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	2/3		2/3		2/3	3/4
2.4.1.4 Cultural Geography: Know and apply geographic information about culture and cultural processes, including religion, language, ethnicity, diffusion, meaning of landscapes, cultural significance of place	1	1								2				3	3	3	3	3	3	2/3	2/3			2/3	2/3		3/4	3/4	3/4	3/4	3/4	3/4
2.4.2 Geographic Skills	1305	1320	1400	2330	2331	2475	3403	3404	3319	4307	4309	3306	4406	3300	3315	3380	3335	3345	4390	3301	4304	3318	4305	4308	3333	3351	3361	3325	3371	4313	3381	3305	4391
2.4.2.1 Geographic Information Systems (GIS): Use GIS to acquire, manage, display, and analyze spatial data in digital form	1	1	1	1	1/2	2	3/4	3/4	3/4	3/4	3/4	2/3	3/4	2/3	2/3	2/3	2/3	2/3	2/3					2/3		2/3		2/3				2/3	3/4
2.4.2.2 Cartography: Producing, creating, and designing paper or digital maps	1					2	3/4	2/3	2/3	2/3	2/3	2	2/3	2/3	2/3	2/3	2/3	2/3	2/3	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
2.4.2.3 Field Methods: Use interviews, questionnaires, observations, photography, maps, GPS, GIS, and other techniques to measure geographic information in the field	1		1	1	2	1/2	2/3		3/4		2/3												3/4										3/4
2.4.2.4 Spatial Statistics: Use quantitative methods to process spatial data for the purpose of making calculations, models, and inferences about space, spatial patterns, and spatial relationships	1		1	2		1/2	2/3	2/3	2/3	3/4	3/4	1/2	3/4													2/3		2/3			2/3		3/4
2.4.3 Geographic Perspectives	1305	1320	1400	2330	2331	2475	3403	3404	3319	4307	4309	3306	4406	3300	3315	3380	3335	3345	4390	3301	4304	3318	4305	4308	3333	3351	3361	3325	3371	4313	3381	3305	4391
2.4.3.1 Spatial Thinking: Identify, explain, and find meaning in spatial patterns and relationships, such as site conditions, how places are similar and different, the influence of a land feature on its neighbors, the nature of transitions between places, how places are linked at local, regional, and/or global scales	1	1	1	2		2	3/4	3/4	3/4	3/4	3/4		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
2.4.3.2 Global Perspective: Possess and apply knowledge of how people, places, and regions are linked by global networks and processes (e.g., globalization, international trade, immigration, Internet technology, global climate system)	1	1	1											3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
2.4.3.3 Interdisciplinary Perspective: Draw on synthesize the information, concepts, and methods of the natural and social sciences for geographic research and applications	1	1	1		2									3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4		3/4	3/4	3/4		3/4		3/4		3/4	3/4
UCA Geography - Expected Student Outcomes	1305	1320	1400	2330	2331	2475	3403	3404	3319	4307	4309	3306	4406	3300	3315	3380	3335	3345	4390	3301	4304	3318	4305	4308	3333	3351	3361	3325	3371	4313	3381	3305	4391
Spatial Thinking: Students will be able to explain spatial patterns and relationships of both physical and cultural landscapes and processes using appropriate spatial theories.	1	1	1	2	2	2/3	3/4			3/4	3/4			3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Human-Environment Interaction: Students will be able to apply relevant geographic information to explain the relationships and linkages between society and the natural world.	1	1	1	2	2	2/3			2/3		3/4	2/3	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Geospatial Data Management: Students will be able to collect, manage, and analyze spatial data for use within an appropriate geospatial technology tool.	1	1	1	2	2	2/3	3/4	3/4	3/4	3/4	3/4	2/3	3/4							2/3		2/3	3/4	3/4		3/4		3/4	3/4	3/4			3/4
Cartographic Techniques: Students will be able to create meaningful spatial representations (maps, visualizations, charts, etc) using appropriate methods.	1	1	1	2	2	2/3	3/4	3/4	2/3	3/4	3/4		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Competency Levels: follows UCA Core assessement rubric scores of 1 to 4 scoring.		Initial Rollout Phase	Initial Rollout Phase	Potential Full Phase	Potential Full Phase	Potential Full Phase														Potential Full Phase		Potential Full Phase						Potential Full Phase		Potential Full Phase			Potential Full Phase

Appendix B

UCA Geography – Program Assessment

This rubric assesses the following four knowledge areas related to Geography program outcomes:

Spatial Thinking: Students will be able to explain spatial patterns and relationships of both physical and cultural landscapes and processes using appropriate spatial theories.

Human-Environment Interaction: Students will be able to apply relevant geographic information to explain the relationships and linkages between society and the natural world.

Geospatial Data Management: Students will be able to collect, manage, and analyze spatial data for use within an appropriate geospatial technology tool.

Cartographic Techniques: Students will be able to create meaningful spatial representations (maps, visualizations, charts, etc) using appropriate methods.

How to use this rubric:

- Apply the rubric to at least one assignment. If different skill or knowledge areas are assessed by different assignments, then apply the respective rows of the rubric to those assignments that assess each specific skill or knowledge area. All skill or knowledge areas listed in this rubric must be assessed by the end of the course.
- For each specific skill or knowledge area, assign a score from 0 to 4 based on the student learning outcome that best matches the performance of the student on the assignment.
- Although the rubric may inform the grading scheme used for the assignment, it should not replace it. Scores of 4, 3, 2, and 1 do not necessarily correspond to A, B, C, and D. The rubric is used to track students' progress throughout the Geography program at UCA, not just their performance in a single course. Thus, a score of 4 represents the expected mastery of that skill or knowledge area by the time a student graduates. That mastery may come earlier or later in a student's progression through the program, but **generally speaking, scores of 1 and 2 are expected in lower-division courses, whereas scores of 3 and 4 are expected in upper-division and capstone courses**.

Appendix B

UCA Geography – Program Assessment

Specific Skill	*Student Learning Outcomes*				
	4	3	2	1	0
Spatial Thinking	Shows both a broad and deep understanding of spatial thinking and its relevance to important questions in the discipline.	Shows a general grasp of spatial thinking and how it relates to important questions in the discipline.	Shows some knowledge of geographic processes and can begin to relate spatial thinking to important questions in the discipline.	Shows limited ability to relate spatial thinking to important questions in the discipline.	Assign a zero for performance that does not meet a score of one (1).
Human-Environment Interaction (HEI)	Shows a comprehensive understanding of HEI and its application to a variety of questions in the discipline.	Shows a general grasp of HEI and how it relates to important questions in the discipline.	Shows some knowledge of geographic processes and can begin to relate HEI to important questions in the discipline.	Shows limited ability to relate HEI to important questions in the discipline.	
Geospatial Data Management	Can acquire data in non-spatial formats and accurately organize information within appropriate geospatial technologies.	Maintains, generates, and collects geospatial data but is unable to convert non-spatial formats into geospatial applications.	Maintains existing geospatial data and generates new variables from the existing using appropriate techniques, but is unable to add new external data.	Maintains provided geospatial data but is not able to generate or collect new spatial variables.	
Cartographic Techniques	Employs appropriate cartographic and data visualization techniques to create maps and graphics that are engaging to the intended audience.	Uses appropriate visualization techniques to create maps or graphics but does not consider the application or use of these products in the design.	Maps or graphics are produced by the student but don't follow accepted techniques for visualization.	Limited map-making applications. Relies on pre-made maps or graphics rather than self-produced items.	

GEOG 1400 (Earth Systems Science) Spring 2025
LAB 9 – Integrated Assessment: Jewel Moore Nature Reserve (140 Points)

Key Terms/Concepts:

Jewel Moore Nature Reserve
Köppen Climate Classification
Climograph
Exotic species
Invasive species
Soil Survey
Biomes

Materials:

- Calculator
- Course Textbook (McKnight's Physical Geography 13th Edition)
- Lab 7 Instructions (Provided)
- Google Sheets (Provided with UCA Google Account)
- NRCS Soil Survey for Faulkner County (Provided)
- Computer with an Internet Connection
- Internet Search Engine of Choice
- YouTube video (https://youtu.be/ZpJnSgYQ_xs?t=717)
- Invasive Plants of the Thirteen Southern States website (https://www.invasive.org/south/seweeds.cfm)

Introduction

Welcome to the last lab of the semester! In this assignment you will learn about the **Jewel Moore Nature Reserve (JMNR)** at the **University of Central Arkansas**, and gain experience integrating skills from previous lab assignments with Internet research, and data obtained from a variety of internet sources. Integrating these different data sources and applying selected techniques from previous Lab Assignments will help foster a more complete understanding of the interactions between the Earth's primary sub-systems (e.g. Atmosphere, Biosphere, Lithosphere, and Hydrosphere), as well as introduce several examples of human-environment interaction.

NOTES:

1. You will have to refer to the **Lab Instructions** from previous assignments (see **Lab Assignment 9** attachments on **Blackboard**), and the **Course Textbook** for details on techniques used in previous assignments.
2. Please provide the full URL (web address) for any web sites that you consult (whether *additional* or *provided* in this assignment). You may use *Wikipedia* as a starting point to guide you to original source materials, but you CANNOT reference *Wikipedia* directly.
3. Be prepared to expand your geographic area of interest or search terms if searches for **Jewel Moore Nature Reserve,** or web sites do not contain the specific results you need.

Instructions

1. **Watch** the **AETN** YouTube video about the **Jewell Moore Nature Reserve** at **UCA** (https://youtu.be/ZpJnSgYQ_xs?t=717) and answer **Questions 1, 2, 3, 4,** and **5.**
2. Use your **Internet Search Engine** of choice to find the **Latin names** (scientific names) and **habitat** for the following plants found in the **Jewell Moore Nature Reserve**:
    a. Sweet Gum
    b. Missouri Ironweed
    c. White Wild Indigo
    d. Japanese Honeysuckle
    e. Chinese Privet
    f. Virginia Creeper
    g. Devil's Walking Stick
    h. Post Oak
    i. Shortleaf Pine
3. Use **complete sentences** to provide the **habitat** and **Latin name** (scientific name) information you find in **Step 3** for **Question 6. NOTE:** The habitat information should describe the **general** conditions (moisture, temperature, etc.) and locations (states, latitude ranges, etc.) where the plants are found in the United States. "In the Jewell Moore Nature Reserve" **is not** an acceptable answer because we already know these plants exist the reserve. **Habitat** information is often available under headings labeled *Distribution* or *Site Characteristics*.
4. **Use** your web browser to visit the **NWS Little Rock, AR** webpage on the **National Weather Service** website (http://www.weather.gov/lzk/wxcntl3.htm) and obtain **climate data** for the **Jewell Moore Nature Reserve**.
    a. **Scroll** down the page to the **1991-2020 Normals for Arkansas** section.
    b. **Use** the dropdown box to choose *Conway (Faulkner County)* and **click** the **Get info!** button.
    c. **Open** *Notepad* or your favorite text editor program.
    d. **Copy** the Conway (Faulkner County) data from the **Normals for Arkansas 1991-2020** section of the **National Weather Service** website and **paste** it into your *Notepad* file. **Save** your *Notepad* file as **GEOG1400_Lab9_JMNRClimateData.** You **will not** submit this file with your **Lab Assignment**, but it is always a good idea to have a copy of your data for later use just in case.
    e. **MEAN** = temperature in °F, and **PCPN** = precipitation in inches.
    f. **Convert** the temperature for **each month** into °C and **convert** the precipitation for **each month** into millimeters (mm). You may use **Appendix A** in your **Course Textbook** or an internet website. If you use your **textbook**, show your work. If you use a **website**, provide the URL (web address). **NOTE:** Google.com (i.e. conversion tools that display in a Search Results page) **are NOT** acceptable. You must use an **actual** website.
5. **Use** the **metric** temperature (°C) and precipitation (mm) data from **Step 4** to complete the climate data table in **Question 7. Round** all metric conversions to **one decimal place.**
6. **Use** Google Sheets to create a climograph for the **Precipitation (mm)** and **Temperature (°C)** data in **Question 7.** Refer to the **Google Sheet Climograph** instructions in **Lab 7** (see **Lab 9** attachments on **Blackboard**) if you need help creating the climograph.
    a. **Change** the **Chart Title** to *JMNR Climograph*.
    b. **Change** the **Chart Subtitle** to *Created by **your name** on **Day, Month, Year.***
    c. **Copy** your JMNR climograph and **paste** it into your **Lab 9 Answer Sheet** to answer **Question 8.**
7. **Use** the **Procedure for Classifying Climates (Köppen System)** instructions in **Lab 7** (see **Lab 9** attachments on **Blackboard**) to **calculate** the **climate statistics** (Annual Average Temperature, Total Annual Precipitation, etc.) for the **Precipitation (mm)** and **Temperature (°C)** data from **Question 7** to answer **Question 9.** SHOW ALL WORK.
8. **Use** the **Procedure for Classifying Climates (Köppen System)** instructions in **Lab 7** (see **Lab 9** attachments on **Blackboard**) to **classify** the climate for the **Jewell Moore Nature Reserve** using

the **climate statistics** (Annual Average Temperature, Total Annual Precipitation, etc.) from **Question 9** to answer **Question 10.**

9. **Watch** the **AETN** YouTube video about the **Jewell Moore Nature Reserve** at **UCA** (https://youtu.be/ZpJnSgYQ_xs?t=717) again and pay attention to the **physical landscape** and **vegetation** and answer **Question 11** about the **biome** types in the reserve. Refer to the **Course Slides** for **Chapter 10** or the **Course Textbook** if you need help understanding biomes.
10. **Read** the **Introduction of Exotic Species** section on **page 336-337** in the **Course Textbook.**
11. **Use** the **Invasive Plants of the Thirteen Southern States** website (https://www.invasive.org/south/seweeds.cfm) and the list of plants found in the **Jewell Moore Nature Reserve** from **Step 2** to identify **invasive species.** Provide the **common name** and **Latin Name** (scientific name) for **each** invasive species you identify, and briefly **explain** the problems **invasive species** create to answer **Question 12.** Use **complete sentences.**
12. **Watch** the **AETN** YouTube video about the **Jewell Moore Nature Reserve** at **UCA** (https://youtu.be/ZpJnSgYQ_xs?t=1061) again and pay attention to **Dr. Larson's** explanation about **why** and **how** and the **prairie** is **managed** today (in the present) to answer **Question 13.** Use **complete sentences.**
13. **Use** the **1979** National Resource Conservation Service (NRCS) Soil Survey PDF (see **Lab 9** attachments on **Blackboard**) to provide a brief assessment for **each of** the **two** predominant soils present in the **Jewell Moore Nature Reserve** (*Leadvale silt loam*, and *Taft silt loam)*. **Read** the summary for **Leadvale silt loam 1 to 3 percent slopes** on **page 8**, and the summary for **Taft silt loam 0 to 2 percent slopes** on **page 16** to find information about the following characteristics for each soil type to answer **Question 14**:
    a. Natural Fertility
    b. Permeability
    c. Acid Reaction
    d. Potential for Cultivated Crops
    e. Potential for Trees
    f. Potential for Urban Uses
    g. Major soil limitations

Lab 9 Questions

NOTE: Read the **Instructions** before answering the questions, and always show ALL your work if calculations are required so that partial credit may be assigned.

1. (**2 pts**) Approximately how many UCA students use the Jewell Moore Nature Reserve every year?

Use this blue font and as much space as necessary to answer all parts of this question

2. (**4 pts**) How do Biology courses at UCA use the Jewell Moore Nature Reserve? (**Hint:** Pay attention to the students describing their experiences in the reserve)

Use this blue font and as much space as necessary to answer all parts of this question

3. (**4 pts**) Name a project that students in the STEM Residential College **collected data** for in the Jewell Moore Nature Reserve.

Use this blue font and as much space as necessary to answer all parts of this question

4. (**4 pts**) How was the **prairie** in the Jewell Moore Nature Reserve maintained in the early 1900s?

Use this blue font and as much space as necessary to answer all parts of this question

5. (**6 pts**) Which **three** prairie plants are described/explained in the Jewell Moore Nature Reserve video?

Use this blue font and as much space as necessary to answer all parts of this question

6. (**30 pts**) Provide the **common name** (e.g. Sweet Gum), **Latin Name** (scientific name), and **habitat** information for each plant listed in **Step 2** of the **Instructions** using **complete sentences.** See **Step 3** of the **Instructions** for more detailed information about **habitat** information requirements.

Use this blue font and as much space as necessary to answer all parts of this question

7. **(10 pts)** Enter the **precipitation (mm)** and **temperature (°C)** data for each month from **Step 4** of the **Instructions** to complete the table below. See **Step 5** in the **Instructions** for details.

Month	Precipitation (mm)	Temperature (°C)
January	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
February	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
March	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
April	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
May	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
June	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
July	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
August	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
September	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
October	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
November	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.
December	Enter your precipitation data here using this blue font.	Enter your temperature data here using this blue font.

URL for Metric Conversion Web site OR
Textbook Information (*Authors, Publication Year, Book Name, Page Number)*:and **work for calculations if you used the textbook.**

8. **(10 pts)** Create a **Google Sheets** climograph for the Jewell Moore Nature Reserve using the **Precipitation (mm)** and **Temperature (°C)** data from **Question 7.** (See **Step 6** of the **Instructions** for more details.) Paste your Google Sheet climograph below.

Paste your **Jewell Moore Nature Reserve** climograph here.

9. **(8 pts) Calculate** the *Temperature Range, Average Annual Temperature, Total Annual Precipitation, Total Summer Precipitation, Total Winter Precipitation, Percent Summer Precipitation*, and *Percent Winter Precipitation* for the JMNR in **Question 7** and **record** your results in the table below. Refer to **Step 7** in the **Instructions** for details and **SHOW ALL WORK.**

Temperature Range	Enter your answer here using this blue font.
Average Annual Temperature	Enter your answer here using this blue font.
Total Annual Precipitation	Enter your answer here using this blue font.
Total Summer Precipitation	Enter your answer here using this blue font.
Total Winter Precipitation	Enter your answer here using this blue font.
Percent Summer Precipitation	Enter your answer here using this blue font.
Percent Winter Precipitation	Enter your answer here using this blue font.

Use this blue font to show your work for the calculations required for the above table in **Question 9.**

10. **(10 pts)** Use the data in **Question 9** and the steps in the **Procedure for Classifying Climates** section of the **Lab 7 Instructions** to classify the climate of this location. (See **Step 8** in the **Instructions** for more details.) **NOTE:** Please **provide an answer** for **ALL** steps. For example, if this location is a B-type climate, the answers to the questions about the A-type climate would be No, and N/A respectively.

Classification Question	**Classification Result**
Is this location an E-Type Climate? **(Yes/No)**	Enter your answer here using this blue font.
What subcategory of E-type Climate is this location? **(ET, EF, or N/A)**	Enter your answer here using this blue font.
Is this location a B-Type climate? (Yes/No)	Enter your answer here using this blue font.
What subcategory of B-Type climate applies to this location? **(2nd letter, or N/A)**	Enter your answer here using this blue font.
What subcategory of B-Type climate applies to this location? **(3rd letter, or N/A)**	Enter your answer here using this blue font.
Is this location an A-Type climate? **(Yes/No)**	Enter your answer here using this blue font.
What subcategory of A-Type climate is this location? **(Af, AW, Am, or N/A)**	Enter your answer here using this blue font.
Is this location a C-Type or D-Type climate? **(C, D, or N/A)**	Enter your answer here using this blue font.
What subcategories of C-Type or D-Type climate apply to this location? **(2nd letter and 3rd letter, or N/A)**	Enter your answer here using this blue font.
Final Köppen Climate Type (with ALL applicable subcategories)	Enter your answer here using this blue font.

11. **(6 pts)** List the **Biome(s)** classification(s) for the **Jewell Moore Nature Reserve**. (See **Step 9** in the **Instructions** for details).

Use this blue font and as much space as necessary to answer all parts of this question

12. **(10 pts)** Provide the **common name** and **Latin Name** (scientific name) for the **invasive species** found in the **Jewell Moore Nature Reserve**, and **briefly** explain the problems created by invasive species. (See **Step 10** and **Step 11** in the **Instructions** for details.) Please use **complete sentences.**

Use this blue font and as much space as necessary to answer all parts of this question

13. **(8 pts) Why** is the **Jewell Moore Nature Reserve** managed today (in the present), and **how** is the reserve managed? (See **Step 12** in the **Instructions** for more details). Please use **complete sentences.**

Use this blue font and as much space as necessary to answer all parts of this question

14. **(28 pts)** Use the **1979 NRCS Soil Survey** for **Faulkner County** to describe the general soil characteristics for **Leadvale silt loam** and **Taft silt loam**. (See **Step 13** in the **Instructions** for details). Please use **complete sentences.**

Use this blue font and as much space as necessary to answer all parts of this question

Student Name:
CRN:

GEOG 1320 Human Geography

Assignment 3: Economic Geography— Models and Theories (40 Points)

Due date: 11:59 p.m., March 19, 2025

ATTENTION: Students need to **hand-draw the graphs on paper**, take pictures of the graphs, and insert them into the assignment. Turn in this assignment with the **original questions and your graphs and answers** in a **Microsoft Word Document** on Blackboard. No separate graphs will be accepted. **Assignments without original questions will get a 5% grade deduction.**

1. What is the von Thünen model of agricultural land use? (2 Points) What are the **assumptions** and **conclusions** of this model? (5 Points) Please **draw a graph** to explain this model and **indicate** the specific type of farming in each agricultural zone (3 Points). **Draw another graph** and **discuss the relationship** between transport gradients and agricultural zones. (3 Points)

2. What is Weber's least cost theory for industrial locations? (3 Points) What are the **assumptions** and **conclusions** of this theory? (6 Points) Please draw **two Weber's locational triangles** to explain the **market orientation** and **raw material orientation** of industrial location (6 Points).

3. What are the **assumptions** and **conclusions** of Hotelling's locational interdependence theory for services? (5 Points) Please draw **two graphs** for the initial **socially optimal locations** and the final **competitive equilibrium** of the locational interdependence theory in retail location. (4 Points). **Describe** where the two vendors/sellers are located in the initial **socially optimal locations** and the final **competitive equilibrium** (3 Points).