

Introduction to the Global Positioning System (GPS)

GEOG/NRES 427/827 (2cr)

12:30 – 1:45 PM Tuesdays

141 Hardin Hall

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Office Hours 12:00 – 1:00 PM MWF

Other times by appointment

Text: The Global Positioning System and ArcGIS – Michael Kennedy (Third Edition)

Course Outline

Please note that this course entails some outdoor activities and the class schedule may be adjusted due to the weather.

Jan 12: **GPS Basics**

- How it works
- Sources of error
- DOP
- Acquiring high quality data

Jan 14: **GPS Basics Continued**

Textbook:

For this class we will be using ArcPad 7.1.1, ArcGis 9.3.1, and ActiveSync.

You can skip TerraSync and Pathfinder Office discussions in the textbook.

Chapter 1 pg. 1-13, review ArcPad usage pg. 23-41

Chapter 2

- Minimizing error

Jan 19: **Mission Planning**

Textbook: Chapter 3 & chapter 7

- Using the almanac
- Identifying potential problems
- Accuracy requirements
- Available resources

- Jan 21: **Differential Correction**
Textbook: Chapter 4
- How it works
 - Post processing
 - Real time
 - DGPS sources
- Jan 26: **Differential Correction Continued**
- SBAS
 - WAAS
- Jan 28: **Class Project**
- What is expected
 - Examples of previous projects
- Feb 2: **Maps, Projections, and Datums**
- Map types
 - Why it matters
 - Which ones to use
- Feb 4: **ArcMap Basics**
Textbook Chapter 5
- Lab Activity – Introduction to ArcMap
- Feb 9: **ArcMap Continued**
Textbook Chapter 6
- Shapefiles
 - Attributes
- Feb 11: **ArcMap Continued**
- Lab Activity – Importing and using data in ArcMap
- Feb 16: **Trimble GeoExplorer XT**
- System setup
 - Screens and controls
 - Available tools
 - NEMA 0183
- Feb 18: **GeoExplorer XT Continued**
- Restoring after a cold boot
 - Enabling and using WAAS
- Feb 23: **GeoExplorer XT Continued**
- Setting parameters
 - Trouble shooting problems

- Feb 25: **GeoExplorer XT Continued**
- Field Activity – Getting your current position, time, and satellites
- Mar 2: **Intro To ArcPad**
Review ArcPad information in Chapters 1 & 2
- ArcPad basics
 - Setting parameters
- Mar 4: **ArcPad continued**
- GPS features and controls within ArcPad
 - On the fly conversions
 - Field Activity – Controlling the GPS within ArcPad
- Mar 9: **ArcPad continued**
- Preparing for field data collection
 - Capturing GPS data in ArcPad
- Field Activity – Storing data in ArcPad
- Mar 11: **Mission Planning 2**
- Selecting attributes
 - Determining potential problems
 - What kind of data do I need
- Mar 16: **Spring Break no class**
- Mar 18: **Spring Break no class**
- Mar 23: **ArcPad continued**
- Exporting data from ArcPad
 - Using ArcPad data in ArcMap
- Mar 25: **Importing Project Data into ArcPad**
- Domains
 - Drop down menus
- Mar 30: **Projections and Datums 2**
- Data sources
 - DOQ's
 - Accuracy
- Apr 1: **ArcMap 2**
- Changing projections
 - Editing, changing, and adding attributes

- Apr 6: **ArcMap 2 Continued**
- Tools
 - Creating new layers
- Apr 8: **Assessing GPS Accuracy**
- Apr 13: **Review**
- Apr 15: **Future of GPS**
Textbook Chapter 8
- Apr 20: **Help with Projects**
- Apr 22: **Help with projects**
- Apr 27: **Help with projects**
- Apr 29: **Projects due**

Grading: Weekly quizzes - 10 points each – drop the lowest – 70% of grade
 Final project – 30 % of grade

Completion of the project is not optional. Students who do not submit a satisfactory project will either receive an incomplete or fail the course.

Students enrolled in this class will:

- Gain an understanding of how GPS works
- Learn how GPS can enhance the research they are doing
- Learn the operation of the school's GeoXT explorer GPS units
- Learn ArcPad software and how it can be used to collect and process data
- Develop the skills to import and use the GPS data in ArcGIS
- Be more aware of the problems and situations that may comprise GPS data integrity

The class will meet each week. Some class sessions will be outdoors and involve actual data collection. Students will be expected to spend time outside of class becoming familiar with the GPS units and software. Student responsibilities include:

- Attending class regularly
- Reading all assigned materials
- Participating in class discussions
- Being respectful and exercise proper care of University equipment
- Completing an approved project using the skills developed during the class

Graduate Credit: To receive graduate credit (800 level) students will be required to prepare and present one course lecture on a topic of the instructor's choosing. As part of the lecture students will prepare a quiz based on previously assigned readings. The quiz will precede the lecture. Students will be graded on the quality of their presentation, their knowledge of the topic, how well the quiz covers the assigned readings, and their response to questions from other students and the instructor.