FNRM 3131
Introduction to GIS in Natural Resource Management

Instructors: Andrew C. Jenks
215 Green Hall
ajenks@umn.edu, @acjenks

Paul V. Bolstad
301J Green Hall
pbolstad@umn.edu
FNRM 3131
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Office Hours (Green 215)
1-3:00 p.m. Mondays and Tuesdays
8-9 p.m. Wednesday via (Google Hangouts; link on class website)
Objectives for Today

• Mechanics and grading
• Content
• Motivation
Introduce Vocabulary, Methods & Technology

Tablet

Smartphone

Glass
Conceptual understanding

This is an example of a feature dataset containing a geometric network for water distribution.

Complex Junctions

Geometric network

- Meter vault
- Service lateral
- Transmission main
- Hydrant lateral
- Hydrant

Pump station

Valve 2
Tee
Check valve
Meter
Pump
Valve 3

Logical representation

The pump station is a complex junction object, containing many simple junctions and simple edges.
• Organize and solve spatial problems
• Organize and solve spatial problems
Predictive knowledge
FNRM 3131
Introduction to Geographic Information System (GIS) for Natural Resources

- Offered both On-Line and In-Person
- Class based around textbook written by one of the course instructors for this specific class.
- Lab exercises apply the concepts covered in text.
- Students can access the class material On-Line, In-Person or any combination of the two.
- If you change how you access the class, you do not need to change your registration
Resources

Software

Three choices (you can switch at anytime)

1. Use Skok 35 computer lab.

2. Use virtual network connection into UMN network (Citrix/Apps to Go).

3. Install on home computer (Windows only)

These steps are covered in Quick Start documents on the Lab page of the Class Web Site.

Most students use Citrix/Apps to Go as you get access to a very fast Windows computer and lots of storage space.

What you need is a computer with an Internet connection.
Class Mechanics

Lecture and Lab each week.
Tests every 2-3 weeks
covering reading/lecture
topics

• Do readings **in advance** for both lectures and labs
• Materials available on the website
FNRM 3131 - GIS For Natural Resource Management

Resources

- Syllabus (.pdf)
- Canvas
- Lab Page
- Apps To Go (link to start UMN Citrix based virtual Desktop)

Materials, Organized Chronologically

Readings are from the book "GIS Fundamentals, Sixth Edition" by Paul Bnsaid

| 1 - Jan 20 | Due to the University Holiday on January 20, 2020, we will begin our class on Monday, January 27, 2020, our lab sessions will also begin that week |
| 2 - Jan 27 | Introduction to GIS Videos; Course Mechanics Introduction, Basic Concepts, Raster Structure and Resampling, Data and File Structures, Coord. Questions |
|            | Lecture PDFS 1, 2 |
|            | Geospatial Revolution, Notes-GIS Links, Notes-Links, 3 trillion trees, What 3 Words |
|            | Lab 1: Complete assignment in ArcGIS Pro, instructions and data are on the Lab Page |
|            | None - start Lab 1 |
|            | Take Canvas Quiz 1 this week. There is a quiz every week that covers the readings for that week, and it closes at the start of the Monday lecture time. |

http://giscourses.cfans.umn.edu/fnrm3131
Department of Forest Resources  
University of Minnesota  

FNRM 3131  
In-Person: Lecture: 4:05-6:00 p.m., Mondays, in 110 Green Hall,  
and a Lab at one of the following:  
6:00 p.m. – 8:00 p.m. Monday 35 Skok  
10:40 a.m. – 12:35 p.m. Tuesday 35 Skok  
4:05 p.m. – 6:00 p.m. Tuesday 35 Skok  
12:50 p.m. – 2:45 p.m. Wednesday 35 Skok  

On-line Labs: (you can also come to any in-person lab session if/as needed)  
On-line Lecture: (see course Website for materials) (you can also come to any in-person lecture if/as needed)

Section 7, 21  
Section 20

Instructors:  
Andrew C. Jenks  
215 Green Hall, 851-387-9600  
ajenks@umn.edu

Paul V. Bolstad  
301H Green Hall, 612-624-9711  
pbolstad@umn.edu

Office Hours:  
Mondays/Tuesdays 1-3:00 pm (Green 215) & Google Hangouts: Wed. 6pm-9pm

Required Texts:  
GIS Fundamentals: A First Textbook on Geographic Information Systems, Sixth Ed., Bolstad, Paul V., XanEdu Publishing, 2019. This book is on reserve in the Natural Resources Library 215. It is on line and should be at the St. Paul Campus Bookstore, and at the website https://www.xan.edu/higher-education/educational-resource-books-catalog/gis_fundamentals_6e/. Readings from this book are required. There are also supplementary readings, which will be posted on the class web link, http://giscourses.cfans.umn.edu/fnrm3131.  
You should do the readings before class meets; there is a quiz each week prior to start of each Monday lecture on the week’s reading assignment.

Required Materials:  
You may download and print the exercises as PDFs from the class website,  
http://giscourses.cfans.umn.edu/fnrm3131. Throughout the labs sessions you will need to save/backup your work. You will be provided UMN class disk space, H:\, used it for your work.

Other Resources:  
The class website is http://giscourses.cfans.umn.edu/fnrm3131. This website has copies of this syllabus, and lab exercises. A related website,  
http://paulbolstad.net/gisbook.html has information on the textbook and errata.

Student Responsibilities:  
You should attend the lectures (or access on-line lecture materials), do the readings, do assigned lab and homework problems submit them via Moodle; complete all quizzes and exams via Canvas. All material from lectures and readings may appear on the examinations.

If you need any assistive devices, services, or accommodations, due to a disability, please contact the Instructor.

# FNRM 3131 - GIS For Natural Resource Management

## Resources
- Syllabus (.pdf)
- Canvas
- Lab Page
- Apps To Go (link to start UMN Citrix based virtual Desktop)

## Materials, Organized Chronologically

Readings are from the book "GIS Fundamentals, 5th Edition," by Paul Bolstad

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Jan 20</td>
<td>Due to the University Holiday on January 20, 2020, we will begin our class on Monday, January 27, 2020; our lab sessions will also begin that week.</td>
</tr>
<tr>
<td>2 Jan 27</td>
<td>Introduction to GIS Videos. Course Mechanics Introduction, Basic Concepts, Raster Structure and Resampling, Data and File Structures, Coord. Questions</td>
</tr>
<tr>
<td></td>
<td>Lecture PDFS 1 2</td>
</tr>
<tr>
<td></td>
<td>Geospatial Revolution, Notes-GIS Links, Notes-Links, 3 trillion trees, What 3 Words</td>
</tr>
<tr>
<td></td>
<td>Lab 1: Complete assignment in ArcGIS Pro. Instructions and data are on the Lab Page.</td>
</tr>
<tr>
<td></td>
<td>None - start Lab 1</td>
</tr>
<tr>
<td></td>
<td>Take Canvas Quiz 1 this week. There is a quiz every week that covers the readings for that week, and it closes at the start of the Monday lecture time.</td>
</tr>
</tbody>
</table>

http://giscourses.cfans.umn.edu/fnrm3131
# Lab Exercises, FNRM 3131, GIS For Natural Resource Management

## Resources

- [Class Page](#)
- [Canvas](#)
- Quick Start - ArcGIS Versions 2020 (Read 1st)
- Quick Start - Mac or PC 2020 (Read next)
- Quick Start - Data 2020 (Read next)
- Quick Start - Citrix (Apps To Go) 2020
- Quick Start - ArcGIS Pro Home Install 2020
- Quick Start - Install and use VPN to map to CFANS Server (Details)

## Lab Materials, Organized Chronologically

Readings are from the book "GIS Fundamentals, 6th Edition" by Paul Bolstad

<table>
<thead>
<tr>
<th>Week</th>
<th>Lab Number &amp; Topic</th>
<th>Assignment</th>
<th>Data (ArcGIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Due to the University Holiday on January 20, 2020, we will begin our class on Monday, January 27, 2020; our lab sessions will begin that week</td>
<td>Instructional Video ArcGIS: All videos are on YouTube (unlisted)</td>
<td></td>
</tr>
</tbody>
</table>

[http://giscourses.cfans.umn.edu/labpage-fnrn3131](http://giscourses.cfans.umn.edu/labpage-fnrn3131)
Class Mechanics

- Reading Quizzes, Assignments, Forums and On-line tests on Canvas:

https://canvas.umn.edu
The primary source for course materials is the class website and the textbook. Canvas will be used to turn in assignments, complete tests, quizzes, and check grades.

Where do I turn in assignments?
We have created a Canvas Dropbox each week and you will upload your work to submit assignments and occasionally other file types as directed.

How do I take quizzes and exams?
We have created a Canvas Quiz and/or Exam in Canvas. They will appear in the week they are assigned.

General Information
- Week 01 - No Class
- Week 02 Introduction to GIS
- Week 03 Geodesy & Map Projections
- Week 04 Data & Data Entry
- Week 05 GPS, Images, COGO
- Week 06 Remote Sensing & Digital Data
- Week 07 Tables
- Week 08 Spring Break

- Week 09 Spatial Analysis
- Week 10 Raster Analysis
- Week 11 Terrain
- Week 12 Interpolation
- Week 13 Cartographic Models
- Week 14 Data Quality
- Week 15 Course Wrap-up & Future
- Week 16 Finals Week
- Week 17 Finals Week
### Week 03 - Geodesy & Map Projections

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 03 - Chapter 3, Reading Quiz</td>
<td>Feb 3</td>
<td>6 pts</td>
</tr>
<tr>
<td>Drop Box for Lab 01</td>
<td>Feb 7</td>
<td>15 pts</td>
</tr>
<tr>
<td>Lab 02 Forum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Week 04 - Data & Data Entry

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 04 - Chapter 4, Reading Quiz</td>
<td>Feb 10</td>
<td>6 pts</td>
</tr>
<tr>
<td>Drop Box for Lab 02</td>
<td>Feb 14</td>
<td>8 pts</td>
</tr>
<tr>
<td>Lab 02 Worksheet Data Entry</td>
<td>Feb 14</td>
<td>9 pts</td>
</tr>
<tr>
<td>Lab 03 Forum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 04 - 1st Online Exam, Chapters 2 and 3</td>
<td>Feb 26</td>
<td>23 pts</td>
</tr>
<tr>
<td>First Exam Forum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Week 05 - GPS, Images & COGO

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 05 - Chapters 3 &amp; 6 (to page 273), Reading Quiz</td>
<td>Feb 17</td>
<td>6 pts</td>
</tr>
<tr>
<td>Drop Box for Lab 03</td>
<td>Feb 21</td>
<td>15 pts</td>
</tr>
<tr>
<td>Lab 04 Forum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Week 06 - Remote Sensing & Digital Data, Start Tables

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 06 - Chapter 6 (to end) and 7, Reading Quiz</td>
<td>Feb 24</td>
<td>5 pts</td>
</tr>
<tr>
<td>Week 03 Geodesy &amp; Map Projections</td>
<td></td>
<td></td>
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<tr>
<td>-----------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 03 - Chapter 3, Reading Quiz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb 13</td>
<td>6 pts</td>
<td></td>
</tr>
<tr>
<td>Drop Box for Lab 01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb 17</td>
<td>15 pts</td>
<td></td>
</tr>
<tr>
<td>Lab 02 Forum</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 04 Data &amp; Data Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 04 - Chapter 4, Reading Quiz</td>
</tr>
<tr>
<td>Feb 10</td>
</tr>
<tr>
<td>Drop Box for Lab 02</td>
</tr>
<tr>
<td>Feb 14</td>
</tr>
<tr>
<td>Lab 02 Worksheet Data Entry</td>
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<tr>
<td>Feb 14</td>
</tr>
<tr>
<td>Lab 03 Forum</td>
</tr>
<tr>
<td>Week 04 - 1st Online Exam, Chapters 2 and 3</td>
</tr>
<tr>
<td>Feb 16</td>
</tr>
<tr>
<td>First Exam Forum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 05 GPS, Images, &amp; COGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 05 - Chapters 5 &amp; 6 (to page 273), Reading Quiz</td>
</tr>
<tr>
<td>Feb 17</td>
</tr>
<tr>
<td>Drop Box for Lab 03</td>
</tr>
<tr>
<td>Feb 21</td>
</tr>
<tr>
<td>Lab 04 Forum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 06 Remote Sensing &amp; Digital Data, Start Tracing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 06 - Chapter 7, Start Tracing</td>
</tr>
<tr>
<td>Feb 24</td>
</tr>
</tbody>
</table>
Add your completed lab assignments as .PDF and when all material is added click “Submit Assignment”
Lab Mechanics

• Labs are due Friday night to Canvas one week after assignment.

• Labs up to 1 week late are penalized 20%

• Labs more than 1 week late are penalized 100%

• Arrange scheduling difficulties in advance
# Course Comprised of Several Parts

<table>
<thead>
<tr>
<th></th>
<th>Quantity</th>
<th>% total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labs</td>
<td>13 Labs</td>
<td>38.25%</td>
</tr>
<tr>
<td>5 on-line exams (4 regular &amp; Final)</td>
<td></td>
<td>49.18%</td>
</tr>
<tr>
<td>Homework (15 pts)</td>
<td>2 homework's</td>
<td>5.46%</td>
</tr>
<tr>
<td>Quizzes (3 pts)</td>
<td>13 quizzes</td>
<td>7.1%</td>
</tr>
</tbody>
</table>

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**Total** 100%

Note: Optional Lab (.91%), Extra Lab (2.73%), Extra Homework (2.73%), Optional Geocaching (.91%)
Canvas Grade screen: keep track of your points/grade.

Note: running grade totals and your grade for the % of the work you have “turned in”
The percent weighting is on the right. Uncheck the "Calculate based only on graded assignments" to see your potential final grade (as of that point in time).
Grading, Integrity, Ethics

Please note you may work together on labs, but you each must do every part of each lab and turn in entirely your own work. That means each of you should perform every step indicated in the lab manual. Your grade is for individual effort; copied files/maps from other students will be construed as cheating. At a minimum you’ll get zero for the lab, and you may automatically fail the course.

We will try to grade labs within a one-week period, for quick turnaround. However, this won’t happen in all cases. Grading will be on a straight scale, not on a curve. If you all do well, you will all get an A. The scale is (note: there is no A- grade used in this class):

- A 90 – 100
- B+ 88 – 89.99
- B 82 – 87.99
- B- 80 – 81.99
- C+ 78 – 79.99
- C 67 – 77.99
- C- 55 – 66.99
- D+ 63 – 64.99
- D 50 – 62.9

Grades are shown/reported on your Canvas grades lab.
The required class work (100%) is comprised of: 13 required labs = 38.26%, 2 required homework assignments = 5.46%, 13 on-line reading quizzes = 7.1%, 4 on-line exams = 32.79%. Final = 16.39%.

In addition to the required class work, there are several opportunities to obtain extra credit. These extra credit assignments, if completed, could add an additional 7.29% to your grade.

Note: during the class, when checking your grades on Canvas, please note the checkbox at the bottom of the ‘Assignments are weighted by group’ section; the check box ‘Calculate based only on the graded assignments’ should be UNCHECKED to project your estimated FINAL Grade.

How EXTRA CREDIT is handled in the Grade Book

There are 4 Extra Credit opportunities: A 15-point Extra Credit Homework Quiz, a 15-point Extra Credit Lab, a 5-point Extra Credit GPS Lab and 5 possible points for “finding” Geocaches. These points COULD total up to 40 Extra Credit points. These 40 points amount to an extra 7.29% of the graded class assignments.

How this Works:
Extra Credit (optional, extra credit opportunities): if all extra credit is completed, you would receive and EXTRA 7.29% of the regular class. Extra Credit is Awarded IN ADDITION to the regular class work.

Extra Credit will appear in the Student Grade Book throughout the class as 0% UNTIL the final grade calculation at the end of the class. (See the Grade Book Section “Assignments are weighted by group.”) When the final grades are calculated we will enter “0” in all unsupmitted Extra Credit Assignments and change the Extra Credit Group percent (%) to 7.29%. So, at the very end of the class the TOTAL possible percent will display as 107.29%.

If you do complete one or more Extra Credit Assignments during the class, your points will be recorded, as they are submitted & graded, and WILL SHOW up in the Grade Book but WILL NOT be included in your Total % column, until the final grade calculation at the end of the class. If you wish to CALCULATE BY HAND the value of your Extra Credit work prior to the end of the class, do the following: take your graded Extra Credit Points and divide them by 40 and then multiply the result by 7.29. This calculation will allow you to predict the extra % that will be added to your total percent (as displayed in the Grade Book during the class). At the end of the class, we will do this same calculation in the grade book and improve your total percent position by whatever percent of Extra Credit you achieved.

For example, say you did 20 of the possible 40 extra credit points. (20/40) * 7.29 = 3.645
3.645% would then be ADDED to your regular class work percentage at the final grade calculation.
# Grading - Straight Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>&gt;100%</td>
</tr>
<tr>
<td>B+</td>
<td>87.5 – 89.99</td>
</tr>
<tr>
<td>C+</td>
<td>77.5 – 79.99</td>
</tr>
<tr>
<td>D+</td>
<td>60.0 – 64.49</td>
</tr>
<tr>
<td>A</td>
<td>90–100</td>
</tr>
<tr>
<td>B</td>
<td>82.5 – 87.49</td>
</tr>
<tr>
<td>C</td>
<td>70.0 – 77.49</td>
</tr>
<tr>
<td>D</td>
<td>50.0 – 59.99</td>
</tr>
<tr>
<td>A-</td>
<td>Not given</td>
</tr>
<tr>
<td>B-</td>
<td>80–82.49</td>
</tr>
<tr>
<td>C-</td>
<td>65 – 69.99</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 50%</td>
</tr>
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</table>
Other information

Andrew Jenks Shared Evernote “notebooks"

https://www.evernote.com/pub/andyjenks/gismapsgeneral

https://www.evernote.com/pub/andyjenks/gis-umn