GEOG 560 - Syllabus:  
GIScience I: Introduction to Geographic Information Science

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Office hours: T 10-11am, F 11am-12pm, or by appointment

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Office hours: Wednesday 5-7pm in the Digital Earth Lab

*** Emails: Please see “email etiquette” at the end of the syllabus ***

Catalog course description. GISCIENCE I: INTRODUCTION TO GEOGRAPHIC INFORMATION SCIENCE (4). Introduction to modern spatial data processing, development, and functions of geographic information systems (GIS); theory, concepts and applications of geographic information science (GIScience). Lec/lab.

Course goals  
The overarching goals of this course are to learn how to display, interpret, create, manipulate, and analyze geospatial data in a geographic information system. A core concept in geography is that the “WHERE” matters in understanding the “WHY”, and GIS gives you an important tool for finding out just how much it matters. Thus, we want you to have a strong enough foundation in GIS that you can begin using spatial data to answer the “WHY” questions important in your field.

Reaching this goal requires a blend of computer technical skill and basic understanding of the geographic and computational principles involved. Much like piloting an airplane, we need to both know how to manipulate the many controls and know the physics and mechanics involved in making those controls reach your goal. Fortunately, we won’t drop out of the sky if we mess up in this class, but we want to strive toward the understanding that will keep our conclusions and products reliable and solid.

Course components  
The course is arranged around readings, weekly labs, quizzes, and a project.

Learning outcomes  
By the end of this course, you should be able to:

• Complete basic GIS tasks, including: acquiring data, preparing data for analysis, conducting basic geospatial analysis, creating research-grade maps, and documenting data for others to use.

• Understand how vector data are arranged and manipulated, including basic database queries and manipulation
• Understand how raster data are arranged and manipulated, including basic algebra and masking operations
• Evaluate common sources of error in vector and raster data
• Conduct basic problem-solving in the interpretation of GIS results
• Understand the importance of metadata
• Articulate the role of space as a source for explanation and understanding.
• Assess the increasing use of geospatial data in popular, commercial, and governmental spheres
Canvas
Go to Canvas: oregonstate.instructure.com. You should see geo565 in your options. Please check on Canvas for class updates, documents (like this syllabus), updated calendar, grading, etc.

Calendar
Check the Canvas site for updates to this calendar.

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Class topic</th>
<th>Readings</th>
<th>Lab / Quizzes</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Th</td>
<td>Sep-24</td>
<td>Spatial data</td>
<td>Chp 1, Chp 2</td>
<td>Lab 1: ArcGIS, computing, exploration</td>
<td>10</td>
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<td>2</td>
<td>T</td>
<td>Sep-29</td>
<td>Coordinate systems</td>
<td>Chp 3</td>
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<td>Th</td>
<td>Oct-1</td>
<td>Vector data</td>
<td>Chp 1</td>
<td>Lab 2: Points, exporting, basic analysis</td>
<td>15</td>
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<td>3</td>
<td>T</td>
<td>Oct-6</td>
<td>Raster data</td>
<td>Chp 1, Chp 7</td>
<td>Quiz 1</td>
<td>10</td>
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<td></td>
<td>Th</td>
<td>Oct-8</td>
<td>Remote sensing</td>
<td>Chp 6, Chp 7</td>
<td>Lab 3: Raster data</td>
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<td>4</td>
<td>M</td>
<td>Oct-12</td>
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<td>Project: Problem statement due</td>
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<td></td>
<td>T</td>
<td>Oct-13</td>
<td>Interpolation, DEMs</td>
<td>Chp 11, 12</td>
<td>Quiz 2</td>
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<td>Th</td>
<td>Oct-15</td>
<td>GPS / Digitizing / Catchup</td>
<td>Chp 4, Chp 5</td>
<td>Lab 4: GPS and Digitizing</td>
<td>15</td>
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<td>5</td>
<td>T</td>
<td>Oct-20</td>
<td>Raster operations</td>
<td>Chp 10</td>
<td>Quiz 3</td>
<td>10</td>
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<td>Th</td>
<td>Oct-22</td>
<td>Raster and poly</td>
<td>Chp 9</td>
<td>Lab 5: Beginning analysis</td>
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<td>6</td>
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<td>Oct-26</td>
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<td>Project: Data availability report due</td>
<td>10</td>
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<td>T</td>
<td>Oct-27</td>
<td>Analysis</td>
<td>Chp 9</td>
<td>Quiz 4</td>
<td>10</td>
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<td></td>
<td>Th</td>
<td>Oct-29</td>
<td>Workflows</td>
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<td>Lab 6: Workflows</td>
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<td>7</td>
<td>T</td>
<td>Nov-3</td>
<td>Reprojection</td>
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<td>Th</td>
<td>Nov-5</td>
<td>Project management</td>
<td>Chp 8, Chp 14</td>
<td>Lab 7: Manage your own project</td>
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<td>8</td>
<td>M</td>
<td>Nov-9</td>
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<td>Project Methods Proposal Due</td>
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<td>Nov-10</td>
<td>Advanced vector analysis</td>
<td>Chp 9</td>
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<td>Nov-12</td>
<td>Open source GIS</td>
<td>Chp15</td>
<td>Lab 8: Open source GIS</td>
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<td>9</td>
<td>T</td>
<td>Nov-17</td>
<td>Advanced raster analysis</td>
<td>Chp 10</td>
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<td>Th</td>
<td>Nov-19</td>
<td>GIS analysis in Python and R</td>
<td>Chp 15</td>
<td>Lab 9: Earth Engine / Arc online</td>
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<td>10</td>
<td>T</td>
<td>Nov-24</td>
<td>Reference data and uncertainties</td>
<td>Chp 14</td>
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<td></td>
<td>Th</td>
<td>Thanksgiving</td>
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<td>No labs</td>
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<td>11</td>
<td>T</td>
<td>Dec-1</td>
<td>Models for environmental analysis</td>
<td>Chp 13</td>
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<td>Th</td>
<td>Dec-3</td>
<td>Wrapup</td>
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<td>No labs: Project time as needed</td>
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<td></td>
<td>M</td>
<td>Dec-7</td>
<td>Projects emailed by 11:59pm</td>
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Readings
Core readings are from “GIS Fundamentals” (4th Edition, 2012), by Paul Bolstad. Please read the sections in the book before you come to class each day. As the term progresses, I may adjust or augment the reading list or schedule, and I will let you know to check for new versions of the calendar as necessary.

Grading
Points for each item are listed on the class calendar. There are 200 points possible through the term.
Labs: 95 points
Quizzes: 40 points  
Research proposal: 65 points

Final grades will be based on standard percentile breakdowns on a non-stretched scale: 90 to 100% of points will earn you an “A”, 80-90% of points a “B” (with + and – at the margins of the range), etc.

**Labs**
GIS is a hands-on thing, making labs critical. You’ll be learning how to use ArcMap within ArcGIS, as well as getting introduced to other software later in the class.

Labs 1-5 are due at the beginning of the next week’s lab.  
Labs 6-9 are due two weeks after being assigned.  
Labs are worth 10-15 points each, depending on the lab (see the calendar).

At your lab time (Thursday or Friday), meet in the Digital Earth lab (Wilkinson 210).

**Quizzes**
40 points total. We’ll have four quizzes through the term (noted on the calendar). The purpose of these quizzes is to keep things fresh in your mind and help focus you on the topics I view as important, not to trick you. Therefore, I will provide candidate quiz questions at the end of each class and randomly draw a few from each group for a given quiz. Quizzes will focus on the recent week’s activities.

**Projects**
You’ll learn GIS best if you can relate to it. You’ll develop a mini research project to begin exploring geospatial analysis in your field of interest.

You’ll do this in several parts:
1. 10 points: Problem statement (100 words or less): Describe a core question or goal that could benefit from a geospatial approach. Briefly describe why it’s interesting.
   a. Your question or goal.
      i. Question form: This project seeks to answer the question: Do more frogs live in forested or non-forested watersheds of the Cascades? This has never been tested before, because…. However, understanding habitat preference is important because.....
      ii. Goal: The goal of this project is to map the spatial distribution of frogs. This is important because .....  
   b. DUE: Monday Oct 12th at 11:59pm  
   c. Please follow this format for filenames of your electronic document:  
      **lastname_firstname_geo565resproposal_problemstatement.pdf**  
   d. I can read Word documents, plain text, or PDFs. Please make your documents are double-spaced.  
   e. Ahem. Again, please make sure your documents are double-spaced.
2. 10 points: Data availability report (ideally 100 words or less, but if need be can be longer): Describe the geospatial data you know to exist that may be relevant to your question. Use narrative, bulleted list, or table form.
   a. MAKE SURE you KNOW these exist and that you can get them. The point here is that you’ve taken the time to do some sleuthing about data. I can’t give points if you haven’t found any data.
   b. Document source, scale, data characteristics, etc. that are important.
   c. DUE: Monday Oct 26th at 11:59pm
   d. Follow the naming convention above, but distinguish this as a data report.

3. Lab 7: Lab 7 will be where you begin building your own database to manage data on your project. It begins November 5th and is due two weeks later.

4. 10 points: Methods proposal (100 words or less): What geospatial operations will you apply to your data to address the problem statement?
   a. Use a narrative, bulleted list, graphic, etc. to describe the workflow
   b. DUE: Monday November 9th at 11:59pm
   c. Follow the naming convention above, but distinguish as methods.

5. Full project, including all prior sections, plus results and discussion.
   a. DUE: Monday December 7th at 11:59pm.
   b. This is in place of a final exam!

Late stuff
Except in unusual circumstances, if you miss an event – a class, a quiz, a due date – without checking with me in advance, you lose that event. Check in advance if you have a problem meeting a due-date for a lab, presentation, or a quiz. If you’re sick but not deathly ill, try to at least email me. I’m a reasonable guy.

Don’t turn stuff in late. You’ll lose a third of the points per day. The one exception: I’ll give each person a freebie to turn in one assignment up to two days late without penalty – except the final research proposal, which has to be in on time so I can get your grade calculated. If you’re using your freebie, mark it clearly IN THE TEXT OF THE DOCUMENT! Thanks.

The Rules (yeah, the rules)
• Student conduct is governed by the university’s policies. Please be aware of student conduct and community standards at OSU:
  http://oregonstate.edu/studentconduct/home/
• You know the drill: Your work is your own. Maintain academic integrity and honesty. If you have any questions about what this means, it’s your responsibility to figure it out! Check out http://oregonstate.edu/studentconduct/offenses.
• Incomplete grades will be given only under the most dire of circumstances.
Email etiquette

- I’ll try to answer all appropriate emails within 24 hours. Don’t expect an instant response, though.
- Include “GEO565” in the subject line of all emails with me so I can see it within the sea of other emails.
- I’ll respond quicker to emails that have clear subject lines.
  - A good subject line: “GEO565: Problem saving file to my data directory”
  - Bad subject lines: “question….”, “today”, “confused”, etc.
- I’ll respond quicker to emails where the core question in the body of the email is put in bold face, and where separate ideas are in separate paragraphs. Stream-of-consciousness text works fine for some fiction, but I find it hard to parse out.
- Please use full sentences in your email and make sure you’ve thought through the email. I reserve the right to not respond to lazy emails...

Course evaluation

Everyone can learn, even old fogeys like me. In addition to the course evaluations at the end of the term, I may ask for written feedback from you during the term so I can improve the course each year. Don’t worry – I really do want feedback, even if it ain’t glowing. Constructive ideas (“this is how you could improve the course”) are way more helpful than ad hominem attacks (“you suck and your shirts are ugly”) of course. 😊