Geology 340 - Images of the Earth
Fall 2019 – Bauman 201

Course web page: http://guilfordgeo.com/geo340

Syllabus

This course will focus on various ways to classify, represent, and visualize the Earth's surface. We will learn how to create and manipulate maps, aerial photographs, and satellite images. We will explore, construct, and use geographic information systems (GIS) and other computer-based methods to create maps and visualize data. We will apply our knowledge and techniques to issues such as ecosystem management, environmental assessment, urban planning, geologic mapping, global change, and archaeology.

The laboratory sessions will include individual and group work, including problem sets, map activities, manual and computer mapping, image processing, GPS and GIS. We will connect our work to field studies and ground-truthing of our maps and images, and we will finish up the laboratory work by developing individual GIS/image processing applications.

The course can count toward the geology major and minor, the environmental studies major and minor, and the CTIS major. It is required for the environmental track for the B.A. and B.S. in geology.

Instructor:

Dave Dobson   316-2278 (w)   Office Hours: Tues/Thurs 11:30-1
Frank 215C   ddobson@guilford.edu   Wed 12:30-2:30

Text: There is no textbook for the course. Readings will be assigned as needed, either as handouts or on the web. These may include articles, studies, and documentation for the various software packages we use. Other optional readings may be assigned. Readings will be provided in class or on the course web page (see above).

Learning Outcomes: Students in this class will develop a detailed understanding of coordinate systems, projections, mapping, digital image processing, data acquisition and processing, and construction of GIS databases. Students will be able to construct maps and datasets to address problems in social, governmental, environmental, and scientific areas. Students will be able to adapt published data sets for their own use. Students will develop skills with several software scripting languages and packages, potentially including Excel, GMT, ArcGIS, VRML, and Wings3D.

Work Required:

- **Participation:** Class periods will include informal lectures twice a week and laboratory activities during the weekly sessions. **Attendance and participation** by students in lectures and laboratories is expected and required. Questions, discussion, attendance, computer work, etc. all lead to a participation grade. **Participation 10%**

- **Labs: Laboratory exercises** on map construction and interpretation, aerial photographs, computer maps, image processing, natural and demographic data sets, and GIS will be conducted weekly. **Labs 40%**

- **Project:** All students will complete a **final project**. Students must create a Geographic Information System database and one or more processed images to be used as a part of the GIS. The project must center around a question of scientific, social, or environmental interest that can be adequately addressed by a GIS. The project should include background research and pertinent commentary. There will be four steps toward completing the project. First, you will submit a project proposal; second, a progress report including a first draft of the GIS; third, a short presentation of your work to the class; and fourth, a written summary and final draft of the GIS. This should include a copy of your presentation materials, the GIS data set itself, an explanation and guide to your GIS, and a brief summary including background research, the hypothesis you are testing, research methods, findings, conclusions, and sources used. **Final Project 25%**

- **Exams:** There will be two **examinations**, one at midterm in class and one take-home final examination. The final exam will be an open-book, open-note exam focusing on the software packages we use. **Midterm 10%, Final Exam 15%**

Attendance: Attendance and engagement in class contributes to the participation grade component. If you miss more than five lectures, you may be required to drop the class. Attendance is **REQUIRED** at all lab sessions.

Grade	% Range	Min % of class
A	90-100	15
B	80-89	35
C	70-79	35
D	60-69	10
F	<60	

Grading: Grades in this course will be determined as shown here, with grade weights in the table to the right. Grading will be on a straight scale with a supporting curve. For example, a student who scores 82% of the total available points is guaranteed a B. However, if that student is in the top 15% of the class, she will get an A- or A instead.

Graded Item	Weight
Exams	**25%**
Midterm	10%
Final exam	15%
Lab Activities	**40%**
Class Participation	**10%**
Final Project	**25%**
Total	**100%**

Late Work: The final project and the take home exam will not be accepted after their due dates, and a grade of zero will be applied. Lab assignments will be accepted after the due date for up to 14 days. For each day or portion of a day the work is late, a penalty of up to 5% of the student's grade may be assessed, to a maximum penalty of 50%. No late work will be accepted after 14 days except in emergency circumstances (major health problems or the equivalent). Note that it is **ALWAYS** better to turn in what you have than not to turn anything in at all. I'm generous with partial credit, but I have to give you zero credit if I've got zero to work with.

Workload: This course is a four credit hour course and it will meet for seven hours of instruction and lab for each of the twelve weeks of the course. Required work outside of class will typically be no less than eight hours per week.

Potential Pop Quizzes: There may occasionally be quizzes on subjects from lectures or readings taken in the first few minutes of class in place of roll-call attendance. I tend to do these when people aren't in class on time. Attendance and good performance on these quizzes will improve your final participation grade. Poor performance or missing the quizzes may hurt your class participation grade.

Guilford Honor Code: Academic honesty and integrity represent central elements of the liberal arts education at Guilford College. As scholars pursuing knowledge and truth, informed by the Quaker testimony on integrity, we seek a community where each member acts responsibly and honorably in all activities and at all times. Acts of dishonesty represent a serious offense at Guilford College. The academic honor code is violated when anyone claims credit, implicitly or explicitly, for work and ideas that are not her or his own. Violations of the academic honor code include, but are not limited to, plagiarism, unauthorized collaboration, and unauthorized use of materials.

For the purposes of this class, this means that all work you turn in must be your own. However, collaboration is usually allowed. With the exception of quizzes and exams, you may consult with others and work with others in doing your work. It is acceptable to work in groups and to give help to and receive help from fellow students, but you should indicate who you worked with and on what in your assignments when you turn them in. It is not acceptable merely to copy answers or solutions. Under no circumstances are you to turn in someone else's work, in full or in part, as your own.

Data sources and references for your lab assignments and project work (other than those I provide for you) should be fully and appropriately cited.

Accommodations: Guilford College facilitates and supports the implementation of reasonable accommodations including resources and services for students with documented disabilities, chronic medical conditions, temporary disability, or pregnancy complications resulting in difficulties with accessing learning opportunities. Students requesting academic accommodations must first self-identify and register with the Accessibility Resource Center (ARC) located in Hege Library, Office 217. The Directors will meet with the student to create an individual accommodation plan (IAP). ARC will provide the accommodation letters to instructors at the student's request when providing any classroom and/or testing accommodations. Please notify ARC the first week of classes to discuss your accommodations needs. More information and relevant policy documents about the types of accommodations and services offered, disability determination, and the student registration process can be found on the [Guilford College ARC site](#).

Schedule:
The schedule is presented on the next page. It is subject to updates during the term.

Week	Dates		Topics Covered	Lab
1	Tue, Sep 17	Thu, Sep 19	The Shape of the Earth; Coordinates and Navigation	**Lab 1: Introduction to Maps**
2	Tue, Sep 24	Thu, Sep 26	Map Projections - Sphere to Plane; Intro to GMT	**Lab 2: Map Projections**
3	Tue, Oct 1	Thu, Oct 3	The Third Dimension – Contouring techniques	**Lab 3: Contouring**
4	Tue, Oct 8	Thu, Oct 10	Introduction to GIS Concepts	**Lab 4: Basic ArcGIS Techniques**
5	Tue, Oct 15	Thu, Oct 17	More GIS Concepts – Vector data; Exam review	**Lab 5: More ArcGIS Techniques**
6	Tue, Oct 22	Thu, Oct 24	Working with Spatial Data **MIDTERM EXAM** Oct. 22	**Lab 6: Raster Data in ArcGIS FINAL PROJECT ASSIGNED**
7	Tue, Oct 29	Thu, Oct 31	Raster data – Grids and Images	**Lab 7: 3D Visualization (VRML/Modeling)**
8	Tue, Nov 5	Thu, Nov 7	3D Visualization Techniques	**Lab 7 Part 2: Frank in 3D FINAL PROJECT PROPOSAL DUE**
9	Tue, Nov 12	Thu, Nov 14	More Raster Data: Aerial Photos, Satellite Imagery	**Lab 8: 3D Visualization in ArcGIS**
10	Tue, Nov 19	Thu, Nov 21	Raster techniques (e.g. filters, shading)	**Lab 9: Fun with Rasters FINAL PROJECT PROGRESS REPORT DUE**
Break	Tue, Nov 26	Thu, Nov 28		
11	Tue, Dec 3	Thu, Dec 5	Environmental GIS: Ecosystems, land use, soils	**Lab: Final project work**
12	Tue, Dec 10	Thu, Dec 12	Applications of GIS and remote sensing; Closing thoughts **Final Exam handed out**	**Lab: Final Project Presentations Final project GIS and writeup due Dec. 13**
Exam	**Thu, Dec 19**		**Final exam due by midnight.**	