FIELD GEOLOGY AND GEOLOGIC MAPPING TECHNIQUES
Geology 3004-01
Fall Semester 2007
Dr. Randy L. Kath, P.G.
rkath@westga.edu

General Outline (subject to change)

I. General Principles and Techniques
1) Philosophy and Organization of Field Studies
   i) Selection of a field study
   ii) Literature search and detailed reconnaissance
   iii) Base map selection
2) Equipment for Geological Mapping
   i) Selecting sampling equipment
   ii) Selecting recording equipment
   iii) Selecting a hand level
   iv) Selecting a compass
3) Basic Procedures
   i) Hand leveling
   ii) Pacing
   iii) Taking a compass bearing
   iv) Measuring planar and linear features
   v) Sampling procedures
   vi) Sample preparation (lab and equipment procedures)
4) The Field Notebook
   i) Field observation
   ii) Field interpretations
   iii) Organization of the field notebook
   iv) Taking field notes
5) Brunton Compass and Hand Level
   i) Parts of a compass
   ii) Proper care and handling
   iii) Magnetic declination
   iv) Measuring planar and linear features in the field
   v) Hand level care and adjustment
   vi) Establishing vertical control
6) Topographic Maps
   i) Contouring
   ii) Construction
   iii) Map projections and datums
   iv) Plotting latitude/longitude and UTM coordinates
II. Field Identification of Rocks and Structures
A) Rock Identification and Classification
1) Metamorphic Rocks
   i) Textures
   ii) Classification
2) Igneous Rocks
   i) Textures
   ii) Classification

B) Field Description of Geologic Structures
1) Analysis of Planar Features
   i) Structure contours
   ii) Map symbols
2) Structural Planes and Topography
   i) Rule of “V’s”
   ii) Predicting outcrop patterns
3) Linear Features
   i) Definitions
   ii) Linear structures
   iii) Map symbols
   iv) Recording in the field notebook
4) Description of Folds and Fold-related Map Patterns
   i) Fold geometry
   ii) Map symbols
5) Fractures, Discontinuities, and Joints
   i) Classification
   ii) Relationship to structures
   iii) Map symbols
6) Faults
   i) Geometry
   ii) Classification
   iii) Recognition of faults on geologic maps

III. Geologic Mapping and Specific Field Techniques
A) General Procedures
1) Preparing a base map
2) Locating Points in the Field
   i) Pace and compass techniques
   ii) Global positioning systems (GPS)
   iii) Triangulation and triangular integrated networks (TIN)
3) Recording Outcrop-Specific Field Data
   i) Base map procedures
   ii) Field notebook procedures
4) Correlation of Geologic Units
   i) Tracing contacts between geologic units
   ii) Geologic projections
5) Mapping Geologic Structures
   i) Outcrop-scale patterns
   ii) Map-scale patterns
B) An Introduction to Digital Geologic Mapping
1) Pen Computers
2) Handheld computers
   i) Palm Pilots
   ii) Windows CE Devices
3) GPS vs. DGPS vs. Post Processing
4) Digital Base Maps
   i) Digital raster graphics (DRG)
   ii) Digital elevation models (DEM)
   iii) Digital line graphs (DLG)
   iv) Digital orthophotoquads (DOQ)
5) Recording digital field notes

IV. Geologic Report Preparation
1) General outline and formatting procedures
2) Construction of digital geologic maps using computer aided design (CAD)
3) Construction of digital illustrations using a graphic program
4) Introduction to stereonet programs and preparing stereoplots for presentation
5) References/Geobase/Georef
FIELD GEOLOGY AND GEOLOGIC MAPPING TECHNIQUES LABS/PROJECTS

- **Projects 1**: Pace and compass
  - Measure and plot baseline information and create a TIN
  - Collection of field data in the Field notebook

- **Project 2**: The GPS: plotting latitude/longitude and UTM data

- **Project 3**: Strike and Dip Project

- **Project 4**: Topographic Maps (after I-6)
  - Contouring techniques and procedures
  - Map projections and vertical datums

- **Project 5 and 6**: Three Point problems

- **Project 7**: Apparent Dip

- **Project 8**: Geologic Map Interpretation of Horizontal and Folded Strata

- **Project 9**: One Weekend Fieldtrip

- **Project 10**: Geologic Mapping- West Georgia Piedmont (Carrollton Quad)

**Course Objectives:**
The following is a list of objective for the course:

- **Map reading**: Students should be able to use topographic and geologic maps to locate themselves in the field and as base maps for data collection.
- **Notebooks/outcrop description/sketching**: Students should be able to accurately record field data, and should be able to describe and sketch outcrops.
- **Pace and compass**: Students should be familiar with pace and compass methods of geologic mapping.
- **Create maps**: Students should be able to create topographic and geologic maps.
- **Sampling/labeling/handling of samples**: Students should know how to collect rock samples in the field and how to label and handle these samples properly.
- **Structural mapping**: Students should be able to map complex structural features.
- **Surveying**: Students should know basic surveying techniques.

**Attendance Policy**-
The University has no written attendance policy. It is my feeling that you are adults and have paid for this course. Because of this, I will be in class during our regularly scheduled time and expect the same of each student. Also, I expect you to be on time! I realize that there are extenuating circumstances that our out of all of our control; however, we can greatly reduce these with a little planning. Each student is expected to attend all classes, be punctual, and be prepared by appropriate study for class lectures and discussions.
Cheating/Plagiarism-
Section 207 of the faculty handbook states “Improper academic conduct on the part of the student shall be interpreted to mean the obtaining and using of information during an examination by means other than those permitted by the instructor, including the supplying of such information to other students. Improper academic conduct shall also include plagiarism, i.e., the purchase and use of ghost-written papers and reports, or incorporating into a report, term theme, research paper, or project, ideas and information obtained from another person without giving credit to the person from whom such information was obtained. Further, inclusion of the published or unpublished writings of another person without duly noting these sources according to normal scholarly procedures shall be considered plagiarism. The above definition of academic misconduct applies equally to improper use of electronic sources of information and opinion.” If students are caught cheating or plagiarizing I have a zero tolerance policy which will result in failing the course for this improper academic conduct.

Projects-
Each student either individually or with a partner(s) be given a field-related problem. There are no restrictions on the type of problems investigated. The investigator(s) gathers data, from the literature, through field work, and in the laboratory; and incorporates results into a final report.

The final report should include but is not limited to:
- Final field map
- Field notes
- See additional handout

Class Labs-
Laboratory exercises are designed to be completed individually and critiqued as a group. Each lab is to be handed in at the beginning of the next lab period for grading. The labs are generally very rigorous and can’t be completed the night before they are due. Be sure to allow plenty of time to complete the lab problems. No late laboratory exercises will be accepted.

Exams and Projects-
For this course there will be two (2) lecture tests (100 points each) and eight (8) labs (25 points each) for a total of 200 points. Additionally, the mapping project will be graded based on 200 points. No late projects will be accepted. There are no make-ups for unexcused missed exams. There will be no extra credit given during this course.

Equipment Required for Geologists-
- Brunton Style Compass (Damped, International)
- 10x or 14x Hand Lens (triplet is best)
- Chistle or Pick Point Rock Hammer
- Erasable Colored Pencils (10 to 12)
- Field Notebook with replaceable paper
- Global Positioning System (i.e., ETrex Legend)
Instructor: Dr. Randy L. Kath, P.G.
Professor of Geology, Department of Geosciences
Director, Center for Water Resources
University of West Georgia
tel: (678) 839-4063
http://www.westga.edu/~geosci
rkath@westga.edu

Office: Room G-8, Geosciences Department (Callaway Building)
Office Hours: M 10:00 - 12:00, T 11-1:30, 2:30-3:30, W 9 - 11:00, Th 11-1:30, 2:30-3:30; or by appointment
Textbook: Geology in the Field: by Robert R. Compton (2nd edition)