GY 302: Crystallography and Mineralogy (Fall 2016)
4 credit hours

Your Host: Dr. Doug Haywick
http://www.southalabama.edu/geology/haywick

Bulletin Description: Introduction to elementary crystallography, crystal chemistry, and atomic structure of minerals, as well as the identification, characterization, and use of common rock-forming minerals and important ore minerals. Prerequisites: GY 111, GY 112, CH 131, or permission of the instructor.

Objectives and Goals: Specific student learning goals and objectives include: (1) recognition of crystal systems and symmetry elements (e.g., mirror planes, axes of rotation etc.); (2) understanding crystallography controls on optical mineralogy; (3) appreciation of the economic importance of ore minerals; (4) geochemical controls on mineral formation. Prerequisites: GY 111/111L, GY 112/112L and CH 131.

Class Format: GY 302 is taught in Flipped format. All students are required to attend all lectures and lab session and to watch a video comprising the second lecture of the week before the second lecture slot on Thursday. Thursday lecture slots will largely be used for discussion session, group activities and prep work (e.g., practice tests). Students in GY 302 will have access to all lectures in the class in video format should they wish to review subject material. Do not be late for lectures or for labs. The weekly lab tests will be administered during the first 20 minutes of the Tuesday lab session and I will not give you extra time just because you are late.

TENTATIVE LECTURE/LAB GAME PLAN

Week 1 CRYSTALLOGRAPHY
Tues Aug 16: Pre test; Course structure; class organization (0)
Lab Tuesday: Special Lecture: Introduction to crystal chemistry, Symmetry operations (1)
Online: nothing this week
Thurs Aug 18: Plane and Bravais Lattices (2)
Lab Thursday: Group Activity 1: Recognition of symmetry in models

Week 2 CRYSTALLOGRAPHY
Tues: Miller Indices and Point Groups (3)
Lab: Cubic and Hexagonal Mineral Systems: (Assignment 1: Cubic/Hex models)
Online: Space Groups, Twinning and Crystal Growth (5)
Thurs: Stereonet projections of crystal faces (4)

Week 3 CRYSTALLOGRAPHY
Tues: Group Activity 2: How to use stereonets (Assignment 2: Stereonet projections)
Lab: Orthorhombic/Tetragonal Systems (Assignment 3: Ortho/Tetra models)
(Quiz 1: Hex & Cubic Models)
Online: Polymorphs, pseudomorphs and crystal habit (6)
Thurs: Discussion: Pseudomorphs are sneaky!

Week 4 OPTICAL MINERALOGY AND CRYSTALLOGRAPHY
Tues: Basic transmission and incident light microscopy (7) Lecture Test 1 issued
Lab: Monoclinic/Triclinic Systems (Assignment 4: Mono/Triclinic models)
(Quiz 2: Ortho & Tetra Models)
Online: nothing this week (test time)
Thurs: Basic transmission and incident light microscopy continued (7)

Week 5 NATIVE ELEMENTS AND SULFIDES
Tues: Native elements: Gold (8) Test 1 due by 11:00 AM
Lab: Optical mineralogy exercises (Assignment 5: Microscopy)
(Quiz 3: Tri & Mono Models)
Online: Native elements: Diamonds (8)
Thurs: Optical mineralogy exercises continued
Week 6 SULFIDES AND SULFOSALTS
Tues: Economics of Sulphides/sulfosalts (9) ONLINE (Doug is at the GCAGS Meeting)
Tuesday Lab: Native and Sulfide mineral identification (Doug is at the GCAGS Meeting)
Online: Economics of sulfides/sulfosalts (9)
Thurs: Economics of Sulphides/sulfosalts (10)
Thurs Lab: Native and Sulfide mineral identification (Assignment 6: Poster Mineral Selection)

Week 7 OXIDES, HYDROXIDES AND HALIDES
Tues: Properties & economic uses of oxide/hydroxide minerals 1 (11)
Lab: Oxide/hydroxide mineral identification
(Quiz 4: Natives/sulphides)
Online: Properties & economic uses of oxide/hydroxide minerals 2 (12)
Thurs: Group Activity 3: Ore assessment (17), Developing a mine (Assignment 7: Ore assessment)

Week 8 HALIDES
Tues: Properties & economic uses of halides (13)
Lab: Carbonate and Halide mineral identification
(Quiz 5: Oxide/hydroxides, Mineral Note Book Examination 1)
Online: Nothing this week
Thurs: Fall Break

Week 9 CARBONATES, SULFATES AND PHOSPHATES
Tues: Properties & economic uses of carbonate minerals (14)
Lab: 1 hour presentation/discussion: Poster Prep. Guidelines (16)
Carbonate and Halide mineral identification
Online: Properties & economic uses of sulphate and phosphate minerals (15)
Thurs: Lecture Test 2 (October 13; in class)

Week 10 THE SILICATES
Tues: Orthosilicates (olivine group) (18)
Lab: Sulfate and Phosphate mineral identification
(Quiz 6: carbonates/halides)
Online: Orthosilicates (garnet group) (19)
Thurs: Group Activity 4: Writing Assignment discussion

Week 11 THE SILICATES
Tues: Soro and Cyclosilicates (20)
Lab: Silicate mineral identification
(Quiz 7: sulfates/phosphates)
Online: Inosilicates (pyroxenes & pyroxenoids) (21)
Thurs: Group Activity 5: Poster Draft Class Critique

Week 12 THE SILICATES
Tues: Inosilicates (amphiboles) (22)
Lab: Silicate mineral identification
(Quiz 8: Ortho/soro/cyclosilicates)
Online: Phyllosilicates (Mica group) (23)
Thurs: Discussion: Recognition of minerals in igneous rocks
Week 13 THE SILICATES
Tues: Phyllosilicates (Clay group; X-ray diffraction) (24)
Lab: Silicate mineral identification
(Quiz 9: Inosilicates)
Online: Nothing this week
Thurs: Group Activity 6: X-ray Diffraction

Week 14 THE SILICATES
Tues: Tektosilicates (Silica Group) (25) Posters Due via email by 5:00 PM
Lab: Silicate mineral identification
(Quiz 10: Phyllosilicates)
Online: Tektosilicates (Feldspar Group) (26)
Thurs: Tektosilicates (Feldpathoid group) (27) Posters Printed by 12:00 Noon

Week 15 PRESENTATION WEEK
Tues: 3 minute poster presentations (Setup posters in LSCB 1st floor hallway by 12:30 PM)
Lab: Poster Presentation (GSA Conference Style)
Thurs: Thanksgiving Day Holiday

November 25-27 [Mobile Rock and Mineral Society rock/mineral show; extra credit

Week 16 FINAL BUSINESS
Tues: Last minute final lab test cram session
Lab: Final Lab test Mineral Note Book Examination 2
Lect 2: Final Lecture Exam Prep (28)

Tuesday December 6th; 2 hour in-class Final exam 10:30am to 12:30 p.m.


Additional Requirements: GY 302 Notebook
Laptop or Notebook Computer with wireless capabilities
Quality Hand lens
Art ink pens (optional, but useful for your mineral notebook)
Mineral identification handbook (optional)
Mineral hardness testing kit (optional)

Assessment: Attendance* 05%
Discussion Participation* 05%
Lab manual** 10% (examined twice)
Lab quizzes*** 20%
Assignments 05%
Mineralogy poster*** 10%
Poster Presentation*** 05%
Lecture test 1 (Take home) 10%
Lecture test 2 (in class) 10%
Lecture test 3 (in class) 10%
Lab Final exam** 10%
100%

Grading: A - 90+  B - 80 to 89  C - 70 to 79  D - 60 to 69  F - 59 and below
**Attendance and Discussion Participation:** It seems that a good number of people who take courses feel they do not have to attend classes. Even more feel that they can ignore class content. Nothing could be further from the truth. Much of the material we will discuss will not be covered in textbooks or on web pages and if you miss class or zone out during class, you will miss this material. Besides, it is rude to the instructor. Attendance is mandatory and assessable in GY 302 (5%). So is your participation in discussion sessions (5%). As far as attendance is concerned, I will dock you if you miss 3 or more once weekly classes and/or lab sessions. If you have 5 or more unexcused absences you will receive 0% for attendance. Excessive absences (more than 20% of class meetings) will result in an additional punitive 10% reduction of your grade (e.g., I will dock you an additional letter grade). If you also fail to complete less than ½ of the quizzes, assignments and exams, I will be forced to assign you an F* grade.

An unexcused absence is one where you fail to attend class and cannot provide an acceptable reason for your absence (e.g., medical excuse). There will be no exceptions to this attendance/discussion policy.

**Laboratories and Mineral Notebooks:** It is up to you to examine the specimens that are assigned in this course and to do all additional laboratory assignments. You need do this during the lab periods as well as outside of normal university hours. A good chunk of your mark in GY 302 will be based upon lab material (lab tests, quizzes etc). Spend suitable time in the lab going over the crystallographic models and minerals. Refer to the web page for lab assignment due dates. I do not give extensions; labs assignments not turned in on time will not be accepted (you get an F for that assignment). You are all required to produce a mineral lab book of all of the minerals that you will see in this class. An example page will be available online, but you are free to make your own if you wish. The mineral note book will be examined twice (see due date webpage). Each examination will be worth 5% of your total grade (total 10%).

**Lab Quizzes and Final Lab Exam:** There are a whole bunch of minerals and crystal systems that you need to know in this class. To make it manageable for you, I’ve found it best to give you weekly quizzes. They will start in Week 3 and will be at the start of each lab session (Tuesday 1:00 to 1:30 PM). Weeks 3-5 involve crystal systems. Each of you will pull 2 wooden models out of a “hat” and answer specific questions about those models during the quiz periods. From Week 8 onwards, the quizzes will be on minerals. You will need to answer specific questions about 5-8 unknown minerals based upon the previous weeks mineral offerings (25-30 each week). You will use your mineral notebooks for these quizzes so make sure that you record all of the important information that you are responsible for during the week before the lab test. This is a time consuming process; budget at least 5-8 hours of additional examination time per week. I give bonus opportunities on most quizzes that is based upon previous work in the labs, so try not to forget everything you learn from week to week. The final lab exam will consist of 30 minerals drawn from the entire GY 302 mineral collection, but 6 will be tektosilicates (they will be asterisked for you). For the final, you will only have to identify the mineral but you will still be able to use your mineral note book.

**Assignments:** Expect some assignments in this class. All assignments (and where applicable, revised versions) are due in my office (hardcopy or online submissions) by 5:00 pm on the assigned due dates. I will not accept late assignments (you will get an F). See the class website for a comprehensive assignment schedule.

**Poster Session:** The capstone project in this class will be a poster presentation on one mineral of your choice. The poster will follow a standard PowerPoint template associated with a geological meeting hosted by the GSSA (The Geological Survey of South Alabama). Although this is a fictitious organization, the poster will be presented in a conference setting modelled after real GSA meetings. You will be provided with the poster template for this assignment. Do not modify it. Posters will be put on display around the building at the end of the semester and will be criticized by Earth Sciences faculty. In addition to the poster session, each student will be given a 3 minute time slot to present their posters to the class in oral format during the class period on the day the posters will be put on display.
Missed exams: The reason for producing a syllabus is to give students advanced notice of exams and assignment due dates. Translation: there is no excuse for missing an exam. However, sometimes it happens. If you have a legitimate excuse for missing an exam (i.e. medical problem), you will be permitted to write a make-up during the last week of classes provided that you show me a signed certificate from a medical doctor stating that it was impossible for you to make the exam. **The make up exam will consist of 2 essay questions** (i.e. no easy stuff like multiple choice questions).

Students with Disabilities: In accordance with the Americans with Disabilities Act, students with bona fide disabilities will be afforded reasonable accommodations. The Office of Special Student Services (OSSS) will certify a disability and advise faculty members of reasonable accommodations. If you have a specific disability that qualifies you for academic accommodations, please notify the instructor/professor and provide certification from the Office of Special Student Services. OSSS is located at 5828 Old Shell Road at Jaguar Drive, (251-460-7212).

Changes in Course Requirements: Not all classes progress at the same rate thus course requirements might have to be modified as circumstances dictate. You will be given written notice if the course requirements need to be changed.

Academic Disruption Policy: The University of South Alabama’s policy regarding Academic Disruption is found in The Lowdown, the student handbook:


Disruptive academic behavior is defined as individual or group conduct that interrupts or interferes with any educational activity or environment, infringes upon the rights and privileges of others, results in or threatens the destruction of property and/or is otherwise prejudicial to the maintenance of order in an academic environment. I expect all students to be cordial, courteous and respectful of each other. I will behave the same way towards you.

Student Academic Conduct: The University of South Alabama’s policy regarding Student Academic Conduct Policy is found in The Lowdown:


The University of South Alabama is a community of scholars in which the ideals of freedom of inquiry, freedom of thought, freedom of expression, and freedom of the individual are sustained. The University is committed to supporting the exercise of any right guaranteed to individuals by the Constitution and the Code of Alabama and to educating students relative to their responsibilities. If you violate these standards in my class, you will be asked to leave my class… permanently.

Online Writing Support: The University of South Alabama provides online writing tutoring services through SMART THINKING, an online tutoring service. SMART THINKING is available at [http://services.smarthinking.com](http://services.smarthinking.com). Students may enter the site by logging on with their Jag number and using the last four digits of the social security number as the password. For log-on problems, technical questions and/or on-campus writing assistance, contact the USA Writing Center at 251-460-6480 or e-mail csaint-paul@usouthal.edu.

The fine print: Plagiarism and cheating are not permitted in this class and either of them will result in severe embarrassment to you (and quite possibly an F for the assignment or exam in question) if you are caught doing them. Be sure to use proper reference citations in your take home exam otherwise it’s plagiarism. All written reports (essay questions, term papers, assignments) are subject to examination through the Turnitin website. This is not meant as a punishment, but is instead, a process intended to improve your writing skills. See me if you have questions about plagiarism and/or Turnitin during my office hours.
D. Haywick Contact Information, Office Hours and Schedule

How & where to find Doug: I reside in LSCB room 049. I believe in open office hours, so feel free to pay me a visit anytime between 9:00 am & 5:00 pm. However, I will generally be in my office during the times posted on my schedule. Should you be unsuccessful in your attempts to find me, fear not! You have two options: 1) check the Where’s Doug note on my door for my location during normal office hours, or 2) leave a message for me:

Telephone: 460-7569 (Haywick’s office – you can leave a message).
E-mail: dhaywick@southalabama.edu
internet: http://www.southalabama.edu/geology/haywick

D. Haywick Hours (Fall 2016 Semester)

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Note: shaded areas are research/committee/personal times: STAY AWAY!

I will permit you to use laptops, smartphones and/or tablets during my lectures if they are being used for the right reasons (i.e., to access online GY 302 relevant content). Facebook, Twitter, checking your email or watching videos in NOT permitted. The first time I see you playing with anything not related to this class, I will politely ask you to stop. The next time, I will be less polite. **Don’t try it 3 times.**