GY 302: Crystallography & Mineralogy

Lecture 0: Introduction to GY 302

Instructor: Dr. Douglas Haywick
Today’s Agenda

1. Syllabus
2. Web resources
3. Your responsibilities
4. Surviving GY 302
Introductions

Doug Haywick

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Cell: 454-0376
dhaywick@southalabama.edu

Class Website:
www.southalabama.edu/geology/haywick/GY302

LSCB 337 Door combo: 2341
LSCB 314 (Study room): 4312
LSCB 315 (Library): closed for a while
# Introductions

## D. Haywick Hours (Fall 2016 Semester)

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>8:00-8:50 AM</td>
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<tr>
<td>9:05-9:55 AM</td>
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<td>Office</td>
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<tr>
<td>10:10 AM-12:00 PM</td>
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<td>GY 111L-106 Lab (LSCB 335)</td>
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<td>12:20-2:10 PM</td>
<td>Office</td>
<td>GY 111-104 Lab (LSCB 335)</td>
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<td>2:10-3:00 PM</td>
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<td>3:00-4:00 PM</td>
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<td>4:00-5:00 PM</td>
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<tr>
<th>Time</th>
<th>Tuesday</th>
<th>Thursday</th>
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<tr>
<td>8:00-9:15 AM</td>
<td>Office</td>
<td>Office</td>
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<tr>
<td>9:30-10:45 AM</td>
<td>ARS 396 (Doug is in Art class)</td>
<td>ARS 396 (Doug is in Art class)</td>
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<td>11:00 AM-12:00 PM</td>
<td>GY 302-101 Lecture (LSCB 337)</td>
<td>GY 302-101 Activity (LSCB 337)</td>
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<tr>
<td>12:00-2:00 PM</td>
<td>GY 302-101 Lab 1 (LSCB 337)</td>
<td>GY 302-101 Lab 2 (LSCB 337)</td>
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<tr>
<td>2:00-3:15 PM</td>
<td>GY 111-104 (LSCB 119)</td>
<td>GY 111-104 (LSCB 119)</td>
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<tr>
<td>3:20-5:00 PM</td>
<td>ARS 411 (Doug is in Art class)</td>
<td>ARS 411 (Doug is in Art class)</td>
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Note: shaded areas are research/community/personal times: STAY AWAY!
Stuff for GY 302

- Quality hand lens
- Quality pocket knife
- Graphite pencils, ink pens
- GY 302 hard-covered lab book
- Wireless capable labtop/netbook/tablet
- Hardness kits
- Coffee mug
Surviving GY 302

The Syllabus…

…is subject to change
# Surviving GY 302

## Part 1: Crystallography

3 weeks of lectures, 3 labs

### 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!
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Part 2a: Optical Mineralogy
1 week of lectures, 1 lab

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
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Part 2b: Mineralogy
11 weeks of lectures, 11 labs

**Week 6**  
**Sulfides and Sulfosalts**  
**Tues:** Economics of Sulfides/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 Sulfides/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
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Assessment:

<table>
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<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Attendance*</td>
<td>05%</td>
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<tr>
<td>Discussion Participation*</td>
<td>05%</td>
</tr>
<tr>
<td>Lab manual**</td>
<td>10% (examined twice)</td>
</tr>
<tr>
<td>Lab quizzes***</td>
<td>20%</td>
</tr>
<tr>
<td>Assignments</td>
<td>05%</td>
</tr>
<tr>
<td>Mineralogy poster***</td>
<td>10%</td>
</tr>
<tr>
<td>Poster Presentation***</td>
<td>05%</td>
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<tr>
<td>Lecture test 1 (Take home)</td>
<td>10%</td>
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<tr>
<td>Lecture test 2 (in class)</td>
<td>10%</td>
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<tr>
<td>Lecture test 3 (in class)</td>
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<tr>
<td>Lab Final exam**</td>
<td>10%</td>
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<td>**</td>
<td>100%</td>
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Grading:  
A - 90+    B - 80 to 89    C - 70 to 79    D - 60 to 69    F - 59 and below
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Poster Session

***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 modeled 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.

**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)*
Lab: Poster Presentation (GSA Conference Style)
Thurs: Thanksgiving Day Holiday

November 25-27 Mobile Regional Mineral Society workshop and classes continue...
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Lab Assignments

- a mixture of practical and writing assignments (5-8)
- the first one (crystallography) is due in 3 weeks

Orthorhombic and Tetragonal Models

Name: __________________________  Date: ________________

Model Number: __________  Crystal Class: __________

Stick Diagram

1) How many mirror planes does it have? ________________________

2) How many 2 fold rotational axes does it have? _________________

3) How many 3 fold rotational axes does it have? __________________

4) How many 4 fold rotational axes does it have? __________________

5) How many 6 fold rotational axes does it have? __________________

6) What is the highest rotational symmetry of the model? __________

7) Are any of the axes (above 2 fold) rotation inversion axes (e.g. 3 and above)? □ Yes □ No (indicate which on questions 2-6)

8) Does the model have a center of inversion? □ Yes □ No

9) What is the point group of the model? __________________________
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Lab Quizzes

- these are more or less weekly
- the first one occurs 12:00-12:20 pm three weeks from today
The most effective teaching technique is group discussions; I will occasionally ask you questions. Be prepared (e.g., pay attention)
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Questions?
GY 302 Pre-tests

1: Individual test (5 minutes)
2: Group test (5 people per group) (15 minutes)
Today’s Lecture Homework

1. Purchase a hand lens, the GY 302 Mineral notebook, one big 3 ring binder* and decent art supplies (pencil, eraser, ink pens)

*for your notes, syllabus, assignments, quizzes etc.

Today’s Lab

1. Lecture 1: Introduction to crystallography
GY 302: Crystallography and Mineralogy

Lecture 0: Class Policy

Instructor: Dr. Doug Haywick
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