

University Puerto Rico, Mayagüez  
Faculty of Arts and Sciences  
Geology Department

**Course Title:** Morphological and Optical Crystallography  
**Class Code:** GEOL 3055L, Sections 070, 071, 080  
**Semester:** Fall 2016  
**Meeting Times:** M or W 13:30-16:20 or F 14:30-17:20  
**Room:** F-302

**Course Description:** Introduction to the internal structure and morphological characteristics of the 32 different classes of crystals & the principles of optical crystallography.

**Course Objectives:**

To understand and be able to identify the basic symmetry elements present in naturally-occurring minerals, including mirror planes, rotation axes, centers of symmetry, and rotoinversions.

To learn the six major symmetry classes, their symmetry elements and the most common natural representatives.

To know how to calculate Miller Indices from coordinates and the reverse.

To be able to create and read a stereonet diagram depicting crystal faces and symmetry elements.

To be able to calculate coordination numbers and average bond strengths.

**Laboratory Textbook:** Minerals and Rocks, 3<sup>rd</sup> edition  
Cornelis Klein

<b>Instructor(s):</b>	<b>Athena Español de la Cruz</b>	<b>Yesenia Herrera</b>
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<b>Phone Number:</b>	787 832 4040 x3021	787 832 4040 x3021
<b>Office Room #:</b>	Physics FA-417B	Physics FA-417B
<b>Laboratory Times:</b>	M 13:30-16:20	W 13:30-16:20 F 14:30-17:20
<b>Room:</b>	Physics FA-302	Physics FA-302

<b>Grading:</b>	Laboratory Exercises (~15)	35%
	Field Trip Report	5%
	Group Projects	10%
	Midterm Exam #1	25%
	Midterm Exam #2	<u>25%</u>
	<b>Total</b>	<b>100%</b>

## Laboratory Rules:

- Attendance at every lab period is mandatory! Come prepared to pay attention and take notes. Disturbances will not be tolerated; **TAs and Professor reserve the right to decline entrance to the lab due to being late and the right to dismiss any student being disrespectful or who is creating a disturbance.**
- **You must attend your assigned Laboratory Section.** You are not allowed to attend the other section if you miss your section. Don't even ask! The sections are overcrowded; there are not enough supplies for more people to attend than are assigned to that section.
- **Late assignments will not be accepted!** This is to ensure that lab assignments are graded the same for each student.
- **Come prepared!** Read the exercise before the corresponding lab and bring your lab book to each lab period.

Mandatory class material: textbook! You will use this for next semester too. **IF YOU CHOSE NOT TO BUY THE BOOK, PHOTOCOPY SOMEONE ELSE'S BEFORE YOUR LAB SECTION. DO NOT COME TO LAB EXPECTING TO BORROW SOMEONE ELSE'S BOOK THEN LEAVE TO PHOTOCOPY IT! YOU WILL NOT BE ALLOWED TO REENTER THE LAB ROOM.**

Suggested class materials: colored pens and/or pencils, highlighters, notebook, metallic ruler, calculator, etc.

- The two lab exams will be given on their dates. They will consist of short-answer questions. You will be required to write in English and draw schematic figures. Make-up exams will be made only by the discretion of the professor, not the TA, and never without an EXTRAORDINARY reason. If you miss an exam, you must contact the professor within 24 hours and, if permitted, take the make-up exam at the next office hour.
- Working in groups is permitted and encouraged. However, each individual is responsible for knowing the necessary material covered by the exams. The exams will **not** be group efforts!
- Attendance to the class field trip is mandatory! There will be no make-up, at all. The report will not be accepted from those who do not attend. Plan accordingly!
- In order to maintain order and organization, lab materials **MUST** be returned in the appropriate location (drawer, box, cabinet, etc.) Your TAs and I are not your mother or your maids. If significant disorder results, all students in the lab section responsible will lose 5% of their lab grades for each lab period after which we have to reorganize the lab materials. Keep an eye on your fellow students and politely encourage them to prevent entropy.
- **Your lack of preparation does not constitute my emergency! Ever!** Remember that I and your TAs have other responsibilities (and private lives) so give us proper warning when you need something. Also, stress in your life **NEVER** gives you the right to disrespect me or the TAs. Ever! **Disrespect will be dealt with severely!**

**Special Accommodations:** Those students with learning disabilities must contact the Dean of Students with the proper paperwork. I will be happy to accommodate those students with proper paperwork.

**Academic Honesty:** Those students found violating the student code of conduct (including plagiarism) will be reported to the Dean of Students and are subject to disciplinary action (including failing this course).

### Course Schedule

Week #	Date	Topic	1st Edition	2nd Edition
1	M 15 Aug	Basic Symmetry Elements	Exer. 1	Exer. 8
	W 17 Aug	Basic Symmetry Elements	Exer. 1	Exer. 8
	F 19 Aug	Basic Symmetry Elements	Exer. 1	Exer. 8
2	M 22 Aug	External Crystal Forms: Part I	Exer. 2	Exer. 9
	W 24 Aug	External Crystal Forms: Part I	Exer. 2	Exer. 9
	F 26 Aug	External Crystal Forms: Part I	Exer. 2	Exer. 9
3	M 29 Aug	External Crystal Forms: Part II	Exer. 2	Exer. 9
	W 31 Aug	External Crystal Forms: Part II	Exer. 2	Exer. 9
	F 2 Sep	External Crystal Forms: Part II	Exer. 2	Exer. 9
4	M 5 Sep	<i>Feriado (Dia del Trabajo): No Lab</i>		
	W 7 Sep	Common Crystal Forms	Exer. 3	Exer. 10
	F 9 Sep	Common Crystal Forms	Exer. 3	Exer. 10
5	M 12 Sep	Common Crystal Forms	Exer. 3	Exer. 10
	W 14 Sep	Atomic Packing & Coordination Number	Exer. 17	Exer. 3
	F 16 Sep	Atomic Packing & Coordination Number	Exer. 17	Exer. 3
6	M 19 Sep	Atomic Packing & Coordination Number	Exer. 17	Exer. 3
	W 21 Sep	Translation in 1D & 2D	Exer. 10	Exer. 17
	R 22 Sep	<i>Friday Schedule: Translation in 1D &amp; 2D</i>	Exer. 10	Exer. 17
	F 23 Sep	<i>Academic Recess: No Class</i>		
7	M 26 Sep	Translation in 1D & 2D	Exer. 10	Exer. 17
	W 28 Sep	Introduction to Space Lattices	Exer. 11	Exer. 18
	F 30 Sep	Introduction to Space Lattices	Exer. 11	Exer. 18
	S 1 Oct	<b>Mandatory Class Field Trip</b>		
8	M 3 Oct	Introduction to Space Lattices	Exer. 11	Exer. 18
	W 5 Oct	Introduction to Space Groups	Exer. 12	Exer. 19
	F 7 Oct	Introduction to Space Groups	Exer. 12	Exer. 19
9	M 10 Oct	Introduction to Space Groups	Exer. 12	Exer. 19
	T 11 Oct	<b>Lab Exam #1 (Ex. 1-3, 10 &amp; 17) TBA</b>		
	W 12 Oct	<i>Monday Schedule: Set up Xtl Growth Exps</i>		
	F 14 Oct	Set up Xtl Growth Experiments		

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Week #	Date	Topic	1st Edition	2nd Edition
10	M 17 Oct	Introduction to Miller Indices	Exer. 4	Exer. 11
	W 19 Oct	Set up Xtl Growth Experiments		
	R 20 Oct	<i>Friday Schedule: Miller Indices</i>	Exer. 4	Exer. 11
	F 21 Oct	<i>Academic Recess: Open House</i>		
11	M 24 Oct	Stereo Projection	Exer. 5	Exer. 12
	W 26 Oct	Introduction to Miller Indices	Exer. 4	Exer. 11
	F 28 Oct	Stereo Projection	Exer. 5	Exer. 12
12	M 31 Oct	Form Development in Stereo Projection	Exer. 7	Exer. 14
	W 2 Nov	Stereo Projection	Exer. 5	Exer. 12
	F 4 Nov	Form Development in Stereo Projection	Exer. 7	Exer. 14
13	M 7 Nov	<i>Feriado: Voting Day (No Class)</i>		
	T 8 Nov	<i>Feriado: Voting Day (No Class)</i>		
	W 9 Nov	Form Development in Stereo Projection	Exer. 7	Exer. 14
	F 11 Nov	<i>Feriado (Dia de los Veternos): No Class</i>	Exer. 8	Exer. 15
14	M 14 Nov	Form Development II	Exer. 8	Exer. 15
	T 15 Nov	<i>(Last Day to Drop Course)</i>		
	W 16 Nov	Form Development II	Exer. 8	Exer. 15
	F 18 Nov	Form Development II	Exer. 8	Exer. 15
15	M 21 Nov	Work on Group Projects		
	T 22 Nov	<b>Lab Exam #2 (Ex. 4-5, 7-8, 11-12) TBA</b>		
	W 23 Nov	Architecture of Borates & Silicates	Exer. 18	Exer. 4
	F 25 Nov	Architecture of Borates & Silicates	Exer. 18	Exer. 4
16	M 28 Nov	Architecture of Borates & Silicates	Exer. 18	Exer. 4
	W 30 Nov	Work on Group Projects		
	F 2 Dec	<i>Thanksgiving - No Lab</i>		
17	M 5 Dec	Group Project Presentations		
	W 7 Dec	Group Project Presentations		
	F 9 Dec	Group Project Presentations		
	10-17 Dec	Final Exams - TBA		

**This schedule is subject to change.**