

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

Course Title: Morphological and Optical Crystallography
Class Code: GEOL 3055, Sections 020 and 030 (3 credits)
Semester: Fall 2016
Meeting Times: M & W 08:30-0:20 or 09:30-10:20
Room: F-201
Co-requisites: GEOL 3025: Introductory Geology; GEOL 3047 Intro Geol Lab;
QUIM 3131: Chemistry I and QUIM 3132: Chem I Lab

Course Description: Introduction to the internal structure and morphological characteristics of the 32 different classes of crystals & the principles of optical crystallography. Description and discussion of the 6 silicate architectures.

Course Objectives:

To be familiar with the relationship between the configuration of electrons (including their spectroscopic configuration) and their roles in the types of chemical bonding between atoms, as well as how the relationships between electrons are responsible for certain physical properties.

To understand and be able to identify the basic symmetry elements present in naturally-occurring minerals (e.g. rotation axes, mirror planes, inversions, glide planes, screw axes, etc.) and how these result from the crystal structure of the mineral.

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

To know the six major silicate structural groups and which common minerals (and formulae) are in each of these groups.

To know the major non-silicate structural groups and which common minerals (and formulae) are in each of these groups.

Professor: Dr. Lysa Chizmadia
Email Address: meteoritachica@yahoo.com
Phone Number: 787 832-4040 x3004
Office Room #: Physics FA-415
Office Hours: M & W & F 16:00- 18:00
Course Website: <https://ecourses.uprm.edu/course/view.php?id=886>

** many materials for this class will be available on this website, e.g. both syllabi, homework assignments, lab materials, term paper instructions and review materials for exams. Please consult this site often for updated materials.

Textbook: The Manual of Mineral Science, 23rd Edition
Cornelis Klein and Barbara Dutrow
ISBN-13: 978-0471721574

Laboratory Textbook: Minerals and Rocks, 3rd edition
Cornelis Klein
ISBN-13: 978-0471772774

Both of these textbooks are Mandatory.

** other editions of these texts are permitted, but page numbers may not be the same and some information may be obsolete.

Laboratory Times:	M 13:30-16:20	W 13:30-16:20
Room:	Physics FA-302	F 12:30-17:20
Instructor(s):	Athena Español de la Cruz	Physics FA-302
Email Address:	athena.espanol@upr.edu	Yesenia Herrera
Phone Number:	787 832 4040 x3021	yesenia.herrera1@upr.edu
Office Room #:	Physics FA-417B	787 832 4040 x3021
		Physics FA-417B

Grading:	Homework & Quizzes (~15)	20%
	Midterm Exams (2)	20%
	Term paper	20%
	Outline = 1 Homework Assignment	
	Draft = 1/4 (5% of final grade)	
	Laboratory Assignments & Exams	20%
	Final Exam	<u>20%</u>
	Total	100%

Class Rules:

- **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 or want something (including letters of recommendation).
- Stress in your life **NEVER** gives you the right to disrespect me or the TAs. **Ever!** Disrespect will be dealt with harshly, including being reported to the Director of the Department and the Dean of Academic Affairs.
- **Disturbances will not be tolerated.** If you disturb the class you will be asked to leave (this includes conversations or preventing other students from paying attention). If you are not able to stay for the whole class, leave quietly. **You are adults. Act like adults.** If you create a significant disturbance in class, I reserve the right to give pop quizzes or cancel class in response. If I cancel class, all students will be responsible for learning the material on your own because it will be covered by the midterm and final exams.
- **Turn off your cell phones!** If a cell phone rings during class, I reserve the right to give pop quizzes. If a cell phone rings during an exam (including lab exams), we reserve the right to confiscate it. Confiscated phones will be returned at the end of the course (at the latest).
- **Attendance at every class is encouraged,** but not mandatory. Satisfactory attendance will be determined by three things: prompt attendance to midterm exams and to the final exam, by homework assignments being turned in on time and your attendance in lab. Although attendance is not mandatory, pop quizzes will take place during class lectures and can take place at any time during the class period. There will be no make up opportunities for missed pop quizzes, no matter what the reason. These pop quizzes together will count for 10-15% of your final grade.
- **You must attend your assigned Laboratory Section.** You are not allowed to attend another section if you miss your section. Don't even ask! The lab sections are already overcrowded and there are not enough supplies for more people to attend than are assigned to that section.
- **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!

- **Come prepared!** Read the chapter before the corresponding lecture & print out lecture slides. Pop quizzes can contain material from both the lectures and the reading., usually from the class before, but can include any previous material. Suggested class materials: textbook, colored pens and/or pencils, highlighters, notebook, ruler, calculator, etc.
- **Exams and lectures are in English.** Please feel free to record lectures, ask me questions and/or email me any questions, doubts, concerns or frustrations – this is your responsibility. Some of the vocabulary words are not similar in Spanish. You can ask questions during the exams, but I will not give you definitions, only synonyms if they exist.
- Midterm 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 TAs) 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. If you have an appropriate emergency, plan to attend the following office hour (class assignments for this or other courses are **not** acceptable excuses) and bring documentation.
- Homework and laboratory assignments are due on their due dates. **Late assignments may not be accepted.** There will be approximately 5 homework assignments and 15 laboratory assignments over the course of the semester. Plan accordingly! Of course, any assignment can be turned in early to accommodate your schedule. If I **do** accept your late assignment, you **will** have a mandatory deduction of 10% per day.
- Regarding term papers: I expect you to write your own term paper. You may discuss topics with your friends and colleagues, but you must write your own drafts. **Late papers may not be accepted.** The professor reserves the right to not accept any late papers and those students whose late papers that are accepted, **will** receive an incomplete. **If plagiarism is discovered, you will receive a 0% for the term paper assignment, resulting in a loss of up to 2 letter grades.**
- The professor has inconsistent internet at home (and cell phone reception for that matter). Therefore, the professor reserves the right to have 24 hours to respond to email and phone messages, 48-96 hours on weekends and during academic recesses.
- I expect a minimum level of manners: “please” and “thank you” go a long way with me; please knock and wait to be invited before entering my office (at times not office hours – during office hours, it will be first come, first served), whining is never welcome; and for best results: be respectful. If given proper notice, I am happy to accommodate your wishes but I am not here to be at your disposal (nor the TAs).
- **Rule of Thumb:** treat me (and your TAs) as you would your favorite grandmother.

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 and especially plagiarism and ghost-writing) will be reported to the Dean of Students and are subject to disciplinary action, including failing this course. **Along these lines, I reserve the right not to grade your final exam until after I have checked your term paper for evidence of plagiarism!** This may result in your receiving an incomplete for the course.

Course Schedule

Week #	Date	Topic	22nd Ed	23rd Ed
1	M 15 Aug	Introduction to Course & Crystallography	Chpt 1	Chpt 1
	W 17 Aug	Intro to Symmetry Elements: Mirrors, Rotation & Inversions	Chpt 5	Chpt 6
2	M 22 Aug	Electronic Structure & Quantum Numbers	Chpt 3	Chpt 3
	W 24 Aug	Pauli Exclusion Principle & Spectroscopy Configuration	Chpt 3	Chpt 3
3	M 29 Aug	Mandatory Presentation from Writing Center		
	W 1 Sep	Paper Topics Assigned		
4	M 5 Sep	<i>Feriado (Dia del Trabajo): No Class</i>		
	W 7 Sep	Mandatory Mtg in Library Re: Literature Databases		
5	M 12 Sep	Atomic Bonding: Ionic vs. Covalent	Chpt 3	Chpt 3
	W 14 Sep	Mandatory Paraphrasing Activity		
6	M 19 Sep	Packing of Atoms & Coordination # & APF	Chpt 3	Chpt 4
	T 20 Sep	<i>Thursday Schedule: No Class</i>		
	W 21 Sep	Crystal Nucleation, Growth & Pt. Defects	Chpt 4	Chpt 4, 10
	R 22 Sep	<i>Friday Schedule: No Class</i>		
	F 23 Sep	<i>Academic Recess: No Class (Paper Outlines Due 23:59:59)</i>		
7	M 26 Sep	Dislocations & 3D Crystal Defects	Ch 2, 4	Ch 4, 10, 12
	W 28 Sep	How to Avoid Plagiarism in Term Paper		
	S 1 Oct	Mandatory Class Field Trip: Lajas & Cabo Rojo		

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Week #	Date	Topic	22nd Ed	23rd Ed
8	M 3 Oct	Crystal Classes, Crystal Axes & Bravais Lattices	Chpt 5	Chpt 7, 9
	W 5 Oct	Motifs, Translation, Space Groups & Point Groups	Chpt 5-6	Chpt 9
	F 7 Oct	Paper 1st Drafts Due 23:59:59		
9	M 10 Oct	<i>Feriado: No Class</i>		
	W 12 Oct	Intro to Silicate Architectures & Nesosilicates	Chpt 11	Chpt 18
10	M 17 Oct	Review for Midterm Exam #1		
	W 19 Oct	Midterm Exam #1		
	R 20 Oct	<i>Friday Schedule: No Class</i>		
	F 21 Oct	<i>Academic Recess: Open House</i>		
11	M 24 Oct	Sorosilicates & Cyclosilicates	Chpt 11	Chpt 18
	W 26 Oct	Inosilicates: Single Chains	Chpt 11	Chpt 18
12	M 31 Oct	Inosilicates: Double Chains	Chpt 11	Chpt 18
	W 2 Nov	Phyllosilicates: TO, TOT, TOTI	Chpt 11	Chpt 18
	F 4 Nov	Optional 2nd Drafts Due at 23:59:59		
13	M 7 Nov	<i>Feriado: Voting Day (No Class)</i>		
	T 8 Nov	<i>Feriado: Voting Day (No Class)</i>		
	W 9 Nov	Phyllosilicates: TOTI, TOT-H ₂ O, Chlorite	Chpt 11	Chpt 18
	F 11 Nov	<i>Feriado: Veteran's Day - No Class</i>		
14	M 14 Nov	Review for Midterm Exam #2		
	T 15 Nov	<i>(Last Day to Drop Course)</i>		
	W 16 Nov	Midterm Exam #2		
15	M 21 Nov	Tectosilicates: SiO ₂ Group & Feldspars	Chpt 11	Chpt 18
	W 23 Nov	Tectosilicates: Feldspathoids & Zeolites	Chpt 11	Chpt 18
16	M 28 Nov	Non-Silicate Structures: Carbonates	Chpt 10	Chpt 17
	W 30 Nov	<i>Thanksgiving - No Class</i>		
	R 1 Dec	<i>(Last day for Midterm Exams)</i>		
	F 2 Dec	Term Papers Due at 23:59:59		
17	M 5 Dec	Non-Silicate Structures: Sulphates & Phosphates	Chpt 9	Chpt 17
	W 7 Dec	Review for Final Exam		
	10-17 Dec	Final Exam: TBA		

This schedule is subject to change.