



GEO 347K: GEMS & GEM MINERALS

DEPARTMENT OF GEOLOGICAL SCIENCES

THE UNIVERSITY OF TEXAS AT AUSTIN



Thursday, December 20th, 2012

- Syllabus
- Objectives
- Schedule
- Project
- Old Exams
- Gem Notes
- Handouts
- Bibliography
- Links
- Messages



Messages

January 6, 2013

- The class textbook, [Gemmology](#); 3rd edition, by Peter G. Read, is no longer in print but is available free to registered UT students through an online link at <http://utxa.eplib.com.ezproxy.lib.utexas.edu/patron/FullRecord.aspx?p=269998>. You need an EID and password to view and/or print the online version. A hard copy is also on reserve in the [Geology Library](#).

January 6, 2013

- Labs do not meet the first week of class. They begin the following week. Monday, Jan. 21 is a University holiday, so students in the Monday section are asked to attend the first lab during one of the other lab sections that week.

December 20, 2012

- The [Glenn and Martha Vargas Gem and Mineral Collection](#) is now online! Browse and/or search 6300+ gemstones and mineral specimens and 5 subcollections. Got an iPhone? View part of the collection with a \$0.99 App available as "[Gems and Minerals by Varietal](#)" through the iTunes store.

December 20, 2012

- The [Featured Article](#) in the August, 2005 Lapidary Journal is about this class! Jamie Janczak, a former student turned free-lance writer, writes about faceting and her experiences in lab.

December 20, 2012

- Welcome to the Spring 2013 Gems and Gem Minerals class! From this home page you can navigate to course information, lecture handouts, on-line lecture notes and much more. Most announcements will henceforth be posted on the UT Blackboard site for this class.
- The spinning ball and stick model above shows the arrangement of carbon atoms in [diamond](#). It and other minerals are easily visualized with XtalDraw, now downloadable as [Drawxtl](#), a powerful (and free) graphics program that displays crystal structures.

[Messages](#) | [Syllabus](#) | [Objectives](#) | [Schedule](#) | [Project](#) | [Old Exams](#) | [Gem Notes](#) | [Handouts](#) | [Bibliography](#) | [Links](#)

Updated 12/20/12
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GEO347K Objectives

Syllabus
Objectives
Schedule
Project
Old Exams
Gem Notes
Handouts
Bibliography
Links
Messages

- ◆ What is a gem? What is a mineral?
- ◆ How do we tell one mineral from another, or from synthetic materials?
- Methods of ID, physical and optical properties
- ◆ From where does their beauty arise?
- Crystallography and optics
- ◆ How are gemstones shaped and polished?
- Lapidary arts
- ◆ Where do gems come from and how are they found?
- Important gem minerals and the geology of major gem localities
- ◆ Who and what determines the value of gems?
- Physical attributes, economic trends, synthetics and imitations

[Messages](#) | [Syllabus](#) | [Objectives](#) | [Schedule](#) | [Project](#) | [Old Exams](#) | [Gem Notes](#) | [Handouts](#) | [Bibliography](#) | [Links](#)

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- **Lecture:** 10:00 - 11:00; M, W, F; GEO 3.120
All Labs meet in JGB 3.102 ([Lab Syllabus link](#))
- **Labs:** (Rm. 3.102)
 - Mon. 2-4 (#27565) Ethan
 - Mon. 12-2 (#27563) Meredith
 - Tues. 2-4 (#27570) Ethan
 - Wed. 12-2 (#27573) Meredith
- **Instructor:** Dr. Mark Helper, JGB 4.112; 471-1009; helper@mail.utexas.edu
- **Teaching Assistants:**
 - Meredith Bush meredith.a.bush@utexas.edu
 - Ethan Lake etlake@mail.utexas.edu
- **Office Hours:** M, W, Fr; 9-10 and whenever my door (JGB 4.112) is open. TA office hours are in the lab syllabus.
 - Lab = 35%
 - Exam I = 15%
 - Exam II = 15%
 - Final Exam = 20%
 - Term Project = 15%
- **Grading:**
 - Lab = 35%
 - Exam I = 15%
 - Exam II = 15%
 - Final Exam = 20%
 - Term Project = 15%
- **Prerequisites:** You must be a registered student to participate in the laboratories for this class. This class does not count toward a degree in Geological Sciences.
- **Required text:** Read, Peter G., [Gemmology](#); 3rd edition. Elsevier, 324 pp. Copies are on reserve in the [Geology Library](#) and available online at <http://utxa.eblib.com.ezproxy.lib.utexas.edu/patron/FullRecord.aspx?p=269998>. You need an EID and password to view and/or print the online version.
- **Recommended text:** Cipriani, C. and Borelli, A., 1984. [Simon and Schuster's Guide to Gems and Precious Stones](#). Simon and Schuster. A handy, inexpensive, superbly illustrated book that is useful in lab.
- **Online Notes and handouts:** Notes for *material presented during lectures in the last half of the course*, are [available](#) on this web site. Many class handouts are available [here](#) as well.
- **Other Items:** Term Projects: Can be 1 or more faceted stones, several cabochons, a combination of both, or a paper on a topic of your choosing (subject to approval). See the [project description](#).
- **Web Sites:** The class website address is <http://www.geo.utexas.edu/courses/347k>. *Most of the material posted there is also accessible at the class Blackboard site.*
- **Academic Integrity:** [Scholastic dishonesty](#) of any type will not be tolerated. Violators will be referred to the Office of the Dean of Students for possible disciplinary action, which in the extreme may result in expulsion from the University.
- **Students with Disabilities:** Please [notify me](#) of any modification/adaptation you may require to accommodate a disability-related need. You will be requested to provide documentation to the [Dean of Students Office](#), in order that the most appropriate accommodations can be determined. Specialized services are available on campus through [Services for Students with Disabilities](#).
- **Attendance/Religious Holidays:** By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence. The same goes for other UT-sanctioned activities - please let me know in advance so I can arrange an accommodation.

GEO 347K Schedule, Spring 2013

DATE	TOPIC	LAB	READING
Jan. 14	Class Introduction; What is a Gem?	No lab first week	
16	The Basics - Mineral, Gem, Crystal, Gemstone <i>(Jan. 17 is last day of official adds/drops)</i>		Ch. 1, p. 9-10
18	Physical Properties		Ch. 5, 6, 7
21	MLK Holiday	Physical Properties & Intro. to Cab. Lab (JGB 1.110)	
23	Atoms, Elements & Crystals		Ch. 3
25	Light & Color		Ch. 8
28	Light & Color in Gems	Physical Properties, Color	Ch. 8
30	Phenomena in Gems <i>(12th class day; last day to drop for a possible refund)</i>		Ch. 8
Feb. 1	Phenomena in Gems II		Ch. 8
4	Crystal Shapes	Quantifying Color	Ch. 4
6	Symmetry & Crystal Systems		Ch. 4
8	Summary & Review		Review Sheet, Old Exams
11	Hour Exam 1	Crystal Systems and Symmetry	
13	Refraction of Light in Minerals		Ch. 9; handout
15	The Critical Angle		Ch. 9
18	Faceting Angles	Lab Exam	Ch. 19
20	Gemstone Design		Ch. 19
22	Double Refraction & Polarization		Ch. 10
25	Optic Axis(es) & Sign	Optical Properties	Ch. 7, p. 96-109.
27	Polarization & Crystal Systems		Ch. 7, p. 96-109.
March 1	Pleochroism		Ch. 7, p.108 - 110.
4	Synthesis & Summary	Mineral I.D. II	
6	Hour Exam 2		Review Sheet, Old Exams
8	Geology of Gem Deposits I		
SPRING BREAK 11-15			

[Syllabus](#)
[Objectives](#)
[Schedule](#)
[Project](#)
[Old Exams](#)
[Gem Notes](#)
[Handouts](#)
[Bibliography](#)
[Links](#)
[Messages](#)

18	Geology of Gem Deposits II	Faceting, Cab. Lab (Begin 1st gemstone)	Ch. 2
20	Geology of Gem Deposits III		Ch. 2
22	Geology of Gem Deposits IV		Ch. 2
25	Quartz	Faceting, Cab. Lab (Must finish pavilion this week to continue)	Course notes
27	Quartz (Chalcedony) and Opal		
29	Beryl - Emerald		
April 1	Beryl - Aquamarine et al. (last day to Q drop with approval)	Faceting, Cab. Lab or Paper	Course notes
3	Corundum: Ruby		
5	Sapphire		
8	Sapphire II	Faceting, Cab. Lab or Paper (Must finish 1st gemstone this week to continue faceting)	Course notes
10	Diamond I		
12	Diamond II		
15	Diamond III	Mineral I.D. II (Fluorescence)	Course notes
17	Tourmaline		
19	Garnet		
22	Topaz	Mineral I.D. IV (Inclusions) Review for Lab Final	Course notes
24	Spinel and Peridot		
26	Pearls		
27	Jade	Lab Final	Course notes Old Exams
May 1	Projects Due; Evaluations		
3	Review for Final Exam		
10	FINAL EXAM 2 -5 PM		

[Messages](#) | [Syllabus](#) | [Objectives](#) | [Schedule](#) | [Project](#) | [Old Exams](#) | [Gem Notes](#) | [Handouts](#) | [Bibliography](#) | [Links](#)

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GEO 347K Semester Project

Syllabus
Objectives
Schedule
Project
Old Exams
Gem Notes
Handouts
Bibliography
Links
Messages

You have 4 options to choose from for the semester project. These are:

- **OPTION 1:** One or more faceted gemstones;
- **OPTION 2:** Six or more cabochon gemstones;
- **OPTION 3:** A short paper on a topic previously approved by Dr. Helper.

REQUIREMENTS:

OPTION 1: The eight-sided brilliant you will all cut as your first stone may be turned in for your project. When grading I look for the following:

- A good polish on all facets, especially the table.
- No chips on the culet, corners or along the edges.
- Good placement of the facets. Are the points or lines of intersection even?
- Correct facet size. Are all facets of a certain type (pavilion mains, crown breaks, etc.) the same size?

With each gemstone **INCLUDE A CARD** with the following information:

- a. mineral (if it is synthetic, say so)
- b. type of cut (the first gemstone you cut is an 8-sided brilliant)
- c. index used (32 index for the first gemstone)
- d. critical angle
- e. pavilion angles
- f. crown angles
- g. polishing lap and polishing agent(s)(cerium oxide lap for quartz)
- h. finished size and weight

Please try to present gemstone projects in a neat and tidy package - gems don't look particularly attractive or alluring in a ziplock bag stapled to a scrap of paper.

OPTION 2: The following criteria must be met:

- At least one set of matching cabs. *made of the same material and the same size.*
- At least one freeform cab.
- At least three cabochons of different standard sizes.

When grading I look for the following:

- There should be a good polish over the entire dome of the cab.
- The dome should be smooth and symmetrical, with no flat spots.
- The outline of the standard cabs should be symmetrical, well rounded, and as close as possible to the standard size.
- The set of cabs should be identical in shape and size and complementary in appearance.
- The placement of the cab on the rough should produce an interesting or attractive cab.

For each cabochon or pair of cabochons **INCLUDE A CARD** with the following information:

- a. mineral and species
- b. size (if standard) and/or shape description (if freeform)
- c. polishing wheel and polishing agent

Please try to present gemstone projects in a neat and tidy package - gems don't look particularly attractive or alluring in baggies stapled to scraps of paper.

OPTION 3: Write a short (no more than 6 pages) paper on a topic related to gems or gem minerals. A good place to start is the online [gems bibliography](#) of the UT Geology Library, or the [reference list](#) for the online notes. Another good launching point is the online [searchable index](#) for Gems & Gemology, the premier publication of its type, linked to the class web site. *I am happy to assist in narrowing the focus of a topic, or to suggest a topic should you have trouble identifying one yourself.*

Papers should be written in a science style; references should be cited in the text, after or within

sentences that contain factual or inferential content, and compiled within a "References cited" page at the end of the paper. *Internet sources are okay, but in addition you must also have two "hard" (i.e. book, journal, periodical, etc.) sources.*

Once you have a draft, take it to the Undergraduate Writing Center, 211 Flawn Academic Center, for critique and improvement. They notify me in writing when a student has come to see them, and I strongly encourage all papers undergo this valuable process.

One final note: In recent years there has been an increase in the number of papers I receive that [plagiarize](#) sources. Any student who turns in such a paper will be required to sign a [Discipline Referral For Scholastic Dishonesty](#), which I transmit to the Office of the Dean of Students for disciplinary action. The penalty is a failing grade for the course. I make no exceptions, nor offer second chances.

All projects are due 10:00 AM, Wednesday, May 1. Completed projects will be accepted (and quickly returned with a grade!) any time during the semester. Late projects will be assessed a penalty of one letter grade (10 points) per day.

[Messages](#) | [Syllabus](#) | [Objectives](#) | [Schedule](#) | [Project](#) | [Old Exams](#) | [Gem Notes](#) | [Handouts](#) | [Bibliography](#) | [Links](#)

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