

Fall 2010 Syllabus

GEO 347K Gems and Gem Minerals

- **Lecture:** 10:00 -11:00; M, W, F; GEO 3.116
All Labs meet in GEO 3.102
- **Labs:**
(Rm. 3.102)
 - Mon. 11-1 (#26875)(Megan); 1-3(#26880)(Megan)
 - Tues. 2-4 (#26890)(Megan)
 - Wed. 1-3 (#26885)(Daniel); 3-5 (#26900)(Daniel)
 - Th. 2-4 (#26895)(Daniel)
- **Instructor:** Dr. Mark Helper, GEO 4.112; 471-1009; helper@mail.utexas.edu
- **Teaching Assistants:** Michael Kallstrom, GEO 3.102; mjkallstrom@mail.utexas.edu
Cory Hanson, GEO 3.102; chanson@mail.utexas.edu
- **Office Hours:** M, W, Fr; 9-10 and whenever my door (GEO 4.112) is open.
- **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 of the original are on reserve in the [Geology Library](#).
- **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 the class web site. Many class handouts are available [there](#) as well.
- **Other Items:** Term Projects: Can be 2 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](#).
The class website address is
- **Web Sites:** <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](#).

GEO347K Objectives

- 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*

GEO 347K Schedule, Fall 2010

DATE	TOPIC	LAB	READING
Aug. 25	Course Intro.; What is a Gem?	No lab first week	Ch. 1, p. 9-10
27	Physical Properties		Ch. 5, 6, 7
30	Atoms, Elements & Crystals <i>(Aug. 30 is last day of official adds/drops)</i>	Physical Properties & Intro. to Cab. Lab (Rm. 1.110)	
Sep. 1	Light & Color		Ch. 3
3	Light & Color in Gems		Ch. 8
6	Labor Day Holiday	Physical Properties, Color	Ch. 8
8	Phenomena in Gems		Ch. 8
10	Phenomena in Gems II <i>(12th class day; last day to drop for a possible refund)</i>		Ch. 8
13	Crystal Shapes	Quantifying Color (or Crystal Systems and Symmetry)	Ch. 4
15	Symmetry & Crystal Systems		Ch. 4
17	Summary & Review		Review Sheet, Old Exams
20	Hour Exam 1	Quantifying Color (or Crystal Systems and Symmetry)	
22	Refraction of Light in Minerals <i>(last day to drop w/o possible penalty)</i>		Ch. 9; handout
24	The Critical Angle		Ch. 9
27	Faceting Angles	Lab Exam	Ch. 19
29	Gemstone Design		Ch. 19
Oct. 1	Double Refraction & Polarization		Ch. 10
4	Optic Axis(es) & Sign	Optical Properties	Ch. 7, p. 96-109.
6	Polarization & Crystal Systems		Ch. 7, p. 96-109.
8	Pleochroism		Ch. 7, p.108 - 110.
11	Optical properties & faceting considerations	Mineral I.D. II	
13	Synthesis & Summary		Review Sheet,

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

GEO 347K Semester Project

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 baggies stapled to scraps 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 to have undergone 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 normal penalty is a failing grade for the course. I make no exceptions, nor offer second chances.**

All projects are due 10:00 AM, Wednesday, Dec. 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.