



# ASTRONOMY & COSMOLOGY



## STARS & STORIES

The Evergreen State College Summer Quarter 2009

**Faculty:** Rebecca Chamberlain 360-867-5845 chambreb@evergreen.edu

**Schedule:** Class sessions, July 30-31, Aug. 6-7, 9-5 p.m.;

Oregon Star Party Field Trip: Depart loop at 7:30 a.m. Aug. 18 and return 7:30 p.m. August 23rd.

**Meeting Location:** 9:00 a.m. to 12:00 p.m. Seminar 2 A 1105

1:00 to 5:00 Computer Application Lab (CAL), between Lab I and II.

Note: there may be adjustments to these meeting locations, depending on workshop length, etc.

### Description:

From sacred stories to fundamentals of astronomy, this intensive course will explore a variety of cosmological concepts from mythology, literature, philosophy, and history, to an introduction to astronomy, archeo-astronomy, and theories about the origins of the universe. We will employ scientific methods of observation, investigation, hands-on activities, and strategies that foster inquiry based learning and engage the imagination. Activities are designed for amateur astronomers and those interested in inquiry based science education, as well as those interested in structuring research projects, or exploring literary, philosophical, cultural and historical cosmological traditions. Students will work in groups to create planetarium programs using stellarium and celestia computer programs. We will use a variety of techniques to enhance field studies and observation skills, including use of star-maps and navigation guides, eight and ten inch dobsonian telescopes, binoculars, and other tools. Field trips include traveling to the Oregon star party, the OMSI planetarium, and Pine Mountain Observatory.

### Required Fees:

\$200. This includes registration for the Oregon Star Party, guest lectures, supplies, travel, program materials, etc.

### Special Equipment:

Students must provide their own camping equipment and supplies for a six-day field trip to the Oregon Star Party (OSP). We will be camping in rustic conditions in the high desert of central Oregon. Begin pulling your supplies together and arranging to share tents etc. early, so you're not scrambling at the last minute. A general list of required supplies includes:

- Flashlights with red cellophane. No white light is allowed at OSP, as astronomers are taking time-laps photos, and doing other light sensitive research on-site. You will all be given sheets of red cellophane to cover the lenses and prevent light leakage on your flashlights. You may want to bring one or two small, compact, fairly dim flashlights that you cover with red cellophane.
- Binoculars, field-guides, star-charts, pens or pencils, notebooks, textbooks for discussions, etc.
- Digital Camera and tri-pod (if you can turn the flash-mode off.)
- Backpack for personal belongings

- Tent, sleeping bag, sleeping pads, tarp, etc.  
You must make arrangements if you choose to share tents, etc. as a group. You can probably get by with a light tarp or cover for your sleeping bag.
- Clothing for high temperatures during the day, and possible freezing temperatures at night. During the day, a sun-hat and lightweight clothes that reflect the sun and cover exposed parts of the body are good. At night, goose down jackets, hats, mittens, and wool socks come in handy.
- Water bottles and water for cooking and drinking. In general, you must provide water for your own use. Bring lots of water for all personal needs, as it will not be easily available.  
I will bring 10 gallons of water for general use. If it's needed, we will go to town to refill containers half-way through the star-party.
- Food for breakfast, lunch, dinner, and snacks. There are amazing foods and vendors on site, and you can purchase foods throughout the night and day from an espresso cart, a chuck-wagon diner, and other vendors.
- Fuel, camp stove, and cooking utensils if you plan to prepare or cook food.
- Personal care products: medications, sunglasses, sunscreen with a high SPF, insect repellent, personal first aid.
  - I will bring a group emergency first-aid kit for general use.
- Cell phone coverage is spotty.
- Folding chairs, blankets, or other items to sit upon.
- You may want to purchase "shower tickets" ahead of time, online for \$10.

### Telescopes

We have arranged to take three eight-inch telescopes from the TESC Lab Store to the Oregon Star Party. A group of at least four students must volunteer to get proficiencies to operate them, to be responsible for their use, set up, etc., and to check them out. I have a ten-inch dobsonian telescope with "push to" technology.

Telescopes are also available for groups of 1-4 students in our program to check out and practice viewing nighttime stars before our fieldtrip. Simply call ahead, get "proficiencies," and have fun under the night sky.

Groups of from one to four students at a time need to arrange telescope operation proficiencies with Peter Robinson at 867-6489, <robinson@evergreen.edu>.

PLEASE MAKE YOUR ARRANGMENTS FAR IN ADVANCE.

### Vans and Drivers

We need 6 student drivers to drive to and from our field-trip sites. We are renting two twelve-passenger vans, and one cargo van for our trip. Six drivers need to arrange to volunteer to pick up the vans and drop them off, drive them, and get proficiencies to operate them. The proficiency can be done on-line, or at the College Motor Pool with Sherry Parsons, 867-6354, <parsonsS@evergreen.edu>.

*Drivers of Evergreen vehicles must have their use permits. They can go on-line and watch the slideshows (motor pool polices and large van driver) at <<http://www.evergreen.edu/facilities/motorpool/usepermit.htm>> or they can come down to the motor pool office and watch them here. They do need to come to the motor pool and show their driver's license and sign a couple of forms. Motor pool office hours are 8 to noon and 1 to 4:30 every day except Tuesday. On Tuesday the motor pool is closed in the afternoon.*

PLEASE MAKE YOUR ARRANGMENTS FAR IN ADVANCE.

### Texts:

#### Required

Calvino, Italo. *Cosmicomics*. New York: Harvest Books, 1979. # ISBN-10: 0156226006

# ISBN-13: 978-0156226004

Chamberlain, Rebecca, Ed. *Earth and Sky Reader*. Olympia, WA: The Evergreen State College, 2009.

These materials will be shared during in-class workshops and/ or scanned and posted on-line. A complete bibliography of all sources will be compiled and posted during the class.

Gibilisco, Stan. *Astronomy Demystified: A Self-Teaching Guide*. New York: McGraw Hill, 2003.  
Primack, Joel R, and Nancy Ellen Abrams. *The View From the Center of the Universe: Discovering Our Extraordinary Place in the Cosmos*. XX: Penguin Group, Riverhead Trade, 2007.  
Williamson, Ray A.. *They Dance in the Sky: Native American Star Myths*. New York: Houghton Mifflin, 1987.

**Recommended:**

You are required to select a field guide and star chart for viewing the night sky.

Dickerson, Terence. *NightWatch: A Practical Guide to Viewing the Universe* (4<sup>th</sup> Edition). XX: Firefly Books, 1998. # ISBN-10: 155407147X, # ISBN-13: 978-1554071470

Sinnott, R. *Sky and Telescope's Pocket Sky Atlas*. XX:xx, 2006.

Williamson, Ray A. *Living the Sky: the Cosmos of the American Indian*. Norman, OK: Red River Books, University of Oklahoma Press, 1984. (0806120347)

Watson, Brent. *Finder Charts of the Messier Objects—2 Volumes*. XX: Plastic Comb, 1993.

**For Additional Reference:**

Bruchac, J. (1997). *Thirteen Moons On Turtle's Back*. Putnam. (0698115848)

Caduto, M., Bruchac, J. & Fadden, J. K. (1994). *Keepers of the Night: Native American Stories and Environmental Activities for Children*. Fulcrum Publishing. (1555911773)

Consolmagno, Guy. *Turn Left at Orion: A Hundred Night Sky Objects to See in a Small Telescope—and How to Find Them*. XX:xx, 2000.

Freedman, R. A. and Kauffman, W.J. III, (2001) *Universe*, CD Edition. W. H. Freeman & Co. (0716746476)

Mechler, Gary. *National Audubon Society First Field Guide: Night Sky*. XX: Scholastic Reference, 1999. (0590640860) I ordered this book for our class, but it is currently out of print. Used copies are available on-line for a couple dollars.

Pacific Science Center Astronomy Curriculum & Resources

*Astro Adventures I: A comprehensive upper elementary curriculum that integrates Washington State, and National standards in science education.* (\$24.95)

**or**

*Astro Adventures II: Middle & High School Curriculum* (\$44.95)

To order, go to: ([www.pacsci.org/education/curricula/astro.html](http://www.pacsci.org/education/curricula/astro.html))

([www.pacsci.org](http://www.pacsci.org)) 200 Second Ave. N., Seattle, WA 98109 (206) 443-2851

Pennington, H. C. *The Year-Round Messier Marathon Field Guide: With Complete Maps, Charts, and Tips to Enjoying the Most Famous List of Deep-Sky Objects*. XX:xx,1997.

Smith, S. (1992). *Project Earth Science: Astronomy*. National Science Teachers Association. First Edition.

Swimme, B., & Berry, T. (1992). *The Universe Story: From the Primordial Flaring Forth to the Eozoic Era—A Celebration of the Unfolding of the Cosmos*. San Francisco: Harper.

(0062508350)

Tyson, Neil deGrasse. *Death by Black Hole: and other Cosmic Quandaries*. New York: W.W. Norton, 2007.

Williamson, Ray A. *Living the Sky: the Cosmos of the American Indian*. Norman, OK: Red River Books, University of Oklahoma Press, 1984. (0806120347)

## Assignments:

**1. Five reading response papers** (due each week, and posted online.) These are responses to required reading assignments and texts for the class. You will turn “hard-copies” in of your first assignment on Aug. 31, and post all assignments on line when the site is ready. See “Guidelines for Writing Reading Responses” and “Reading Assignment Handouts,” for details for each week.

- Week 1: Due July 31
- Week 2: Due Aug. 7
- Week 3: Due Aug. 14
- Week 4: Due Aug. 18
- Week 5: Due Aug. 28th

**2. Create a Planetarium Show: What’s “up” in the night sky? Due Aug. 7<sup>th</sup>**

Use stellarium to familiarize yourself with the current features of our night sky.  
Use stellarium to familiarize yourself with the features of the OSP sky.

Use stellarium to work in a group and create a planetarium show.

Your group will give a final presentation, Friday August 7<sup>th</sup>, that will include:

- An oral presentation (10 min. per person, so 3 people get 30 min.)
- A handout that includes:

- The names of all the participants in your group
- A “star chart” of the particular time, location, and features of your night sky.
- Helpful notes, observations, information, or research that you’ve uncovered.

You will work in groups for the next two weeks, during the afternoon, in the CAL. You may also need to come in and do additional work when the CAL is open, or work on your own computers—the software is free and easy to download. You will use this time to develop a planetarium show, “What’s “up” in the night sky? You will gain familiarity with stellarium software, as if you are playing with a planetarium consol. How can you use new computer technologies to navigate the night sky and unpack its secrets? Shift your latitude and longitude to see the sky from a whole new point of view. Find out what’s in the sky, and how to find it.

Two or three people will work in groups to research various astronomical features, planetary conjunctions or alignments, comets, or other features at any one point or location. You will research astronomical features from a particular point in time. Use our astronomy textbook and other sources to help collect your data. Organize your information into a thoughtful presentation that examines the sky from a unique, well-researched point of view.

Where do you want to go? What do you want to see and learn? What’s in the night sky at a particular place and time? Do you want to examine the sky at a particular point in the summer, spring, winter or fall? Is there a particular time, date, and year that you want to examine? What is the constellation lore, world star mythology, navigation techniques, astronomical features, or other topics based on this particular snap-shot of the sky?

What meaning might the sky have for those who have used techniques of physical astronomy and observation in our human past, and how can you use modern technology to learn about it? Do you want to find out about a particular moment in the Mayan Calendar? What about the astronomy of Persia, the ancient near east, the Greeks, Celts, Chinese, or Egyptians? What about Polynesian star lore or navigation techniques? What can you find out? Go to any place on earth, any time, and research a particular culture or perspective. Do you want to check out a theory from archeo-astronomy? Do you want to examine the sky from Chaco Canyon and see if you can uncover any of the secrets of its petroglyphs? The sky’s the limit.

**3. Star Stories, due during the OSP:** The instructor will tell a version of the Star Child Myth and other star stories and origin myths at some point during the Oregon Star Party. You are invited to informally share star stories as well, for an evening of “star” storytelling. Find a star story that you’d like to work on and prepare to tell it at the gathering.

**4. A Final Synthesis Paper, due August 28<sup>th</sup>** (3-5 pages, due ) based on class lectures, workshops, guest speakers, films, readings, and your learning at the Oregon Star Party. What did you learn? What did you do? How did you do it? What difference did it make? You may want to include quotes, information from readings, research, etc.

**5. Self and Faculty Evaluations: Due August 28<sup>th</sup>.**

Three signed copies of your self-evaluation. Two copies will be returned with the instructor’s signature at the final eval. conference.

You are required to write a faculty evaluation. (These can be turned in to the program secretary if you wish.)

**6. A Portfolio** that includes all of your written assignments from, 1-5, above, **Due August 28<sup>th</sup>**. Turn them in at the instructors office, Seminar 2 B 2121.

**7. Final Project, due August 28<sup>th</sup>** (ONLY FOR THOSE WHO WANT UPPER DIVISION SCIENCE CREDIT. Project proposal is due August 14<sup>th</sup>. You will work with the instructor to develop a final project that meets your educational goals. Do you want to go on into science education? Do you need to research a particular topic around theories of cosmology? Your project can include a research paper, an educational program, curriculum, or demonstration, or a science project.

**8 Credits: Astronomy, Literature and Mythology, Education.** For an 8 credit class, second session, you should expect to work on the average 40 hours a week, over the next five weeks.

**Final Evaluation Conference: Sept. 3<sup>rd</sup> 2:00 –5:00 p.m.**

We will have a potluck lunch/early dinner at the instructor’s home. (Details to be given out during class. If you are not clear, call 866-2141.) Students will meet with the instructor in final evaluations conferences while dinner, seminar conversations, etc. are going on. Students getting upper-division science credit will share samples of their final projects with the group.

If you are unable to meet for the potluck, you will have to schedule an individual conference at another time.

