

PTY5 595 The Galilean Satellites of Jupiter

<http://pirlwww.lpl.arizona.edu/~mcewen/PTY5595>

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Open door policy, but best to email or call to set up appointments.

Course Description: This 1-credit class will be a seminar on the Galilean satellites of Jupiter, four large worlds with complex orbital, tidal, and magnetospheric interactions. The course objective is for students to gain a first-order understanding of these worlds, and a more detailed understanding of some aspect of these satellites.

Grading (letter grade from A to F):

Graduate students:

Reading assignments and class participation: 20%

Presentation of background information (25 min): 20%

Project presentation and discussion (25 min): 20%

Final 5-page report: 40%

Final reports should present a summary of current knowledge in a given topic, citing sources of information. Graduate student papers will also be expected to follow the format of Geophysical Research Letter papers and to include critical analysis of previous work or some original content.

Grading Scale:

A >90%

B 80-90%

C 70-80%

D 60-70%

Required texts: none. Journal articles will be provided in pdf format (see class website)

Prerequisites: Course is open to graduate students majoring in one of the physical sciences, especially Geoscience, Astronomy, or Planetary Science. Graduate student in other disciplines such as life sciences or engineering may also be appropriate for the class, but should contact the instructor.

Background: Galileo Galilei discovered the four large Moons of Jupiter in 1610; little was known prior to spacecraft exploration by Voyager in 1979. Each world is unique: Io is a rocky world with a large metallic core and is intensely volcanically active; Europa is a rocky world but with an outer layer of water and ice and a geologically young surface; Ganymede and Callisto are rock-ice mixture of about the same size (slightly larger than Mercury), yet only Ganymede has an intrinsic magnetosphere. Io, Europa, and Ganymede share a coupled thermal-orbital evolution driven by the LaPlace resonance and tidal heating. The icy moons may contain subsurface water, perhaps habitable. Several new international spacecraft missions are being planned or proposed to explore these moons. This 1-credit seminar will explore current issues in understanding these worlds and the Jupiter satellite system.

Course requirements: Following an overview of the Galilean satellites, presented in part by the graduate students, each student will select a particular topic for in-depth study, give a presentation and lead a discussion of this topic in the class, and submit a final 5-page summary.

Topics may include:

- Origin of the Galilean Satellites
- Orbital evolution and tidal heating
- Interior compositions and structures
- Satellite atmospheres and exospheres
- Magnetospheric interactions with the satellites
- Active volcanism on Io
- Evidence for past/present volcanism on Europa or Ganymede
- Tectonics of icy moons
- Tectonics of Io
- Interior oceans and habitability
- Impact cratering
- Future mission concepts
- Comparisons to other icy worlds such as Titan or Triton
- Other ideas are welcome

Absence policies: Students will be expected to attend all classes except under extenuating circumstances. We will schedule 2 class periods per week but utilize only 50% of these times, to accommodate the instructor's travel. Please check emails and the class website for schedule updates. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored. Unexcused absences will count against the grade for class participation.

Other Policies: Policies against plagiarism, etc., within Student Code of Academic Integrity: <http://dos.web.arizona.edu/uapolicies>. Policies against threatening behavior by students: <http://policy.web.arizona.edu/~policy/threaten.shtml>.

Reminder to students who are registered with the Disability Resource Center: they must submit appropriate documentation to the instructor if they are requesting reasonable accommodations: <http://drc.arizona.edu/teach/syllabus-statement.html> .

Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.