



WINONA STATE UNIVERSITY  
PROPOSAL FOR GENERAL EDUCATION PROGRAM COURSES

Department Geoscience

Date March 2, 2014

GEOS 375  
Course No.

Planetary Geology  
Course Name

4  
Credits

Prerequisites ENG 111, GEOS 235, and GEOS 470 OR permission of instructor

GEP Goal Area(s):\*

CORE GOAL AREAS

- Goal 1: Communication
- Goal 3: Natural Science
- Goal 4: Mathematics/Logical Reasoning
- Goal 5: History and the Social and Behavioral Sciences
- Goal 6: The Humanities and Fine Arts

THEME GOAL AREAS

- Goal 7: Human Diversity
- Goal 8: Global Perspective
- Goal 9: Ethical and Civic Responsibility
- Goal 10: People and the Environment

\* Courses may be submitted for up to two Goal Areas.

Additional Requirement Categories (list number of credits desired in appropriate category):

Intensive:

- 1. Writing
- 2. Oral Communication
- 3a. Mathematics/Statistics
- 3b. Critical Analysis

Physical Development and Wellness

Provide information as specified in the previous directions.

Attach a *General Education Program Approval Form*.

Department Contact Person for this Proposal:

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[Revised 9-6-11]

## Proposal for General Education Program Courses, Additional Information

Application for GEOS 375 Planetary Geology to satisfy the requirements for a Writing Intensives course.

### Catalog Description

#### **375 – Planetary Geology – 4 S.H.**

The study of solar system objects from the point of view of a geologist. Current understanding of geology on Earth is used to interpret the many other terrestrial bodies in our solar system. Examination of geologic processes throughout our solar system is used to more deeply understand the Earth's evolution and geology. Topics covered include fundamentals of solar system objects, planetary formation and evolution, primary geologic processes throughout the solar system, remote sensing of planetary surfaces, and instrumentation and mission design methods used for solar system exploration. *Prerequisites:* ENG 111, GEOS 235, and GEOS 470 OR permission of instructor. Offered alternate years.

### Course Outline of the Major Topics and Subtopics

1. Solar System Classification
  - a. Stars
  - b. Terrestrial Planets
  - c. Jovian Planets
  - d. Satellites
  - e. Asteroids
  - f. Kuiper Belt Objects
  - g. Comets
  - h. Meteorites
2. Solar System Scales
  - a. Relative Sizes
  - b. Relative Distances
3. Planetary Formation
  - a. Nebular Hypothesis
  - b. Nice Model
  - c. Extra-Solar Planetary Systems
  - d. Planetary Differentiation
  - e. Effects of Giant Impacts
4. Solar System Dynamics
  - a. Kepler's Laws
  - b. Newton's Laws
  - c. Gravity
  - d. Orbits
5. Geologic Processes
  - a. Energy Sources in the Solar System
  - b. Impact Cratering
  - c. Volcanism
  - d. Tectonics
  - e. Weathering and Erosion
  - f. Life in the Solar System
6. Remote Sensing of Planetary Surfaces
  - a. Electromagnetic Radiation
  - b. Imaging Systems
  - c. Spectroscopy
  - d. Determining Surface Compositions
7. Mission Design
  - a. NASA Mission Funding
  - b. Mission Styles
  - c. Mission Instrumentation
  - d. Mission Constraints
8. Planetary Mapping
  - a. Topography
  - b. Compositions
9. Human Space Exploration
  - a. Mercury & Gemini Missions
  - b. The Apollo Missions
  - c. Space Shuttle and ISS
  - d. Future Human Spaceflight

**This course contains the following writing intensive assignments:**

**Short weekly writing assignments**, especially at the beginning of the semester, about specific topics where students are able to get feedback quickly on their writing style. Any problem areas (spelling, grammar, usage, etc.) will be identified early. Topics will include Question-Response-Summary papers on journal articles, overviews of Apollo landing sites, rock and thin section descriptions of the various NASA thin sections that we use in class, etc.

**A NASA-style Mission Proposal Paper** – a 3-4 page journal article including figures, tables, references, etc., done to the standards of the journal Geophysical Research Letters. Students will work on this throughout the semester in stages, getting feedback regularly, as they select a mission target and design a mission to that planetary object. The audience for this paper will be planetary geologists.

**A Mission Proposal Poster** – Students will create a poster describing and justifying their mission to an audience of college educated, tax-paying citizens.

Writing assignments in GEOS 375 will comprise no less than 40% of the final course grade. Assignments will be assessed on proper English grammar, spelling, and usage as well as the overall clarity of writing. Additional consideration will be based on proper level for the given audience, use of appropriate references, accuracy of the information presented, and the structure of the paper.

I plan to use the Association of American Colleges and Universities' (AAC&U) Written Communication VALUE Rubric to assess the students' progress on their writing assignments. I will tailor this rubric to expectations in the Geosciences and my course and create a "key" for each listed benchmark and learning outcome so that my students understand what the rubric is looking for and how I will use it. This rubric assesses students on the following learning outcomes:

- Context of and Purpose for Writing
- Content Development
- Genre and Disciplinary Conventions
- Sources and Evidence
- Control of Syntax and Mechanics

<b>Student Competencies for Writing Intensive Course</b>	<b>Learning Opportunity</b>	<b>Assessment Method</b>
Practice the processes and procedures for creating and completing successful writing in the geosciences.	Students will be given the opportunity to practice their writing numerous times throughout the semester on weekly writing assignments as well as the final research paper and poster.	Weekly graded assignments that build on each other as students work toward their final research paper and poster projects. Rubrics for each assignment will be used to assess student performance. In addition, the AAC&U Written Communication VALUE Rubric will be used throughout the semester to help students gauge their progress.

<p>Understand the main features and uses of writing in the geosciences.</p>	<p>Students will have various opportunities to write short geologic descriptions of thin section samples (for example) up through a longer paper to propose a specific planetary mission.</p>	<p>Students will be assessed on their weekly assigned writings as well as their semester-long paper and poster assignments.</p>
<p>Adapt their writing to the general expectations of readers in the geosciences.</p>	<p>Students will have multiple opportunities to write for different audiences that are common in the geosciences, including a NASA-style mission review team, fellow geoscientists, and the general public.</p> <p>When writing for the NASA-style review team and fellow geoscientists, students will follow the NASA Guidelines for Proposers and the journal requirements for the Geophysical Research Letters journal.</p>	<p>Students will be assessed on how well their writing conforms to the requirements of the given audience and publisher, from NASA's Guidebook for Proposers to the author instructions for the Geophysical Research Letters journal.</p> <p>Rubrics for each assignment will reflect the standards and level of writing required for each specified audience.</p> <p>Students will act as peer-reviewers to their classmates and review each other's writing assignments.</p>
<p>Make use of the technologies commonly used for research and writing in the geosciences.</p>	<p>Students will utilize common software programs used in writing in the geosciences, including:</p> <ul style="list-style-type: none"> <li>• Microsoft Word and Excel</li> <li>• Adobe Photoshop</li> <li>• Adobe Illustrator or Microsoft Publisher</li> </ul>	<p>Weekly assignments will focus on honing skills within each of these software programs following the conventions prescribed by the journal or organization.</p> <p>Students will be evaluated on weekly assignments and semester-long assignments.</p>
<p>Learn the conventions of evidence, format, usage, and documentation in the geosciences.</p>	<p>Student assignments will follow conventions as set forth by NASA and the Geophysical Research Journal.</p>	<p>Literature searches and reviews will be discussed in class and students will be evaluated on their appropriate use and documentation of reference sources.</p>