

PTYS 595B - Venus

Kuiper Space Sciences Building, Room 312, T-Th 2:00 pm -3:15 pm

Description of Course

This course will introduce students to the planet Venus from interior to atmosphere. The course will cover topics that include Venus's dynamics, spin state and interior, the composition of the atmosphere and surface, volcanism and current activity, surface atmosphere interactions and winds, tectonics, impact cratering, surface age, and what we know about the planet's evolution. We will discuss Venus's relevance to exoplanet studies and our understanding of habitability. Students will gain a broad introduction to the scientific literature on Venus as well as to the techniques that have been used to study this planet. They will have a chance to spend time specifically delving into topics relevant to their research interests. We will also discuss future Venus exploration.

Instructor and Contact Information

Instructor: Lynn Carter, Room Kuiper 540, lmcarter@arizona.edu
Office Hours: Thursdays 3:15 pm to 4:00 pm, or by appointment
Website: d2l.arizona.edu

Course Objectives

The objective of this course is to provide students with an in-depth understanding of the planet Venus, including its atmosphere, surface, interior, and evolution. The course will cover current open science questions, techniques used for Venus research, and past and future spacecraft missions and instruments.

Expected Learning Outcomes

At the end of the course, students should be able to:

- Describe our knowledge of the current state of the Venus atmosphere, surface, and interior.
- Describe what we know about Venus's evolution and its relevance to our understanding of Solar System and exoplanet evolution.
- Demonstrate an understanding of the methods used to study the Venus atmosphere/surface/interior.
- Describe and discuss some of the current major science questions about Venus.
- Describe and discuss some of the previous and future spacecraft missions.
- Present and lead a discussion on topics relevant to Venus science using peer-reviewed materials.
- Prepare a written project on an aspect of Venus science or future instrument/missions.

Required Texts or Readings

There is no textbook for this class. The required readings will be provided in a folder on the D2L site, along with links to relevant reference books.

Assignments: Schedule/Due Dates

Students will be required to read and present on two science topics using scientific papers. The students will sign up for an in-class time based on their interests and the class schedule.

There will be a final project for this class, which can be a small research project, white paper, instrument concept paper, or other type of project approved by the instructor. Students can work individually or in groups for the final project. Each member of a group will do the same amount of work as expected for an individual project and all group members will earn the same grade, but working in a group will allow for more detailed or comprehensive projects. Students will present their project ideas mid-way through the semester as a short written proposal and class presentation.

There are no exams in the class. Deadlines will be posted on D2L.

Final Examination or Project

There is not a final exam in this class. Instead, the course will have a final project.

Grading Scale and Policies

The course grading scale is (%):

A	≥ 90
B	80 to 89
C	70 to 79
D	60 to 69
E	< 60

The grades for this course will be determined as follows:

Grade Item	**% final grade**
Class participation	10
In class topic presentations	
Topic 1	10
Topic 2	10
Final project proposal	
Written document	10
Presentation	10
Final project	
Final written document	30
Final presentation	20

Incomplete (I) or Withdrawal (W):

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policy, which is available at https://catalog.arizona.edu/policy/courses-credit/grading/grading-system.

Scheduled Topics/Activities

The topics covered in the class are listed below in a rough schedule. Topics are subject to change based on guest lecture availability and student interests.

Week	**Topic**
1	Introduction and exploration history
2	Dynamics, magma ocean, and interior structure
3	Crater age dating and resurfacing debate
4	Tectonics, coronae
5	Volcanism, channels, current activity
6	Atmospheric composition, structure, UV absorber
7	Winds and aeolian processes
8	Surface composition and surface weathering
9	Impact crater deposits and melts, project presentations
10	Cratons (tesserae)
11	D/H ratio and atmospheric evolution
12	Upper atmosphere and exosphere
13	Overview of Venus evolution and relevance to exoplanets
14	Current and future exploration
15	Final project presentations
16	Final project presentations

University-wide Policies link

Links to the following UA policies are provided here, http://catalog.arizona.edu/syllabus-policies:

- Absence and Class Participation Policies
- Threatening Behavior Policy
- Accessibility and Accommodations Policy
- Code of Academic Integrity
- Nondiscrimination and Anti-Harassment Policy
- Subject to Change Statement