Spring 2025
Space Sciences Building (SSB) 105
Tues/Thurs 11:40 am - 12:55 pm

Instructor: Prof. Nikole Lewis [nkl35], office hours (SSB220): Mondays, 4-5 pm
TA: Abby Boehm [vab55], office hours (SSB217): Wednesdays, 3-4 pm
Grading: Letter or SU grades, 3 credits

I. Course Description and Learning Objectives:

Description

Introduction to the solar system with emphasis on the quantitative application of simple physical principles to the understanding of what we observe or can deduce. Topics include: planetary orbital and spin dynamics, tidal evolution, the interiors, surfaces, and atmospheres of the planets including the effects of greenhouse gases on climate, and smaller bodies such as satellites, asteroids and comets. Comparisons will be made between planetary systems discovered about other stars and our own solar system. Results from past and current spacecraft missions will be discussed. Final grades will depend on homework sets and on a final team project and in-class presentation, supported by a joint term paper.

Specific Learning Objectives

- Gain a basic understanding of the application of physics and chemistry to planets.
- Acquire a working knowledge of the ideas of planetary science.
- Develop critical thinking skills.
- Learn to explain scientific concepts effectively.
- Gain a better understanding of solar system exploration.
- Engage with the scientific research process.

II. Format and Procedures:

The format of this course will consist primarily of lectures and group project work sessions. Problem sets and in-class worksheets will be used to provide further exercise and test retention of key concepts.

III. Course Requirements:

Lecture Attendance and Worksheets

You should plan to attend lectures regularly as this is the primary source for the course material. During each lecture there will be a short worksheet to complete that will count toward your final grade. The lowest two worksheet grades will be dropped to allow for lectures missed due to illness, etc.

Course Readings

There is no compulsory textbook for this course. Lecture slides/notes will be made available at least one hour before lecture on Canvas. Distributing course materials beyond use in this course without express permission of the instructor and copyright holder will be considered academic misconduct, and subject to a grade penalty under the Cornell Code of Academic Integrity and may in some cases be illegal. The following textbooks/e-books cover most of the topics we will consider in this course and are available through Cornell Library:

Introductory Notes on Planetary Science (Salyk and Lewis)
Fundamental Planetary Science (Lissauer and de Pater)

Problem Sets

There will be four problem sets due throughout the course. These problem sets will focus on applying your physics, chemistry, and math skills to solving problems relevant to planetary science topics. You will have at least two weeks to complete any given problem set (see schedule below).

Project

You will work in groups (4-5 people) to design a mission to a solar system object. As a team, you will research your chosen object and determine some of the unanswered science questions about it. You will then design a spacecraft armed with the instruments needed to answer your questions. You will describe the measurements your spacecraft's instruments will take and explain how those measurements will answer your science questions. You will present your mission concept in class (15 minutes) and submit a 10-page mission proposal. You will provide feedback on your peer's proposal and reflect on your own mission design experience.

IV. Grading Procedures

Your final grade will be calculated based on the following distribution. All grades will be made available on Canvas gradebook.

Your final grade will be calculated based on the following

Course Requirement	**Percentage**
In-Class Worksheets	10%
Problem Sets (4 in total)	40%
Project Presentation	20%
Project Write-up	20%
Project Peer and Self-Evaluation	10%
Total	100%

Late problem sets will be accepted with no penalty up to 24 hours after the deadline. Problem sets will only be accepted beyond 24 hours after the deadline for health-related or emergency situations.

For S/U grading option: a cumulative score equivalent to C- or higher on the course materials is required to receive a Satisfactory (S) grade

For Letter grade option: Letter grades will be roughly assigned according to the following cumulative percentages, these might be modified depending on class averages:

98% and above: A+	78% - 79%: C+	below 60%: F
93% - 97%: A	73% - 77%: C	
90% - 92%: A-	70% - 72%: C-	
88% -89%: B+	68%- 69%: D+	
83% - 87%: B	63% - 67%: D	
80% - 82%: B-	60% - 62%: D-	

VI. Academic Integrity

Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work. For this course, collaboration is allowed for certain activities and will be labelled as such.

You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. One great way to assess what you know is to teach the idea to a peer! You may also work together on problem sets and give "consulting" help to or receive "consulting" help from your peers. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in any form (e.g. email, Word doc, Box file, Google sheet, or a hard copy). Assignments that have been previously submitted in another course may not be submitted for this course.

Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment.

Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

VII. Accommodations for Students with Disabilities

Students with Disabilities: Your access in this course is very important to us. In order to have adequate time to arrange your approved accommodation(s), you must request your SDS accommodation letter **no later than the add/drop deadline for the semester**.

- **Students currently registered with SDS:** Once you request your accommodation letter and it is approved by SDS, it will be emailed to both you and the course instructors. Processing time can be up to 48-hours.
- **Students not registered with SDS:** The registration process for new accommodations can take up to three weeks. Once you are approved by SDS for accommodations, you will be able to request your accommodation letter for this course.
- **If you are approved for accommodations later in the semester:** you must request your accommodation letter as soon as possible.

VIII. Inclusivity Statement

We understand that our community members represent a rich variety of backgrounds and perspectives. The Cornell Astronomy Department is committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:

- share their unique experiences, values, and beliefs.
- be open to the views of others.
- honor the uniqueness of their colleagues.
- appreciate the opportunity that we have to learn from each other in this community.
- value each other's opinions and communicate in a respectful manner.
- keep confidential discussions that the community has of a personal (or professional) nature.
- use this opportunity together to discuss ways in which we can create an inclusive environment in this course and across the Cornell community.

Class rosters are provided to the course instructors with each student's legal name. We will gladly honor your request to address you by your preferred name and gender pronouns. You will be able to indicate such preferences in the "Values Affirmation Worksheet" distributed in the first lecture.

IX. Cornell Wellness Resources

We acknowledge that personal emergencies and illnesses can happen. Please alert your instructor and TA in such situations so we can make the appropriate accommodations. Please remember that your mental health and emotional well-being are just as important as your physical health. If you need help, Cornell has many consultation and support services available to meet the emotional, physical, social, and spiritual needs of the university community. For all of the resources, support, and practical tools surrounding wellness at Cornell, visit mentalhealth.cornell.edu .

X. Tentative Course Schedule (Subject to Change)

Week #	Class Day	Lecture #	Class Date	Lecture Topic	Problem Sets
1	T	1	21 Jan	Introduction to Course & Solar System Overview	
	Th	2	23 Jan	Inventory & Exploration of the Solar System	
2	T	3	28 Jan	Energy from the Sun	
	Th		30 Jan	Group Project Work Session	PS #1 Out
3	T	4	4 Feb	Planetary Dynamics I	
	Th	5	6 Feb	Planetary Dynamics II	
4	T	6	11 Feb	Planet Formation I	
	Th	7	13 Feb	Planet Formation II	PS #1 Due
5	T		18 Feb	February Break (No Class)	
	Th		20 Feb	Group Project Work Session	PS #2 Out
6	T	8	25 Feb	Planetary Interiors I	
	Th	9	27 Feb	Planetary Interiors II	
7	T	10	4 Mar	Planetary Surfaces I	
	Th	11	6 Mar	Planetary Surfaces II	PS #2 Due
8	T	12	11 Mar	Planetary Atmospheres I	
	Th		13 Mar	Group Project Work Session	PS #3 Out
9	T	13	18 Mar	Planetary Atmospheres II	
	Th	14	20 Mar	Magnetic Fields	
10	T	15	25 Mar	Meteorites	
	Th	16	27 Mar	Minor Planets: Asteroids & TNOs	PS #3 Due
11	T	17	8 Apr	Comets & Interstellar Objects	
	Th		10 Apr	Group Project Work Session	PS #4 Out
12	T	18	15 Apr	Planetary Rings	
	Th	19	17 Apr	Search for Life in our Solar System	
13	T	20	22 Apr	Exoplanets I	
	Th	21	24 Apr	Exoplanets II	PS #4 Due
14	T		29 Apr	Final Project Presentations	
	Th		1 May	Final Project Presentations	
15	T		6 May	Mission Selection and Course Wrap-up	