

# Alien Worlds

## Astronomy 105

### Spring 2011

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**Course Description and Goals:** Astronomy 105 focuses on the search (and study of) ex-traterrestrial worlds that harbor life. We will embark on a detailed examination of our solar system, the history of NASA exploration, and the discovery of  $\sim 500$  planets orbiting other stars. This course will examine alien worlds we can touch, alien worlds on which we can (or have) landed, alien worlds that are studied from a great distance, and examine the question of how common life is in the Universe. Students will use telescopes to observe the worlds of our solar system, examine alien worlds as portrayed in cinema, learn the tools needed to interpret astronomical observations, and be exposed to the myriad discoveries coming from current studies of extrasolar planets, including the recently discovered “super Earth” in the habitable zone of a low-mass star.

**Class Times:**  
CAS AS105 A1: Lecture: Tu,Th: 9:30-11:00 (GCB)

**Teaching Fellows:**

TBD  
Email: TBD  
Office: TBD

TBD  
Email: TBS  
Office: TBD

**Office Hours:**

West: TBD, by appointment  
TBD: TBD, by appointment  
TBD: TBD, by appointment

**Note on office hours and questions:** Please make use of office hours (both mine and the TF’s). They are designed to set up a personal setting where you can feel comfortable asking questions that may not seem appropriate in class. I have found that students who make use of my office hours tend to be much more successful in my class.

In general, the best way to get information is to ask questions. No instructor is perfect, myself included. If I do a poor job in explaining some concept, please raise your hand and ask me to rephrase.

**Discussion Sections:**

You are required to register for one of the discussion sections, which are listed as separate sections but are part of the same course. Your grade will be a combination of the coursework and activities completed in these sections. Discussion sections will be with one of the TFs in Room 521 of the CAS building.

CAS AS105 A2: M (B04) – 12:00-1:00

CAS AS105 A3: W (B04) – 4:00-5:00

CAS AS105 A4: Th (B04) – 1:00-2:00

CAS AS105 A5: TBD (TBD) – TBD

**(Text)books:**

1) *The Crowded Universe*, 2009, Alan Boss

2) *How to Find a Habitable Planet*, 2010, James Kasting

3) *The Sparrow*, 1996, Mary Doria Russell

**Web site:** My plan is to have most of the course information available through the BU Blackboard site (<http://blackboard.bu.edu>). You will be able to log into the course site by logging into blackboard with your BU username and Kerberos password.

**Background:** Astronomy 105 has no prior course requirements. It is designed with the expectation that you have had high school algebra and an understanding of basic science. Basic mathematical equations should not freak you out.

**Current Science:** This class is not designed to prepare you to be an astronomer; rather one of the goals is to give you enough background to understand basic astronomical concepts. The best assessment of this goal is your ability to read popular scientific articles. Throughout the semester I will bring in popular articles to class that we will discuss. Perhaps this process will start a new good habit for everyone!

**Daily Traditions:**

*Music:* Some days as you are coming into class I will play a song that has something to do with what we are talking about in class that day. Enjoy, and see if you can recognize some of the tunes!

*Questions:* We will always start each day with an opportunity for you to ask questions. Although you should always ask questions at any point during class, I will always reserve the first few minutes for any questions that may have come up overnight. Some of the time you will be asked to share your questions with a partner before asking me.

*Questions of the Day:* All of my lectures begin with a set of questions. These are an outline of what I hope you learn that day. By the end of the day you should be able to answer each question with at least a couple of sentences.

*Minute Papers:* At the end of every class, you will write for 2-3 minutes about the important points of the lecture. This will count towards the participation portion of your grade but will not be graded on content. Instead, it will serve as an evaluation for both your ability to pay attention in lecture and my effectiveness as an instructor.

**Exams:**

There will be 3 exams in this class.

Midterm 1 - Thursday, February 24

Midterm 2 - Thursday, April 14

Final - TBA

**Observing “Alien Worlds”**

No astronomy class would be complete without the opportunity to view the night sky, look through telescopes, and apply some of what you have learned in this course to direct observations. Boston University has a small observatory on the roof of CAS that we will be using as part of this course.

Observing will be held on the telescopes on the roof as CAS, above the lecture hall. Take the stairs to the fifth floor (door next to room 522), then just keep climbing.

I will schedule several observing sessions throughout the semester when will be able to examine the Moon, Saturn, and other astronomical phenomena.

**Other Dates**

- No class on Tuesday, February 22 - Monday schedule
- No class on Thursday, April 7 - Monday schedule
- Final Exam - TBA

**Grading:**

Participation 5%

Harvard Museum Trip 5%

Homework and Class Assignments 20%

Exercises 15% (5% Sections 10% Night Observing)

Midterms 25% (12.5% each)

Final 30%

**Late Policy:** Labs and homework will be accepted up to 1 week late with a 25% penalty. No work will be accepted after 1 week. No exams can be made up without prior-to-class arrangement. Of course I am a human being and realize that sometimes life is out of our control so if a problem occurs, come and talk to me (earlier rather than later).

**Cell Phone Policy:** Cell phones MUST be turned off at all times. In the event of a cell phone interruption, I reserve the right to answer your phone and thoroughly embarrass you in front of the entire class.

**Collaboration:** Science often requires us to work together. In doing homework and writing up labs it is okay and even encouraged that you work together. It is very important that each person turns in his or her own work. Copying will not be awarded any credit. If you have any questions about the fine line between collaborating and cheating, please come and see me.

## Course Outline

Week	Tuesday	Thursday	Homework	Reading
1 (1/18-1/20)	Introduction - Exploration of the Solar System and extrasolar planets	Size, Time and other Scales	HW 1 (Due 1/25)	TBA
2 (1/25-1/27)	Alien worlds in human history	Alien worlds in Science Fiction	HW 2 (Due 2/3)	TBA
3 (2/1-2/3)	Laws of Motion, Orbits and Gravity	States of Matter, Light	HW 3 (Due 2/10)	TBA
4 (2/8-2/10)	Early NASA missions - Moon and impacts	Planetary geology	HW 4 (Due 2/17)	TBA
5 (2/15-2/17)	NASA missions to Terrestrial Worlds I: Planetary Surfaces	Geological processes	No Homework	TBA
6 (2/22-2/24)	NASA Missions to Terrestrial Worlds II: Atmospheres/Climate change	Midterm 1	HW 5 (Due 3/3)	TBA
7 (3/1-3/3)	NASA Missions to Outer Planets	What happened to Pluto?	HW 6 (Due 3/10)	TBA
8 (3/8-3/10)	Asteroids and Comets	KT Impact	No Homework	TBA
9 (3/22-3/24)	Exoplanets I: Telescopes	Exoplanets II: Doppler Effect, Transits	HW 7 (Due 3/31)	TBA
10 (3/29-3/31)	Exoplanets III: Atmospheres	Midterm 2	No Homework	TBA
11 (4/5-4/7)	Exoplanets IV: Current inventory and properties	Exoplanets V: Stellar Evolution	HW 8 (Due 4/14)	TBA
12 (4/12-4/14)	Exoplanets and Galaxies	Formation/Evolution of Solar System	HW 9 (Due 4/21)	TBA
13 (4/19-4/21)	Drake Equation and Habitability	Current Exoplanet Missions	HW 10 (Due 4/28)	TBA
14 (4/26-4/28)	Future Exoplanet Missions	Astrobiology I: Extremophiles	No Homework	TBA
15 (5/3-5/5)	Astrobiology II: SETI	Wrap-Up, Evaluations	No Homework	No Reading



I have read this syllabus and understand the requirements and policies for Astronomy 105.

Printed Name:

Signed Name:

Date: