

# *Syllabus for Fall 2018: The Henrietta Project*

## *ASTR 3400: Research Methods in Astronomy*

1:00-2:50 Mondays + Wednesdays  
S125 at Sommers-Bausch Observatory

### *Instructors and Office Hours*

Prof. Zach Berta-Thompson  
zach.bertathompson@colorado.edu, 303-735-6821  
Tue. 4-6pm (SBO), Thu. 9-11am (Duane D213), by appointment

Mr. Will Waalkes  
william.waalkes@colorado.edu  
Mon. 10am-noon (Duane 241),  
Wed. 4-5pm (Duane, Astronomy Help Room)

### *Why would you take this course?*

Humans make science. Before astronomical knowledge can be written in textbooks or taught in classrooms, it has to be discovered by people like you. In this class, we will learn the skills of the professional astronomer and apply these skills to answering real world questions in astronomy. Sometimes, we may encounter problems that have no known solutions, and we will have to figure out where to go next. You should take this class if you are willing to put lots of hard work into learning the craft of astronomical research, if you are curious about how we create new astronomical knowledge, and if you are excited to discover something new about the Universe.

### *Course Content*

Topically, for Fall 2018 we will focus these skills on the detection and characterization of transiting exoplanets using data from the NASA *Kepler* and *TESS* telescopes. Some of the stars, objects, and datasets we'll be working on have never been studied by anybody else! In this class, we will learn skills for interpreting and visualizing astronomical data, and we will practice scientific communication through reading, writing, listening, and speaking. We will work together in teams and collaborate in creating an inclusive learning and research environment for everyone.

*While you are reading, please think about:*

- *Do you find each aspect of this syllabus fair and reasonable?*
- *What parts do you want to know more about, or find confusing?*

### *What to call me?*

The senior scientists around you have worked hard to earn the jobs they have. I suggest that you should *always* err on the side of politeness and call scientists by their honorific titles (“Prof. Madigan”, “Dr. Pineda”), unless they tell you otherwise. In general, first names are appropriate only after a sense of mutual respect has been established. In this class, I plan to treat you as my colleagues, so I would like you to please call me “Zach.”

### *Learning Goals*

The goals of this class are for student to practice thinking about the world like a scientist, through hands-on experience. By the end of this class, we hope that students will be able to

- explain how the properties of stellar and planetary systems are determined through remote astronomical measurements
- learn independently by crafting a well-posed question and then improvising a path that can be followed to answer it
- draw robust scientific conclusions by analyzing and interpreting observational data in the context of a theoretical framework
- communicate scientific knowledge through data visualization, personal conversations, written work, and oral presentations
- feel a sense of belonging as members of the scientific community

### *Course Preparation*

This class requires prerequisite courses of ASTR 1040 and PHYS 1125 or 1120, as well as a co-requisite or prerequisite of ASTR 2600. It is restricted to ASTR majors. Please come talk to me if you have not completed these requirements, or if you feel you struggled in any of these classes.

### *Course Logistics*

We plan to use canvas for most course announcements and materials, accessible at [canvas.colorado.edu/courses/21603](https://canvas.colorado.edu/courses/21603). You will submit assignments either in person or on canvas. We will also use a slack workspace for communicating outside of class, accessible at [astr3400-f18.slack.com](https://astr3400-f18.slack.com). You can access slack through a browser, or with an application on your computer, or on your phone. We’ll try to use canvas for more official communication and slack for more informal discussion and help.

### *General Course Format*

The layout of each week may change from week to week, but generally we will aim to follow this pattern:

**Mon.** Reading discussions, conceptual lecture, FBOTEC.

**Wed.** Colloquium summaries, technical skills lecture, project work.

### *Grades*

All assignments in this class are designed to practice skills that we want to learn or to assess how well we are doing as a group in covering our stated goals. Grades on assignments are meant to serve as constructive feedback for where you can make improvements. The approximate breakdown for graded assignments in this class will be:

20% Skills Projects (individual or in groups; practicing technical skills and submitting plots, code, and written responses).

10% Reading Reflections (individual; reading popular and scientific articles, and responding with discussions and summaries).

5% Fearless Back-of-the-Envelope Calculations (groups; estimating solutions to open-ended questions, mostly during class).

10% Take-Home Quizzes (individual; testing the core class concepts)

15% Scientists in their Natural Habitat (groups; attending a scientific talk, interviewing the speaker, and reflecting on it in class).

30% Scientific Research Project (groups; a written and oral presentation of an inquiry-driven research project).

10% Class participation (individual; contributions to discussions and the promotion of an inclusive learning environment).

### *Textbooks*

There is no single textbook for this class. Our readings will be drawn from the scientific literature, pulled from the web, and scanned from books. You may find the textbooks from your other astronomy, math, physics, and statistics classes to be valuable reference resources for some of the concepts we will cover in class.

### *Attendance and Deadlines*

I expect you to attend and participate constructively in class. If you miss class, you will be responsible for completing work that you

missed and gathering notes to catch up. I will accommodate reasonable requests for extensions on deadlines, but please make arrangements with me before the deadline passes.

### *Accommodation for Disabilities*

I do not want any disabilities to stand in the way of your learning experience in this class, and I am happy to accommodate your needs. Whether you have a letter from Disability Services documenting a disability need or not, please set up a time to talk to me about how I can help. Information on requesting official accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website.

### *Observance of Religious Holidays*

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, if you must miss an exam, assignment, or tutorial because of observance of a religious holiday, please notify me in writing at least one week prior. See the campus policy regarding religious observances for full details.

### *Respect in the Classroom*

Students and faculty each have responsibility for maintaining an appropriate<sup>1</sup> learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to me with your legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on classroom behavior and the student code.

<sup>1</sup> Think about the question "What does appropriate mean to you?" and check out the Ground Rules on canvas. Please feel free to propose any changes you would like to those ground rules.

*Honor Code*

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the academic integrity policy of the institution. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access, clicker fraud, resubmission, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code Council ([honor@colorado.edu](mailto:honor@colorado.edu); 303-735-2273). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code Council as well as academic sanctions from the faculty member. Additional information regarding the academic integrity policy can be found at [honorcode.colorado.edu](http://honorcode.colorado.edu).

*Sexual Misconduct, Discrimination, Harassment, or Related Retaliation*

The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (including sexual assault, exploitation, harassment, dating or domestic violence, and stalking), discrimination, and harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or [cureport@colorado.edu](mailto:cureport@colorado.edu). Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website. Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

