Astronomy Town Hall Meeting

Fall 2019

Topics of Discussion

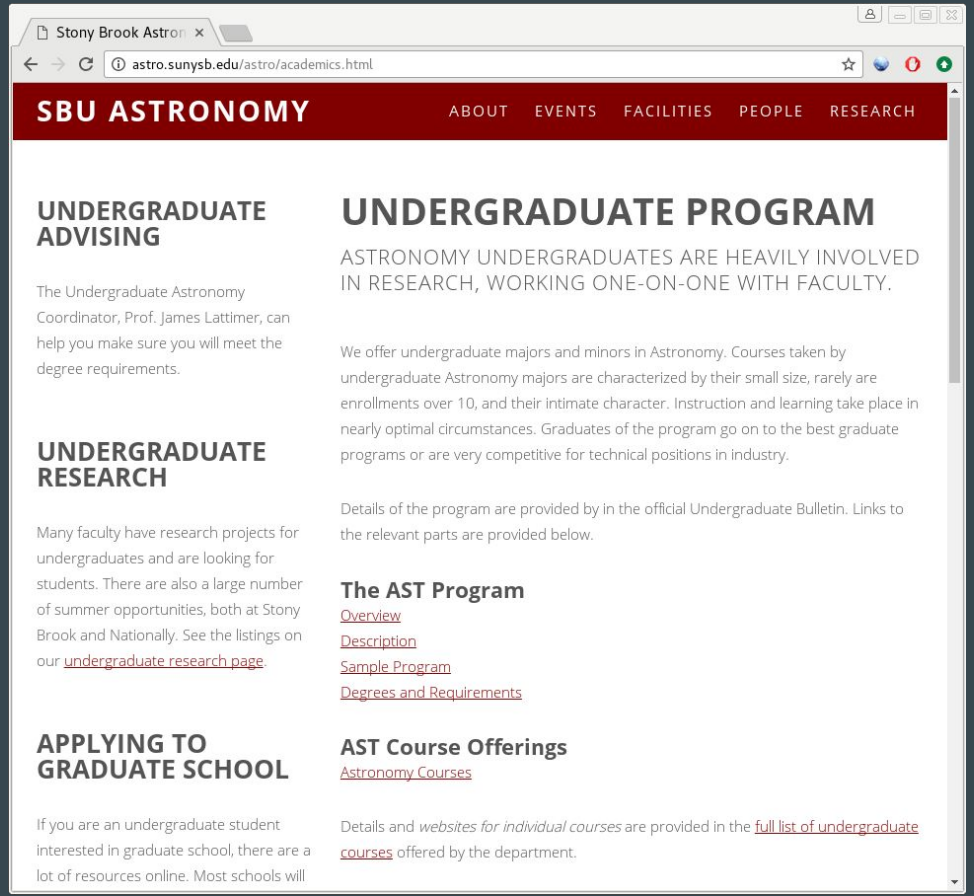
- Astronomy courses / degree requirements
- Research opportunities
- Astronomy club
- Graduate School
- Careers
- Whatever is on your mind

Introduction

The Astronomy group has 12 regular faculty and a number of active research and emeritus faculty, several postdocs, many graduate students, and many undergraduates active in research.

UG Astro Program

- Links to the UG bulletin with degree requirements
- Links to research opportunities
- Information about graduate school



Astronomy Courses

- AST 203 is now offered every semester
- AST 205 is offered every Fall (order with AST 203 doesn't matter)
- AST 34x-level classes are offered on a 2 year cycle—plan ahead
- Many students take AST 443 (observational techniques) to satisfy major requirements
    - Can be used in place of senior physics lab (PHY 445) for double majors
    - Note: if you plan to do MAT in physics later, you should take PHY 445
- Many students also do research or reading classes to satisfy major requirements
    - You need to find an advisor willing to mentor you
    - You may not find someone willing to do 3 credits in one semester
- Physics and Astronomy majors are closely related—many students double major
- Talk to Prof. Lattimer for information about the major

Astronomy Degree Requirements

- AST 203
- Three of: AST 341 (stars & radiation); AST 346 (galaxies); AST 347 (cosmology); AST 390 (special topics)
- Six credits from AST 205 of higher
  - Except: AST 248, AST 301, AST 389, AST 475
  - Any combination of:
    - AST 205 (planetary science)
    - AST 443 (observational techniques)
    - the 4th of the AST 3xx series
    - PHY 408 (modern relativity)
    - independent research
- PHY intro sequence
- PHY 251/2 (modern physics)
- PHY 277 (introduction to computation)
- PHY 300 (waves)
- PHY 306 (thermal physics)
- Eight credits from advanced physics courses
- MAT 131 and 132 or similar sequence
- MAT 203 or 205 or 307 or AMS 261 (calc III)
- MAT 303 or 305 or 308 or AMS 361 (calc IV)

Astronomy Degree Requirements

- Note: no more than 3 classes with a grade of C- may be applied to the major
- Practical note: you need AST 203 by Spring of your sophomore year to finish in 4 years
- Plan ahead!
- Some recent changes:
  - AST 203 is offered every semester now
  - AST 205 is offered every year (instead of every 2 years)
  - PHY 251 (modern physics) will be offered over the summer

Astronomy Degree Requirements

- Other popular classes:
  - PHY 153: python and statistics
  - PHY 408: General Relativity
    - requires a love of mathematics & PHY 301 as prerequisite
    - Counts towards required PHY courses for Astro majors
  - Linear algebra
  - Complex analysis
  - AMS 326: Numerical Analysis

AST 3xx Sequence

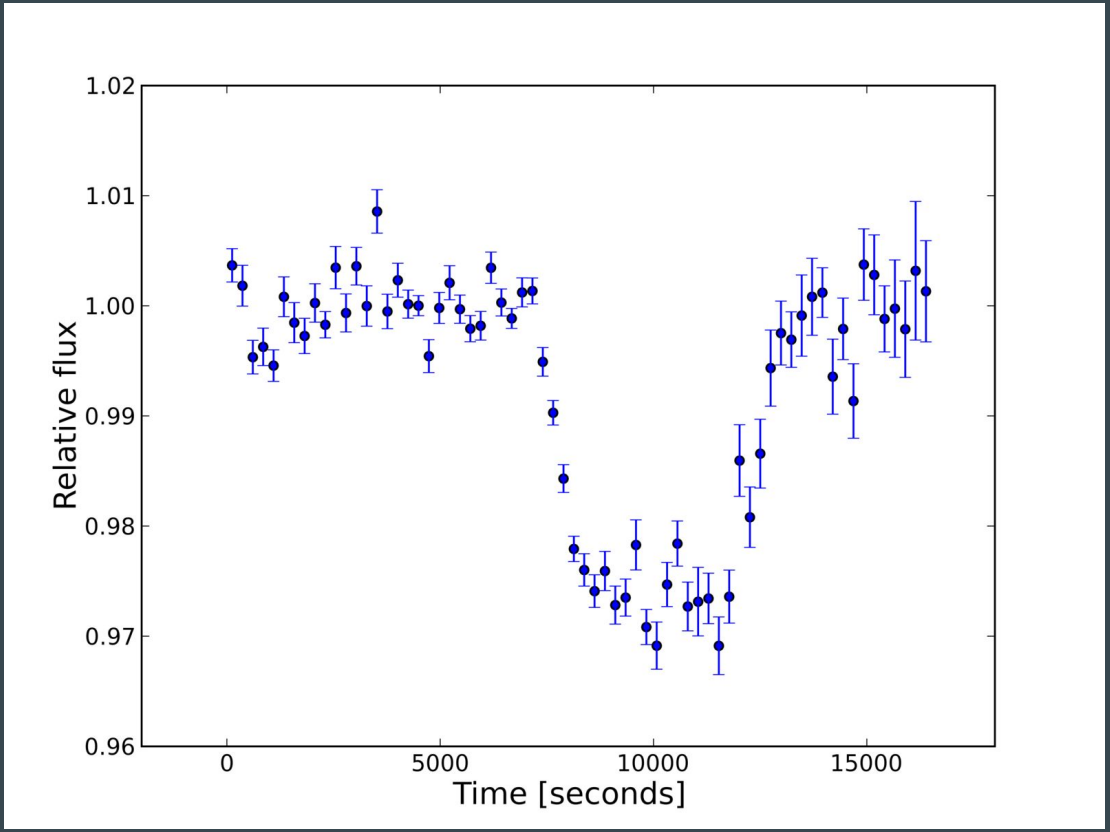
- AST 341: Stars and Radiation
  - Fall 2018
  - Fall 2020
- AST 346: Galaxies
  - Spring 2019
  - Spring 2021
- AST 347: Cosmology
  - Fall 2019
  - Fall 2021
- AST 390: special topics
  - Spring 2020
  - Spring 2022

AST 390: Special Topics

- This course could substitute on of the other AST 34x courses
- Potential topics
  - Black holes, neutron stars, and gravitational waves
  - Computational astrophysics (follow-on to PHY 277)
  - Exoplanets
  - Radio astronomy
  - ...
- Currently requires permission of the instructor

AST 443: Observational Techniques

Lightcurve of transiting exoplanet around HD189733—data taken by students in AST 443 from our rooftop telescope!



Upper-Level Writing Requirement

Students are certified as satisfying the upper-division writing requirement by registering for the 0-credit AST 459 and completing writing projects within their major. All students majoring in Astronomy/ Planetary Sciences must submit two papers (term papers or independent research papers) to the Astronomy coordinator for Department evaluation by the end of the junior year. If this evaluation is satisfactory, the student will have fulfilled the upper- division writing requirement. Papers should be written in the form of a journal article. All papers must consist of an abstract, introduction, main content, and references. References should be cited throughout the text. Any figures should be numbered and have an appropriate caption. If you are using a lab report for the basis of this requirement, you should expand upon the introduction and describe the connection to topical scientific research.

A typical length should be 10 pages (double spaced, 11-point font) plus references, preferably written in LaTeX.

Students should consult with the department advisor to ensure that their plan for completing the Upper Division Writing Requirement is consistent with university graduation requirements for General Education. Students completing the Stony Brook Curriculum (SBC) must complete a course that satisfies the "Write Effectively within One's Discipline" (WRTD) learning objective to graduate. The Upper Division Writing Requirement is consistent in most cases with the SBC learning outcomes for WRTD.

You should hand in your papers by the end of your Junior year

SBC Requirements

- We require 2 upper-level writing papers. To get credit you must register for AST 459
  - AST major: register for AST 459 *after* you completed the first paper.
  - PHY+AST double majors should take for AST 459 for one paper and PHY 459 for the other (doesn't have to be at the same time)
  - This ensures all University requirements (WRTD) are fulfilled
- You should complete these *before* your senior year
  - Often changes are requested to the papers
  - Waiting until the last minute can put your graduation in jeopardy
- Students can take the 1-credit AST 100 to satisfy the SPK requirement

Science Writing and Speaking

- Students wanting extra instruction on speaking and writing should look at:
  - JRN 365: Talking Science: highly recommended by your peers
  - WRT 380: Advanced Research Writing

Honors

- In your Junior year, you can apply to become a candidate for Departmental honors
  - Need to complete a thesis as part of your research
  - Need to register for AST 447 or AST 487
    - You will want to have a faculty mentor lined up at this point
  - Need a GPA of 3.3 or higher in math/natural sciences
- You need to form a committee of 3 faculty: 2 from astro + 1 from outside
- The thesis needs to be approved before you are cleared for graduation
- Note:
  - the PHY major honors does not require a thesis, so you can do both AST and PHY honors with only a single thesis.
  - in order for your thesis to count as part of your writing requirement you have to submit it separately as a writing requirement paper. This is not automatic.

Research Opportunities

- AST 200 (Current Astronomical Research) is a good way to see what research is taking place
- PHY 277 (Computation for Physics and Astronomy) provides a good basis for the tools you'll need
- Local opportunities
  - Knock on doors
  - Talk to fellow students
  - Look at the UG section of the Astro Group webpage
- Most groups have weekly meetings that UGs can sit in on and participate
- UG student office (back of ESS 437) available
- Course credit:
  - AST 287: Introductory Research
  - AST 345: Undergraduate Research
  - AST 447: Senior Tutorial
  - AST 475: Teaching Practicum (not for major credit)
  - AST 487: Senior Research

External Research Opportunities

- NSF REU program
  - Provides stipend and travel expenses for ~10 week research experience at a University in the US
  - Previous SBU students went to Hawaii, Harvard, Texas, SF, ...
  - Highly competitive
  - Applications due in toward end of Jan. (but start looking in Dec.)
- URECA can provide money for summer research on campus
- Many other summer opportunities exist—look at the UG webpage
- Typically application requires: transcript, 2 - 3 letters of recommendation, statement of interest

Graduate School

- Apply during the senior year
- Both Physics and Astronomy programs and Astronomy/Astrophysics programs
- Strong application:
  - GPA
  - Letters of reference
  - Personal statement
  - Research experience
  - GREs (note: many programs are dropping this requirement)
- PhD graduate students are fully supported
  - Teaching / research assistant with annual stipend (~$30,000) + tuition waiver
- ~ 4 - 6 years to get degree (sometimes shorter, sometimes longer)
- Interested in graduate school? talk to some of our grad students

Graduate School

- There are fellowships available that you can apply for during your senior year (through NSF and DOE and other organizations)
  - These will give you independence in your studies
- Beware of masters-only admission
  - You will need to pay your own way and there is no guarantee that you will be admitted into the PhD program
  - These are an increasing trend nationally
- Applications are due in winter of your senior year
  - You'll hear in March-ish
  - Deadline to make a choice is typically April 15th of your senior year

Physics GREs

- Many programs no longer require the PGRE
  - https://docs.google.com/spreadsheets/d/19UhYToXOPZkZ3CM469ru3Uwk4584CmzZyAVVwQJJcyc/edit?usp=sharing
- Talk to some seniors about the exam and how to prepare
- Practice tests can be found on the internet

Careers

- Astronomy research provides students with the skills to do data analysis, software / algorithm design, and problem solving
- Career paths:
  - Academic (all levels: grade school through high school, college and university)
  - Industry
    - Astro related
    - Software
    - Financial
    - ...
  - National observatories and laboratories
  - Museums / planetariums
  - Science journalism
  - ...

Astronomy Group Events

- There are several weekly events:
  - *Astronomy seminars* on Mondays at 11:30am in ESS 450
  - *Weekly coffee* on Thursdays at 10:30 am in ESS 437
  - *Astro-ph discussions* on Fridays at 10:30 am in ESS 437
- Other interesting events:
  - Department colloquia on Tuesdays at 4:15pm in Harriman 137
  - IACS seminars (times vary)

Undergraduate Astronomy Club

- Active since 2010
- Run observing sessions, annual AstroFest, excursions
- Help with open night
- Use our telescopes

M42: the Orion Nebula