Designing An Astronomy Course

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AST 101: Introduction to Astronomy - General Format

- In-person, 2 times a week for 80 minutes
- Office hours will occur twice a week after class
- Highlight in the syllabus this class will contain lectures, labs, and in-class activities and that their participation will affect their grade

Category	Percentage of Grade
Participation	15%
Homeworks and Lab Reports	30%
Exam 1	15%
Exam 2	15%
Final	25%

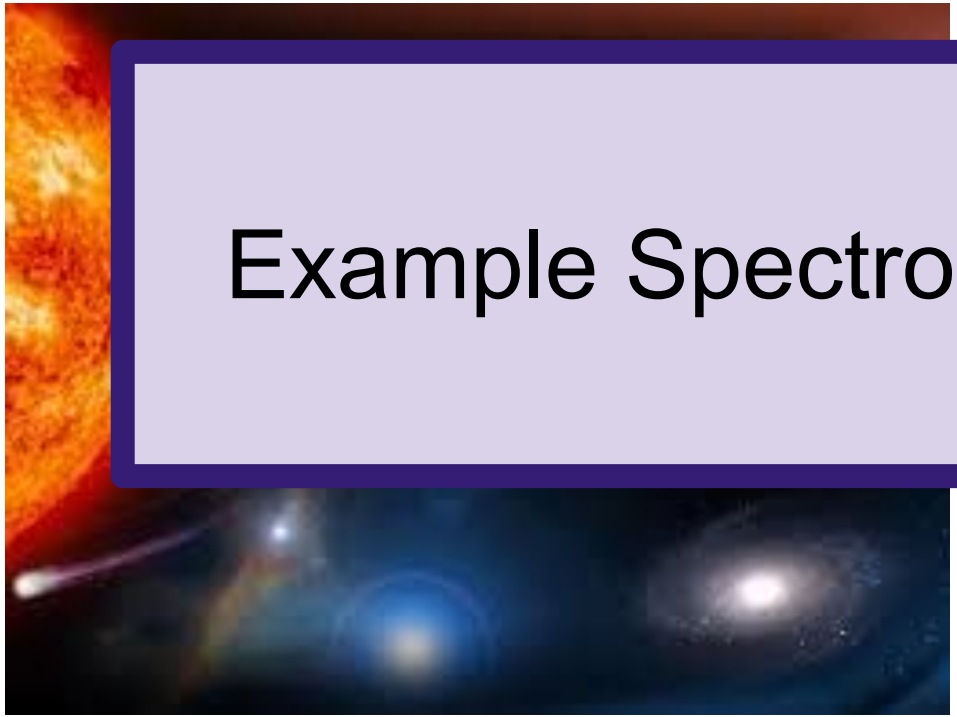
AST 101: Introduction to Astronomy - Course Focus

- Foundations of modern astronomy
- What is light and how it is used for astronomical observations
- Objects in the Solar System
- Gravity’s role in the motion and interaction of celestial bodies

AST 101: Introduction to Astronomy - Desired Outcomes

- Learn how to “think like a scientist”
- Learning how to analyze data
- Learning how to dissect graphs

AST 101: Introduction to Astronomy - Desired Outcomes



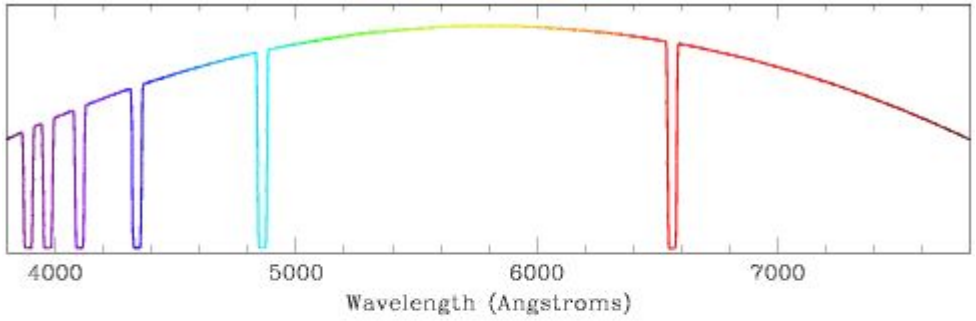
Example Spectroscopy Lesson

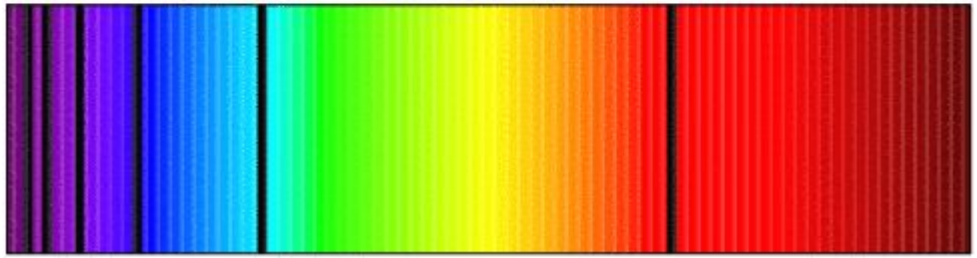
lata

- Learning how to dissect graphs

Lesson Plan: Big Ideas

- Teach students about spectroscopy and how it relates to astronomy
- Every element has a unique absorption/emission features.
- These absorption/emission features are used in astronomy to determine the composition of objects/media in space



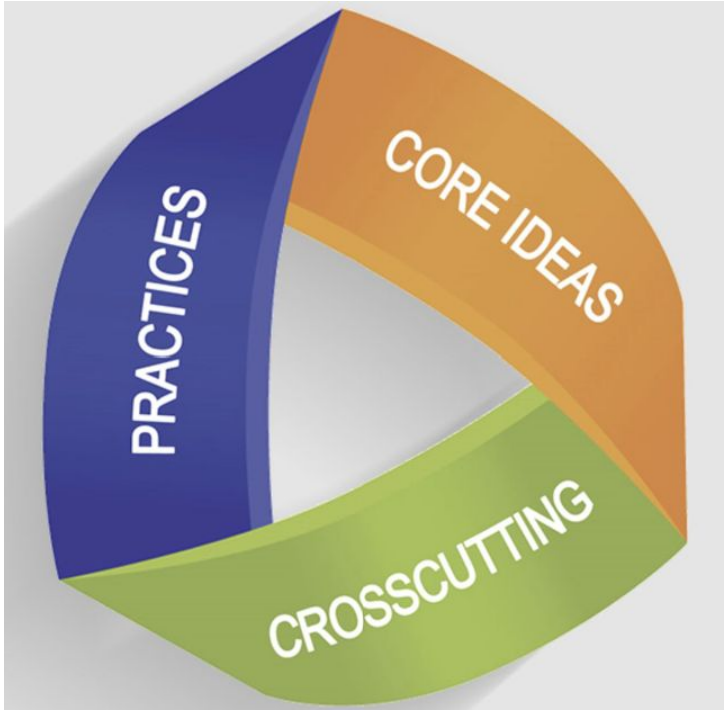


Lesson Plan: Desired Results

- Identify elements using their spectral signatures
- Understand why identifying elements through their spectra is a key concept in astronomy

Lesson Plan: Assessing

- Students will submit lab reports
- Core Ideas:
  - What is light? And how is it used in astronomy?
- Crosscutting Concepts:
  - Patterns
  - Cause and Effect
- Science Practices:
  - Plan and carry out investigations
  - Analyze and interpret data
  - Engage in argument from evidence
  - Obtain, Evaluate and Communicate Information

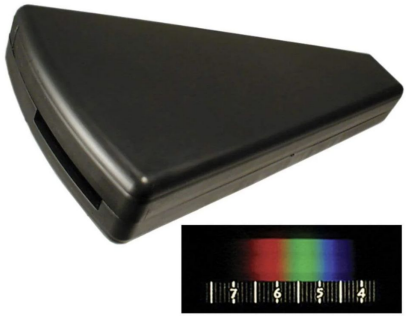


Lesson Plan: Outline

- Spectroscopy Pre-Lab (Class Discussion): (15 minutes)
  - What Properties does light have?
  - What are Wavelengths?
  - What is a Spectrum? What is measured and what does it represent?
- Spectroscopy “Tool-talk”: (10 minutes)

Spectroscopy Lab: Tool Talk

Spectrum Tube



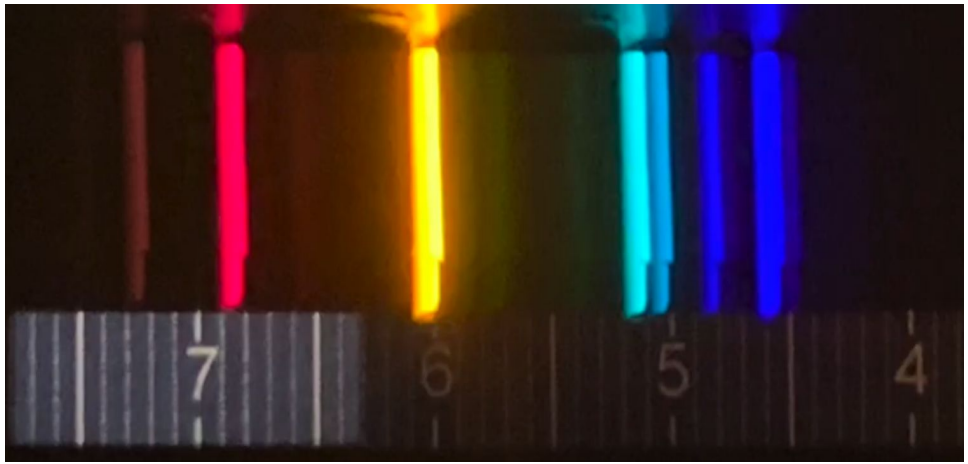
Spectroscope

Lesson Plan: Outline

- Spectroscopy Pre-Lab (Class Discussion): (15 minutes)
  - What Properties does light have?
  - What are Wavelengths?
  - What is a Spectrum? What is measured and what does it represent?
- Spectroscopy “Tool-talk”: (10 minutes)
- Spectroscopy Lab/Data Collection: (40 minutes)

Spectroscopy Lab: Data Collection

- Students can select mystery tubes of gas
  - Insert the tube in the power supply
  - Observe the light through the spectroscope
- Record what you observe!
- Compare to provided elemental spectra



Spectrum #2 Known gas: _____ Number of tube: _____

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  - What Properties does light have?
  - What are Wavelengths?
  - What is a Spectrum? What is measured and what does it represent?
- Spectroscopy “Tool-talk”: (10 minutes)
- Spectroscopy Lab/Data Collection: (40 minutes)
- Spectroscopy Post Lab (Class Discussion/Mini Lecture): (15 minutes)
  - Discuss what students have learned in the lab?
  - Discuss how this is important/relevant in astronomy
    - Put up example(s) of “real” spectra. See if anyone wants to guess some spectral lines/elements in the real spectrum

Conclusions

- Intro astronomy course for students in the major
- Mixed-modal course with lectures, activities, and labs
- Outlined one of lab sessions which is a spectroscopy lab