

# **Phys90: Introduction to Astronomy Laboratory**

## **Laboratory Syllabus**

Laboratory: M 1:00pm-3:00pm, 3:00pm-5:00pm, 6:00pm-8:00pm Gal-205 or Campus Observatory Pad

Campus Observatory: TBA

Instructor: [Prof. Ron Olowin](#)

(Office: Gal-103b, Galileo Hall; Voice: 925.631.4428;  
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## **Special Criteria**

Reasonable and appropriate accommodations, that take into account the context of the course and its essential elements, for individuals with qualifying disabilities, are extended through the office of Student Disability Services. Students with disabilities are encouraged to contact the Student Disability Services Coordinator at (925) 631-4164 to set up a confidential appointment to discuss accommodation

guidelines and available services. Additional information regarding the services available may be found at the following address on the Saint Mary's website: [Student Disabilities Services](#)

## **Course of Study**

Astronomy is as creative an enterprise as any of the arts and humanities. It flows from the realm of human consciousness that wants to know, and that includes knowing about the Universe of which we are an intimate part.

How we know what we know is as important as what we know, and astronomy as much as any other science reveals the interplay between our collective observations of the world and the imagination of the human mind to conceptualize its nature. In this course, we shall present the diverse facts that form the context of a science and at the same time do justice to the unifying concepts that draw these facts together into a consistent picture, interweaving sufficient concepts with facts to provide the essence of contemporary astronomical thought. If, long after the factual content is forgotten, you retain some awe from having experienced the great intellectual quest that is astronomy, you are fortunate; otherwise, you haven't been paying attention!

While the course is designed in such a way as to have

three one-hour lectures, there is one two-hour laboratory session per week, with the laboratory work complementing the lecture material. The laboratory will meet at irregular hours, early morning, afternoon and evening, to accommodate outdoor observing sessions at the Campus Observatory, practical experimentation in the Physics laboratory, as well as field trips to local planetaria and observatories.

### Laboratory Course Description

Demonstration of astronomical principles through laboratory observations and analysis of astronomical data. Required for PHYSI-090, Introduction to Astronomy

### Student Learning Outcomes

• Demonstrate an understanding of scientific concepts, principles, and theories that explain the natural and physical world:

- Apply the scientific method to understand motions in the heavens, from a geocentric and heliocentric point of view;
- Identify the physical nature of planets stars and galaxies;
- Use the Atomic Theory and Theory of Electromagnetism to understand the phenomena of stars and stellar systems
- Apply the scientific method to a selected group of topics in astronomy, e.g. motions in the heavens, the physics of planets stars and galaxies.

- Collect, analyze, and interpret empirical data gathered in a laboratory or field setting:

- Collect, report and analyze data obtained in a laboratory and/or observatory setting in a manner exhibiting organization, proper documentation and critical thinking.
- Identify environmental factors, which affect the outcome of an experiment or observation and apply basic error analyses techniques.
- Perform visual observations and use proper astronomical vocabulary and terminology.
- Demonstrate a basic understanding of the use of standard astronomical instruments.
- Demonstrate a working knowledge of computer on-line and Internet astronomical programs.
- Use "Current Events" as a means to demonstrate a working knowledge of contemporary astronomical events and influences.

- Examine social or ethical issues that arise in the process of scientific inquiry or out of scientific or technological developments:

- Demonstrate a knowledge of the cultural impact of the simultaneous Cosmic, Biological and Informational Revolutions.
- Demonstrate a knowledge of the impact of Cosmology, the discovery of our "Sense of Place" in the Universe.
- Demonstrate a knowledge of the impact of AstroBiology, the discovery of extraterrestrial life and intelligence and its impact on human culture.
- Demonstrate a knowledge of Technological Evolution (e.g. the development of synthetic life and artificial

- intelligence) and its impact on humankind.
- Demonstrate a knowledge of the our planet's Ecosystem, Climate Change, Global Warming and its impact on human culture.

## Laboratory Schedule

	Day	Topic	Observations	
	MON	Grand Tour of the Night Sky	Constellations (Night Time & Daytime)	
	MON	Celestial Sphere, Coordinates	Altitude, Azimuth, Right Ascension, Declination	
	MON	Planets, Minor Planets, Comets, Meteoroids	Bodies of the Solar System: Motion of the Moon	
	MON	The Sun As a Star	Our Star:, The Sun => Meridian Plynth Observations	
n 1				
	MON	Spectra	Elemental Emission Spectra	
	MON	Conversions: Charts to Telescopes	Star Colors, Brightness, Variability	
	MON	Stellar Evolution	Star Colors, Brightness, Variability	
	MON	Stellar Evolution	Telescopic Observations: Stars and Clusters	
n 2				
	MON	The Milky Way Galaxy	Our Galaxy: The Milky Way	
	MON	Planets, Stars, Galaxies	Combined* Observing (*Naked Eye + Instruments)	
	MON	Planets, Stars, Galaxies	Combined* Observing: Evening	
	MON	Planets, Stars, Galaxies	Combined* Observing: Morning (4am}	
n 3				
	MON	Planets, Stars, Galaxies	Combined* Observing: Evening	
	MON	Planets, Stars, Galaxies	Combined* Observing: Morning (4am)	
	MON	Planets, Stars, Galaxies	Combined* Observing ; Transient Events (Satellites, Meteors, Transits and Occultations)	
i	<b>MON</b>	Full Review	Using Resources: Internet and iPad Apps	
AM		<b>FINAL LAB EXAM</b>		



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