

VAMPY Astronomy Syllabus

Hello and welcome to Astronomy!

My name is Madison Staton and I am your astronomy instructor. A bit about me... I am from Morgantown, KY where I teach a variety of science courses at Butler County High School including Anatomy and Physiology, Forensics, and Environmental Science. I attended the Mahurin Honors College at Western Kentucky University, where I received my Bachelor's degree in Middle School Science Education in 2019. In 2021, I earned my Master's degree in Curriculum and Instruction with an emphasis in Educational Technology from Purdue University. In 2022, I earned my Rank 1 in STEM Teaching Leadership from the NASA Endeavor STEM Teaching Program. When not teaching, I love gardening, cooking, playing board games, and spending time with my family.

In this course, you will learn about the Earth, Sun, Moon, planets, solar system, stars, galaxies, and the universe! Considering the vast distances and spans of time involved it is really incredible what we humans have learned about our surroundings over the past few hundred years. It is my goal that you gain an appreciation and a working understanding of these findings!

Observation Notebook

This ongoing assignment is a personal log of celestial observations, which includes date, time, location, and description of each event. Certain observations will be required. Some observations will be made during class, while others must be made on the student's own time.

Projects and Labs

Students will be required to complete various "hands-on" and/or research-oriented activities, including but not limited to: reports, model construction, physical experiments, computerized simulations, internet research, etc.

Daily Participation

Each student is expected to participate in all class activities and will receive a grade each week for doing so. Participating in class includes such things as taking notes, responding to questions, working practice problems, group work, lab exercises, etc.

COURSE RESOURCES

Text: OpenStax Astronomy, Astronomy 2e. OpenStax CNX. Mar 9, 2022
<https://openstax.org/details/books/astronomy-2e>

An Astronaut's Guide to Life on Earth: What Going to Space Taught Me About Ingenuity, Determination, and Being Prepared for Anything

Supplemental Videos:

Nova: Hunt for Alien Worlds (PBS)
Nova: Eclipse of the Century (PBS)
Nova: Countdown to the Invisible Universe (PBS)

Nova: Death of a Star (PBS)
Nova: Venus Unveiled (PBS)
Mysteries of Deep Space, Vol. I – III (PBS)
Voyage to the Outer Planets and Beyond (Today Home Entertainment)
Black Holes (New River Media)
The Amazing Space Shuttle, STS-1 thru STS-8 (Holiday Video Library)
Apollo Moon Landings (Holiday Video Library)
The Farthest (PBS)
Men in Space, From Goddard to Armstrong (A&E Home Video)
Pathfinder: Race to Mars, The NASA Briefings (IVN Entertainment Inc.)

ASTRONOMY COURSE OUTLINE

A. Measurement and Calculation

Astronomical techniques, conventions, and units of measure; review of geometrical concepts such as angle relations and trigonometry; review of algebra

B. The Visible Sky

Coordinate systems, frames of reference, constellations, the ecliptic, motions of the sun, moon, planets, stars, etc.

C. Cosmological Models

Ancient models of the sky, astrology, Ptolemy's geocentric model, Copernicus' heliocentric model, Kepler's Laws, Modern Laws of Motion, Galileo's works, Newton's Laws, Einstein's theories of relativity

D. Electromagnetic Radiation

Visible astronomy: optical telescopes; invisible astronomy: UV, IR, radio, gamma, etc.; spectroscopy; Doppler effect – red shift, blue shift

E. Inner Planets

Physical properties of Mercury, Venus, Earth, and Mars (and their moons); orbits and rotation; evolution

F. Outer Planets

Physical properties of Jupiter, Saturn, Uranus, Neptune, and Pluto (and their moons); orbits and rotation; evolution

G. The Solar System

Asteroids, comets, meteors and meteorites, origin and evolution of the solar system

H. The Sun

Physical properties and makeup, fusion process, sunspots, solar flares, magnetic field

I. The Stars: Other Suns

Distances, colors, temperatures, sizes, spectral classification, Hertzsprung-Russell Diagram, binary systems

J. Stellar Evolution

Star birth and death, white dwarfs, red giants, neutron stars, novae, supernovas, pulsars, black holes

K. Other Celestial Objects and Phenomena

The Milky Way, other galaxies, quasars, dark matter, SETI, Big Bang theory

L. Space Exploration

Past, present, and proposed future space missions, satellites, and telescopes