DEPARTMENT: SCIENCE	**COURSE TITLE: ASTRONOMY HONORS** **COURSE NUMBER: 250B**
GRADE(S): 11-12	**PRE-REQUISITES (IF ANY): ALGEBRA**

UNIT	**LENGTH**	**CONTENT**	**SKILLS**	**METHODS OF ASSESSMENT**	**FRAMEWORK STRAND(S) & STANDARD(S)**
Unit 1: Celestial Sphere Model	13 days	• Locate objects in the sky. • History of astronomy • Celestial Sphere Model • Daily and annual motions of the sun and stars • Sunrise and sunset positions • Reasons for the seasons • Retrograde motion of planets • Phases of the Moon • Observational relationships between planets	Students will: • Use a variety of coordinate systems. • Construct and present a historical time line. • Build a Celestial Sphere Model. • Interpreting a Celestial Sphere Model. • Understand relative motion of objects in the Solar System. • Read star maps. • Understand directional orientation. • Analyze horizon diagrams in both hemispheres. • Define and understand terms. • Analyze data. • Apply order of magnitude concepts to sizes of celestial objects. • Observe, record, and report on real phenomena. • Draw diagrams. • Understand scale modeling. • Demonstrate understanding of measurement. • Extract information from computer sources. • Demonstrate understanding of mathematical analysis of relative sizes. • Perform unit analysis.	• Pre and post tests • Locating objects in the sky lab (Honors extension) • Plotting the daily motion of the sun lab (Honors extension) • Building and using a celestial sphere lab (Honors extension) • Modeling the sun's motion on the celestial sphere lab (Honors extension) • Plotting the distance from the Earth to the Sun lab • Modeling the reasons for the seasons lab (Honors extension) • Worksheets (Honors extension) • Observational project (graded as they are completed – long term project) • Quiz • Unit exam (Honors extension) • Unit notebook check	Earth Science: Matter and Energy in the Earth System: 1.8, 1.9., 1.14 The origin and Evolution of the Universe: 4.2, 4.4
Unit 2: Planetary Motion	12 days	• Ptolemaic and Copernican systems • Development of modern model of planetary motion • Copernican equations for planetary distances • Kepler's Laws of planetary motion • Phases of Venus	Students will: • Differentiate between earth-centered and sun-centered models. • Use and analyze historical data. • Solve equations. • Derive mathematical relationships from data. • Draw diagrams. • Understand modeling.	• Mars orbit lab • Explorer 35 orbit lab (Honors extension) • Computer orbit simulations lab • Worksheets (Honors extension) • Problem sets (Honors extension)	Earth Science: Matter and Energy in the Earth System: 1.14 The Origin and Evolution of the Universe: 4.5, 4.6 Physics: Motion and Forces: 1.5,

		• Newton's Three Laws of Motion • Universal gravitation • Mass and weight • Orbital velocities • Surface gravity • Escape velocities • Sidereal and Synodic Periods	• Draw scale diagrams. • Relate equations to observational phenomena. • Construct computer models. • Analyze sidereal and synodic period diagrams.	• Quiz (Honors extension) • Unit notebook check • Unit exam (Honors extension) • Kepler's Third Law activity	1.6, 1.7, 1.10, 1.11, 1.12
Unit 3: The Solar System	13 days	• Components of the solar system • Characteristics of terrestrial planets • Characteristics of Jovian planets • Solar Nebulae Theory • Origins of planetary atmospheres • Types and origins of asteroids • Oort cloud and comets • Formation of the solar system • Planetary moons and rings • Earth's moon: composition, origin, motion • Seasons • Solar and lunar eclipses • Synchronous rotation	Students will: • Analyze models for the formation of the solar system. • Analyze differences between terrestrial and Jovian planets. • Relate differences in planets to validate models for formation of the solar system. • Extract material from videos and textbook. • Diagram and model eclipses. • Model seasons on Earth.	• Quiz • Unit notebook check • Unit exam (Honors extension) • Video-based worksheets • Relative position and motion using the Earth, Sun, Moon models • Oral summaries about an object in the solar system • Peer evaluation of oral presentations • Lab practical	Earth Science: Matter and Energy in the Earth System: 1.6, 1.8, 1.9, 1.14 Earth Processes and Cycles: 3.4, 3.14 The Origin and Evolution of the Universe: 4.5, 4.8 Physics: Conservation of Energy and Momentum: 2.5
Unit 4: Measuring Properties of Stars	10 days	• Properties of the Sun • Properties of stars • Astronomical distances • Methods of measurement • Inverse Square Law • Relative and absolute magnitude of stars • Electromagnetic spectrum • Production of electromagnetic radiation • Speed of light • Spectral analysis and classes of stars • Doppler shift • Wien's Law • H-R diagrams • Proper motion	Students will: • Solve equations. • Derive equations from data. • Analyze mathematical relationships. • Draw diagrams. • Analyze diagrams. • Categorize properties. • Analyze relative motions. • Analyze H-R diagrams. • Analyze actual star data. • Use a spectroscope.	• Parallax of a star lab (Honors extension) • Distances to a star lab • Proper motion of a star lab (Honors extension) • Plotting an H-R diagram lab (Honors extension) • Spectra of seven elements lab • Measuring the universe with color lab (honors extension) • Quiz (Honors extension) • Unit notebook check • Unit exam (Honors extension) • Lab practical (Honors extension)	Earth Science: Matter and Energy in the Earth System: 1.2, 1.4, 1.14 The Origin and Evolution of the Universe: 4.2, 4.3, 4.7 Chemistry: Atomic Structure: 2.3, 2.5, 2.6 Physics: Waves: 4.6 Electromagnetic Radiation: 6.1, 6.2

Unit 5: Stellar Evolution	12 days	• Life history of stars • Properties of a main sequence star • Properties of black holes • Factors affecting lifetime of a star • Death of stars • Red giants, white dwarfs, neutron stars, pulsars, black holes • Nucleosynthesis • Supernovas • Hubble's Law and the Hubble Constant • Big bang theory • Galaxies • Variety of cosmological topics presented as student projects	Students will: • Present a project orally. • Research a topic. • Write a 6 –10 page research paper. • Develop openness to new ideas. • Extend collectable data to theory formation. • Analyze H-R diagrams. • Predict the evolutionary path of a star. • Use really BIG numbers. • Classify and identify galaxies from Hubble photographs. • Draw analogies.	• Classifying and identifying galaxies lab • Stellar evolution lab • Research paper • Oral presentation • Unit exam (Honors extension) • Unit notebook check	Earth Science: Matter and Energy in the Earth System: 1.14 The Origin and the Evolution of the Universe: 4.1, 4.3, 4.4, Chemistry: Atomic Structure: 2.9 Physics: Motion and Forces: 1.11 Electromagnetic Radiation: 6.2