Exploring the Universe: An Adventure in Astronomy
Physics 20- Syllabus Addendum for Prospective Teachers

Chapter	Earth and Planetary Science Subject Matter Requirements	Academic content standards for kindergarten through grade twelve, adopted by the California State Board of Education
Ch 1-Our Place in the Universe	1.3a Cite various forms of evidence that indicate the proximity of the planets in the solar system in relation to Earth and the stars	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 1d Students know the evidence indicating that the planets are much closer to Earth than the stars are.
Ch 5-Universal Motion: From Copernicus to Newton	1.2a Explain how the solar system was formed, including differences and similarities among the sun, terrestrial planets, and the gas planets, and cite the evidence from Earth and moon rocks that indicate that the solar system was formed approximately 4.6 billion years ago	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 1a Students know how the differences and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system.
Ch 14-Our Star	1.1c Know that the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 1e Students know the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium; 2c *Students know* the evidence indicating that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion in stars
Ch 15-Stars	1.1d Describe the process of the nuclear synthesis of chemical elements and how accelerators simulate the conditions for nuclear synthesis (i.e., in stars and in the early universe)	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2e * Students know accelerators boost subatomic particles to energy levels that simulate conditions in the stars and in the early history of the universe before stars formed.
Ch 16-Star Stuff	1.1f Describe, in terms of color and brightness, how the evolution of a star is determined by a balance between gravitational	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2f * Students know the evidence indicating that the color, brightness, and evolution of a star are determined by a balance

	collapse and nuclear fusion	between gravitational collapse and nuclear fusion
Ch 17-The Bizarre Stellar Graveyard	1.1e Compare the use of visual, radio, and X-ray telescopes to collect data that reveal that stars differ in their life cycles	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2d Students know that stars differ in their life cycles and that visual, radio, and X-ray telescopes may be used to collect data that reveal those differences.
Ch 18 – Our Galaxy	1.1a Identify and describe characteristics of galaxies	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2b Students know galaxies are made of billions of stars and comprise most of the visible mass of the universe
Ch 19-Galaxies: From Here to the Horizon	1.1a Identify and describe characteristics of galaxies	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2b Students know galaxies are made of billions of stars and comprise most of the visible mass of the universe
Ch 20- Galaxy Evolution	1.1a Identify and describe characteristics of galaxies	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2b Students know galaxies are made of billions of stars and comprise most of the visible mass of the universe
Ch 21-Dark Matter and the Fate of the Universe	1.1b Explain the evidence for the “big bang” model	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2g * Students know how the red-shift from distant galaxies and the cosmic background radiation provide evidence for the "big bang" model that suggests that the universe has been expanding for 10 to 20 billion years
Ch 22-The Beginning of Time	1.1b Explain the evidence for the “big bang” model	Science Content Standards for California Public Schools, Grades 9-12, Earth Sciences: 2g * Students know how the red-shift from distant galaxies and the cosmic background radiation provide evidence for the "big bang" model that suggests that the universe has been expanding for 10 to 20 billion years