

COMMUNITY UNIT SCHOOL DISTRICT 200

Astronomy High School – Grades 10, 11, 12 Intermediate Level – One Semester Elective

- 1. Subject Expectation (State Goal 11)** **The student will understand the processes of scientific inquiry and technological design, investigate questions, conduct experiments and solve problems.**

Essential Learning 1 (Learning Standard A)	Know and apply the concept, principles and processes of scientific inquiry
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| Critical Content | 11.A.4c | a. collect, organize, and analyze data accurately and precisely <ul style="list-style-type: none">• organize and explain data on a variety of tables, graphs, and charts• locate data from different types of graphs or tables that present findings• analyze data from different types of graphs or tables to present findings objectively |
| | 11.A.5e | b. report, display, and defend the results of investigations to audiences that may include professionals and technical experts <ul style="list-style-type: none">• relate and discuss the results of investigations and responding to questions |

Essential Learning 2 (Learning Standard B)	Know and apply the concepts, principles and processes of technological design
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| Critical Content | 11.B.4a | a. identify a technological problem inherent in a commonly used product <ul style="list-style-type: none">• identify a design problem that causes poor performance in a product |
| | 11.B.5b | b. select criteria for a successful design solution to the identified problem <ul style="list-style-type: none">• identify observational conditions that are limited by current designs and suggest solutions |

- 2. Subject Expectation (State Goal 12)** **The student will understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.**

Essential Learning 1 (Learning Standard C)	Know and apply concepts that describe properties of matter and energy and the interactions between them
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| Critical Content | 12.C.4a | a. use kinetic theory, wave theory, and quantum theory to explain energy transformations <ul style="list-style-type: none"> • explain electron distribution within the atom using quantum theory • discuss the relationship of energy changes to matter on a molecular/atomic level • describe light using wave model equations |
| | 12.C.4b | b. know the atomic and nuclear structure of matter <ul style="list-style-type: none"> • relate subatomic particles to properties and behavior of matter |
| | 12.C.5a | c. analyze the effects of gravitational, electromagnetic and nuclear forces on a physical system <ul style="list-style-type: none"> • describe the gravitational effects on orbital motion using Kepler’s laws • describe the placement of a star on the H-R diagram due to gravitational and electromagnetic effects |

Essential Learning 2 (Learning Standard D)	Know and apply concepts that describe force and motion and the principles that explain them
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| Critical Content | 12.D.5a | a. analyze factors that influence the relative motion of an object <ul style="list-style-type: none"> • give examples of and evaluate how gravity is affected by an object’s size and its distance from other particles • identify and discuss the factors that influence the relative motion of an object |
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Essential Learning 3 (Learning Standard F)	Know and apply concepts that explain the composition and structure of the universe and Earth’s place in it
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| Critical Content | 12.F.3a | a. simulate, analyze, and explain the effects of gravitational force in the solar system <ul style="list-style-type: none"> • explain the factors that affect the gravity of each planet • compare the gravity of each planet • summarize and compare the orbital shapes of the planets |
| | 12.F.4a | b. explain theories, past and present, for changes observed in the universe <ul style="list-style-type: none"> • summarize the life cycles of small, medium, and massive stars • discuss the theories for observed changes in the universe and comparing them with current theories |
| | 12.F.4b | c. describe and compare the chemical and physical characteristics of galaxies and objects within galaxies |
| | 12.F.5a | d. know the processes involved in the life cycles of stars and evaluate the supporting evidence <ul style="list-style-type: none"> • compare and contrast the life cycles of stars based upon the star’s solar mass |
| | 12.F.5b | e. describe the size and age of the Universe and evaluate the supporting evidence |

- use red shift to describe relative motion of objects
- relate Hubble’s constant to the age of the universe

3. Subject Expectation (State Goal 13) The student will understand the relationships among science, technology and society in historical and contemporary contexts.

Essential Learning 1 (Learning Standard A)	Know and apply the accepted practices of science
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| Critical Content | 13.A.4c | a. | describe how scientific knowledge, explanations, and technological designs may change with new information over time <ul style="list-style-type: none"> • explain how changes in technology, changes in public opinion, research, and cultural development can improve over time |
| | 13.A.5b | b. | explain the criteria that scientists use to evaluate the validity of scientific claims and theories |
| | 13.A.5c | c. | explain the strengths, weaknesses and uses of research methodologies including observational studies, controlled laboratory experiments, computer modeling, and statistical studies |

Essential Learning 2 (Learning Standard B)	Know and apply concepts that describe the interaction between science, technology and society
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| Critical Content | 13.B.4e | a. | evaluate the claims derived from purported scientific studies used in advertising and marketing strategies |
| | 13.B.5b | b. | analyze and describe the process and effects of scientific and technological breakthroughs |
| | 13.B.5d | c. | analyze the costs, benefits, and effects of scientific and technological policies at the local, state, national, and global levels |
| | 13.B.5e | d. | assess how scientific and technological progress has affected other fields of study, careers and job markets and aspects of everyday life |