

## U. S. Curriculum Correlations by State

### Washington, D.C.

#### The Universe

#### ES.2. Galaxies are made of billions stars and form most of the visible mass of the Universe.

1. Recognize that the Universe contains many billions of galaxies, and each galaxy contains many billions of stars.

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2. Describe various instrumentation used to study deep space and the Solar System (e.g., telescopes which record in various parts of the electromagnetic spectrum, including visible, infrared, and radio, refracting telescope, reflecting telescope, spectrophotometer.)

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3. Describe Hubble's Law, and understand the Big Bang Theory, and the evidence that supports it (background radiation, relativistic Doppler effect).

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4. Explain the basics of the fusion processes that are the source of energy of stars.

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5. Explain that the mass of a star and the balance between collapse and fusion determine the color, brightness, lifetime, and evolution of a star.

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6. Analyze the life histories of stars and different types of stars found on the Hertzsprung-Russell diagram, including the three outcomes of stellar evolution based on mass (black hole, neutron star, white dwarf).

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7. Describe how elements with an atomic number greater than helium have been formed by nuclear fusion processes in stars.

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8. Explain that the red shift from distant galaxies and the cosmic background radiation provide evidence for the Big Bang model that the Universe has been expanding for 10 to 20 billion years.

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9. Construct a model and explain the relationships among planetary systems, stars, multiple-star systems, star clusters, galaxies, and galactic groups in the Universe.

#### Starry Night Lesson Plans *In order of relevance*

H1 H2 H3 G1 G2

I1 I2 H1 H2 H3 F1 F2 F3

H2 H3 I1

G2

G2

G2

G2

H1 H2 H3 I1

B1 B2 F3 G1 H1 H2

## U. S. Curriculum Correlations by State

### Washington, D.C. Continued

#### Solar System

**ES.3. Our Solar System is composed of a star, planets, moons, asteroids, comets, and residual material left from the evolution of the Solar System over time. The Sun is one of billions of stars residing in one of billions of galaxies in a Universe that has been changing and evolving over vast amounts of time.**

1. Describe the location of the Solar System in an outer edge of the disc-shaped Milky Way Galaxy, which spans 100,000 light years.

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2. Compare and contrast the differences in size, temperature, and age between our Sun and other stars.

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3. Understand and describe the nebular theory concerning the formation of solar systems, including the roles of planetesimals and protoplanets.

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4. Observe and describe the characteristics and motions of the various kinds of objects in our Solar System, including planets, satellites, comets and asteroids, and the influence of gravity and inertia on these motions.

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5. Explain how Kepler's Laws predict the orbits of the planets.

#### Starry Night Lesson Plans *In order of relevance*

G1 H1 H2 H3

G1 G2 F1 F2 F3

F3 C1 C2 C3 D1 D2 D3

B1 B2 C1 C2 C3 D1 D2 D3

C2