WEEK 1 – ORIENTATION AND INTRODUCTION

OBJECTIVES
The learner will:

- Become familiar with the structure of the short course: The Solar System
- Review the expectations of the short course
- Develop a professional development plan.
- Evaluate a NASA Activity using the Council of State Science Supervisors (CSSS) rubric.

ACTIVITIES

SYNCHRONOUS (ON-LINE)

- Overview of Syllabus
- Overview of Content to be Covered
- Technology Utilized
- Assessments and Course Deliverables
- What is and is not Science
- AAAS Project 2061
  - Benchmarks for Science Literacy
  - Science for all Americans
  - National Science Education Standards
- Pedagogical Implications
- What is Inquiry?
  - Introduce CSSS Inquiry Rubric document
  - In the nasa.gov website, on the right side of the page, click “Solar System.”
  - Click, “Build your own space mission”
  - Begin by designing your scientist/engineer and determine which equipment to take on your mission.
  - Design your lab work area.
  - Build your spacecraft.
The Solar System

- Select a mission destination.
- Load spacecraft and launch the rocket.
- Monitor data.
- Small Group Discussions

ASYNCHRONOUS (OFF-LINE TO BE COMPLETED BEFORE NEXT ONLINE CLASS)

- Read Sci-pack Object: “Earth in Space”
- Read CSSS “Rubric for Evaluating Essential Features of Classroom Inquiry in Instructional Materials.” Answer the following questions.
  - What questions do you still have about teaching through inquiry?
  - What level of inquiry do you use in the classroom?
  - Post how you could use this lesson in your classroom.
  - How could this activity aid student understanding of the solar system?
  - Name one new thing that you learned.
  - Did you find any information surprising?
  - From the content presented, with what do you think your students will have the most difficulty?
  - How could this be used as an inquiry activity?
- Create a personal profile on the Learning Center
The Solar System

Week 2 – The Earth in Space

OBJECTIVES

The learner should be able to:

- Explain that we discover and learn about the other planets through the use of various kinds of telescopes, space probes, and other technologies.
- Relate observations of the motion of objects in the sky to a sun-centric model of the solar system, including observations of the “wandering” stars (planets) from Earth’s frame of reference.
- Recognize that Earth is one of the planets in the solar system, that it orbits the sun just as the other planets do.

ACTIVITIES

SYNCHRONOUS (ON-LINE)

- Elicit Prior Knowledge
- SMC: The Earth in Space
  - Earth is a relatively small planet, the third from the sun in a system of planets. The sun, an average star, is the central and largest body in the solar system. Our still-growing knowledge of the solar system comes to us in part by direct observation from earth, including the use of optical, radio, and x-ray telescopes that are sensitive to a broad spectrum of information coming to us from space; computers that can undertake increasingly complicated calculations, find patterns in data, and support or reject theories about the origins of the solar system; and space probes that send back detailed pictures and other data from distant planets.
- Assessing Student Understanding
  - Prior conceptions/misconceptions
  - Approaches to teaching these concepts
  Lunar Planetary Institute
  Follow the check marks
  - Educator Resources
  - Exploring the Solar System
  - Solar System
  - “Solar System on a Map” (5th bullet down under “Activities”)
  - Planet Size – Part 1
  - In small groups, discuss questions on PowerPoint slide
- NASA Activity 4: Hubble Telescope,
The main Hubble web page tells the history, projects, location, etc. of the Hubble Telescope. Jot down brief note about the type of information found on this page for later use.

Then click on the “Education & Museums” button at the top of the page.
- On the left side of the page click, “Hand-held Hubble”
- Look through the three models and find the age/grade appropriate model for your students. (PVC, Paper, Expert Paper model)

**ASYNCHRONOUS (OFF-LINE TO BE COMPLETED BEFORE NEXT ONLINE CLASS)**
- Read - SciPack – “A look at the Planets”
  - Check out the different technology imagery tools
  - Click on the “Themis” image
  - Click on the lower left picture
  - Click “in the classroom”
  - The Northern lights
- Post responses to the community discussion tool about each of the above NASA activities (5 & 6). Answer questions 1-5 for each of the two NASA activities.
  - Name one new thing that you learned.
  - Did you find any information surprising?
  - From the content presented, what do you think your students will have the most difficulty?
  - How could this activity be used in your classroom?
  - Does this activity address your state Standards?
WEEK 3 – A LOOK AT THE PLANETS

OBJECTIVES

The learner should be able to:

• Describe, compare, and contrast the following basic features for the planets in our solar system: size, composition, atmosphere, periods of rotation and revolution, surface features, and ring systems.
• Describe the similarities and differences between terrestrial and Jovian planets.
• Describe, compare, and contrast the characteristics of planetary moons in our solar system.

ACTIVITIES

SYNCHRONOUS (ON-LINE)

• SMC: A Look at the Planets
  o In total, there are eight planets of very different size, surface and atmospheric composition, and surface features that move around the sun in nearly circular orbits. Around the planets orbit a great variety of moons and (in some cases) flat rings of rock and ice debris or (in the case of the earth) a moon and artificial satellites. Features of many of the planets and their moons show evidence of formation and evolutionary processes similar to those that occur on the earth (such as earthquakes, lava flow, erosion, and changes in the atmosphere).
• NASA Activity 7: http://photojournal.jpl.nasa.gov/index.html
  o Follow directions below
    ▪ First, click on a planet and notice the plethora of photos available.
    ▪ Second, Click on “Solar Systems (at the top of the screen).
      • Click, “Kids”
      • Click, “Mars Fun Zone”
      • Click, “Take a Mars adventure”
    ▪ What was the intended goal of this activity?
  o Post answers to response on slide
• Review Planet Characteristics @ http://solarsystem.nasa.gov/planets/index.cfm
• Review information about the Messenger Mission to Mercury.
• “Why Isn’t Pluto a Planet Anymore” – Ask an astronomer @ http://www.youtube.com/watch?v=FqX2YdnwtRc&feature=related
The Solar System

- Brain storm inquiry activities for introducing planet characteristics

**ASYNCHRONOUS (OFF-LINE TO BE COMPLETED BEFORE NEXT ONLINE CLASS)**

- Read – SciPack Object - Asteroids, Comets, and Meteorites
  - Our solar system
  - Games
    - Space sense
    - Eight planets & dwarf Sudoku game
- Make
  - Post responses to the community discussion tool about each of the above NASA activities (8 & 9). Answer questions 1-5 for each of the two NASA activities.
    - Name one new thing that you learned.
    - Did you find any information surprising?
    - From the content presented, what do you think your students will have the most difficulty?
    - How could this activity be used in your classroom?
    - Does this activity address your state Standards?
WEEK 4 – ASTEROIDS, COMETS, AND METEORITES

OBJECTIVES
The learner should be able to:

• Describe the size, composition, and motion of meteors, asteroids, and comets.
• Describe the similarities and differences in comets, asteroids, and meteors.
• Explain how scientists learn about comets, asteroids, and meteorites.
• Differentiate between meteorites, meteors, and meteoroids, and explain what happens to meteors as they fall through Earth’s atmosphere.

ACTIVITIES

SYNCHRONOUS (ON-LINE)

• Asteroids, Comets, and Meteorites
  o There are many asteroids and meteors composed of rock orbiting the sun. Some of those that Earth encounters glow and disintegrate from friction as they plunge into the atmosphere – and sometimes impact the ground. Other chunks of rock mixed with ice have such long and off-centered orbits that they periodically come very close to the sun, where some of their surface material is boiled off by the sun’s radiation and pushed into a long illuminated tail that we see as a comet.

• Common preconceptions/misconceptions regarding asteroids, comets, and meteorites
  o Bad Astronomy: http://www.badastronomy.com/bad/misc.html
    ▪ Under Misconceptions, click “Movies”
    ▪ Scroll down to the “Movie List” and click on the Spoilers.
    ▪ Select 5 movies and read about the astronomy misconceptions found in the movie.

• Perseid Meteor Shower @ http://www.youtube.com/watch?v=Yo5Vt_vWx8

• NASA Activity 10.
  o NASA, Dwarf Planets website (http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Ceres_and_Pluto_Dwarf_Planets.html)
    ▪ Review the Student Activity first, then review the Teacher Guide
The Solar System

- Gather thoughts/opinions about lesson
- NASA Site @ http://solarsystem.nasa.gov/planets/profile.cfm?Object=KBOs
  - Read about Kuiper Belt and Oort Cloud. Then click on “Kid’s Eye View” to learn fun facts about Kuiper Belt and Oort Cloud at “Go Figure.”
- NASA, Bright Tails, Black Hearts: The Exploration of Comets website @ (http://solarsystem.nasa.gov/index.cfm)
  - Click on “Comet Facts” do a quick read about Comets.
  - Then click on “Kid’s Eye View” to learn fun facts about comets at “Go Figure.”

ASYNCHRONOUS (OFF-LINE TO BE COMPLETED BEFORE NEXT ONLINE CLASS)
- Read, Scipack Object, “Formation of our Solar System”
  - Select one lesson you could use in your classroom that is age/grade appropriate for your students.
  - Share on the community discussion board, why you selected this particular lesson.
The Solar System

Week 5 – Formation of Our Solar System

OBJECTIVES

The learner should be able to:

• Provide the basic story line of how the solar system may have formed from the debris of exploding stars.
• Relate the different characteristics and features of the planets to their different distances from the Sun.
• Explain some of the methods scientists have used to learn about the formation and evolution of the solar system.

ACTIVITIES

SYNCHRONOUS (ON-LINE)

• Formation of Our Solar System
  o The solar system coalesced out of a giant cloud of gas and debris left in the wake of exploding stars about five billion years ago. Everything in and on the earth, including living organisms, is made of this material. As the earth and the other planets formed, the heavier elements fell to their centers. On planets close to the sun (mercury, Venus, Earth, and Mars), the lightest elements and their compounds were mostly blown or boiled away by radiation from the newly formed sun; on the outer planets (Jupiter, Saturn, Uranus, and Neptune) the lighter substances still surround them as deep atmospheres of gas or as frozen solid layers.
• Common preconceptions regarding the formation of our solar system
• Group discussions
• Hands On Activity – Angular Momentum
• Hands On Activity – Rotation
• Websites
  o Nebular Theory - Cartoon Style. (http://www.youtube.com/watch?v=dm9LTnozHJ0)
    ▪ Play the game and review for the test
  o Space School – The Solar System from the Science Channel @ (http://www.youtube.com/watch?v=mtKNH2Y2OJM&feature=related)
1. **Webography of NASA resources**
   You will develop a Webography or a review of 5 NASA resources. This review will be annotated to include a screen shot of the resource, description of the resource, the intended audience, and classroom application possibilities. You will also evaluate the level of inquiry (using the CSSS Inquiry Rubric) and provide suggestions about how to improve the inquiry learning potential for each NASA resource. More details will be provided during class. For more details, refer to the Webography Template provided.

2. **Instructional Unit**
   You will develop an instructional unit for use in your classroom utilizing NASA and NSTA resources. Although the instructional unit topic is of your own choosing, it should be related to the course content. Your unit will guide your application (actual instruction) of this course material and will include components such as lesson plans and pre/post-test assessment plans.

3. **PD Plan and Portfolio**

4. **Sci-Pack Final Assessment**
Requirements

EXAMS AND MAJOR ASSIGNMENTS

1. Class Attendance and Active Participation (20% of course grade)

You will participate in online discussion, surveys, and other activities each week responding to others and posting your comments/questions. Participant dialogue is crucial to the learning process. The sharing of thoughts and experiences and the reflection on what others share will be an important aspect of the course. It is expected that you will take an active part in discussions of the readings and complete the evaluation at the end of each week’s online session.

2. Webography of NASA resources (20% of course grade)

You will develop a Webography or a review of 5 NASA resources. This review will be annotated to include a screen shot of the resource, description of the resource, the intended audience, and classroom application possibilities. You will also evaluate the level of inquiry (using the CSSS Inquiry Rubric) and provide suggestions about how to improve the inquiry learning potential for each NASA resource. More details will be provided during class. For more details, refer to the Webography Template provided.

3. Instructional Unit (30% of course grade)

You will develop an instructional unit for use in your classroom utilizing NASA and NSTA resources. Although the instructional unit topic is of your own choosing, it should be related to the course content. Your unit will guide your application (actual instruction) of this course material and will include components such as lesson plans and pre/post-test assessment plans. For more details about this assignment, refer to the Instructional Unit Template provided.

4. PD Plan and Portfolio Assignment (20% of course grade)

You will develop a PD Plan and Portfolio through the http://learningcenter.nsta.org website. More details in class.

5. Completion of SciPack and SciPack Final Assessment (20% of course grade)

You will complete the Solar System SciPack and the SciPack final assessment as a part of this course.
GRADING PROCEDURES

Your course grade will be determined on a point system as described in the Scoring Rubrics provided. Letter grades will be assigned according to the following percentages: A – 90-100 points, B – 80-89 points, C – 70-79 points, and D – 60-69 points.

POLICY ON ATTENDANCE

Attendance at all sessions and participation in on-line discussion is necessary and important. If an emergency arises you need to contact your instructor to discuss how to make up the class session prior to missing a class session.