

Humans in Space: Preparing for Moon, Mars, and Beyond Graduate Credit Syllabus Summer 2012

What will it take to send humans to Moon, Mars, and beyond? Use human spaceflight as a context for teaching Earth, life and physical science as you explore how astronauts will meet their needs on extended spaceflights. Examine how space travel changes human physiology, the challenges of growing food in space and much more. Explore the history and future of NASA missions and how these missions have helped us to understand our own planet and to improve our technologies here on Earth.

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Course Objectives

Students will be able to:

- Describe the nutritional, physical, and mental needs of astronauts and how these needs are met.
- Use the context of human space flight to teach Life and Physical Science concepts.
- Describe the history and future of human space flight.
- Incorporate curricular resources from NASA missions and sources into regular classroom instruction.
- Adopt inquiry and technology-based teaching and learning strategies and successfully implement them in the classroom.

Course Requirements

This course is a blended synchronous/asynchronous class. The live class meeting dates are indicated on the course calendar and on the schedule below. During asynchronous weeks, participants must participate in online discussions with their classmates by responding to questions posed by the instructor.

All readings are to be done prior to the discussion or class meeting for the week, and assignments must be handed in before midnight on the date specified. Students will be assessed using rubrics.

Major course assignments are outlined in this syllabus, and more detailed information will be provided in class. *Changes may be made to the syllabus to accommodate your learning.*

Note: Please be sure to use reputable sources and to cite them appropriately using APA format; no credit will be given for plagiarized papers or segments.



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Part I: Mandatory Assignments

These assignments must be completed by the due date indicated.

1. Class Participation and Preparation (15 points)

Participants must attend and actively participate in all live sessions and discussions. Please arrive at the class or discussion having already read the applicable reading assignments. You should be prepared to ask thoughtful questions of guest speakers and your peers and to provide feedback on their work.

2. Humans in Space Lesson Plan (15 points)

Since the first manned space missions, NASA has been dedicated to studying how humans can successfully meet their needs in space. How does space travel affect the human body? Can we grow food in space? What environmental control systems are available? How do we protect astronauts from radiation and the harsh environment of space? There are so many questions to explore.

For this assignment you will create a formal lesson plan focused on one research area related to humans space travel. You must incorporate data from NASA research. Data can take the form of charts, graphs, images, diagrams and does not have to be extensive. Make it work for you and your students.

Be sure that your plan is clear enough that it may be easily used by another member of your class. Please note that you are welcome to use ideas from or adapt an existing plan. Make sure to cite the source and then re-work it into a format that includes the criteria below and make it appropriate for your class. While the lesson plan format may vary, please be sure that your plan includes all of the following:

- ✓ Grade level, Topic of focus, Time Needed
- ✓ Standards Addressed
- ✓ Objectives
- ✓ Detailed Procedures, Methods, DATA, and/or Student Worksheets if applicable
- ✓ Assessment (i.e., grading rubric, quiz questions, etc.)

The course resource page has several great lesson plans and resources. However you may want to begin by visiting the following web pages to identify a topic of interest.

- NASA Human Research website: <http://www.nasa.gov/exploration/humanresearch/index.html>
- Habitability and Environmental Factors Division: <http://www.nasa.gov/centers/johnson/slsd/about/divisions/hefd/index.html>
- Life Sciences Data Repository – 50 years of accessible NASA data: <http://lsda.jsc.nasa.gov/>

Due dates and directions:

July 9th: Add your idea for using NASA data to build a lesson plan to the discussion board, under the “Mandatory 2 Data Set” Forum. You will give and receive feedback from classmates and ultimately build your formal lesson plan around your ideas. Please provide substantive feedback to at least 3 classmates.

July 23rd: In the discussion board under “July 23rd Lesson Plans”, create a new thread with your name and the title of your lesson and post your lesson.

July 30th: Review and provide a substantive comment to 3 of your classmates’ lessons.

Part II: Additional Assignment

Due Date for all work: November 1st

At least 50 pts must be attempted by September 1st

Please choose the assignments that are most beneficial to your own learning. Note the possible point value of each assignment because you must earn at least 90 points to get an A in the course. **You must choose at least one content assignment.**

A. CONTENT ASSIGNMENT OPTIONS:

Content Option 1: Science Topic Paper (20 points possible)

Choose a scientific topic related to human spaceflight. Read current research articles/abstracts on this area. In a 4-6 page paper, describe the importance of this type of research in terms of NASA’s vision for exploration as well as life on Earth. What are the scientific understandings that underpin the topic and how does spaceflight alter these understandings?

This is your opportunity to do a more in-depth study of a topic that interests you. Some resources are given on the resource page: <http://www.us-satellite.net/nasa/endeavor/resources/HISlinks.cfm>

Possible topics include the effects of microgravity of human blood flow, the effects of EVA on human pulmonary function, the mechanics of space flight, or growing food in space to support longer expeditions.

Content Option 2: Missions Paper (10 points possible)

Using the NASA website, research current NASA missions related to the exploration of the Moon, Mars and Beyond. In a 3-5 page paper, briefly describe at least 3-4 such missions. Include at least the following for *each* mission:

- Name of Mission and Mission Goals
- Destination
- Major Science/Engineering Research Activities
- Instrumentation
- Relevance to NASA’s Vision for Exploration

Be sure to cite your sources appropriately; no credit will be given for plagiarized papers or segments. A great starting point for this assignment is the NASA Missions home page:

<http://www.nasa.gov/missions/index.html>

Content Option 3: Engineering Design Challenge (40 points possible)

Follow the steps of one of NASA's Engineering Design Challenges related to meeting the needs of humans in space, either on your own or with your students. Document your progress through the challenge with photographs, a scientific journal, or by another means. Finally, write a short (2-3 pages) reflective essay about how the experience influenced your understanding of the challenges of human space flight, as well as the engineering design process, and why this is important for NASA scientists and/or your students.

You may access select Engineering Design Challenges on the course resource page: <http://www.us-satellite.net/nasa/endeavor/resources/HISlinks.cfm?cat=eng>

Or by visiting NASA Education and doing a search: <http://edc.nasa.gov/challenge.html>

B. PEDAGOGY ASSIGNMENT OPTIONS:

Pedagogy Option 1: NASA Education Paper: (20 points possible)

Review NASA's Strategic Plan 2011:

http://www.nasa.gov/pdf/516579main_NASA2011StrategicPlan.pdf

NASA's Education Goals

<http://www.nasa.gov/offices/education/about/index.html> (NEW LINK)

In 4-6 pages, discuss the following:

- Provide some background information about your position and school—what grade level(s) and subject(s) you teach and the types of students you teach (ability levels, English Language Learners, etc.) As you examine NASA's vision and goals for education, explain how you can incorporate these goals into your instruction.
- Discuss why STEM education is important for your particular students, and how working with NASA content and materials might improve their STEM skills and content knowledge. Based on your experience in this course, what concepts might you add to your curriculum that you haven't taught before and why? What will you teach in a different way? Why? What obstacles do you foresee when working NASA content into your instruction, and how might you overcome these obstacles?
- Share your thoughts and ideas on achieving NASA Education Goals and Strategic Goal 6 outlined in NASA's Strategic Plan 2011. What is your school and/or community presently doing (or what could they be doing) to help achieve these strategic goals? Incorporate discussion of specific resources as you see appropriate <http://www.us-satellite.net/nasa/endeavor/resources/HISlinks.cfm>

Pedagogy Option 2: Multimedia Resource Review (10 points possible)

Choose any TWO of the multimedia resources (i.e., videos, podcasts, interactive views, etc.) on the U.S. Satellite Humans in Space Resource Pages <http://www.us-satellite.net/nasa/endeavor/resources/HISlinks.cfm> or on another related site. Interact with the TWO multimedia resources and provide the following information in a 2-3 page reflection:

- A summary of each resource
- An evaluation of each resource—did you find it informative, useful, helpful, etc. Why or why not?

- Suggestions on how each resource should be used by educators. Can it be used in the classroom? How?
- Is it better suited for professional development? How?
- Is it more appropriate for scientists, the public, or other audiences? Why?

Pedagogy Option 3: Electronic Portfolio (40 points possible)

Create an electronic portfolio to demonstrate successful program implementation. You may upload your artifacts through the dropbox or use another means, i.e., a webpage or wiki, to display them. Please consider how you organize your submissions.

As you implement the program(s), reflect critically on how the program is helping to improve student interest, understanding, and/or achievement.

Follow the following steps to complete your portfolio:

1. Review the course objectives.
2. As you implement what you have learned, collect 'artifacts' that illustrate how you have met your course objectives, and passed them on to your students. Artifacts can be in many forms including, but not limited to:

- student work samples (such as scanned student writings, posters, or journal entries; video/audio recordings of presentations; photographs of work; etc.)
- digital photographs or videos of students actively engaging in activities
- lesson plans showing how you are incorporating the program into your instruction
- assessments you have created based on the programs
- results of assessments
- PowerPoint presentations created by you or your students for use during class
- notes from parents indicating changes they have seen in their children
- letters from supervisors discussing the program implementation

3. Select the three artifacts that most effectively illustrate that you have met each objective. You will therefore have a total of 15 artifacts in your portfolio.
4. Write a short (one paragraph) reflection for each artifact that describes why you selected the artifact and what it shows.
5. Write a 3-5 page reflective essay that briefly describes how you implemented what you have learned in your classroom, and how the portfolio illustrates successful implementation. Explain how the course affected your own planning and instruction, your content knowledge, and also your students' learning and success.

National Board Certification Option

As an Endeavor fellow, you have the option of working towards becoming a Nationally Board Certified Teacher with the National Board for Professional Teaching Standards (NBPTS). If you have selected this option with Endeavor staff, you may use the content from this course to develop a Portfolio Entry that meets the course objectives AND the requirements of the National Board portfolio. Successful completion of a portfolio entry will fulfill the 'optional' requirement for the course. You are responsible for the mandatory assignments only and do not need to select other optional assignments listed in this syllabus. Please submit your completed portfolio to

Karen Woodruff: kwoodruff@us-satellite.net Your Candidate Support Provider is available for guidance and to review your work prior to final submission.

Course calendar

Date	Topic	Assignment
July 2 nd	History of Human Space Flight Future of NASA	
July 9 th	Meeting the Needs of Humans in Space: Exercise Science Guest speaker: Dr. Todd Trappe	Readings and Discussion – see OLS Lesson
July 16 th	Space Technology: Now and in the Future K-12 Resources	Readings and Discussion – see OLS Lesson
July 23 rd	Meeting the Needs of Humans in Space: Plants in Space Guest speaker: Dr. Chris Brown	Final Lesson Plan Due to Discussion Forum
July 30 th	NAS A Resources in your classroom	Feedback on classmates' lesson plans due
September 1 st		50 points attempted
November 1 st		All coursework due

Grading Scheme

Assignment	Possible Points
Mandatory 1: Class Participation and Preparation	15
Mandatory 2: Humans in Space Lesson Plan	15
Content Option 1: Science Topic Paper	20
Content Option 2: Missions Paper	10
Content Option 3: Engineering Design Challenge	40
Pedagogy Option 1: NASA Education Paper	20
Pedagogy Option 2: Multimedia Resource Review	10
Pedagogy Option 3: Electronic Portfolio	40
National Board Portfolio	

B: 80-89

A: 90-100

Graduate credit minimum = 80 total points (B)