Space Science for Educators  
SCE 5836  
Orlando Campus  
Summer 2010

I. Descriptive Information

SCE 5836 is designed to provide students with experiences that promote effective science education in the elementary and middle schools. It will focus on principles of air and space flight with particular emphasis on the historical aspect of man’s experience with flight, space, and rockets. This course will provide a framework for understanding an American perspective on our Space Program. Topics included will be: History of manned space flight, Newton's laws of motion and gravitational attraction, earth and space environments, rocket and aviation principles, rocket propulsion and thrust, model rockets, communication, navigation, and remote sensing satellites; and current status of Florida's Space industry. Furthermore, it will focus on how these subjects can be translated into relevant and interesting lessons that can be taught in the classroom.

Course Credit: 3 Hours  
Classroom: Room 116 Teaching and Learning Academy - Orlando Campus  
Professor: Mary Kalen Romjue, Ph. D.  
Phone: _________________________ (I will provide you with a contact number the first night of class.) My office is on another campus and I am not in that office in the summer. If I am not available to answer, leave a voice message and I'll return your call as soon as possible.  
Or E-Mail: mromjue@mail.ucf.edu (Please include SCE 5836 in the subject line so that your message will not be mistaken as spam. I usually retrieve my e-mail messages one time a day, earlier in the morning.)

Office: For the purpose of this class I will use the classroom, Room 116, one hour before and one half hour after class. Other hours by appointment (call for appointment).

II. Goals and Objectives

Course goals. The primary goal is to help you improve science and mathematics instruction in your classes. Rocketry, air and space sciences and applications will be used to introduce various scientific principles and related mathematics. Hopefully, the materials, experiments, and lessons that will be presented in this course will make science and mathematics more interesting and relevant to you and all of your students.

A secondary goal is to increase your interest in science and the space program so that in turn you may be able to spark the interest among the young people that you teach in pursuing careers in science, mathematics and engineering.

Course objectives and The Related Accomplished Practices*  
Upon successful completion of this course, you will be able to:

*Design and implement relevant and interesting lesson plans and activities dealing with air and space flight, rocketry, space science and space applications with your students.)
*Describe some of the historical events of manned air and space flight  
*Build and instruct students in the construction of a variety of model rockets.  
*Safely launch and recover model rockets, and compute their altitudes and average speeds based on measurements taken during flight (weather permitting, with drought we sometimes have to use our other rockets).  
*Describe the major components and subsystems of rockets, launch vehicles and spacecraft.  
*Understand and explain Newton's laws of motion and gravitational attraction, and how they apply to aircraft, rockets, and spacecraft.  
*Understand and explain the relationship between the Sun and the Earth, and the effects of the space environment on humans and spacecraft.
III. Required texts and readings

You will need (i.e., must purchase)
-Rocket materials will be purchased during class on Tuesday, May 25, 2010 - special rates are provided by the vendor. All of these materials will be your property to keep. Materials include rockets, engines, and launch pads, launch controller, etc.
You will need to be ready to purchase these during class on May 25, 2010. Cost is estimated to be $_________) Make the check out to: _________________________ (I will announce this on first night of class.)
-On the evenings when we build rockets you will also be asked to bring:
  -Sandpaper (fine), ruler, scissors, glue, and an Xacto knife.
-Other curriculum materials will be provided by the instructor and may be copied because we are using NASA materials and they are public domain materials.

IV. Major topics of the course
- A. History of aeronautics, unmanned and manned space flight
- B. NASA Paradigms (pros & cons of NASA’s space program)
- C. NASA Spin-offs
- D. NASA/Aerospace Science Education Workshop
- E. Newton's laws of motion
- F. Building and safely launching model rockets
- G. Florida Solar Energy Workshop @ FSEC
- H. At least one Planetarium Visit

V. Academic course requirements
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You will develop a portfolio for this class. It is a record of your growth in learning and thinking about science education and in particular the role of air and space science (including rockets) in the Elementary/middle School. The portfolio itself will not be graded but is intended to represent what you feel represents your learning and hopefully will serve as a resource that you may use for years to come. You will show it to me near the end of the class.
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Your portfolio should be kept in a 3-ring binder.
It MUST include:
1) A table of contents and
2) A 1/2 to 1 page statement as to how the contents demonstrate your growth of learning in this class and
3) It will include (A through C below), but is not be limited to the following:

A. Unit lesson plan
You will work in groups of approximately 3 or 4 students to design a unit lesson around the topics appropriate to this class. Each of you have different teaching assignments and grade levels. We will try to group you so that your end product makes sense to you and is usable after this class. Otherwise we will have wasted our time.

After you select your topic and the instructor has approved it, you may begin preparation. Each of the (hands-on/minds-on) lessons should be approximately 15-20 minutes long (depending on the grade level). Each of you will prepare two lessons, making unit length dependent upon group size. This will be a group activity in both preparation and presentation. We will have time to teach one of your lessons from the unit to the entire class. You will be responsible for furnishing any needed supplies and for the clean up after your lesson. Remember -- Topics must be pre-approved by the instructor. Criteria for Unit Lesson Plans are provided. (Class will determine method of presentation - see description below.)

B. Reflection Papers
Thoughtfully write Reflection Papers on assigned readings. (Assignments will be made periodically and criteria are provided). Not all articles and/or videos that you will be assigned to read or view will fall into this category. I will tell you in class the specific articles/videos will be handled this way and when they are due. After these have been handed back put them in a section of your portfolio. (These are preferably
C. Journals
Journals will be kept by each student to describe your thoughts and feelings about activities and ideas that occur in the class. These journals should be no less than one page per week with a maximum of 2 pages. They should be made on loose-leaf paper so that they may be collected on one class section and returned again the following class session. Keep these in a section of your portfolio. Look at the Schedule to see which dates they are actually due. (These may be handwritten). Should you wish to use word processing that is fine too.

D. Building and launching rockets
You will work in groups to help each other to build and launch a variety of rockets. For the most part this will be done during class but it may be necessary to take a rocket home to complete it if you do not finish it in class. You will keep these rockets at home until the day we launch them. If all goes as planned they will be launched (weather permitting) near the end of the class.

Evaluation and Grading

For a Grade of an "A" or a "B":

Wm. Glasser says that if classes are to be meaningful to students (so that they can reach their quality world) they must construct their own learning. The instructor has set minimum goals for a grade of a C but wants you to help construct what is meaningful to you. You must consider what you need to learn in this course to make you a better teacher and then what it is that you need to produce to get you there. You will therefore write a contract for a grade that you wish to have. A grade of a C is expected as the minimum for this course. I will have a personal conference with each of you and we will negotiate your contract. This must be done very soon; a deadline will be set by the end of the first week.

Requirements for a C (C- through a C+) are:
Successfully completing the following:
- A minimum of 80% attendance
- Assigned journals
- Building and launching model rockets
- Reflection papers (as assigned)
- Participation in class activities & Class attendance/Positive Attitude
- Unit Lesson Plan (preparation and teaching part of the lessons of the unit)

Requirements for a B (B- through a B+) are:
- Successful completion of all requirements for a C and
- A minimum of 85% attendance

Plus two Special B Projects

1. NASA Spin-offs Learning Center (and summary)
   - To be displayed on a "Science Fair Backdrop"
   Your choice of NASA Spin-offs (Criteria will be provided)

And
2. after researching several Astronauts, you are asked to prepare an Interactive Bulletin Board
   - it is to be displayed on a "Science Fair Backdrop" (this bulletin board will feature at least one male and one female astronaut. You will also hand in a Summary Report, which describes your bulletin board. (See Criteria).
Requirements for an A (A- through an A) are:
- A minimum of 90% attendance
- Successful completion of all requirements for the C and B and
- An additional major Project (called the A Project) or two minor projects (see contract description)

Note: Attendance, participation and attitude are very important to this class and have an effect upon your grade. See remarks regarding attendance below.

Classes.

No Incompletes will be given

D-F- See Instructor*

Grades will be reduced for:
- Poor Quality work
- Consistently arriving late or leaving early will result in lost days and reduced grade
- Nonprofessional actions &/or attitude (such as constant complaining
- Failure to attend class (see policy above)
- Failure to complete work as part of a teaching or a support group
- Consistently handing in assignments late
- Plagiarism

*Remember, it is possible (within time restraints) to revise your work or to discuss its merits with the instructor. This philosophy is based on the fact that good teachers must always reflect on their work, revise or refine lessons, and seek feedback from peers. But when it comes to the A Projects, time has run out for doing them again, so do it right the first time.

Mode of Instruction

In order that I can help you understand the methods that I wish you to use to teach space science I will use these same methods to teach you. Lecture will be very limited. Most of the pedagogy and space science will be taught by doing. We will learn scientific principles at the same time that we are experiencing a new teaching model. Most of this class is to be hands-on/minds-on.

Course Contract Description

1. You write this contract. It includes the required assignments and any additional tasks you wish to include to raise the level of achievement to a grade above "C".
2. When we agree upon the contract it is signed by both of us. You keep the original and need to make a photocopy for me.
3. To complete the form, you need to think about what you personally would like to learn in the course. Define your needs and list them on the contract.
4. The required activities have already been described. The optional activities (projects) listed on the contract should reflect and fulfill the needs that you listed on the contract.
5. When you complete the contract work, the contract is fulfilled and you receive the grade for which you contracted. This, of course, is assuming that the work you do is acceptable. The writing of an "A" contract means that you will be doing "A" quality work. Any work turned in that is not of "A" quality will receive a lower grade this will lower the contract grade, for instance an A grade might be lowered to an A- or even a B+ if it happens regularly. Quality work includes having the work free from grammatical and spelling errors.
6. An individual conference will be held between you and the professor to discuss and sign the contract. You will receive a copy of the contract and the professor will keep one for her files.
7. Contract changes may be negotiated between you and the professor. In general contracts can be renegotiated for lower grades only.
Name________________________________________________________________

Grade/subject you teach and school________________________________________________________________________

Home Address_________________________________________________________________________________________

__________________________Home phone (_____)____________(where can be reached)______________________________

E-mail address:  ____________________________________________________________

In regard to Space Science what are two or three things that you need to learn or gain in order to be able to share this content area with your own students?

1. 
2. 
3. 

The required activities for the grade of a C are listed in the syllabus. Additional learning activities which I feel will help me to meet my needs are:

**B-Project(s)- Describe in detail-**

**The NASA Spin-offs Learning Center**

(10 spinoffs must be the used in this center – see description)

**The Two Astronauts** that will be the topic of my Interactive Bulletin Board are:_________________________ and ___________________________

These may change at any time if need be.

**A-Project(s) - Describe in detail-**

Describe what the product(s) will look like. You may choose one major project or two minor projects. Use the back side of this sheet if necessary.

This contract is for the grade of __________

Student (Signed)___________________________________________ Date _______________

Professor (Signed)________________________________________ Date _______________

Please make a photocopy for me after we have signed the contract. You keep the original.
REFLECTION PAPER FORMAT

Reflection papers are reviews of assignments, videos, journal articles, books, or other materials that are designed to elicit your reactions and responses.

(Should be typed/word processed), in some cases an assignment may be Done during class and these will be hand written.

USE THE FOLLOWING FORMAT:
Length: 1-2 pages is sufficient
Your Name and Date
Name of Article/VIDEO
Name of Author, if available
Source if identifiable
Date of publication if identifiable

1. First read the assigned reading or view the video, whichever is requested.

2. Go back through the assigned material and identify passages that seemed to catch your attention, either positively or negatively. When viewing a video this may not be possible and so take notes as you view the material and work from your notes.

3. Write out the first of the quotations "..."and cite them like this - (pg. 23) and then write a paragraph or more describing what it was about that particular section that seemed to stand out to you. Describe not only your feelings about what was being said, but just as importantly describe what leads you to feel that way. Otherwise what in your experience has led you to think this way?

4. Continue with the other quotations using the same procedure as described in #3.

5. Your last paragraph should attempt to summarize your thoughts about the assigned article/video.
LESSON PLAN FORMATS/Presentations

Should you be required to submit an Electronic Portfolio the Lesson Plans will be the target assignment for both the sections of the FEAP called, Knowledge in the Content Area and for the section called Planning. These will be submitted in what is called the Live Text Portfolio for the College of Education.

Each group must prepare a unit lesson plan related to the topic of Air and or Space. You are to prepare your two lessons and then make copies for your group and one for me to keep.

The Lesson Plan Format is:

Your Name –

Your Partners Names –

1). Title of Unit
   Title of your lesson

2). Grade Level

3). Objectives written in terms of expected student behaviors and identification of FSSS, and ESOL Strategies (ESOL 5, 6, 12, 15, 16, 18).

4). Materials – List the materials used in your lesson. Give an estimate of the cost and where you might find them so that others may actually repeat the lesson should they wish to do so.

5). Content Overview – Describe pertinent content information about your lesson include:
   Identify the important ideas (concepts that you are trying to get across
   Define those concepts, especially in an age appropriate manner
   List new terms
   Define them too

6). Process Skills – List the major process skill(s) the lesson develop(s). Use the FOSS Skills that I will give you in class.

7). Instructional Procedures – Include:
   a way to introduce the lesson
   the procedure to follow in teaching the lesson
   the procedures you expect the students to follow
   suggest specific questions to be used in guiding the student’s thinking through the various process skills emphasized in the lesson.

8). Evaluation/Assessment Procedures

9). References – Reference your activity. Optional: List follow-up references where elementary students can learn additional information about the topic of the lesson.

Presentation of Units
1. Peer teaching Unit lessons
The group will teach one of the lessons to the entire class. Lessons should involve the whole class and following each lesson the class will give feedback to the teachers. You will be responsible for obtaining needed materials and cleanup afterwards. Follow the lesson plan format below. (These must be typed or word-processed.)
The following criteria will guide you in designing your Spin-off center.

1). **The first step in the process is to identify 10 Spin-offs that you feel are important for your students to know about (age appropriate and relevant).**

2). You may use the CD that we have provided or get into the NASA Websites for newer ones. You need a minimum of 10 spin-offs. You need to design and build each of the activities. Ideally no more than 2-4 students will use an activity at a time.

3). **Identify the age appropriateness of your center.** Keep in mind that even Kindergarten students can do some activities with little teacher direction.

4) Displayed on some sort of a Science Fair Board.

5). **A detailed summary of each of the activities will be handed in to Dr. Romjue. This will not be returned and so if you want a copy, make one for yourself. The summary should contain a detailed description of the activity, the materials needed, and a description of both teacher and student responsibilities/actions. It would also include any handouts, diagrams, etc.** Each activity must be designed and built, and you will bring it with you to present to the class. Otherwise, a simple written description will not suffice in place of actually having the activity. If you use activities from printed or internet sources, this is fine, BUT you must include complete bibliographical information for each of the activities that you use from these sources. You also may indicate any activities that you design all by yourself. List the bibliography reference with the activity description.

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**NASA Spin-offs Center**  
**Assessment Sheet**  
(This is one of the B Projects)

1) (yes)(no) Identified and used at least 10 NASA Spin-offs for the center.
2) (yes)(no) Identified age appropriateness of Center
3) (yes)(no) Displayed activities on a Science Fair Display Board
4) (yes)(no) Designed, built, and brought each of the activities
5) (yes)(no) Provided a summary of the activities to be turned in

Summary included: 
- Detailed description of each activity
- List of materials
- Teacher/student responsibilities
- Any handouts
- Bibliographic source for each activity
U.S. ASTRONAUTS
INTERACTIVE BULLETIN BOARD
(This is one of the B Projects)

Select at least one male and one female astronaut and then design and build an Interactive Bulletin Board

Use about 1/2 of the board for each person

1. Research U.S. Astronauts using the NASA Websites and then select two astronauts and list on your contract. If you change your mind about which two, just let me know and we will change the names on the contract, this is not a problem.
2. Think about things that happened to them in their lives and about the contributions that they made to science and/or the space program.
3. Think of ways that you may use to communicate their lives and their contributions to children.
4. Design at least one activity per person that allows the student to interact with the bulletin board so that when they are finished they will have learned what you wanted them to know about each person.
5. The bulletin board will be shown to members of the class on a designated date. We will draw numbers and you will be given a specific date to show yours to the class. We will spread these out throughout the semester.
6. I also want you to give me a written report of the project. It should include:
   a. a copy of the information put on your bulletin board for each astronaut
   b. a copy of handouts/activities that you are using
   c. a picture of each Astronaut should be displayed on the board.
7. I will keep the written report and will not hand it back.

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U.S. ASTRONAUTS
INTERACTIVE BULLETIN BOARD
ASSESSMENT SHEET
(One of B Projects)

Name________________________________________

1. The two astronauts are: ___________________ & ___________________
2. Designed activities that allowed the student to interact with the bulletin board (yes)(no)
3. Displayed on a "science fair board" to members of the class (yes) (no)
4. Provided a written report of the project for instructor to keep. It included:
   a. a copy of the information put on your bulletin board for each scientist/engineer (yes) (no)
   b. a copy of handouts/activities that you are using (yes) (no)
5. Overall quality of the Written Report (minimal effort) (satisfactory) (outstanding)
6. Overall Quality of the Bulletin Board (minimal effort) (satisfactory) (outstanding)
(This would be considered one possible small project for a grade of an A)

Student's Name _____________________________________

Learning Center Topic________________________________________

Handed in on due date (yes)  (no)

The following criteria were given for your learning center:
No more than two of the ten activities may be commercially made. If you choose to use commercially prepared activities you must explain in detail how they will be used. You must also give complete bibliographic credit for any activities that you take from another source.

(yes) (no)THEME-The first step in the process is to identify a theme.
(yes) (no) Had at least 10 ACTIVITIES
(yes) (no)used a project backdrop for display
(yes) (no) Identified AGE APPROPRIATENESS

Submitted A detailed summary (free of spelling & grammatical errors) of each of the activities will be handed in to Dr. Romjue. This will not be returned and so if you want a copy, make one for yourself. Each activity must be designed and built, and you will bring it with you to present to the class. Otherwise, a *simple written description will not suffice in place of actually having the activity.*

(yes) (no) Designed and built each activity & brought to class
(yes) (no) Submitted a DETAILED Description of each of the activities
(yes) (no) Summary was free from spelling, grammatical errors and was coherent
(yes) (no) Included a list of materials needed
(yes) (no) Described teacher & student responsibilities
(yes) (no) Included activity/worksheets
(yes) (no) Included bibliographic information, otherwise the source of each activity. If it was your creation said so.

OVERALL QUALITY OF SUMMARY:

(Less than satisfactory) (minimal effort) (satisfactory) (outstanding)

7) Overall Quality of Backdrop

(Less than satisfactory) ( minimal effort) (satisfactory) (outstanding)
BOOK REVIEW GUIDELINES

(As described this would be equivalent to one small project)

Should you contract to do a book report for a project for this class you will need to do the following:

1). The book that you review must be agreed upon and identified on the contract.

2). Submit a typewritten/word processed review of the book you choose. You may wish to make a second copy for yourself, because it will not be returned.

3.) The book review must contain the complete bibliographic information.

4) Not all books are written the same and are not all easily described in the same fashion. The format you choose will depend somewhat upon the book you choose. As long as you give a detailed summary of the contents and your personal response (also in some detail) to those contents you will have fulfilled the objective of this project.
There are two major purposes for a person to develop a resource file. They are:

1. To have on hand an accumulation of written and non print resources that belong to you and that you can easily use in teaching science to your classes.

2. Maybe the most important reason to build a resource file is to become "RESOURCEFUL". Otherwise, you need to learn how to obtain quality curriculum & materials that you can use in your teaching that do not cost anything. Schools often find themselves strapped for money and it is very common for teachers to have to go out and find things to teach with. Being resourceful may be one of your greatest assets.

If you are interested in building a science resource file which you can use in your class, either now or later, here are some guidelines for that file.

Have a minimum of 75 separate items (this is not a single book with 60 activities or 75 lesson plans or 75 activities)

1). Make sure that the items you collect are related to the topic, in this case science. THESE ITEMS MUST BELONG TO YOU, NOT SOMETHING BORROWED FROM A LIBRARY, ETC. – borrowed items will not count toward the 75.

Items which are already in your possession (and you can verify) may be used. I do not want you to go out and buy a resource file. You may only purchase 8 - 10 of the items.

2). These items should come from a variety of sources such as:
Books, booklets, kits, videos, CD ROMS, Computer Programs, etc.
(WEB Sites may be included, but need to be grouped into logical groupings) One grouping is equal to a source. Individual items such as aquariums, microscopes also count if a lesson plan or detailed description of how it is to be used is included. Pamphlets do not count as individual items, but they may count as a single item if they are grouped into logical groupings. Individual items such as listing cotton balls, Q-tips, crayons, etc. do not count.

There are many places that these can be found free. Check such places as:
Kennedy Space Center’ Education Resource Center (call 321-867-4090 to make an appointment to go in to copy their videos, etc.) Garage and Yard Sales, Utility companies, Museums, 4-H Offices, National Heart Association, National Cancer Society, etc. The back of your Project WILD Book is filled with places to get free materials. The Internet is also full of places to get free curriculum materials for Educators. Don’t wait, it takes time for these places to respond. Start at the beginning of the semester.

3). For each item you need to do the following:
   a. Make an annotated bibliography, see example that I will show.
      i. e., It should include the important bibliographic information AND a short paragraph explaining the contents.
   b. The annotated bibliography needs to be typewritten or word processed.
      Make two copies (You will keep one and I will keep the other)
   c. Bring both the annotated bibliography and the collection of your resource file to class on the designated day. You and I will go through the contents together.