

**PRAIRIE VIEW A&M UNIVERSITY
DEPARTMENT OF PHYSICS
PHYS 4473- SENIOR RESEARCH PROJECT
COURSE SYLLABUS
SPRING Y2K+7**

Professor: Dr. A. Anil Kumar
Office: Room 330C, New Science
Building
Phone: (936) 261-3130 (Office)
(281) 890-0848 (Home)
E-mail: aakumar@pvamu.edu
Lectures: W 7:00 P.M. - 9:50 P.M.
New Science Building, Room 320
Office hours: By appointment



COURSE DESCRIPTION

The purpose of this course is to provide you with an adequate preparation for your student teach internship to teach science to middle and high school students. The course will be conducted in the form of a research project consisting of a set of meetings, reading assignments, writing and submission of weekly reports, preparation of a comprehensive syllabus for a course in physics and chemistry or composite science, periodic presentations to the class and a final comprehensive presentation to selected faculty in the College of Arts & Sciences and the College of Education.

GOALS

By the end of the course, you should, at a minimum:

- demonstrate an understanding of the standards in science education in Texas and across the nation;
- identify existing gaps in science education within Texas and the nation;
- Identify specific needs for science education in the chosen school(s);
- identify steps needed to fill these gaps at this school; and
- develop a systematic approach to close these gaps.

ACTIVITIES

1. Pick a middle or high school, preferably where you are likely to do your student teach internship.
2. Obtain a copy of their science and mathematics education curriculum and all the materials associated with it - textbook, assignments, syllabus, outline and timeline of lectures, etc.
3. Assess the extent of coverage (number of lectures, depth and breadth of topics covered) in various disciplines of science - biology, chemistry, ecology, environmental science, physics, and mathematics.
4. Assess how well aligned the curriculum is with respect to the various standards - State (Texas), national (National Science Teachers Association and Project 2061 of the American Association for the Advancement of Science), and international.
5. Identify "gaps" (if any) between the proposed curriculum, implemented curriculum and the standards. Breadth refers to the number of topics covered in a given term. A gap in breadth, for instance refers to the difference in the number of topics covered versus the number of topics required by the standards. (Specifically, state the topics not covered or exceed the required number, if any.) Depth refers to the amount of time spent on each topic, specific examples discussed, number of assignments, etc. For instance, when teaching the principle of conservation of energy, how much time was spent and how many examples were given to illustrate it.
6. Develop a modified set of curricular and instructional materials so as to enhance the current science and mathematics education in the chosen school.
7. Propose a realistic timeline, with appropriate milestones, to begin implementing your proposed plan.

8. Read and familiarize yourself with the reports and presentations throughout the semester.
9. Submit reports, via e-mail, on or before 12:00 noon every Monday.

OUTCOMES

1. A review of the challenges facing schools in science and mathematics education, discussion of the known and possible reasons for these challenges, discussion of at least a few efforts in Texas and the U.S. to alleviate these problems, and new (if any) proposed solutions.
2. "Gap Analysis" - A brief but comprehensive report of science and mathematics curriculum at the chosen school, with "gaps" clearly identified. (This is Report V mentioned above.)
3. A syllabus and course outline that you plan to implement.

PROJECT TIMELINE

During your first week you must develop a project management timeline with milestones (for example a Gantt Chart) for the tasks you will be conducting over the next five weeks. An example of such a chart is shown on the last page. (This is just a sample. You must develop your own depending upon the sequence of tasks you are going to lay out. You may need to revisit the chart depending upon your progress, any challenges you may encounter, etc.)

A Gantt chart is a horizontal bar chart developed as a production control tool in 1917 by Henry L. Gantt, an American engineer and social scientist. Frequently used in project management, a Gantt chart provides a graphical illustration of a schedule that helps to plan, coordinate, and track specific tasks in a project. Gantt charts may be simple versions created on graph paper or more complex automated versions created using project management applications such as Microsoft Project, Excel or Milestones. The link http://www.mindtools.com/pages/article/newPPM_03.htm is a good site to visit to learn and implement a Gantt Chart for your project.

Also visit the following websites for more examples, questions/answers, etc.:

<http://www.netmba.com/operations/project/gantt/>
<http://www.smartdraw.com/examples/gantt/index.htm>
<http://www.me.umn.edu/courses/me4054/assignments/gantt.html>
http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=000076&topic_id=1

READING ASSIGNMENTS

A CD with several useful papers, reports, presentations and newspaper articles will be provided to you at our first meeting. You are required to familiarize yourself with the content of these materials. You should be particularly aware of the content of the following materials:

1. Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future (2005)
2. The State of State SCIENCE Standards, Thomas Fordham Institute (2005)
3. American Competitiveness Initiative, President Bush (2006)
4. College Board 2005 Results on graduation statistics from U.S. schools
5. Creating A High School Diploma that Counts, American Diploma Project Network
6. Less Than Proficient, A Review of the Draft Science Framework for the 2009 National Assessment of Educational Progress, Thomas B. Fordham Foundation Report (2005)
7. Teacher Education: Coming Up Empty, Thomas B. Fordham Foundation Publication (2006)
8. The State of Science Education In Texas, Presentation by Chris Castillo-Cromer, Texas Education Agency (2004)
9. No Dream Denied, A Pledge to America's Children, National Commission on Teaching and America's Future (2003)

ADDITIONAL READING MATERIALS

1. What is Science? by Richard Feynman, Presented at the fifteenth annual meeting of the

National Science Teachers Association, 1966 in New York City, and reprinted from The Physics Teacher Vol. 7, issue 6, 1968, pp. 313-320

<http://southerncrossreview.org/32/feynman3.htm>

2. Students failing in science proficiency
<http://www.timesguardian.com/2006/011106/011106-3.html>
3. Too Much on the Numbers...Not Enough on the Children, By Gene R. Carter, Executive Director, ASCD <http://www.ascd.org/portal/site/ascd/index.jsp/>
4. They're Not Dumb, They're Different, Sheila Tobias, Research Corporation (1990)
5. The Big Picture - Education is Everyone's Business, Dennis Littky, ASCD (2004)
6. The Differentiated Classroom, Carol Ann Tomlinson, ASCD (1999)
7. Differentiated Instruction - Making It Work, Patti Drapeau, Scholastic (2004)
8. Developing More Curious Minds, John barrell, ASCD (2003)
9. Declining by Degrees - Higher Education at Risk, Eds. R. H. Hersh and John Merrow, Palgrave-Macmillan (2005)
10. Teachers Have it Easy, D. Moulthrop, N. C. Callegari and D. Eggers, The New Press (2005)
11. High Schools on a Human Scale, Thomas Toch, Beacon Press (2003)

Thought Provoking Statements - Do You See Any Relevance to the Subject of the Course?

"The centipede was happy, quite, Until the toad for fun Said, 'Pray which leg comes after which?' This worked her mind to such a pitch, She lay distracted in a ditch, Considering how to run." - George Herbert Palmer

"The difficulty lies, not in the new ideas, but in escaping the old ones, which ramify, for those brought up as most of us have been, into every corner of our minds." - John Maynard Keynes, Economist

"We are at the very beginning of time for the human race. It is not unreasonable that we grapple with problems. But there are tens of thousands of years in the future. Our responsibility is to do what we can, learn what we can, improve the solutions, and pass them on." - Richard P. Feynman, Physicist and Teacher

"There is at least one point in the history of any company when you have to change dramatically to rise to the next level of performance. Miss that moment - and you start to decline." - Andrew S. Grove, Former Chief Executive Officer of Intel

There is a story about a college. The college was building a large addition consisting of several buildings and a large quad area. After the buildings were completed, one of the Regents visited. He asked why there were no sidewalks between the buildings. The college president replied that the architect had a good plan - open the buildings without sidewalks, let the students walk over the grass. Over time, trails will develop along the most common paths. Then come back in a year and pave the trails.

PERFORMANCE EVALUATIONS

Weekly Reports

You are expected to submit, through e-mail, a weekly report on before close of business each Monday. Each report should clearly summarize the previous week's activities, accomplishments, progress towards the goals, any challenges faced, and a clear summary of the proposed activities and outcomes for the following week. The Final Report is a comprehensive one that should be written in the form of a paper that summarizes the entire semester's activities and results. Formats for the reports and the paper will be provided through e-mail.

Presentations

Every four weeks or so, you will be asked to make a presentation to the class on your activities. The purpose is to share your experiences with the others and perhaps gain from theirs as well as contribute to their own plans.

Panel Discussions

There will be at least two panel discussions. The format for these discussions will be a freeflowing sharing of ideas on issues facing education, what our understanding and perceptions are and develop our own approaches to meet the challenges. You will be given reading materials to use as sources. The purpose is to comprehend the field and practice of education in the world and how factors "outside" the field of education influence education.

Special Presentation

The last assignment for the semester will be for you to make a presentation on the results of your work. Details of the format will be provided later. The audience will be selected faculty from the College of Arts and Sciences, and the College of Education.

Grading Policy

Your grade, in particular the final grade, will be determined on a combination of your performance in the activities stated above. In order to obtain a proper grade, I need to be convinced that you have acquired the necessary knowledge from the course. The following is the overall grade distribution among the various types of assignment.

Weekly Reports (10)	5% each
Monthly Presentations (3)	5% each
Panel Discussions (2)	5% each
Final Report	20%
Special Presentation	10%

STUDENTS WITH DISABILITIES

All lectures will be conducted in the New Science Building, Room 320, which is accessible to persons with disabilities. If you need accommodations in this class related to a disability, please make an appointment with me as soon as possible. My office is located in Room 330C, New Science Building. There is an Office of Disability Services on the campus located in Evans Hall Room 315, Tel: (936) 857-2610. More information is provided on Pages 5 and 39 of the **Registration and Term Information Spring 2007** booklet, available online at <http://www.pvamu.edu:80/pages/2112.asp>.

CONDUCT AND ETHICS

A strict code of ethics will be imposed during the entire session. You shall take a pledge that you will not copy, steal or plagiarize someone else's work nor will you tolerate anyone else doing the same. You must ensure that all your reports are written by you in your own words. Any material taken from a published report (in print or on the web) must be given appropriate credit by providing a reference. Read the copyright statement carefully so that the conditions under which the report or some material from it is cited, are met. It shall be the policy in this course to discourage any such activity to the extent possible rather than punish. HOWEVER, IN FAIRNESS TO ALL CONCERNED, CHEATING AND PLAGIARISM WILL BE DEALT WITH SEVERELY WHEREVER THEY ARE FOUND. You are advised to read and abide by the rules and the regulations of the University as mentioned in the Catalog, in particular the topics Student Life and Academic Regulations. Graduating means more than completing a certain number of hours and obtaining a reasonable GPA. You must strive to develop a code of strict conduct, acquire a sense of discipline, serve as a role model to your juniors and in particular experience the feeling of accomplishment.

If you have any questions or have any problems that you think I may be able to help with, please do not hesitate to contact me. I am here to help. Learning does hurt. But I am here to make it hurt a little less.

HAVE A PRODUCTIVE AND AN ENJOYABLE SEMESTER!