

BOULDER VALLEY SCHOOL DISTRICT

COURSE OUTLINE

Course Name: RESEARCH SEMINAR IN SCIENCE

Course Code:

Designated Grade Levels: 11-12 Course Duration: 2 Semesters

Prerequisite/Recommendation: High school science courses in grades 9, 10 -- Physical Science, Biology or others of comparable credits and lab experience.

Fees, Supplies: Lab journal book (\$6)
membership in Colo-Wy Jr. Academy of Science (\$6)

Credits: 10

Teacher: _____ School:

Course Overview:

This very structured year-long science research course offers highly motivated students of various achievement levels an opportunity to perform authentic science research of their own choosing. Students participate in the community of scientific research and scholarship as part of their high school experience. This program directly addresses student need to perform hands-on scientific research. It requires students to identify their own topic of research; read relevant and appropriate scientific literature; create testable hypotheses; design, analyze, and perform experiments under the supervision of a scientist; record, analyze and discuss results; and state clear conclusions directly dependent on the results.

Course Content / Student Objectives:

1. Measurement: the goal of this unit is to expose students to a variety of laboratory techniques. (Review metric system and employ dimensional analysis, demonstrate the ability to safely and accurately use some laboratory equipment basic to scientific disciplines, learn to keep a detailed lab book and journal, review significant digits, and use error analysis.)
2. Statistics: the goal of this unit is to familiarize students with basic statistics, to make sure students know common statistical terms and how to apply the most frequently used formulae, to practice the use of statistics through several exercises and labs, and ultimately to help students understand the valuable and necessary role statistics plays in research. (Compare descriptive and inferential statistics, Bell and Logarithmic distribution curves, various graph types and their uses, how to report variation in data -- range, standard deviation/variance, and frequency distribution, the importance of calibration, how to set up a spread sheet and their use in analyzing research, probability.)
3. Research Methods: The focus of this unit is to familiarize the student with the procedures of finding information, reviewing literature, and writing project proposals and scientific procedures.
4. Ethics: The intent of this unit is to create an understanding in students that good ethics are an important part of reputable science and to understand what ethics involve. (The importance of documenting sources and the meaning of plagiarizing, legitimate motives for choosing research topics, correct due process for conducting research, the International Science and Engineering Fair rules and regulations that govern the use of animals and human tissues in projects, avoiding conflicts of interest.)
5. Presentation Skills: The goal of this unit is to instill in students the skills necessary to generate and present oral, written and multimedia reports. (Use of Excel, Power Point, and other visual media; practice

in giving oral reports; and guidance in preparing a written report that is clear, concise, well organized, grammatically correct and interesting will be covered.)

6. Social Skills: The focus here is to help each student improve his/her ability and confidence in working with adults in a professional setting. (Included will be how to give criticism politely, how to receive it without taking it personally, how to enter into an open and honest exchanges of ideas, skills in making cold contacts on the telephone, and interview skills.)

It is hoped that several students from each high school will develop projects suitable for entry in local, state and national competitions such as science fair. It is also anticipated that most students will prepare a paper describing their research experiences and present it at the Colorado-Wyoming Junior Academy of Science Annual Meeting in April.

Learning Materials or Resources that may be used:

Print and electronic media including internet will be used for literature searches; it is expected that the University of Colorado libraries and computer system will be heavily used by the students in this class. Each student will also work on a research project with a mentor of matching interest within the scientific community.

Teacher Comments: