

APPLICATION FOR UNIVERSITY OF CALIFORNIA F SUBJECT REQUIREMENT

COURSE TITLE: S.T.A.R.: SCIENCE TECHNOLOGY AND RESEARCH 1 AB
(a Biomedical Research Course)

BACKGROUND:

The USC Science, Technology And Research (STAR Program) is a collaborative science education venture between the University of Southern California Health Science Campus and Francisco Bravo Medical Magnet High School. The STAR Program provides inner city junior and senior high school students the opportunity to learn science by joining a USC basic science research team at the University of Southern California Health Sciences and University Park Campuses. The STAR 1 class, which takes place on the high school campus, prepares students for the STAR 2 class. Both STAR 1 and STAR 2 students participate in research projects as an integral part of their high school curriculum and conduct their own science research project during their tenure in the STAR Program.

COURSE DESCRIPTION:

This is a five-unit, one year, elective course at the high school level, for juniors or seniors. It is a research class that consists of a cognitive emphasis in conjunction with developing laboratory research skills used presently in scientific research. The cognitive areas include an understanding of DNA, RNA, cells, enzymes, and tissues, and techniques such as bioassays, electrophoresis, and histology.

Throughout the year, students will research various scientific journals and periodicals as well as the Internet. Using ideas from their research, students will design several experiments, culminating in a long-term science project for the school science fair. For all experiments students will be called upon to integrate math, chemistry, biology, and statistics. Present computer skills will be enhanced through students designing data charts and graphs and locating pertinent background research for their experiments.

An increase of vocabulary and comprehension skills necessary, to perform well on the SAT/ACT tests, will be accomplished through a weekly practice using sample tests and SAT/ACT practice books.

EXPECTATIONS FOR PERFORMANCE:

The student will;

1. Develop mathematical skills necessary to prepare molar, normal, and percent solutions and serial dilutions.
2. Understand microbial biology and learn methods and procedures for achieving the required sterility needed in most research.
3. Spend one week learning to use the Internet, in order to locate information for weekly research summaries, information for debate topics, and background research for a science project.

4. Move from textbook to the cutting edge of scientific discovery, through weekly research on the Internet and in scientific journals or periodicals, expressing knowledge of the research through a written summary.
5. Expand their independence, organization, creativity, critical thinking, and problem solving skills, through developing their own experiments and then working on a more extensive science project to be presented in the school science fair.
6. Use scientific knowledge to create a health policy through a debate on a current health issue.
7. Show an understanding of historical events involving DNA, through designing a DNA timeline and/or group presentation.
8. Enhance present computer skills through designing data charts and graphs, and locating pertinent background research for experiments and a science project.
9. Develop critical and analytical abilities through the selection of material and analysis of resulting photographs made on the research microscope and developed in the darkroom.
10. Increase vocabulary and comprehension skills necessary to perform well on the SAT/ACT tests, through a weekly practice of sample tests from SAT/ACT practice books.
11. Expand oral speaking skills by presenting a scientific article in a class seminar, presenting their science project, and participating in a debate.
12. Increase analytical skills of microscope specimens through histology and H&E staining techniques that include embedding, slicing, staining, and viewing tissues.

NUMBER AND NATURE OF ASSIGNMENTS:

1. Weekly research and summary of a scientific article from the Internet or scientific journal or periodical such as *Discover*, *Scientific American*, *The Biology Teacher*, *U.S. News and World Report*, and the newspaper.
2. Three to six experiments designed to use skills taught.
3. A major science project incorporating many techniques learned.
4. Three oral presentations, namely, a seminar presentation, a debate, and an oral presentation of their science project.
5. One written research report.
6. One electrophoresis experiment involving the use of RNA and a plasmid.
7. One creative construction of a DNA timeline or oral group report on a DNA history topic.
8. At least two photographs taken on the microscope and developed in the darkroom.
9. At least two histology projects involving sterile embedding, sectioning, staining, and analyzing tissues.
10. Two tissue culture experiments involving sterile technique and the use of the laminar flow hood.
11. Weekly practice of the SAT/ACT tests in order to improve test scores.

TEXTS AND OTHER MATERIALS USED:

1. Sourcebook of Biotechnology Activities. National Association of Biology Teachers. Allison M. Rasmussen and Robert H. Matheson III, Project Co-Directors, 1990.
2. Scientific journals and periodicals such as *Discover*, *Scientific American*, and *The Biology Teacher*.
3. Sources from the Internet.

METHODS OF STUDENT EVALUATION:

1. Laboratory performance skills.
2. Laboratory notebook.
3. Written summaries, laboratory reports, and a research report.
4. Periodic quizzes.
5. Ability to work independently and consistently.
6. Oral presentations.

PREREQUISITES

Biology AB

Algebra 1 / Integrated Math 1

Chemistry AB (or concurrent)

Preferable: Algebra 2 / Integrated Math 3

GENERAL SKILL LEVEL REQUIRED TO ENTER COURSE:

Above average skills in math, reading, and writing.

HOW THE COURSE ADDRESSES THE FOUR FUNDAMENTAL ARTS COMPONENTS AS IDENTIFIED IN THE STATE FRAMEWORK:

This is an enrichment class that provides challenges for critical thinking, analysis and evaluation skills, and opportunities for redesigning and re-evaluation. The class also provides an opportunity to enhance oral presentation skills.