Canyon Crest Academy: Applied Science

Level of Difficulty	Estimated Homework	Prerequisites
☐Moderate ☒Difficult ☐Very Difficult	30-60 minutes per day* *This is a general guideline for planning and scheduling purposes. A student's ability level may affect actual preparation time needed.	Department Successful completion of Research Methods (Tier 1) or approval by Applied Science teacher on suitable prior experience and project prior to enrollment AND completion or concurrent enrollment in Chemistry and Integrated Math 2

Course Description

This course will serve as the Tier II course for the QUEST program at Canyon Crest Academy. In this course students will apply knowledge and techniques to conduct research.

In this project-based course, students are required to use the information that they have learned in previous science and math classes to solve and investigate "real world" problems. They will also learn new material while conducting background research to solve problems and design experiments. Students will network with experts who can provide more information and insight towards their projects, go on field trips, write technical reports, and make formal technical presentations. Students will complete an original research project as a culminating event. Students will have the opportunity to enter research competitions, including but not limited to Science Fair.

Research Project Expectations

Select a general area of interest

- Pursue background research on several potential general areas of interest
- Select one general area of interest
- Explain (in writing) why you selected the general area of interest

Research and narrow the topic

- Pursue in-depth research in the area of interest--including primary, secondary, and tertiary sources in scientific journals
- Explain (in writing) the relevance/importance/potential applications of this topic

develop a research question

- Study additional background on your topic with a particular emphasis on primary resources
- Develop a tentative and original research question
- Discuss your research question with your peers and instructor
- Select a research question that has potential for original research
- Explain (in writing) the relevance/importance of your research question

Design a research hypothesis

- Write a review of the literature for the your research project
- Develop a hypothesis
- Summarize (in writing) the reasoning and research that led to this hypothesis

Design a research plan

- Draft a tentative research plan to test your hypothesis through experimentation (data collection) and analysis
- Summarize your tentative research plan using a design matrix
- Prepare a list of needed materials and resources
- Determine the feasibility of the research, including time, materials, and cost
- Describe (in writing) the proposed method or procedures for your project
- Clearly indicate how you manipulate the independent variable, measure the dependent variable, and control other potential variables
- Determine that you have included sufficient numbers in both control and experimental groups to be statistically valid
- Discuss your research plan with your peers and instructor
- Develop a realistic timeline for each component of your research plan
- Develop data tables for recording raw and derived data
- Determine that your research plan meets the safety and ethical guidelines (for appropriate research involving human subjects, non-human vertebrate animals, pathogenic agents, controlled substances, recombinant DNA, and human or non-human animal tissue)

Write a research proposal

- Review the guidelines for writing a research paper provided by your teacher
- Write a 250-word research proposal summary that includes the purpose of the experiment, procedures and possible research applications
- Write a rough draft for each section of the research paper including title page and table of contents, introduction, literature review, materials and methods, acknowledgements, references and bibliography. (follow the guidelines provided by your teacher)
- Seek feedback on each section of your rough draft from your peers and instructor
- Use feedback and self-evaluation to make revisions to each section of the research paper
- Prepare a final draft of your research proposal
- Prepare a 100-word easily understandable summary of your project in layperson's terms that includes research question, background, procedures, and relevance.

Prepare a poster visual display

- Review guidelines for creating an effective presentation (provided by your teacher)
- Prepare a display that is organized, clear, concise, correctly presented, well-constructed, and eye-catching.
- Practice speaking freely and confidently about your display to demonstrate that you have a good grasp of your project
- Present your display to classmates and engaged in discussion and answering questions related to your work
- Complete peer reviews on visuals and presentations

Complete the Applications

- Identify a science competition to enter (ie. Intel, Science Fair, Siemens)
- Complete application for competition selected, pay special attention to deadlines.
- Submit your application to your instructor and mentor for review
- Refine your project as required for inclusion in other science research competitions

Links

QUEST Homepage http://teachers.sduhsd.net/ccquest/

Supplemental Information

10 credits
Meets graduation requirement for electives