

**EL DORADO UNION HIGH SCHOOL DISTRICT
Educational Services**

Course of Study Information Page

Course Title: Student Research Project	
<p>Rationale: EDUHSD students have not traditionally entered research exhibition contests such as the International Science & Engineering Fair (ISEF) or the Intel Science Talent Search (ISTS). Existing science class formats do not adequately support them in doing so. Student Research Projects could be conducted within the disciplines of Computer Science, Mathematics, Biological, Environmental and Physical Sciences, and the Social Sciences. In addition, this course is based on sound pedagogical principles such as constructivist education, inquiry-based science, student-centered learning, and school-to-career experiences.</p>	
<p>Course Description: This course is designed to teach students the skills required to conduct original research. There are nine instructional units, which sequentially emphasize the skills and knowledge the student should possess in order to be successful in their research project. Students repeating this course must produce increasingly sophisticated projects using increasingly more sophisticated methods. The nine instructional units are self-presenting, making the course suitable for a regular class format as well as independent/distance learning situations. Individual students attending a site that does not conduct this as a classroom course could complete it with the minimal supervision of an Independent Study advisor.</p>	
<p>How Does This Course Align With or Meet State and District Content Standards? (Please attach a copy of the standards used) – This course aligns with all elements of the California Science Standards for “Investigation and Experimentation”. In addition, it applies at least five of the eight District Technology Competencies as well as ISTE NETS for students. Subject specific content standards can be rigorously met based on the particular research topic agreed between the student and advisor.</p>	
Length of Course:	One Semester. Students may repeat for credit, if more rigorous research is completed.
Grade Level:	11 or 12
Credit: <input checked="" type="checkbox"/> Number of units: 5 credits <input type="checkbox"/> Meets graduation requirements <input type="checkbox"/> Request for UC "a-f" requirements <input type="checkbox"/> College Prep <input checked="" type="checkbox"/> Elective <input type="checkbox"/> Vocational	
Prerequisites:	Algebra 1/instructor approval
Department(s): science, math, social sci.	Nondepartmental
District Sites:	All
Board of Trustees Adoption Date:	January 22, 2002
Textbook(s)/Instructional Materials:	
Date Adopted by the Board of Trustees:	

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Department: Non-Departmental
Course Title: Student Original Research Project

UNIT #1: Theories of Knowledge

GOAL: Student will gain an understanding of the role that science has played in the development of man's understanding of the world around him.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
1. Describe various types of knowledge and discuss the advantages and limitations of each.	1. View and discuss PowerPoint "21 st Century Research"
2. Demonstrate familiarity with the evolution of the pursuit of knowledge through the ages.	2. Use a web browser to complete a web quest on the History of Science.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science A2, G2 Info Lit. #1, 2, 3 California Science 1k, 1m

*For models of how other departments have used this template, contact your school principal to gain access of the District Courses of Study and Content Standards binder.

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UNIT #2: Research in the 21st Century

GOAL: Student will become familiar with how research is conducted and shared by contemporary professionals.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
<ol style="list-style-type: none"> 1. Describe how today's professionals utilize modern tools of technology such as computers, the web, email and data collection & analysis software to conduct and share research. 2. Demonstrate familiarity with tools of technology used in research. 3. Identify an area of personal interest that presents opportunities for student research. 	<ol style="list-style-type: none"> 1. View and discuss PowerPoint "21st Century Research." 2. Read examples of published research. 3. Write a summary paper on modern research methods. 4. Send email. 5. Produce a word-processed document. 6. Use a web browser to complete a web quest on 21st Century Research. 7. Complete a simple data collection and analysis activity. 8. Write the 1st draft of her/his project proposal using a provided template.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science A1, A2, E2 California Science 1A Tech Foundations 3, 4, 5

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UNIT #3: Background Survey of Literature

GOAL: Student will become more familiar with research methods by examining examples of published research.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
1. Demonstrate the ability to assess the authority and validity of an information source.	1. Examine and discuss a rubric that has been designed to assess the reliability of an information source.
2. Demonstrate the ability to locate reliable information on a desired topic.	2. Use the rubric to assess several assigned information sources.
3. Become familiar with the scope and processes of existing research within her/his field of interest.	3. Use Electronic Library resources and the Web to locate examples of existing research within her/his field of interest.
4. Limit the scope of her/his own research.	4. Assess the reliability of these information sources.
	5. Produce a written summary of several examples of research using the provided template.
	6. Refine her/his project proposal based on the scope and processes observed in the survey of existing research.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science A1, A2, G1 California Science 1G, 1M Tech Foundations 3, 5 Info. Lit #1, 2, 3, 7, 8

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UNIT #4: The Scientific Research Method

GOAL: Student will gain familiarity with the accepted process of refining knowledge through the steps of the Scientific Research Method.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
1. Give a detailed description of the process known as the Scientific Research Method.	1. View and discuss the video "The Scientific Method."
2. Demonstrate the ability to formulate a testable hypothesis for her/his own research.	2. Write a paper explaining each component of the Scientific Research Method.
3. Apply the Scientific Research Method to her/his own research.	3. Write a hypothesis for her/his own research.
	4. Describe the test of her/his own hypothesis.
	5. Write a description of her/his own research using the format of the Scientific Research Method.
	6. Add the hypothesis and description to her/his project proposal.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science A1, A2, E2 California Science 1F Tech Foundations 3, 6

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UNIT #5: Standards, Guidelines and Regulations Governing Research

GOAL: Student will develop a methodology for her/his own research that complies with all standards, guidelines and regulations that govern contemporary research.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
<ol style="list-style-type: none"> 1. Demonstrate familiarity with the standards, guidelines and regulations that govern legitimate, contemporary research. 2. Incorporate specific policies that pertain to the research he/she will be doing. 3. Exhibit an understanding of how he/she will conduct her/his own research. 4. Demonstrate the ability to manage the time and resources needed to conduct her/his research. 	<ol style="list-style-type: none"> 1. View and discuss the PowerPoint "Standards, Guidelines and Regulations." 2. List policies that apply to her/his own research. 3. Add limitations to her/his research proposal based on specific policies that pertain to her/his research. 4. View and discuss the PowerPoint "Materials and Procedures." 5. Write the preliminary Materials and Procedures document for her/his research notebook. 6. View and discuss the PowerPoint "Project Management." 7. Construct a timeline for her/his research with specific deadlines for various tasks. 8. Accumulate the resources needed for her/his research.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science A1, G1 Tech Foundations 5, 6

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UNIT #6: Collecting and Organizing Data

GOAL: Student will collect and organize data in an effective manner as he/she conducts her/his research.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
1. Demonstrate familiarity with common methods of collecting and organizing data.	1. Learn measurement techniques, sensor techniques, and construction of data tables.
2. Design and explain the data collection and organization process to be used in her/his project.	2. Add the data collection methodology to her/his research notebook.
3. Perform data analysis on her/his project data.	3. Conduct experiment.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science A1, A2, E1 California Science 1A Tech Foundations 6

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UNIT #7: Analyzing Data

GOAL: Student will perform an appropriate analysis of her/his data to enable meaningful conclusions to be drawn.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
1. Demonstrate familiarity with the graphical analysis of data.	1. Perform graphical analysis of example data sets.
2. Demonstrate familiarity with techniques for ensuring statistical reliability, including sampling distribution, Central Limit Theorem and confidence intervals.	2. View and discuss video "Sampling Distributions."
3. Demonstrate familiarity with methods of hypothesis testing, including null and alternate hypothesis, one and two-tailed tests and error types.	3. View and discuss video "Hypothesis Testing."
4. Describe a method of analyzing the data that was acquired during their own research.	4. Add analysis methodology to her/his research notebook.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science E1 California Science 1E, 1J

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UNIT #8: Drawing Conclusions

GOAL: Student will draw conclusions by critiquing her/his original hypothesis and methodology based on the research results.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
1. Demonstrate familiarity with the purpose of writing conclusions.	1. Evaluate the conclusions in example research reports.
2. Demonstrate familiarity with common sources of error in experimental methods.	2. Error analysis worksheet.
3. Write conclusions in her/his research notebook.	3. Write conclusions in her/his research notebook.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
National Science A1, E1 California Science 1B, 1C, 1D, 1H, 1N

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UNIT #9: Publishing and Presenting Results

GOAL: Student will share the results of her/his research through publishing a Research report in an approved format, constructing an exhibit display and presenting at an exhibition.

OBJECTIVES	SUGGESTED ACTIVITIES
The student will:	
1. Demonstrate familiarity with standard formats for research reports, exhibition displays and presenting at an exhibition.	1. View and discuss video "Science Fair Projects: the ultimate guide."
2. Publish and exhibit her/his research.	2. Publish and exhibit her/his research.

Content Area Standards (Please identify the source)
The students will achieve the following content standards:
California Science 1M Tech Foundations 4

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