## UC Doorways Online Update Template

(Required Information needed to prepare for course submission)

· **Program Information**

**NOTE:** The School Information must be updated / verified as accurate at the start of each submission cycle. This must be completed before the system will allow any course submissions.

Program Information
Program Name: ______________________________________________
City: ______________________________________________
Program Course List Contact Information
First Name: ______________________________________________
Last Name: ______________________________________________
Position/Title: ______________________________________________
Phone Number: ______________________________ Ext.: ____________
E-mail: ______________________________________________
Teacher Contact Information
First Name: Dominique
Last Name: Evans-Bye
Position/Title: Teacher
Phone Number: (818) 248-8324 Ext.: 4200
E-mail: devans-bye@gusd.net

· **Previously Approved Courses**

**NOTE:** Complete outlines are not needed for courses previously approved by UC. Courses that are defined as "previously approved" are courses from programs (Advanced Placement, International Baccalaureate, ROP courses, etc.) and courses that have been removed within a three-year window and are being reinstated. Each section below represents an individual page on the electronic submission site.

Was this course "Previously Approved" by UC? ______ Yes _X____ No

If "No", proceed to the **Course Description** section.

If "Yes," please indicate which category applies:

Is this course being reinstated after removal within 3 years?

______ Yes ______ No

If "Yes," what year was the course removed from the list? ______________________

Exact Course Title: ______________________________________________

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Has this course been provided program status, is not an online course, and is it listed below?

______ Yes ______ No

If "Yes," select an option from the Program Status list:

______ AVID Program
______ Advanced Placement (AP)
______ CDE Agricultural Education
______ CSU Early Assessment Program (EAP)
______ Center for Advanced Research and Technology (CART)
______ International Baccalaureate (IB) Program
______ Project Lead the Way
______ ROP/C Organization Name of ROP/C: ____________________

If "Advanced Placement", has it been authorized by the College Board through the AP Audit Process?
______ Yes _______ In Progress

**NOTE:** UC will only allow Advanced Placement courses that have passed or are in the AP Audit process. UC requires all AP courses on your list, including those approved in prior years, to be verified via the College Board AP Audit process. UC will run quarterly reports based in AP Audit data. AP courses not listed on the AP Audit list will be removed.

If "In Progress," date submitted to AP: __________ (MM/DD/YY)

Exact Program Course Title: ______________________________________________

· **Course Description**

Course Title: The Geology of Disasters: a Hazus-MH Training Course

**NOTE:** Courses that are "previously approved" must use the same exact course title as the previously approved course.

Transcript Title(s)/Abbreviation(s):

Course Code(s): ______________________________________________

Seeking "Honors" Distinction

**NOTE:** To receive "honors" distinction, the course submission must satisfy certain requirements. For information about these requirements, please visit the a-g Guide: http://www.ucop.edu/a-gGuide/ag/a-g/honors.html. For "previously approved" courses (including AP and IB), the honors information will be pre-populated as applicable.

__X__ No
_______ Yes, AP
_______ Yes, IB (Higher Level)
_______ Yes, IB (Standard Level)
_______ Yes, Other Honors

**NOTE:** Defined as a course specifically designed by the school with distinctive features which sets it apart from regular high school courses in the same discipline areas. Course should be seen as comparable in terms of workload and emphasis to AP, IB, or introductory college courses in the subject. Honors courses must be designed for the 11th and 12th grade level and require a comprehensive, year-long, written final exam. In addition to AP and IB higher level courses, high schools may certify as honors level courses *not more than one unit in each of the following subject areas only*: history, English, advanced mathematics, each laboratory science, each language other than English, and each of the four VPA disciplines. If there are no AP or IB higher level courses in a given subject area, the high school may certify up to, but not more than, two units at the honors level in that area.

Subject Area and Category

______ "a" – History / Social Science
    ______ U.S. History
    ______ American Government / Civics
______ World History / Geography / Cultures
______ "b" – English
    ______ English
    ______ English-ESL/ELD
______ "c" – Mathematics

______ Algebra 1; Yr 1 of 2
______ Algebra 1; Yr 2 of 2
______ Algebra 1
______ Integrated Math 1
______ Geometry; Yr 1 of 2
______ Geometry; Yr 2 of 2
______ Geometry
______ Integrated Math 2
______ Algebra 2; Yr 1 of 2
______ Algebra 2; Yr 2 of 2
______ Algebra 2
______ Integrated Math 3
______ Algebra 2/Trigonometry
______ Advanced Mathematics
______ Statistics
______ "d" – Laboratory Science
______ Biological Science
______ Chemistry
______ Physics
______ Integrated Science

**NOTE:** Students electing to enroll in an integrated-science program (ISP) are strongly advised to complete the entire three-year sequence. In most cases, the first year of an integrated-science sequence fulfills only the "g" elective requirement; the second and third years of the sequence then fulfill the two-year "d" laboratory science requirement. Accordingly, if only ISP I is successfully completed, then two courses from the categories of Biology, Chemistry, or Physics in the "d" subject area must be completed. If ISP I and only one of ISP II or ISP III are completed, then one additional course from the categories of Biology, Chemistry, or Physics from the "d" subject area must be taken to fulfill the "d" requirement.

______ Interdisciplinary Science

**NOTE:** This category demonstrates that the course is cross-disciplinary and is often used for advanced science courses such as AP Environmental Science or Biochemistry.

______ "e" – Language Other than English
- ______ LOTE Year 1
- ______ LOTE Year 2
- ______ LOTE Year 3
- ______ LOTE Year 4+

Language:

______ ASL
______ Chinese
______ French
______ German
______ Hebrew
______ Italian
______ Japanese
______ Latin
______ Other
______ Russian
______ Spanish
______ "f" – Visual & Performing Arts
______ Dance (Intro)
______ Dance (Advanced)
______ Music (Intro)

_______ Music (Advanced)
_______ Theater Arts (Intro)
_______ Theater Arts (Advanced)
_______ Visual Arts (Intro)
_______ Visual Arts (Advanced)
_______ “g” – Elective
    _______ History / Social Science
    _______ English
    _______ English-ESL/ELD
    _______ Math
    _______ Statistics
    _______ Science-Biological
    _______ Science-Integrated
    ___X___ Science-Physical
    _______ LOTE
    _______ VPA
    _______ Interdisciplinary
    _______ Other

Grade Level: ___ 9 _X_ 10 ___X___ 11 ___X___ 12

**NOTE:** Grade level pertains to which grades the course has been designed. 9th grade cannot be selected for Advanced VPA. 9th and 10th grades cannot be selected for honors courses.

Unit Value: _______ 0.5 (half year or semester equiv.) __X____ 1.0 (one year, 2 semesters, or 3 trimesters equiv.)

· **Course Attributes**

Is this course classified as a Career Technical Education course?

__X____ Yes ___________ No

If “Yes,” please select the name of the Industry Sector and Career Pathway:

_______ Agriculture and Natural Resources
    _______ Agricultural Business
    _______ Agricultural Mechanics
    _______ Agriscience
    _______ Animal Science
    _______ Forestry and Natural Resources
    _______ Ornamental Horticulture
    _______ Plant and Soil Science
_______ Arts, Media, and Entertainment
    _______ Media and Design Arts
    _______ Performing Arts
    _______ Production and Managerial Arts
_______ Building and Construction
_______ Cabinetmaking and Wood Products
_______ Engineering and Heavy Construction
_______ Mechanical Construction
_______ Residential and Commercial Construction

_______ Education, Child Development and Family Services
    _______ Child Development
    _______ Consumer Services
    _______ Education
    _______ Family and Human Services
_______ Energy and Utilities
_______ Electromechanical Installation and Maintenance
_______ Energy and Environmental Technology
_______ Public Utilities
_______ Residential and Commercial Energy and Utilities
_______ Engineering and Design
_______ Architectural and Structural Engineering
_______ Computer Hardware, Electrical, and Networking Engineering
_______ Engineering Design
_______ Engineering Technology
___X___ Environment and Natural Science Engineering
_______ Fashion and Interior Design
_______ Fashion Design, Manufacturing, and Merchandising
_______ Interior Design, Furnishings, and Maintenance
_______ Finance and Business
_______ Accounting Services
_______ Banking and Related Services
_______ Business Financial Management
_______ Health Science and Medical Technology
_______ Biotechnology Research and Development
_______ Diagnostic Services
_______ Health Information
_______ Support Services
_______ Therapeutic Services
_______ Hospitality, Tourism, and Recreation
_______ Food Service and Hospitality
_______ Food, Science, Dietetics, and Nutrition
_______ Hospitality, Tourism, and Recreation
_______ Information Technology
_______ Information Support and Services
_______ Media Support and Services
_______ Network Communications
_______ Programming and Systems Development
_______ Manufacturing and Product Development
_______ Graphic Arts Technology
_______ Integrated Graphics Technology
_______ Machine and Forming Technology
_______ Welding Technology
_______ Marketing, Sales, and Service
_______ E-Commerce
_______ Entrepreneurship
_______ International Trade
_______ Professional Sales and Marketing
_______ Public Services

______ Human Services
______ Legal and Government Services
______ Protective Services
______ Transportation
______ Aviation and Aerospace Transportation Services
______ Collision Repair and Refinishing
______ Vehicle Maintenance, Service, and Repair

· **Catalog Description**

Brief Course Description

**NOTE:** Briefly (in a short paragraph) describe the course, focusing on content, rather than instructional strategies, assessments, or rationale. If school has a catalog, enter the description that is in the catalog.

The Geology of Disasters; a Hazus-MH Training Course is appropriate for 10th through 12th grade students who are interested in disaster preparedness planning and mitigation with geographic information systems. The major focus of the Geology of Disasters course is to prepare students to do risk analysis, loss estimation and evaluate mitigation techniques for earthquake, flood and hurricane wind disasters. Students will employ GIS analysis integrated with cartographic and scientific concepts for the investigation of disaster related problems. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges throughout the course. Students will also learn how to document their work, and communicate their findings to their peers and members of the professional community.

Pre-Requisites: _Physics___________________________ Required __X____ Recommended ______

**NOTE:** Laboratory science and Advanced VPA courses require a pre-requisite. Submissions will not be allowed if this is not included. Some courses, particularly in the mathematics subject areas, require appropriate pre-requisites. For further explanation, refer either to the "Guide to a-g Requirements" document or the a-g Interactive Guide web site at www.ucop.edu/a-gGuide.

Co-Requisites: _Algebra I or Algebra A/ B _____________ Required __X____ Recommended ______

· **Background Information**

**NOTE:** Do not include information that could identify your school or district.

Context for Course (optional) **REQUIRED FOR CTE COURSES**

**NOTE:** In order to understand the context for a new course, sometimes it is helpful for UC to understand the broader educational program and/or reform efforts of the school. How does this course fit into broader departmental and/or pathway structure? How does it fit into the overall school restructuring plans? Is the course intended to be a core course or supplemental? What are the student/school/community needs met by this course?

The Geology of Disasters: a Hazus-MH Training Course is one of three classes offered in the geographic information system program at Clark Magnet High School, all of which are approved through the Los Angeles County Regional Occupation Program. This course is not intended to replace a core science class, but is offered as a supplemental science elective. GIS can be used to compliment any college major or career path. Labor market analysis show jobs involving GIS as having high growth potential in the near future.

History of Course Development (optional) **REQUIRED FOR CTE COURSES**

**NOTE:** Likewise, it is sometimes helpful for UC to know the origins of a course and who was involved in its development. Did you consult with UC Admissions personnel or UC professors? If so, what was the nature of such consultation and what was the result? Was this course modeled after another course at another school? If so, is that course UC approved? How does the course being submitted differ from the course after which it was modeled? Has this course received any special recognitions, designations or awards? Has it been articulated to local community colleges or universities?

This course was developed with the support of a UCLA *Teacher Initiated Inquiry Project* grant awarded to a team from Clark Magnet High School led by science teacher Dominique Evans-Bye consisting of three teachers and the head counselor. Ms. Evans-Bye and team member Alex Day-Blattner attended the University of California Curriculum Integration Institute in May of 2011 in order to develop an academically rigorous course integrating career technical education. A partnership with the Federal Emergency Management Agency has been fostered resulting in adoption of FEMA training materials for the Hazus-MH portion of the course.

· **Textbooks**

**NOTE:** Include list of Primary and Secondary Texts. Make sure to note the books that will be read entirely and those that will be as excerpts. Textbook information is not necessary if your course is a Visual and Performing Arts, Advanced Placement or an International Baccalaureate course. Online texts or non-standard text materials should include a link to the online text.

Textbook

Title Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes

Edition: (3rd Edition)

Publication Date: January 16, 2011

Publisher: Prentice Hall

Author(s): Edward A. Keller, Duane E. DeVecchio

URL Resource(s): www.hazardcity.com

Usage: ___X___ Primary Text __X____ Read in entirety or near entirety

(Be sure to list any additional textbooks that are used for the class.)

Supplemental Instructional Materials: *Please describe. If using online text or non-standard material, please provide the title of the material or webpage and the URL link.*

Laboratory Manual in Physical Geology
Eighth Edition, Pearson/Prentice Hall
Richard M. Busch, Editor

USGS website www.usgs.gov
FEMA website www.fema.gov
IRIS Incorporated Research Institutions for Seismology http://www.iris.edu
NASA website www.nasa.gov
National Oceanic and Atmospheric Administration website www.noaa.gov
Pierce College Weather Station http://www.piercecollegeweather.com/temperatures.html

The following FEMA workbooks for Hazus-MH course sections will be used:

- **313 Basic Hazus-MH**
- **174 Hazus-MH for Earthquake**
- **172 Hazus-MH for Flood**
- **296 Application of Hazus-MH for Risk Assessment**
- **317 Comprehensive Data Management**

http://www.fema.gov/plan/prevent/hazus/hz_training.shtm

## Course Guidance

**GENERAL LABORATORY SCIENCE GUIDANCE**

The intent of the laboratory science requirement is to ensure that entering freshmen have a minimum of one year of preparation in each of at least two of the areas of Physics, Chemistry, and Biology/Life Science. This requirement can be satisfied by taking two courses from among these specific subject areas, but courses from across the broad spectrum of scientific subjects are potentially acceptable, provided they conform to the Course Requirements specified below.

**Goals of the Laboratory Science Requirement**

The overarching goal of the subject requirement in Laboratory Science is to ensure that freshmen are adequately prepared to undertake university-level study in any scientific or science-related discipline. The term “laboratory” is intended to signify an empirical basis of the subject matter, as well as inclusion of a substantial experimental and/or observational activity in the course design. The requirement emphasizes Biology/Life Sciences, Chemistry, and Physics, because these subjects are preparatory to university-level study in all scientific and science-related disciplines. However, coverage of these foundational subjects in suitable breadth and depth can potentially be found in a wide range of science courses, provided the courses conform to the criteria described under the Course Requirements below.

All courses certified in the Laboratory Science subject area should be designed with the explicit intention of developing and encouraging these scientific habits of mind:

1. Students should develop a perception of science as a way of understanding the world around them, not as a collection of theories and definitions to be memorized.
2. Students should emerge from high school embracing an ease in using their scientific knowledge to perceive patterns and regularity, make predictions, and test those predictions against evidence and reason.
3. Students should recognize that abstraction and generalization are important sources of the power of science.
4. Students should understand that scientific models are useful as representations of phenomena in the physical world. They should appreciate that models and theories are valuable only when vigorously tested against observation.
5. Students should understand that assertions require justification based on evidence and logic, and should develop an ability to supply appropriate justifications for their assertions. They should habitually ask “why?” and “how do I know?”
6. Students should develop and maintain an openness to using technological tools appropriately, including graphing calculators and computers, in gathering and analyzing data. They should be aware of the limitations of these tools, and should be capable of effectively using them while making sound judgments about when such tools are and are not useful.
7. Students should recognize that measurements and observations are subject to variability and error, and that these must be accounted for in a quantitative way when assessing the relationship between observation and theory.

**Course Requirements**

Regardless of the scientific subject, all approved courses are expected to satisfy these criteria:

1. Courses should be consistent with and illustrate the Goals described above.

2. Courses must explain the relevant phenomena on the basis of the underlying biological, chemical, and/or physical principles, as appropriate. They should provide rigorous, in-depth treatments of the conceptual foundations of the scientific subject studied.

3. Courses should afford students opportunities to participate in all phases of the scientific process, including formulation of well-posed scientific questions and hypotheses, design of experiments and/or data collection strategies, analysis of data, and drawing of conclusions. They should also require students to discuss scientific ideas with other students and to write clearly and coherently on scientific topics.

4. Courses must specify, at a minimum, elementary algebra as a prerequisite or co-requisite, and should employ quantitative reasoning and methods wherever appropriate.

5. Courses must take an overall approach that is consistent with the scientific method in relation to observing, forming hypotheses, testing hypotheses through experimentation and/or further observation, and forming objective conclusions.

6. Courses must include hands-on scientific activities that are directly related to and support the other class work, and that involve inquiry, observation, analysis, and write-up. These hands-on activities should account for at least 20% of class time, and should be itemized and described in the course description.

The content for Physics, Chemistry, and Biology/Life Sciences courses in grades 9 through 12 will usually be drawn from the Science Content Standards for California Public Schools, and may, in some cases, also be drawn from the California Career Technical Education Model Curriculum Standards.While these standards can be a useful guide, coverage of all items in the standards is not necessary for the specific purpose of meeting the subject requirements for university admission.Likewise, simple coverage of all standards in not enough to assure course approval. For success in college, secondary science teachers should help students learn to assimilate the major ideas and principles that encompass the standards rather than explore the breadth of all the standards. More important than the topics covered, or even than the skills directly used in class, are the more general abilities and attitudes gained through the effort of mastering the course content. These general abilities and attitudes are described in the Goals section above.

**HONORS LABORATORY SCIENCE GUIDANCE**

- Laboratory Science Honors courses are expected to provide both breadth and depth of exploration in the subject area, developing writing, research, and analytical skills. Specific detailed evidence must be included in the course outline.
- The courses must offer content and/or experience that are demonstrably more challenging than what is offered through the regular college preparatory courses in the same field.
- Factors considered for UC approved honors courses that satisfy the "d" requirement include but are not limited to the assignment and evaluation of one long or numerous short, challenging, and properly-annotated research papers and a comprehensive final examination. Specific details of each of these assignments are required.
- The use of college-level textbooks is encouraged.
- Regular college preparatory courses in the subject areas should be offered. If regular non-honors courses are offered, a strong justification for the lack of a regular course is required.
- In addition to AP and IB higher level courses, high schools may certify as honors level courses **not more than one unit** for each Laboratory Science Discipline.
- A single, written, comprehensive, full year final exam must be administered that encompasses all the material that has been covered for the entire year.

## · Course Content

**NOTE:** The following questions are subject specific and ask for detailed information regarding the course curriculum. Since UC has developed their own criteria for the review of curricula, it is not necessary (and preferred) that the State Standards are not listed when submitting course descriptions to the University. When preparing the course submission, keep in mind that your audience is the UC High School Articulation unit and UC faculty. Include relevant information that would assist those reviewing the course and provide UC a better understanding and clarity about the intent of the curriculum. UC expects to see information that would show specific, detailed evidence of the course rigor and development of essential skills and habits of mind. Course template components need to be more expository and illustrative of the integration of each course component and how the overarching goals are being accomplished. The text boxes below will expand to accommodate additional text.

**Course Purpose:** *What is the purpose of this course? Please provide a brief description of the goals and expected outcomes. (How these will be accomplished should be reserved for the Course Outline, Key and Written assignments, Assessments, and/or Instructional Methods.)*
**NOTE:** More specificity than a simple recitation of the State Standards is needed.

| **Course Goals and/or Major Student Outcomes** |
|---|
| **1.** Students demonstrate understanding of geologic features and processes of the Earth – rocks and minerals, geologic formations and changes, the atmosphere, the oceans, the weather and geographical formations, sufficient for college matriculation requirements.<br>**2.** Students develop critical thinking, problem solving, and analysis skills as they apply Earth Science knowledge to understanding, mapping, and estimating risk from natural disasters.<br>**3.** Students create and run probabilistic and historical hazard scenarios from earthquakes, flood and hurricane winds using Hazus-MH.<br>**4.** Students analyze hazard scenario results in terms of loss estimations and loss mitigation strategies using Hazus-MH.<br>**5.** Students assess risk and investigate disaster preparedness plans at the site, city, county and state level by combining Hazus-MH analysis and outside research.<br>**6.** Students work in teams to prepare a formal risk assessment. This technical document will include Hazus-MH estimates of physical, economic and social impacts from natural disasters along with suggested mitigation strategies.<br>**7.** Students prepare a formal presentation for "government officials." |
| |

**Course Outline:** A *detailed descriptive summary of all topics covered. All historical knowledge is expected to be empirically based, give examples. Show examples of how the text is incorporated into the topics covered. A mere listing of topics in outline form is not sufficient (i.e. textbook table of contents or California State Standards).*

**Unit 1. Is There a Map for That? - Introduction to GIS and the Geology of Earthquakes**

Essential Questions: What is GIS and how am I already using it? What can maps do and how can we use them? How do maps help us understand earthquakes? What are the effects of earthquake hazards on California's natural resources? How can I apply my understanding of earthquakes and maps to help my family be better prepared for the next earthquake?

In this unit students learn to use maps to connect earthquake hazards to plate tectonics and locations of natural resources in California. They explain how earthquakes occur and recognize signs of tectonic activity in the world around them and relate the observed properties of rocks to processes that produce rocks, including formulating proposed geologic histories for rocks and possible future changes. Students apply the scales used to measure earthquake intensity and magnitude to assess possible damage from predicted earthquakes on their own home and school.

| "a-g" Academic Topics | CTE |
|---|---|
| Students recognize maps in daily use and categorize their purposes. | • Students recognize geographic reference tags in daily use in order to construct what GIS is and predict what it can be used for. |
| Using posted classroom evacuation maps, students evacuate to designated safe zones and connect the 2 dimensional representation of space (x,y coordinates) on the maps to real 3 dimensional space. | • Students make 2D to 3D spatial connections. |
| After trying out the posted evacuation maps, students discuss and develop possible improvements to them. If appropriate students justify to the school administration the need to revise the posted evacuation maps before the Great American Shakeout Drill (November).<br>Students read "Introduction to Natural Hazards " (Chapter 1, Keller) as a basis for discussion about and identification of key terms employed by professionals in the fields of forecasting, predicting, and providing warnings of hazardous events. | • Students select and use suitable software to upgrade posted classroom evacuation maps. |

| | |
|---|---|
| Students list reasons for classroom evacuation maps and procedures and then review published geologic hazard maps of California. They categorize the California hazards and relate hazards to regions of the state and then compare these categories to hazards around the United States and the world, in order for students to retrieve knowledge about plate tectonic processes. Students then interpret hazard maps to identify evidence of geologic events of the past and predict geologic changes in the future. Students repeat the analysis of published maps in order to identify, categorize and locate California's natural resources, then research how earthquakes and plate tectonic activity are related to the production of the natural resources in the first place. | • Access online hazard maps and related resources. |
| During a field trip to the San Andreas fault as it runs through Palmdale students record observations of evidence of geologic events in the past (folding, sedimentary layers, igneous intrusions, erosion, sag pond) and interpret their observations based on the properties of rocks and the physical and chemical conditions in which they formed, including plate tectonic processes. They use the knowledge, observations and experience to create and publish a class map of the area including detailed, geologically precise descriptions of geologic features and processes.<br><br>Students connect the observations made during the Palmdale field trip to the principal structures that form at a transform (right lateral strike slip) plate boundary. They then classify the three main plate boundaries (convergent, divergent and transform) and identify the principal structures that form at the different boundaries.<br>Students extend their observations and data collecting about rocks from the Palmdale field trip to investigate and identify the properties of sedimentary, igneous, and metamorphic rocks. They connect the properties of rocks to the physical and chemical conditions under which they form by researching those conditions and describe the processes involved. | • Map a sag pond using GIS coordinate systems.<br>• Use photographs and descriptions of features to develop a community map project. |
| Students locate information in the media about recent earthquake activity and summarize the information presented about these events. They explain why these | • Input GPS coordinates and monitor satellites. |

| | |
|---|---|
| earthquakes occurred and interpret the modified Mercalli scale for intensity of an earthquake and the Richter scale for the magnitude of an earthquake. Students understand how the epicenter of an earthquake is determined using distance data from a minimum of three seismic observation stations and relate that process to how GPS coordinates are generated using data from a minimum of three satellites. They analyze media reports to connect earthquake events to their effects including structure collapses, fire, landslides, liquefaction, permanent displacement of land surface and tsunamis. Students determine connections between building codes and land use and effects of earthquakes. They then assess the possible effects of earthquakes of particular magnitude or intensities on their home and design a suitable safety plan and earthquake kit for their family. Students discuss provisions made for earthquakes at school, evaluate whether they are sufficient, refine the plan and present our findings to the administration. Students use the Hazard City on line assignment in applied Geology: Earthquake Damage Assessment to model possible effects of earthquakes of different intensities on the Modified Mercalli Intensity scale and to scaffold their own analysis of their home and school site.<br><br>Student readings for this section can include "Internal Structure of Earth and Plate Tectonics" "Earthquakes" and "Tsunamis" (Chapter 2, 3 and 4, Keller). | |

**Unit 2 - Hazus Earthquake**

*Outcomes*

Students will create study areas where assessment of risks, estimates of physical, economic and social impacts and evaluate mitigation strategies for earthquake damage will be performed.

| "a-g" Academic Topics | CTE Topics |
|---|---|
| • Identify the geologic features and structures that provide evidence of plate tectonics<br>• Predict the likelihood of an earthquake in a study area for different magnitudes | • Create a Hazus earthquake analysis using standard cartographic principles and essential map elements<br>• Use global positioning systems equipment to map waypoints of geologic features (anticlines, synclines, tilting and sag ponds) |

| | |
|---|---|
| • Evaluate risks posed by earthquakes in California by using United States Geologic Survey shakemaps | indicating tectonic activity<br>• Analyze and list effective options for loss mitigation for earthquake hazards<br><br>(313 Basic Hazus-MH and 174 Hazus-MH for Earthquake FEMA workbooks) |

**Unit 3 – Is There a Map for That? Streams, Floods, and Mass Wasting**

Essential Questions: What are the characteristics of streams and their floods? What are the consequences of floods and what can we do to mitigate those effects?

This unit allows students to define basic river processes, including flooding and the differences between flash floods and downstream floods. They then recognize factors that result in regions being at risk from flooding and summarize the effects of flooding including connections to other hazards and the benefits of flooding. Students outline adjustments that humans can make to reduce flood damage and loss of life. Students describe slopes and the forces acing on them in order to understand what makes a slope unstable. They describe geographic regions at risk from landslides and the links to other hazards. Students assess the impacts human activity have on the probability of a landslide and recommend methods for reducing the probability.

| “a-g” Academic Topics | CTE Topics |
|---|---|
| Students label features of topographic maps and relate them to real life features to make connections between the 2 dimensional representation of 3 dimensional objects. | • Create layout using industry standards |
| Students explain the hydrologic cycle in terms of the interrelationship of the hydrosphere, geosphere, biosphere and atmosphere. Students map the drainage basin in the area around the school and prepare to educate their peers about water pollution on their school campuses and how to take actions to protect the watershed in order to be ready to enter the Generation Earth “From the Streets to the Sea” competition in April. | • Document the effect human activity has on the environment<br>• Investigate connections between local watersheds and the ocean<br>• Diagram ways in which the health of the marine environment affects climate |
| Students view world topographic maps in order to recognize and classify drainage patterns, factors affecting stream erosion and deposition, flood plains, deltas, and stream valley development patterns. Students read “Flooding” (Chapter 6, Keller) and incorporate the information provided about basic river processes, the differences | • List human activities that affect the atmospheric environment |

| | |
|---|---|
| between flash floods and downstream floods, possible benefits of floods, and consequences of human activities on flood magnitudes and frequencies into their analyses of local and world wide flooding data compiled by the group. | |
| Students survey media reports concerning recent and historic floods to collect data on locations, causes, effects and timing of flood events and present their findings to their peers. They compile combined findings in order to outline possible ways to control floods or mitigate damage from flooding. Students complete the Hazard City Assignment in Applied Geology: Flood Insurance Rate Maps to analyze the predicted flood damages to three residential properties in order to recommend to the homeowners how much flood insurance to purchase. | • Students access online hazard maps and related resources. |
| Students review media reports related to the La Conchita landslide of 2005 and read "Mass Wasting" (Chapter 7, Keller) to recognize processes that result in different types of landslides and geographic regions at risk from landslides. Students investigate the effects of forces on slopes and the influence on probability of mass wasting. Students evaluate the effects of landslides and how human activities affect landslides. Students identify features that indicate high potential for landslide in order to propose approaches for minimizing landslide hazards. | • Use GIS to identify areas prone to geological hazards<br>• Describe processes causing soil erosion |
| Students combine their "Streets to the Sea" water pollution data with their knowledge of flood and mass wasting events to report on the probability of a flood event or a landslide occurring on the school campus and in the surrounding neighborhood, the possible consequences and possible responses to avoid death and damage. | |

## Unit 4 - Hazus Flood

*Outcomes*

Students will define topography, generate a stream network, define a flood scenario, run hydrology and delineate a floodplain. Students will perform a risk assessment, generate loss estimations and loss mitigation strategies for a flood event.

| "a-g" Academic Topics | CTE Topics |
|---|---|
| • Compare and contrast riverine verses coastal flood events in California<br>• Use digital elevation models from the USGS to identify areas in California susceptible to flooding | • Create a Hazus flood analysis using standard cartographic principles and essential map elements<br>• Assess the risk for a 100-year and 500-year flood event and estimate associated |

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|---|---|
| • Use a depth-damage curve to predict percent loss by flood depth and evaluate mitigation strategies | losses<br>• Create a topographical map by Integrating a DEM to determine the direction of water flow through a study area<br>• Analyze and list effective options for loss mitigation for flood hazards<br><br>(313 Basic Hazus-MH and172 Hazus-MH for Flood FEMA workbooks) |

**Unit 5 "In Hertford, Hereford and Hampshire, Hurricanes Hardly Ever Happen"**
Essential Questions: What are hurricanes, where do they happen and why? What is the difference between a hurricane and a tornado? What is the difference between weather and climate? What are the effects of other severe weather conditions and how can we minimize these effects?

Through this unit students examine the energy balancing act that produces weather and climate on Earth, and compare and contrast weather and climate in order to be able to distinguish between the two terms. Students outline different types of severe weather events and assess the main effects, including links to other natural hazards, in order to propose approaches to minimizing adverse effects. Students recognize the weather conditions that create, maintain, and dissipate hurricanes, geographic regions at risk and summarize the effects of hurricanes including links to other hazards and benefits. Students communicate actions that minimize damage and injury from hurricanes, and prudent actions during hurricane watches and hurricane warnings.

| "a-g" Academic Topics | CTE Topics |
|---|---|
| Students recall meteorological terms associated with Hurricane Katrina and research the damage estimates and current status of rebuilding in New Orleans. They then compare and contrast the meteorological terms associated with reports about the April 2011 tornados in Alabama and the damage estimates for those disasters. | • Students will use Hazus-MH to analyze atmospheric pressure and weather systems |
| Students distinguish between tornadoes and hurricanes by understanding the development and occurrence of tornadoes (including air masses that result in severe thunderstorms) compared to the formation and decay of hurricanes. Students consider lightning casualties in the US and safety guidelines for lightning and surviving violent tornadoes. "Atmosphere and Severe Weather" (Chapter 9, Keller). | • Describe systems used to monitor, analyze and predict conditions of meteorological events |
| Mapping hurricanes to identify world regions where they occur, principal months and common tracks and recognize the band of no hurricanes within 5 degrees°*d* of the equator and postulate why that | • Use GIS technology to document, analyze |

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| happens. | and model storm systems |
| Students survey media reports concerning recent and historic hurricanes and complete additional research to ascertain the history of the method of naming for tropical storms and hurricanes, how the Saffir-Simpson Scale is used, what storm surge is, levels of wind damage from a hurricane, how hurricanes are related to heavy rains and inland flooding, and the difference between hurricane watches and warnings. “Hurricanes and Extratropical Cyclones” (Chapter 10, Keller) | • Use appropriate tools and procedures to analyze historic hurricane scenarios |

**Unit 6 - Hazus Hurricane Winds**

*Outcomes*

Students create and analyze reports of direct physical, economic and social losses due to the impact of hurricane winds in an area prone to hurricanes. Both historical and probabilistic scenarios will be explored.

| “a-g” Academic Topics | CTE Topics |
|---|---|
| ● Model effect of Hurricane winds transferring energy from the atmosphere into inhabited areas<br>● Correlate hurricane risk and proximity to warm water ocean currents | ● Create a Hazus hurricane analysis using standard cartographic principles and essential map elements<br>● Analyze and list effective options for loss mitigation for hurricane wind hazards<br><br>(313 Basic Hazus-MH FEMA workbook) |

**Unit 7 - What a Disaster! Final Project**

Essential Questions: What other natural (or man-made) disasters should we consider when creating local, city, and state emergency preparedness plans? What can communities learn from disasters that happened in the past? How can we communicate important information to our classmates, school mates, family members, community members?

Students recall what they have read and written about during the course so far and analyze the features of a natural disaster compared to a man-made disaster and what constitutes a catastrophe. Students demonstrate that they recognize and can represent patterns in the data they have collected concerning current and historic disaster events and consequences. Students research a particular historic disaster and work in a group to produce a multimedia presentation that includes quantitative data to illustrate and explain the causes and effects of the disaster to peer group demonstrating the knowledge they have of disaster terminology, mapping techniques and use, human impacts on disasters and approaches to mitigation. Students work in groups to produce a product that includes more in depth analysis than would be possible for any one person and involves organization of time to meet deadlines and division of labor to accomplish the task. All students are involved in practicing presentation skills to peers and considering next steps for presentation to a wider community.

| "a-g" Academic Topics | CTE Topics |
|---|---|
| Students list natural disasters and distinguish them from man-made disasters. Fires (natural and arson), deaths from extremes of temperature (heat and cold), volcanoes, creep, avalanches, subsidence (natural and from mining), water pollution (from mining, oil spills, chemical spills, nuclear leaks). Students select methods for communicating information to different audiences. Re-read "Introduction to Natural Hazards" (Chapter 1, Keller). | |
| Students select a disaster to research for final group projects and presentations. Students collect information about the disaster and construct a description of that disaster for their classmates including when, where, why, what and how, the casualties and destruction, responses and long term consequences. Students assess what could have been done differently to mitigate damages or what the response might be if an historic disaster were to strike today. Students begin the research process by reading or rereading chapters from the textbook: "Tsunamis, Volcanoes. Subsidence and Soils, Atmosphere and Severe Weather, Coastal Hazards, Climate and Climate Change, Wildfires" (Chapters 4, 5, 8, 9, 11, 12, and 13, Keller). | • Students will work as a team to organize a disaster plan for a study site |
| Students present findings to classmates and consider possible amendments that would be necessary in order to make presentations suitable for the school community or wider audiences. | • Communicate risk assessment and mitigation strategy results in a PowerPoint presentation |

**Unit 8 – Risk Assessment**

*Outcomes*

As a working group, students will evaluate all potential risks for a study area of their choosing. They will create and analyze Hazus-MH reports of direct physical, economic and social losses due to the risks identified and include mitigation strategies that have been modeled in Hazus-MH and have shown effectiveness in reducing losses.

| "a-g" Academic Topics | CTE Topics |
| --- | --- |
| • Conduct literature search for all potential geologic hazards that could impact a study area<br>• Analyze geographic and geologic data to evaluate risks<br>• Create a summative report to communicate the imposed risks and offer solutions to reduce losses | • Use project management skills within a team to develop a complete risk assessment for a study area<br>• Apply appropriate problem-solving strategies and critical thinking skills to rank hazards for a study area from greatest to lowest risk and form a priority list of mitigation strategies<br><br>(296 Application of Hazus-MH for Risk Assessment and 317 Comprehensive Data Management FEMA workbooks) |

**Laboratory Activities:** *Acceptable courses include hands-on scientific activities that are directly related to and support the other classwork, and that involve inquiry, observation, analysis, and write-up. These hands-on activities should account for at least 20% of class time, and should be listed and described in detail. Please itemize and describe each laboratory activity in detail.*

1) Topographic Maps, Aerial Photographs, and Satellite Images (Laboratory Manual in Physical Geology, Laboratory Nine, pages 167 – 194)
Students use map symbols, colors, latitude and longitude, and compass bearings to locate features on topographic maps. Students recognize the scales on topographic maps and use that knowledge to identify the scales of the maps studied and developed in *Unit 1 – Is there a Map for that?* Students discuss the use of maps that are not to scale and possible cautions for such maps for use during disaster events. Students practice interpreting and constructing contour lines based on points of known elevation on Earth's surface. Students collect data concerning elevation for the school campus and add that to existing campus maps. Students construct topographic profiles and calculate their vertical exaggeration, including for the campus map.

2) Thinking Science! (www.undsci.berkeley.edu)
Students observe what happens when different materials are placed in water using blocks of various materials (including concrete, clay, metal, wood, salt, limestone) and/or objects they provide. Students present their observations to the group and appropriate methods for recording observations for future reference are discussed and agreed upon. Questions about what has been observed are brainstormed and groups assigned to investigate one of the questions further. Groups research existing knowledge using the internet and Chemistry, Physics, and Geology textbooks provided for reference. Students plan and carry out investigations to collect further first hand observations to refute or support their initial questions and possible answers. Students write up their plans, observations and reflections on

what they observe in individual science notebooks. The relationship between the density of the blocks as well as their nature can be discussed and drawn out and methods developed for measuring density of materials. Students use the density simulation at http://phet.colorado.edu/en/simulation/density to further observe the effects of volume, mass and density on isostatic equilibrium, to record data for analysis, and to consider the use of models in science for furthering understanding.

3) Observing and Measuring Earth Materials and Processes

a. Ongoing weather data collection and analysis

Pasco temperature probes to measure soil temperatures at various locations and times on campus. Thermometers for shade and non-shade temperatures at various locations and times. Additional observations of cloud cover, wind conditions. Students develop original scales for categorizing wind speeds and then research how wind is measured at the local weather stations. Procedures for recording the data collected to be developed by the students and reflected upon and revised as the volume of data to be stored and analyzed increases through the course. Students calculate the average temperatures for a month for a particular location at the school and compare results for different locations and suggest possible explanations for variations in values. Students also compare an average value at the school site to the monthly averages from the Glendale weather station and the Pierce College (San Fernando Valley) station. Additional data to be collected and analyzed (e.g. develop a rain gauge, a method for estimating percentage cloud coverage) as students ask questions and are interested to find out more. Relationship between humidity values recorded at weather stations and conditions noticed on campus discussed and analyzed.

b. Ongoing disaster data collection

On a world map posted in the classroom students record with a colored sticker (color coded for severity of disaster according to class agreed parameters) the location of disaster events as they occur and write the date on the sticker. Responsibility for recording events during a particular week assigned to different students each week. An event log to be kept in addition to the map record, in order to provide confirmation for no event days or weeks. Student reporters also post a written summary of an event on the class wiki page including hyperlinks to the news sources referred to for reporting the event. Class members required to comment on event summaries at least once every two weeks. The class generated map can be periodically compared to online versions provided by usgs.gov and IRIS (http://www.iris.edu/dms/seismon.htm) and differences noted and possible reasons discussed.

c. Data Collection Field trip to San Andreas Fault and Sag Pond in the Antelope Valley

Before the field trip students read Laboratory Manual in Physical Geology pages 1-25 about how Geologists observe earth materials and the processes of change through time, including the scales involved in the observations, and the importance of direct observation, investigation, and measurement in the field and in the laboratory, and the use of satellite remote sensing. Students discuss the text in order to answer questions from the lab manual in writing in their lab notebooks about geologic time, and the analysis of satellite images. Students plan what observations they expect to be able to make and want to record during the field trip and what equipment/technology to take on the trip and what they will be used to do.

During the field trip – Students use Trimble Juno hand-held GPS units to map geologic features such as anticlines, synclines, sag pond and tilting along the fault line. Each feature will also be documented as a GeoTiff photo. Field trip data will be mapped in GIS following the trip.

4) Rock Forming Processes and the Rock Cycle (Laboratory Four, pages 75 - 88)

Students observe a set of numbered rock samples and the photographs collected during the field trip using a magnifying lens. They record rock properties (textures, minerals, fossils) in a table in their lab notebooks and use their observations to infer the rock classification (igneous, sedimentary, metamorphic) and then describe how the rock would be formed. Additional research and reading to be carried out using the internet and Geology texts as necessary. Students then use the rock cycle to propose possible future changes for each rock sample.

Use www.joidesresolution.org to track the ongoing work of scientists aboard the ship collecting ocean crust core samples.

5) Earthquake Hazards and Human Risks (Laboratory Sixteen, pages 297 to 300 )

a. Students experiment with models to make connections between earthquake damage to buildings and the Earth materials on which they are constructed. For buildings built on uncompacted dry sediment use a cup of sand with several coins placed vertically to model walls of buildings, tap on table as the cup is rotated to simulate an earthquake. For buildings built on moist compacted sediment, repeat with coins pushed into moist sand that has been pressed down. Discuss the results in the lab notebook and explain what might happen to the compacted moist sediment if it became totally saturated with water and an earthquake happened. Design a follow up model to test your explanation and record results. Discuss in the write up how the experiment is conducted to try to make it "a fair test" for each different model. Write a summary statement for how water in sediment beneath a home affects the response of the building to an earthquake and justify your statements using the observations you made using the models in the experiment.
b. Students gain a greater appreciation of how a seismograph works, and a better understanding of recordings of ground motion that they see on seismograms by building their own seismograph using common materials in groups of 3-4 students. Students then demonstrate to each other how their seismograph records motion.
http://www.iris.edu/hq/files/programs/education_and_outreach/aotm/8/1.SeismographModel-Lahr.pdf

Students use recent three component seismic data to locate an earthquake. They identify P and S waves on seismograms, find the distance of an epicenter from a seismic station using travel time curves, locate the epicenter of an earthquake by triangulation, and calculate the time of origin of an earthquake based on seismic data. http://www.iris.edu/hq/resource/locating_earthquake

**Key Assignments**: *Detailed descriptions of all Key Assignments which should incorporate activities and projects, as well as, short answers and essay questions. How do assignments incorporate topics? Include all assignments that students will be required to complete. Assignments should be linked to components mentioned in the course outline. It is not appropriate or necessary to include instructions given to students regarding the execution of assignments (formatting, timeliness, etc.). Do not include exams or assessments in this section.*

**Recurring Assignments**

Odd numbered Units:

Disasters in the News Blog – students post updates on the class wiki regarding disaster events in the news, in class and on days that class does not meet.

Mapping and data collection – record major events on a large map in the classroom with color-coded dated stickers. (See 3.b laboratory activity described above). Post summary of event on class wiki including hyperlinks to the news sources referred to for reporting the event. Class members required to comment on event summaries at least once every two weeks.

Online portfolio – developing personal and team online portfolios for research into disaster situations and events and possible mitigation, comparing proposed responses and actual responses. Applying Earth System Science approach to analysis of situations and events and developing Mind Maps after each analysis.

Even Numbered Units:

The FEMA Hazus-MH workbooks will be used throughout to guide students through software exercises and review each unit using short answer and essay questions to interpret results of hazard analyses run.

**Key Assignments**

(Unit 1) Is There a Map for That? – Introduction to GIS and the Geology of Earthquakes

a) Classroom Evacuation Plan

b) Geologic Hazard Map of California – Earthquake

c) Natural Resources Map of California and analysis in comparison to Geologic Hazard Map

d) Hazard City: Assignments in Applied Geology: Earthquake Damage Assessment

e) Design an Earthquake Kit

(Unit 2) Hazus Earthquake Review

a) Students download a shakemap from the United States Geologic Survey, prepare and incorporate the file into an earthquake analysis of the area chosen.

Students use the Advanced Engineering Building Module to analyze the effect of the following variables on site specific inventory:

i) soil type
ii) liquefaction effects
iii) attenuation function and

iv) magnitude

(Unit 3) Is There a Map for That? Streams, Floods, and Mass Wasting

a) Drainage Basin Map for school area and supporting explanatory pamphlet/information sheet.

b) Hazard City Assignments in Applied Geology: Flood Insurance Rate Maps, recommendation report to homeowners concerning amounts of flood insurance to purchase.

c) Hazard City Assignments in Applied Geology: Landslide Hazard Assessment

d) Written scientific report on probability of a flood and/ landslide event on the school campus and surrounding neighborhood, possible consequences and recommended responses.

(Unit 4) Hazus Flood Review

a) Students download a digital elevation model through Hazus to analyze flood risk in a study area.

b) Students use the Flood Information Tool to process and convert locally available flood information to data that can be used by the HAZUS Flood Module.

(Unit 5) "In Hertford, Hereford and Hampshire, Hurricanes Hardly Ever Happen."

a) Severe Weather Poster to educate the school population regarding forms of severe weather, and present possible safety precautions.

b) World Map to identify hurricane regions and time of year for major activity with proposed explanation for no hurricane zone close to equator.

c) HazardCity Assignments in Applied Geology: Hurricane/Tsunami Hazard Assessment.

(Unit 6) Hazus Hurricane Winds Review.

a) Students list abiotic factors and analyze historical hurricane patterns to identify areas within the United States prone to hurricane hazards.

b) Students run a probabilistic hurricane analysis and identify loss mitigation factors.

(Unit 7) What a Disaster!

Research project and oral presentation to peers.

Part 1. Students in assigned teams of up to four students develop a team proposal for their final research project. The proposal outlines the disaster selected with reasons for the choice, the proposed allocation of work for each student in the team and a timeline detailing the steps that will need to be taken in order to complete the project on time. Students create their own checklist for making sure the steps towards completion are met for each team member and procedures to implement to keep team members on task.

Part 2. Students research a historic or recent disaster event and construct a description of that disaster for their class mates including when, where, why, what and how, the casualties and destruction, responses and long term consequences. Students assess what could have been done differently to mitigate damages or what the response might be if an historic disaster were to strike today. Students use the team wiki space to record all their individual research findings including references and to compile a final edited team wiki product.

Part 3. Students prepare a short 10 minute summary presentation of their findings and analysis that is suitable for presentation to other students in the class.

Part 4. Individual students submit a mind map for the disaster their team researched and a written reflection on the team activities, their personal learning during the final project, and the possible adjustments to the group presentation that could make it suitable for school wide or community "Disaster Education" events.

(Unit 8) Risk Assessment Review — Students work in teams to develop a comprehensive risk assessment for a study area as a capstone project for the class. The risk assessment presented both in a multimedia format and

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| technical written document. |
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**Instructional Methods and/or Strategies:** *Indicate how the Instructional Methods and/or Strategies support the delivery of the curriculum. What portions of the Course Outline are supported by the methods and strategies?*

- Direct instruction through lecture in both academic and software class sections (Units 1-8)
- Guided practice using FEMA Hazus workbook exercises (Even numbered units)
- Collaborative group work to develop capstone project (Units 7- 8)
- Laboratory exercises correlated with science standards (Odd numbered units)
- Collaborative team teaching – the academic (geology) teacher and the CTE (Hazus) instructor alternate instructional time to connect academic concepts with practical applications (Units 1-8)
- Research – library and internet (Units 1,3,5,7,8)
- Self and peer critiques to improve writing literacy (Units 1,3,5,7,8)
- Interactive instruction (involves changing parameters in the Hazus program to evaluate mitigation strategies for different natural disasters) (Even numbered units)
- Daily assignments for both class sections (Units 1-8)
- Cornell notetaking strategies for lecture portion (Units 1-8)
- Field experience using handheld GPS (Units 1,3)
- Online assignments correlated to science standards (Odd numbered units)

**Assessments Including Methods and/or Tools:** *Indicate the intent of each assessment and a brief description of how each relates to the Course Purpose and goals related to the development of critical thinking and other habits of mind skills.*

- Formative assessments — checks for understanding, acquisition of information
- Assigned unit exercises using Hazus-MH — allows students practice and familiarity with Hazus-MH software

- Section quizzes — confirms assimilation of subject material
- Written composition and reports — demonstrates application of subject material and literacy in the content area
- Laboratory exercises — practical application of subject area
- Unit tests — assesses comprehension of material
- Interim assessments — assesses mastery of subject
- Presentations — learning is further developed by teaching others
- Midterm — assesses comprehension and retention of material
- Comprehensive final — assesses comprehension and retention of material
- Capstone project – documents students' ability to adapt course material to real-world predictable and unpredictable situations

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**NOTE:** If "Yes" is selected for "Seeking 'Honors' Distinction" on the "Course Description" page of the "New Course" submission process, please complete the remaining 2 text boxes below.

**Corresponding Non-Honors Course:** *Indicate the name of the regular non-honors course corresponding to this proposed honors course.*

**Differences in Honors/Non-Honors Courses:** *Describe in detail how this honors course differs from the regular course offered in the same subject area. Be specific. UC assumes Honors submissions will have increased level of reading and writing. Please be specific and descriptive regarding precisely how these increase the rigor of the course beyond merely increased amounts of work.*