



Title: Geology of Disasters: Hazus-MH Training Course

CBEDS Code: 5575

State Course I.D.:

ROP Number

Approval Date:

Anchor Job Title: **Emergency Management Specialist**
Surveying & mapping Technician
Environmental Technician
Geological & Petroleum Technician
Social Science Research Assistant
Cartographers & Photogrammetrists

Course Hours: 180

Course Description:

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 GIS. 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. The Geology of Disasters gives students the opportunity to develop skills and understanding of course concepts through project-based learning.

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.

Module	Module Title	Classroom	OJT (CC) Hours	OJT (CVE) Hours
I	Career Essentials	12	0	0
II	Introduction to Geographic Information Systems	21	0	0
III	Introduction to Hazus-MH	6	0	0
IV	Introduction to Earthquake Analysis	9	0	0
V	Introduction to Flood Analysis	9	0	0
VI	Introduction to Hurricane Analysis	9	0	0
VII	Group Exercise	24	0	0
VIII	California, West Coast, Pacific Rim	30	0	0
IX	Weather	30	0	0
X	Oceans and Climate Change	30	0	0
Total Hours: 180		180	0	0

Los Angeles County Regional Occupational Program

Geology of Disasters: Hazus-MH Training Course

Course Title	Geology of Disasters: Hazus-MH Training Course	<p>Course Description: The Geology of Disasters; a Hazus-MH Training Course, is a 180 hour course that trains students for post-secondary education and/or an entry-level position in a variety of related occupations, such as Emergency Management Specialist, Surveying and mapping Technician, Environmental Technician, Geological & Petroleum Technician, Social Science Research Assistant, Cartographers and Photogrammetrists.</p> <p>The Introduction to GIS Module (minimum 21 hours): Students will use ArcGIS software for map design and analysis. Students will become proficient using the tools and geoprocesses required for Hazus-MH.</p> <p>The Introduction to Hazus-MH Module (minimum 6 hours): Students are initiated into Hazus-MH operations through an overview of hardware requirements, installation, capabilities of the software, levels of analysis, benefits of analysis, role in emergency management, support and how to get started.</p> <p>The Introduction to Earthquake Module (minimum 9 hours): Students will learn the geological principles behind earthquakes. Students will use Hazus-MH to define and analyze historical, arbitrary and probabilistic earthquake scenarios for risk assessment, loss estimations and loss mitigation strategies.</p> <p>The Introduction to Floods Module (minimum 9 hours): Students will learn flood analysis methodologies and processes. Students will use Hazus-MH to define and analyze 500 year return period flood scenarios for risk assessment, loss estimations and loss mitigation strategies.</p> <p>The Introduction to Hurricanes Module (minimum 9 hours): Students will learn hurricane analysis methodologies and processes. Students will use Hazus-MH to define and analyze historical and probabilistic hurricane scenarios for risk assessment, loss estimations and loss mitigation strategies.</p> <p>Academic modules meet California State Science Curriculum Standards for Earth Science.</p> <p>This course is a rigorous hands-on, intensive, extensive reading and writing, research, and laboratory program. Students may have an opportunity to compete as a team to solve an environmental or community based problem.</p>
CBEDS Code	5575	
State Course I.D.		
Approval Date		
Revision Date		
Anchor Job Title & SOC Code	Emergency Management Specialist 11-9161 Surveying & mapping Technician 17-3031 Environmental Technician 19-4091 Geological & Petroleum Technician 19-4041 Social Science Research Assistant 19-4061 Cartographers & Photogrammetrists 17-1021	
CTE Industry Sector	Engineering and Design	
Career Pathway	Environmental and Natural Science Engineering	
UC Credit		
Certification		
Course Hours	180	

Classroom Physical Environment:

The classroom setting requires a fully equipped computer lab with up to date ArcGIS software, Hazus-MH software, GPS equipment, and poster supplies in sufficient quantity to train the number of students assigned to each instructor. Space conducive for a group theory lesson including flat student chairs with desks or worktables, whiteboard, file cabinet, teacher's chair and desk, computer tables to accommodate a class set of computers, plotter printer and Internet access will be provided. This facility must be equipped with adequate lighting and many electrical outlets (at least one outlet per every two students plus four additional).

Training OJT Environment:

Title 5 Education Code No. 10085

The following criteria shall be used to select and approve a community classroom training station:

- (a) The management of the community classroom training station shall:
 - (1) Have a clear understanding of the community classroom methodology and a willingness to participate in the training experience.
 - (2) Cooperate with the career technical education director, or his/her designee, in preparing a written joint venture agreement.
 - (3) Participate with the community classroom teacher in preparing an individualized training plan.
 - (4) Provide and assist students with unpaid on-the-job training experiences as described in the individualized training plan.
 - (5) Consult with the community classroom teacher regarding the student's progress during the unpaid on-the-job training experiences.
 - (6) Assist in maintaining accurate records of the pupil's training hours.
- (b) The training station shall offer training opportunities in the specific occupation for which the course is approved. Training opportunities at the station shall expand competencies developed in the classroom instruction portion of the student's training.
- (c) The training station shall have adequate equipment, materials, and other resources to provide an appropriate learning opportunity.
- (d) Training station conditions shall prevail which will not endanger the health, safety, welfare, or morals of the pupil.
- (e) The training station shall be concurrently engaged in a business operation, which requires employment in the occupation for which training is provided.

Ed. Code Title 5 10107

- (a) The employer at the cooperative career technical [CVE] training station shall:
 - (1) Have a clear understanding of program objectives and a willingness to participate in the program.
 - (2) Provide adequate supervision to ensure a planned program of the students' paid on-the-job training in order that the student may receive maximum education benefit.
 - (3) Consult with the cooperative career technical education teacher regarding the paid on-the-job progress of the student.
 - (4) Cooperate with the career technical education director or his or her designee in preparing a written training agreement.

- (5) Participate with the cooperative career technical education teacher and the student in preparing an individualized training plan.
 - (6) Provide a minimum of 8 hours of paid employment per week to assist students to acquire those competencies necessary for employment and advancement in the occupational area for which training offered.
 - (7) Assist in maintaining accurate records of the students' training hours.
 - (8) Provide Workers' Compensation Insurance for students employed through the Cooperative Career Technical Education Program.
- (b) The training station shall offer training opportunities in the specific occupation for which the course is approved. Training opportunities at the paid station shall be in the occupation for which related instruction is provided.
 - (c) Training station working conditions shall not endanger the health, safety, welfare or morals of the students.
 - (d) The training station shall have adequate equipment, materials and other resources to provide an appropriate learning opportunity.

Safety:

- All students will successfully complete a safety exam with results kept on file.
- Specialized safety needs.

Equipment and Materials:

Software:

- ArcGIS (ArcGIS desktop or ArcInfo)
- Hazus-MH
- Additional GIS programs (optional)
 - Envi
 - ArcGIS Explorer
- GPS software
 - Pathfinder Office
 - Terrasync
 - ArcPad
- Microsoft Office suite
 - Word
 - Excel
 - PowerPoint
 - Publisher
 - Access
- Microsoft Active Sync
- Microsoft Project
- Google Earth
- Google Sketchup

GPS:

- Class set of Trimble handheld GPS (Juno or Geo series)

Printers:

- Plotter printer
- Color laser printer
- Black and white printer

Miscellaneous Supplies:

- Foam board
- Adhesive
- Poster paper
- Standard printer paper
- Printer ink

Text

Student FEMA Workbook for ArcGIS for Emergency Managers

Student FEMA Workbook for Basic Hazus-MH

Student FEMA Workbook for Application of Hazus-MH for Risk Assessment

Mentors

CSUN

FEMA

So Cal Hazus-MH Users Group

NOAA

Esri (Geomentors program)

USC (QuikScience program)

Community

Corporate

Magazines & Scientific Journals

Hazus-MH Hot Zone Newsletter

Science News

Science News for Kids

Reference Books

Student FEMA Workbook Comprehensive Data Management for Hazus-MH

Student FEMA Workbook for Hazus-MH for Earthquake

Student FEMA Workbook for Hazus-MH Flood

Student FEMA Workbook for Hazus-MH Hurricane

Using Hazus-MH for Risk Assessment

Developing the Mitigation Plan

Designing Better Maps; A guide for GIS Users

Differential GPS Explained

Electronic Resources

Internet

Methods, Strategies and Techniques:

- Lecture and Discussion
- Laboratory Activities which Emphasize Open-ended Hands-on Exploration and Investigation
- Team and Subspecialty Teamwork
- Exposure to Current Trends and Information in GIS through Reading Assignments in Current Periodicals and Journals
- Written Assignments Correlating with Concepts Presented in Lecture
- Independent and Group Research Projects
- Independent and Group GIS Projects
- Internet Research
- Enrichment Videos and Slide Presentations
- Collaboration with Mentors
- Possible Field Trips to Channel Islands, Local Foothills, San Andreas fault, GIS Day Events
- Training with field data collection equipment such as:
 1. Remotely operated vehicle
 2. Hand held GPS
 3. Data Logger with sensors and probes

Assessment of Student Performance:

- Extensive Reading Assignments, Substantial Written Assignments, Internet Research
- Individual and Group Research Projects
- Problem-solving Activities
- Written Tests and Quizzes
- Accomplishment of Specific Goals in Subspecialty Teams
- Properly Formatted Maps
- Poster Presentations
- Paper Presentation

Operational Methodologies:

- **Classroom (C)** : Instruction provided by a qualified teacher, utilizing a lesson plan, to a group of students in a classroom.
- **Community Classroom (CC)**: An instructional method which utilizes unpaid, on-the-job training experiences at business, industry, and public agency sites.
- **Cooperative Vocational Education (CVE)**: An instructional method which correlates concurrent, formal vocational classroom instruction with regularly scheduled, paid on-the-job training experience.
- **Related Instruction (RI)**: Classroom instruction and unpaid/paid on-the-job training experiences are being conducted together within the same time frame (quarter, semester, etc.).
- **On-the-Job Training (OJT)**: Refers to "hands-on" job skill training in either the community classroom (unpaid) or in correlation with cooperative vocational education (paid).

LACOROP Certificate Requirements:

- Student Prerequisites: Minimum age of 16 or 11th grade status.
- An interest in applying GIS to disaster related issues.

Special Instructor(s) Prerequisites:

- Three years of training and experience in the field of GIS.
- FEMA certified Hazus-MH Professional or Hazus-MH Practitioner
- Valid California Driver's LicPS
- Willingness to establish community work sites and demonstrates ability to access resource.

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
I. CAREER ESSENTIALS		12				
A. Introduction to ROP	<ul style="list-style-type: none"> Relate philosophy, purpose, and goals of LACOROP to individual needs. Describe how course goals and objectives relate to individual need/goals. 					
B. Job Search	<ul style="list-style-type: none"> Be able to search for employment, write a resume and cover letter, complete a job application, and participate in a successful interview. (FS W2.5; FS 3.6) 					
C. Job Survival	<ul style="list-style-type: none"> Describe what is necessary to maintain employment. (FS 3.1) 					
D. All Aspects of the Industry	<ul style="list-style-type: none"> Describe and design a delivery system, the major components of a system and how external factors can affect a system. 					
E. Work Ethics	<ul style="list-style-type: none"> Define ethics and morals, and explain how these fit in the workplace. (FS 8.2) 					
F. Safety	<ul style="list-style-type: none"> Define basic safety rules in the classroom and workplace and be able to follow these rules in the workplace. (FS 6.1-6.4) 					
G. Harassment	<ul style="list-style-type: none"> Identify verbal, non-verbal, and physical types of harassment as defined by the state/federal law and determine appropriate behavior in the workplace. (FS 8.1-8.3) 					
H. Diversity						
I. Entrepreneurship	<ul style="list-style-type: none"> Describe why it is important to address diversity in work place and consequences if it is not. (FS 9.5) 					
J. Customer Services	<ul style="list-style-type: none"> Explain the concept and value of entrepreneurship in our society and identify characteristics of successful entrepreneurs. Identify the components of good customer service and explain their worth in society 					
K. Exit Activities	<ul style="list-style-type: none"> Successful completion of all course work, course evaluation opportunity for feedback. 					

Standards

- Foundation Standards (FS) California Career Technical Education Model Curriculum Standards, Grades 7-12, Engineering and Design Industry Sector (R-Reading, W-Written, W/O Written and Oral English Language Conventions, L/S Listening and Speaking)

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
II. Introduction to GIS A. Fundamentals of GIS <ul style="list-style-type: none"> • Layered "Smart Map" • ArcMap • ArcCatalog. • Levels of GIS <ul style="list-style-type: none"> ○ Free online Interactive maps ○ Free downloadable programs and applications ○ Professional GIS analysis programs 	<ul style="list-style-type: none"> • Use menu and toolbar functions to design basemaps (<i>FS 1.a; 2.4; 5.1; 8.1</i>) • Query map data(<i>FS 1.a; 4.2-3; 10.1-5; 8.1</i>) • Create thematic maps (<i>FS 1.a, d, 1.1; 2.6; PS 1.2; 2.4; 5.1; 8.1</i>) • Follow basic cartographic principles to design map layouts (<i>FS 1.a; 2.6; PS 1.2; 2.4; 5.1</i>) • Export and print maps • Explore and manage data using ArcCatalog (<i>FS 1.a</i>) • Edit metadata (<i>FS 1.a</i>) • Edit attribute table (<i>FS 1.a; 5.2; 8.1</i>) • Join attribute tables (<i>FS 1.a; 5.2; 8.1</i>) • Relate attribute tables (<i>FS 1.a; 5.2; 8.1</i>) • Create graphs (<i>FS 1.a; 8.1</i>) • Define a coordinate system (<i>FS 1.a; 5.2; 8.1</i>) • Reproject data (<i>FS 1.a; 5.2; 8.1</i>) • Create a geodatabase (<i>FS 1.a; 5.2; 8.1</i>) • Create a feature class (<i>FS 1.a; 5.2</i>) • Locate street data on the internet (<i>FS 1.a</i>) • Create an address locator (<i>FS 1.a</i>) • Geocode an address (<i>FS 1.a</i>) 	21				

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
III. Introduction to Hazus-MH A. <u>Installation and Study Region Creation</u> <ul style="list-style-type: none"> FEMA download ArcGIS specific 32-bit Windows XP or 7 platform. Base map data package for analysis. B. Inventory <ul style="list-style-type: none"> Aggregate inventory Site-Specific inventory Hazard Specific inventory. demographic data General building stock Occupancy categories Building types Agriculture Vehicles Facilities Transportation Utilities 	<ul style="list-style-type: none"> Create a study region <i>(FS 1.a; 4.2; 10.1; PS 2.5; 5.1-2)</i> Use Hazus-MH to identify inventory in a study region <i>(FS 1.a; 4.2; 10.1-2; PS 5.2)</i> Use Hazus-MH to Find the replacement value aggregate and site specific inventory in a study region <i>(FS 1.a; 4.2-3; 5.1-3; 10.1-2, 5; PS 1.3; 5.2-5; 8.1)</i> Find the total square footage of buildings by occupancy categories <i>(FS 1.a; 4.2; PS 1.2-3; 5.1-3, 5.5, 8.1)</i> 	6				

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
<p>IV. Introduction to Earthquakes</p> <p>A. Earthquake Hazard</p> <ul style="list-style-type: none"> Geologic processes Past, present and future Models losses from inventory data of a study region. <p>B. Earthquake Analysis</p> <ul style="list-style-type: none"> Model damage to structures and non-structural components. Direct physical damage Induced physical damage Social losses Debris Economic impacts. <p>C. Earthquake Results</p> <ul style="list-style-type: none"> Direct physical damage Direct and indirect economic losses Casualties Need for temporary shelters. 	<ul style="list-style-type: none"> Identify the cause and location of earthquakes (FS 1.a; 4.2; 10.1-5; PS 2.3-5; 5.5; 8.1; CS 1g-l; 3a, b, d; 9b, d) Define a historical earthquake scenario (FS 1.a; 4.2; 10.1-5; PS 2.3-5; 5.5; 8.1; CS 1g-l; 3a, b, d; 9b, d) Define an arbitrary earthquake scenario (FS 1.a; 4.2; 10.1-5; PS 2.3-5; 5.5; 8.1; CS 1g-l; 3a, b, d; 9b, d) Define a probabilistic earthquake scenario (FS 1.a; 4.2; 10.1-5; PS 2.3-5; 5.5; 8.1; CS 1g-l; 3a, b, d; 9b, d) Modify hazard parameters to evaluate the impact soil type has on earthquake damage (FS 1.a,d; 4.1-3; 5.1-3; 10.1-5; PS 1.2; 2.3-5; 5.1-3, 5.5; 8.1) Modify hazard parameters to evaluate the impact magnitude has on earthquake damage Modify hazard parameters to evaluate the impact attenuation function has on earthquake damage (FS 1.a,d; 4.1-3; 5.1-3; 10.1-5; PS 1.2; 2.3-5; 5.1-3, 5.5; 8.1) Modify hazard parameters to evaluate the impact liquefaction has on earthquake damage (FS 1.a,d; 4.1-3; 5.1-3; 10.1-5; PS 1.2; 2.3-5; 5.1-3, 5.5; 8.1) Determine the number of people vulnerable to fire from an earthquake in a study region (FS 1.a, d, 1.1; 4.2-3; 5.1-3; 10.1-5; PS 2.3-5, 5.5, 8.1) Estimate the loss in dollars to a utility (FS 1.a, d, 1.1; 4.2-3; 5.1-3; 10.1-5; PS 2.3-5, 5.5, 8.1) Estimate power outages due to earthquake in a study region (FS 1.a, d, 1.1; 4.2-3; 5.1-3; 10.1-5; PS 2.3-5, 5.5, 8.1) Determine the total economic impact from an earthquake in a study region (FS 1.a, d, 1.1; 4.2-3; 5.1-3; 10.1-5; PS 2.3-5, 5.5, 8.1) Determine the economic loss to residential structures from an earthquake (FS 1.a, d, 1.1; 4.2-3; 5.1-3; 10.1-5; PS 2.3-5, 5.5, 8.1) Estimate the amount of debris generated from an earthquake (FS 1.a, d, 1.1; 4.2-3; 5.1-3; 10.1-5; PS 2.3-5, 5.5, 8.1) Estimate the number of hospital beds needed in 	9				

	a study region after an earthquake (FS 1.a, d, 1.1; 4.2-3; 5.1-3; 10.1-5; PS 2.3-5, 5.5, 8.1)					
INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
V. Introduction to Flood Analysis A. Flood Hazard <ul style="list-style-type: none"> Riverine Flood depth Topography Generate a stream network. Analyze flood risk Hydrologic analysis Coastal flood hazards B. Flood Analysis <ul style="list-style-type: none"> Damage estimates Loss estimation User defined facilities Agriculture and vehicle losses Debris, shelter requirements and economic losses 	<ul style="list-style-type: none"> Import a study region (FS 1.a; 4.2; PS 8.1) Define the flood hazard type (FS 1.a; 2.3-5; 4.2; PS 8.1) Select a DEM and generate a floodplain (FS 1.a; 2.3-5; 4.2; PS 8.1) Define a flood scenario (FS 1.a; 2.3-5; 4.2; PS 8.1) Run a hydrologic analysis (hydrology) (FS 1.a; 2.3-5; 4.2; PS 8.1) Draw a levee and evaluate flood risk with and without mitigation (FS 1.a; 2.3-5; 4.2; PS 8.1) Set up coastal hazard (FS 1.a; 2.3-5; 4.2; PS 8.1) Define and segment coastline (FS 1.a; 2.3-5; 4.2; PS 8.1) Delineate a 500-year floodplain (FS 1.a; 2.3-5; 4.2; PS 8.1) <ul style="list-style-type: none"> Run a 500 year return period flood scenario (FS 1.a; 4.2; 5.1-3; PS 1.2; 2.3-5; 5.1-3, 5.5; 8.1) Explore flood occupancy mapping scheme of a census block (FS 1.a; 4.2; 5.1-3; PS 1.2; 2.3-5; 5.1-3, 5.5; 8.1) Explore damage curves from a census block Run a flood analysis (FS 1.a; 4.2; 5.1-3; PS 1.2; 2.3-5; 5.1-3, 5.5; 8.1) 	9				
INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
V. Introduction to Flood Analysis (continued) C. Flood Model Results <ul style="list-style-type: none"> Viewing current scenario results Tables, reports and maps. Flood depth grids 	<ul style="list-style-type: none"> Determine the number of census blocks in a region for a 500 year return period flood analysis. (FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1) 					

<ul style="list-style-type: none"> • Flood boundaries • Map values and export tables • Export reports • Assess general building stock • Assess essential facilities • Assess lifelines • Other assessments include vehicle, agriculture and indirect economic losses, shelter requirements. 	<ul style="list-style-type: none"> • Determine the number of census blocks in a scenario for a 500 year return period flood analysis. <i>(FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1)</i> • Determine the number of damaged census blocks in a region for a 500 year return period flood analysis. <i>(FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1)</i> • Determine the maximum flood depth for a 500 year return period flood analysis. <i>(FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1)</i> • Explore highway bridge damage for a 500 year return period flood analysis. <i>(FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1)</i> • Explore essential facility damage for a 500 year return period flood analysis. <i>(FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1)</i> • Identify the census block with the most debris for a 500 year return period flood analysis. <i>(FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1)</i> • Determine the value of residential structures at risk from flooding. <i>(FS 1.a; 4.2; 10.1-2; PS 2.3-4; 5.2; 8.1)</i> 					
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INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
V. Introduction to Hurricane Analysis A. Hurricane Hazard <ul style="list-style-type: none"> Storm locations Winds, storm track, rainfall and storm surge can be modeled in Hazus-MH. Surface roughness Trees Probabilistic return period Historic User defined scenarios. B. Hurricane Analysis <ul style="list-style-type: none"> High winds Building construction affects loss Terrain and debris Public shelter needs vary 	<ul style="list-style-type: none"> Run a historical hurricane scenario (<i>FS 1.a; 4.1-3; 10.1-5; PS 2.3-5; 5.1-3, 5.5; 8.1</i>) Run a probabilistic hurricane scenario (<i>FS 1.a; 4.1-3; 10.1-5; PS 2.3-5; 5.1-3, 5.5; 8.1</i>) <ul style="list-style-type: none"> Run a hurricane analysis (<i>FS 1.a; 4.1-3; 5.1-3; 10.1-5; PS 2.3-5; 3.3, 3.5; 5.1-3, 5.5; 8.1</i>) 	9				

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
VI. Introduction to Hurricane Analysis (continued) C. Hurricane Results <ul style="list-style-type: none"> Run Loss estimation results 	<ul style="list-style-type: none"> Duplicate a study region (<i>FS 1.a</i>) Define the Hurricane Fran scenario and run the analysis (<i>FS 1.a; 4.1-3; 5.1-3; 10.1-5; PS 2.3-5; 3.3, 3.5; 5.1-3, 5.5; 8.1</i>) Explore single family residential structure damage from Hurricane Fran (<i>FS 1.a; 4.1-3; 5.1-3; 10.1-5; PS 2.3-5; 3.3, 3.5; 5.1-3, 5.5; 8.1</i>) Explore building summary reports from Hurricane Fran (<i>FS 1.a; 4.1-3; 5.1-3; 10.1-5; PS 2.3-5; 3.3, 3.5; 5.1-3, 5.5; 8.1</i>) Explore the debris results from Hurricane Fran (<i>FS 1.a; 4.1-3; 5.1-3; 10.1-5; PS 2.3-5; 3.3, 3.5; 5.1-3, 5.5; 8.1</i>) Explore the estimated shelter requirements from Hurricane Fran (<i>FS 1.a; 4.1-3; 5.1-3; 10.1-5; PS 2.3-5; 3.3, 3.5; 5.1-3, 5.5; 8.1</i>) Export reports (<i>(FS 1.a; PS 1.3)</i>) 					

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
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VII. Group Exercise A. Disaster Mitigation <ul style="list-style-type: none"> Hazard mitigation plan requirement Hazards may or may not affect all parts of a jurisdiction equally. Inventory vulnerability Mitigation strategies Plan and prepare B. Risk Assessment <ul style="list-style-type: none"> Organize resources Assess risks Develop a mitigation plan Implement plan and follow progress 	<ul style="list-style-type: none"> Create a region description for a probabilistic earthquake or flood scenario analysis(<i>FS 1.a, 1.d, 1.l; 4.1-3; 5.1-3; 9.1, 9.3-6; 10.1-6 PS 2.3-5, 8.1</i>) Describe the building exposure(<i>FS 1.a, 1.d, 1.l; 4.1-3; 5.1-3; 9.1, 9.3-6; 10.1-6 PS 2.3-5, 8.1</i>) Create a description of the hazard(<i>FS 1.a, 1.d, 1.l; 4.1-3; 5.1-3; PS 2.3-5, 8.1</i>) Report the building damage by building count (<i>FS 1.a, 1.d, 1.l; 4.1-3; 5.1-3; PS 2.3-5, 8.1</i>) Explore the geographic distribution of residential building losses(<i>FS 1.a, l; 4.1-3; 5.1-3; 9.1, 9.3-6; 10.1-6 PS 2.3-5, 8.1</i>) Identify areas susceptible to impacts(<i>FS 1.a, 1.d, 1.l; 4.1-3; 5.1-3; PS 2.3-5, 8.1</i>) Identify possible mitigation actions (<i>FS 1.a, 1.d, 1.1; 4.1-3; 5.1-3; PS 2.3-5, 5.2-3, 5.5, 8.1</i>) <ul style="list-style-type: none"> Create a multi-hazard study region for your county with at least two Hazus-MH supported hazards(<i>FS 1.a, 1.d, 1.1; 4.1-3; 5.1-3; 9.1, 9.3-6; 10.1-6; PS 1.2, 2.3-5, 5.1-3, 5.5, 8.1</i>) Assemble mitigation planning team members (<i>FS 9.1, 9.3-6</i>) 	24				

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
VII. Group Exercise (continued) B. Risk Assessment (continued) <ul style="list-style-type: none"> Risk assessment definition 	<ul style="list-style-type: none"> As a group, complete a risk assessment and mitigation strategy for a community using Hazus-MH(<i>FS 1.a, 1.d, 1.l; 4.1-3; 5.1-3; 7.1-4; 8.1-3; 9.1, 9.3-6; 10.1-6; PS 1.2, 2.3-5, 5.1-3, 5.5, 8.1</i>) Communicate risk assessment and mitigation strategy results in a PowerPoint presentation (<i>FS 1.a, 1.d; 9.1, 9.3-6</i>) 					

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
VIII. California, West Coast, Pacific Rim <ul style="list-style-type: none"> The natural resources of California The natural hazards of California Effects of plate tectonics over geologic time 	<ul style="list-style-type: none"> List resources of major economic importance in California and their relation to California's geology. <i>(PS E2.2)</i> Describe the principal natural hazards in different California regions and the geologic basis of those hazards. <i>(PS E2.3)</i> Explain the importance of water to society, the origins of California's fresh water, and the relationship between supply and need. <i>(PS E2.2)</i> Analyze published geologic hazard maps of California and know how to use the map's information to identify evidence of geologic events of the past and predict geologic changes in the future. <i>(PS E2.4)</i> Describe the principal structures that form at the three different kinds of plate boundaries. <i>(PS E2.3)</i> Explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonic processes. <i>(PS E2.1)</i> Explain why and how earthquakes occur and the scales used to measure their intensity and magnitude. <i>(PS E2.3)</i> Describe two kinds of volcanoes: one kind with violent eruptions producing steep slopes and the other kind with voluminous lava flows producing gentle slopes. <i>(PS E2.3)</i> Compare the location and properties of volcanoes that are due to hot spots to those that are due to subduction. <i>(PS E2.3)</i> 	30				

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
IX. Weather <ul style="list-style-type: none"> • Energy in the biosphere • Effects of heating of Earth's surface and atmosphere 	<ul style="list-style-type: none"> • Compare the relative amount of incoming solar energy with Earth's internal energy and the energy used by society. • Describe the fate of incoming solar radiation in terms of reflection, absorption, and photosynthesis. • Illustrate the relationship between the rotation of Earth and the circular motions of air in pressure centers. <i>(PS E3.3)</i> • Describe the origin and effects of temperature inversions. <i>(PS E3.3, 3.5)</i> • Show how weather and climate involve the transfer of energy into and out of the atmosphere. <i>(PS E3.3)</i> • Describe the thermal structure and chemical composition of the atmosphere. • Illustrate through mapping that rain forests and deserts on Earth are distributed in bands at specific latitudes. • Show how the interaction of wind patterns, ocean currents, and mountain ranges results in the global pattern of latitudinal bands of rain forests and deserts. • Map features of the ENSO (El Niño southern oscillation) cycle in terms of sea-surface and air temperature variations across the Pacific and some climatic results of this cycle. <i>(PS E3.6)</i> 	30				

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
<p>X. Oceans and Climate Change</p> <ul style="list-style-type: none"> • Definition of climate • Life effects the atmosphere • The ocean affects weather, climate and geological hazards 	<ul style="list-style-type: none"> • List the different atmospheric gases that absorb the Earth’s thermal radiation and explain the mechanism and significance of the greenhouse effect. • Explain the relationship between the rotation of the Earth and the circular motions of ocean currents. • Describe how the interaction of wind patterns, ocean currents, and mountain ranges results in the global pattern of latitudinal bands of rain forests and deserts. <i>(PS E3.5)</i> • Document how Earth’s climate has changed over time, corresponding to changes in Earth’s geography, atmospheric composition and other factors, such as solar radiation and plate movement. <i>(PS E3.7)</i> • Use computer models to predict the effects of the increase in greenhouse gases on climate for the planet as a whole and for specific regions. <i>(PS E3.6, 3.7)</i> • Describe how properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic distribution of marine organisms. <i>(PS E3.6)</i> • Explain how the composition of Earth’s atmosphere has evolved over geologic time and know the effect of outgassing, the variations of carbon dioxide concentration, and the origin of atmospheric oxygen. • Explain the location of the ozone layer in the upper atmosphere, its role in absorbing ultraviolet radiation, and the way in which this layer varies both naturally and in response to human activities. <i>(PS E3.7)</i> • Model the effects on climate of latitude, elevation, topography, and proximity to 					

	<p>large bodies of water and cold or warm ocean currents. <i>(PS E3.4, 3.5)</i></p> <ul style="list-style-type: none"> • Model how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat. <i>(PS E3.4, 3.5)</i> 				
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<p>STANDARDS</p> <ul style="list-style-type: none"> • Foundation Standards (FS) California Career Technical Education Model Curriculum Standards, Grades 7-12, Engineering and Design Industry Sector (R-Reading, W-Written, W/O-Written and Oral English Language Conventions, L/S Listening and Speaking) ◆ Pathway Standards (PS) California Career Technical Education Model Curriculum Standards, Grade 7-12, Engineering and Design Industry Sector, Environmental and Natural Science Engineering Pathway

INSTRUCTIONAL CONTENT	STUDENT OUTCOMES	C	CC		CVE	
			RI	OJT	RI	OJT
I. Career Essentials		12				
II. Introduction to Geographic Information Systems		21				
III. Introduction to Hazus-MH		6				
IV. Introduction to Earthquake Analysis		9				
V. Introduction to Flood Analysis		9				
VI. Introduction to Hurricane Analysis		9				
VII. Group Exercise		45				
VIII. California, West Coast, Pacific Rim		30				
IX. Weather		30				
X. Oceans and Climate Change		30				
	Total Classroom Hours =	180				
	Total CC Related Instruction Hours =					
	Total CC Hours =					
	Total CVE Related Instruction Hours =					
	Total CVE OJT Hours =					
	TOTAL COURSE HOURS = 180	180				

Los Angeles County Regional Occupational Program
Expected Student Learning Results

Every ROP student will be a life long learner and will apply professional and technical skills for successful employment by:

Communicating Effectively

Students understand, create, manage, and deliver effective oral, written and multimedia communication in a variety of formats and contexts. *(CTE Foundation Standard 2.0 Communication)*

- Using professional language and workplace terminology
- Demonstrating effective listening skills
- Generating clear and purposeful written documents
- Delivering a variety of oral presentations

Students understand effective leadership styles, key concepts of group dynamics, team and individual decision-making, the benefits of workforce diversity, and conflict resolution. *(CTE Foundation Standard 9.0 Leadership and Teamwork)*

- Participating as a member of a team
- Working with diversity
- Demonstrating negotiation skills

Accessing and Managing Job Related Resources

Students know how to use contemporary and emerging technological resources in diverse and changing personal, community and workplace environments. *(CTE Foundation Standard 4.0 Technology)*

- Selecting and applying appropriate supplies, resources, and technology to the task
- Identifying the similarities and differences within all aspects of the industry

Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques. *(CTE Foundation Standard 5.0 Problem Solving and Critical Thinking)*

- Organizing and managing time on a variety projects and tasks
- Using basic concepts of budgeting and financial management
- Applying critical thinking skills to make informed decisions and solve problems

Students understand professional, ethical, and legal behavior consistent with applicable laws, regulations and organizational norms. *(CTE Foundation Standard 8.0 Ethics and Legal Responsibilities)*

- Demonstrating personal integrity, ethical behavior, and social responsibility in the workplace
- Identifying employee/employer rights and responsibilities

Setting Career and Life Goals

Students understand how to make effective decisions, use career information, and manage personal career plans. *(CTE Foundation Standard 3.0 Career Planning and Management)*

- Completing a resume, job application, and simulated job interview
- Planning and researching career interests
- Assessing personal strengths and weaknesses
- Setting short and long-term goals

Accepting Personal Responsibility

Students understand health and safety policies, procedures, regulations and practices, including equipment and hazardous material handling. *(CTE Foundation Standard 6.0 Health and Safety)*

- Practicing job safety
- Passing a safety test

Students know the behaviors associated with the demonstration of responsibility and flexibility in personal, workplace, and community settings. *(CTE Foundation Standard 7.0 Responsibility and Flexibility)*

- Demonstrating punctuality and expected attendance
- Accepting personal responsibility for one's actions
- Demonstrating appropriate coping skills, self discipline, and positive attitudes
- Using workplace etiquette
- Dressing appropriately for the workplace
- Serving clients/customers

Finalized August ?, 2011

Los Angeles County Regional Occupational Program
ESLR SCORING GUIDE

	Communicating Effectively	Accessing and Managing Job Related Resources	Setting Career and Life Goals	Accepting Personal Responsibility
ADVANCED	Always articulates appropriate terminology associated with the subject matter. Consistently summarizes a message in writing or orally. Creates written documents such as letters, directions, manuals, reports, graphs and charts with no grammatical errors. Delivers a clear message that is engaging with appropriate verbal and non-verbal communication. Assumes leadership role on a team. Respects the differences and roles of others. Applies the steps in conflict resolution in a real life situation.	Uses and applies the most appropriate supplies, resources, and technology required to complete a specific task. Consistently demonstrates successful time management strategies to complete assigned tasks. Utilizes comprehensive problem solving skills. Can debate and defend the moral and ethical issues of a situation. Identifies employee/employer rights within a given scenario. Has accurately completed a detailed resume, job application, job interview, and portfolio.	Sets ambitious and realistic career and personal goals; utilizes strategies appropriate for study/work habits, time/organizational management; consistently exhibits initiative, self-discipline, and reflection in academic/personal areas; understands and accepts consequences related to actions.	Mastered entry-level skills, has a 'model' Personal Career Portfolio; exceeds standards in job safety; has excellent attendance and punctuality; maintains a professional appearance and demeanor; trains others and encourages contributions; excels in customer relations; exhibits high moral and ethical behavior; utilizes comprehensive problem solving skills.
PROFICIENT	Usually articulates appropriate terminology associated with the subject matter. Accurately summarizes a message in writing or orally. Creates written documents such as letters, directions, manuals, reports, graphs and charts with few grammatical errors. Delivers a clear message with evidence of purpose. Participates as a responsible and productive team member. Recognizes the differences and roles of others. Identifies steps in conflict resolution.	Identifies and explains the most appropriate supplies, resources, and technology required to complete a specific task. Utilizes time management strategies appropriate to completed assigned tasks. Demonstrates some problem solving skills Participates in a discussion on moral and ethical issues. Explains in own words basic employee/employer rights. Has accurately completed a resume, job application and a simulated job interview.	Sets realistic and obtainable career and personal goals; recognizes strategies appropriate for study/work habits, time/organizational management; exhibits some initiative and self-discipline in academic/personal areas; understands the consequences related to actions.	Has a complete and approved Personal Career Portfolio; competent in entry-level skills and job safety; meets industry standard for attendance, punctuality and dress; successful employability skills through simulation/actual hiring; understands moral and ethical issues; trains others and assists customers; demonstrates some problem solving skills.
DEVELOPING	Rarely articulates appropriate terminology associated with the subject matter. Inconsistently summarizes a message in writing or orally. Creates written documents such as letters, directions, manuals, reports, graphs and charts with more than 3 grammatical errors. Delivers a unclear message with little or no evidence of purpose. Demonstrates resistance to group work and participation is inconsistent. Limited awareness of the differences and roles of others. Learns the steps in conflict resolution.	Identifies some supplies, resources, and technology required to complete a specific task. Identifies time management strategies to complete assigned tasks. Can explain the steps in problem solving. Can define terms "moral" and "ethical." Introduced to basic employee/employer rights. Resume completed with errors. Less than adequately prepared or no job interview.	Able to establish some personal and career goals; lists strategies appropriate for study/work habits, time/organizational management; occasionally demonstrates initiative or self-discipline; has some difficulty in accepting consequences related to actions.	Has started Personal Career Portfolio; requires reinforcement of safety standards; attendance is below d; practicing appropriate dress standard; shows beginning awareness of moral and ethical issues; requires guidance/ support in training and assisting customers; can explain the problem solving process.