CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

ACADEMIC SENATE

GENERAL EDUCATION COMMITTEE

REPORT TO

THE ACADEMIC SENATE

GE-076-156

GSC 1410L – Principles of Geology (GE Area B3)

General Education Committee	Date: 06/29/2016
Executive Committee Received and Forwarded	Date: 08/17/2016
Academic Senate	Date: 08/31/2016 First Reading

BACKGROUND:

This is a revisioned course. Under the quarter system it is known as GSC 141L and it currently has GE status.

RESOURCES CONSULTED:
Faculty
Department Chairs
Associate Deans
Deans
Office of Academic Programs

DISCUSSION:

The GE Committee reviewed the ECO for this course and found it to satisfy the GE Student Learning Outcomes and other requirements for GE Area B3.

RECOMMENDATION:

The GE Committee recommends approval of GE-076-156, GSC 1410L – Principles of Geology for GE Area B3.

GSC - 1410L - Principles of Geology Laboratory

C. Course - New General Education* Updated

General Catalog Information

Department*	**Geological Sciences**
Semester Subject Area*	**GSC**
Semester Catalog Number*	1410L
Quarter Subject Area	**GSC**
Quarter Catalog Number	141L
Course Title*	Principles of Geology Laboratory
Units*	**(1)**
C/S Classification *	**C-16 (Laboratory)**

To view C/S Classification Long Description click: http://www.cpp.edu/~academic-programs/scheduling/Documents/Curriculum%20Guide/Appendix_C_CS_Classification.pdf

Component*	**Laboratory**
Instruction Mode*	**Face-to-Face**
Grading Basis*	**Graded Only**
Repeat Basis*	**May be taken only once**

If it may be taken multiple times, limit on number of enrollments	**1**
Cross Listed Course Subject Area and Catalog Nbr (if offered with another department)	
Dual Listed Course Subject Area and Catalog number (If offered as lower/upper division or ugrd/grad)	
Choose appropriate type (s) of course(s)*	☑ Major Course ☐ Service Course ☑ GE Course ☐ None of the above
General Education Area / Subarea*	**B3**

To view the General Education SubArea definitions, click http://www.cpp.edu/~academic-programs/scheduling/Documents/Ch.3-GeneralEducationProposals.pdf.

I. Catalog Description

Catalog Description

Laboratory synthesis of the rock cycle and geologic topics, including earthquakes, plate tectonics, and earth surface processes. Classification of minerals and rocks, reading and interpreting topographic and geologic maps, and understanding basic geological concepts.

II. Required Coursework and Background

Prerequisite(s)

None

Corequisite(s)	
Pre or Corequisite (s)	
Concurrent	

III. Expected Outcomes

List the knowledge, skills, or abilities which students should possess upon completing the course.*	Upon successful completion of this course, students will be able to:

1. Identify common rock forming minerals, and associate with important economic uses and basic chemical groups.

2. Understand processes that create common igneous, sedimentary and metamorphic rocks, and the environments they form in.

3. Obtain qualitative and quantitative information about the earth's surface from topographic maps and construct topographic profiles.

4. Apply elements of the scientific method to interpret crosscutting relationships involving rocks of different relative age, using geologic maps and aerial photographs.

5. Construct geologic cross sections through sequences of folded and faulted rock.

If this is a course for the major, describe how these outcomes relate to the mission, goals and objectives of the major program.

Outcomes of this course will build student capacity in each of the following areas as defined by program objectives and student learning outcomes for the Geology Bachelor of Science degree program.

PSLO-1. Recognize and implement various facets of the scientific method.

PSLO -2. Effectively communicate results of scientific investigations in written and oral format.

PSLO -3. Recognize common Earth materials, structures, and landforms, describe their properties, and determine their age relationships.

PSLO -4. Acquire geologic data in the laboratory or field using standard observational procedures and scientific equipment.

PSLO -5. Develop skills needed to function effectively and efficiently in the field.

PSLO -6. Use maps, cross sections, and other imagery to analyze and interpret spatial and temporal relationships displayed by Earth features or geologic data sets.

Explain how the course meets the description of the GE SubArea(s). Please select appropriate outcomes according to the GE Area/SLO mapping.

This course reinforces principles learned in GE Area B1 physical science lecture courses such as Principles of Geology or Earth, Time, and Life. Laboratory exercises include observational and interpretive components of the scientific method and writing is integrated into these learning and discovery activities. Given its emphasis on interpreting minerals, rocks, and maps to understand earth processes and their importance to society, this course provides an appropriate complement to any B1 course, and furthermore offers scientific context for general discussion of values and ethics related to use of earth resources and global environmental change.

Describe how these outcomes relate to the associated GE Learning Outcomes listed below.*

1a) Write effectively for various audiences.
Students will use written words to describe observations and interpretations about the earth based on maps and samples of rocks and minerals. Laboratory reports require a short written summary statement describing the work submitted. Quizzes and examinations contain short answer and/or essay questions that require students to describe their knowledge and explain course concepts in written words. (See also Course SLO 1, 2, 3, and 4 above)
1b) Speak effectively to various audiences
Selected laboratory reports require oral presentation of observations or results to the class by individual students or student teams. In the case of group presentations, each team member must speak. Most laboratory activities involve group work efforts such that verbal interaction between students, peers, and instructor is encouraged and reinforced. (See also Course SLO 2 and 4 above)
1d) Construct arguments based on sound evidence and reasoning to support an opinion or conclusion.
This course intentionally asks students to interpret events or processes that created rocks and landscapes. Conclusions draw upon evidence preserved in rocks, based on their spatial arrangement determined from maps. In many cases, rocks preserve an incomplete record of events, or map patterns may be ambiguous about what is going on below the surface. Therefore, the observations made by students commonly yield more than one interpretation (competing hypotheses) and the conflict is resolved through reasoning (See also Course SLO 2, 3, 4, and 5 above)
1e) Apply and communicate quantitative arguments using equations and graphical representations of data.
Several laboratory activities require extraction of numerical data (dimensions, angles, quantities) from maps and cross sections, interpretation of graphs, and application of equations to support results. Examples may include determination of map scale, measurement of slopes and stratigraphic thickness, calculation of rock volumes, and deduction of the rates of geologic processes from graphs of pressure, temperature, and time. The process of creating to-scale cross sections from a map is a graphical and quantitative method of communicating interpretations about three dimensional structures. In general, use of graphical data representations to aid interpretations is pervasive throughout geoscience. (See Course SLO 3, 4, and 5 above)
2a) Apply scientific methods and models to draw quantitative and qualitative

conclusions about the physical and natural world.
This course addresses observation, descriptive, and interpretive components of the scientific method. Students use first-order observations to develop alternative working hypotheses for explaining processes and events responsible for creating the materials and landscapes of the earth. (See also Course SLO 1, 2, 4, and 5 above)

General Education Outcomes*

Ia. Write effectively for various audiences

Ib. Speak effectively to various audiences.

Id. Construct arguments based on sound evidence and reasoning to support an opinion or conclusion.

Ie. Apply and communicate quantitative arguments using equations and graphical representations of data.

IIa. Apply scientific methods and models to draw quantitative and qualitative conclusions about the physical and natural world.

To view the mapping, click https://www.cpp.edu/~academic-programs/Documents/GE%20SLO%20Mapping.pdf

IV. Instructional Materials

Provide bibliography that includes texts that may be used as the primary source for instruction, and other appropriate reference materials to be used in instruction. The reference list should be current, arranged alphabetically by author and the materials should be listed in accepted bibliographic form.

Instructional Materials*

Primary Texts may vary with instructor and over time. Examples of possible texts include:

1. Jones, C.E., and Jones, N.W., 2012, *Laboratory Manual for Physical Geology (8th edition)*, McGraw-Hill, 368 p.

2. Ludman, A., and Marshak, S., 2015, *Laboratory Manual for Introductory Geology (3rd edition)*, Norton, 480 p.

Lectures, lecture notes, homework assignments, and current papers on the diverse topics will also be made available on BlackBoard* by the instructor.

Faculty are encouraged to make all materials accessible. Indicate with an asterisk those items that have had accessibility (ATI/Section 508) reviewed. For more information, http://www.cpp.edu/~accessibility

V. Minimum Student Material

List any materials, supplies, equipment, etc., which students must provide, such as notebooks, computers, internet access, special clothing or uniforms, safety equipment, lockers, sports equipment, etc. Note that materials that require the assessment of a fee may not be included unless the fee has been approved according to University procedures.

Minimum Student Material*

notebook	Computer
graph paper	Internet service
e-mail	printer
cell phone	Standard writing materials
calculator	

VI. Minimum College Facilities

List the university facilities/equipment that will be required in order to offer this class, such as gymnastic equipment, special classroom, technological equipment, laboratories, etc.

Minimum College Facilities*

External Support

Information Technology (IT) Services	Classroom Management System (e.g. BB)
copier	scanner

Physical Space & Major Equipmen

sufficient plug-ins to support numerous electrical devices	wet lab (benches/sinks/gas/air) with seating for 25 students
smart classroom (computer/projector)	microscope(s)*
overhead screen	white board/dry erase markers
adjustable lighting	

VII. Course Outline

Describe specifically what will be included in the course content. This should not be a repetition of the course description but an expansion that provides information on specific material to be included in the class, e.g. lecture topics, skills to be taught, etc. This should not be a week-by-week guide unless all instructors are expected to follow that schedule.

Course Outline*

The following list is a representative sample of the topics that may be discussed during the class meetings:

- Properties, identification, and uses of minerals
- Identification, description and classification of igneous, sedimentary, and metamorphic rocks
- Volcanoes
- Weathering and erosion
- Reconstructing earth history based on cross-cutting relationships
- Faults, folds and tectonic deformation
- Processes that shape earth landscapes
- Earthquakes and plate tectonics
- Earth resources
- Interpreting topographic and geologic maps and cross sections
- Humans and global environmental change

VIII. Instructional Methods

Describe the type(s) of method(s) that are required or recommended for the instruction of this course (lectures, demonstrations, etc.). Include any method that is essential to the course, such as the use of particular tools or software.

Instructional Methods*

lecture	field studies
problem-solving	case studies
discussion	individual instruction
small group activities	peer instruction
observation	creating and presenting a talk/speech
inquiry-based learning	project-based learning
laboratory exercises/hands on practice	assigned readings (textbook, journals, etc.)
demonstrations	outlining (readings, papers, activities, etc.)
invited speakers	review, evaluation, critique
project (by individual, group, and/or class)	study groups

IX. Evaluation of Outcomes

Describe the methods to be used to evaluate students' learning, i.e. written exams, term papers, projects, participation, quizzes, attendance, etc.*

Students' learning of course content is evaluated **via laboratory reports, short quizzes, and practical examination.** Suggested weighting in grade calculations is 65% laboratory reports, 10% quizzes, and 25% final practical exam. These evaluation methods will be graded using standard numerical methods and/or rubrics.

Laboratory Reports involve written and oral reports about rock specimens, maps, cross sections or geologic relationships observed in the laboratory or field. Report content might include description of rocks, minerals, or outdoor features, presentation of techniques for geotechnical illustration, visualization of geologic processes, and assessment of movies or guest lectures. Written reports shall include a concise summary statement. Oral reports may be presented individually or by teams of 2-3 students in which each group member speaks to the class. Learning gain will occur through verbal interactions between students, peers and instructor.

Short Quizzes, to be given periodically during laboratory meetings, will address recently covered content areas and assess short-term recall of important geological concepts. Instructor evaluations of quizzes provide study material to the student that is pertinent to the practical examination. At least one quiz question will be written in nature and repeated on the final to assess student improvement and knowledge gained.

Practical Examination (final) is a structured, hands-on activity with a time limit, to be completed individually. Students will demonstrate the knowledge gained in laboratory by identifying mineral and rock specimens, interpreting topographic and geologic maps and cross-cutting relationships. Types of questions may include multiple choice, match-up, short answer, labeling drawings or diagrams,

short essays, calculations, and illustrating geologic processes or features with drawings.

Describe the meaningful writing assignments to be included.*

Students will have multiple opportunities to demonstrate effective writing, with feedback provided through instructor comments. Laboratory reports require a short written summary statement describing the work submitted. Quizzes and examinations contain short answer and/or essay questions that require students to describe their knowledge of specific course content or create reasoned scientific arguments in written words. Selected quiz questions will be written in nature, evaluated by the instructor, and repeated on the practical examination to assess student improvement and knowledge gained. This process also enables students to use the feedback to improve their technical writing.

Discuss how these methods may be used to address the course and program outcomes, as appropriate. Include or attach a matrix to align the evaluation methods to the outcomes.*

Below is a Matrix indicating how assessment methods align to course learning outcomes.

	Methods of Assessment		
Student Learning Outcome (see detailed list in Part III above)	**Laboratory Reports**	**Short Quizzes**	**Practical Examination**
#1. Identify common rock forming minerals, and associate with important economic uses and basic chemical groups.	X	X	X
#2. Understand processes that create common igneous, sedimentary and metamorphic rocks, and the environments they form in.	X		

#3. Obtain qualitative and quantitative information about the earth's surface from topographic maps and construct topographic profiles.	X		X
#4. Apply elements of the scientific method to interpret crosscutting relationships involving rocks of different relative age, using geologic maps and aerial photographs.	X	X	X
#5. Construct geologic cross sections through sequences of folded and faulted rock.	X		

If this is a general education course, discuss how these methods may be used to address the associated GE Learning Outcomes listed

Below is a matrix indicating how assessment methods evaluate the GE learning outcomes:

	Methods of Assessm

below. Include or attach a matrix to align the evaluation methods to the outcomes.*

GE Learning Outcome (see Part III above)	Laboratory Reports
#1a: Write effectively	X
#1b: Speak effectively	X
#1d: Construct arguments	X
#1e: Quantitative reasoning	X
#2a: Scientific method	X

X. This OPTIONAL Section is for describing Course/Department/College specific requirements.