Graduation Writing Assessment Requirement (GWAR)
Course Approval Sheet

Department: GEOSCIENCES College: Science and Engineering

Course Number: Geol 460 Course Title: Sedimentology and Stratigraphy

Contact Person: Karen Grove Email: kgrove@sfsu.edu Phone: X82617
This proposal is a: (please check one)

__X__ Minor Modification to an Existing Course
_______ Substantial Modification to an Existing Course
_______ Completely New Course

Relationship of course to major(s). Please indicate how this course fits in the major. This is a required course for geology majors, typically taken in their junior year.

Prerequisite: A prerequisite for the course is the completion of English 214 or its equivalent with a grade of "C-" or better. XX Yes _____ No

Please attach a course syllabus to this form.

Please indicate how this course meets each of the GWAR criteria: (Note: You may respond either in the blanks below or on a separate sheet attached to this form.)

Criterion #1 - Class Size: Courses satisfying the GWAR should have an enrollment of 25 students or fewer.

This course typically has an enrollment of 12-20 students.

Criterion #2 - Number of Pages/Words: The overall assignments for the course will include a minimum of 15 pages, meaning the equivalent of 4000 words, of formal writing that demonstrates upper-division written English proficiency within the given discipline.

The writing assignments in this course include three structured assignments and many less-structured smaller assignments, all staggered through the semester. (1) The largest writing assignment, the coastal environments report, includes two drafts that are edited by the instructor and revised by the students. The report requires students to blend results of library research with their own observations. They must follow the standard scientific style and format as defined in the Authors Guide of the Geological Society of America. The final report length is 10 pages, plus figures. (2) The Point Lobos report is based on students’ measurements and descriptions and is 2-3 pages in length, plus figures. (3) The final exam for the course is a culminating experience that requires the students to read several journal articles and to write a 5-6 page summary of the readings. (4) Small writing assignments during the semester will require students to
write about their observations and interpretations. These small, less-structured assignments will be edited by the instructor and revised by the students and will be used to help students prepare for the larger, more-structured assignments.

Criterion #3 - How Writing Will Affect the Final Grade: At least 60% of the grade in GWAR courses must be based on written assignments and take-home essay exams (e.g., exams designed to allow for revision), which are evaluated for both content and quality of writing.

Geol 360 is a four unit course: 2 units of lecture and 2 units of lab. One of the 2 lab units is field work that is completed on weekends. The remaining 3 units include in-class lab work, group activities, informal and formal writing assignments. Because one of the units is field work, 45% of the grade in this 4-unit course is based on the writing assignments.

Criterion #4 - Revision of Assignments: GWAR courses must include substantive revision of major, graded, written assignments in response to feedback.

See above. The largest assignment (coastal environments) will involve several revisions, and the smaller, in-class assignments will involve one revision and will be used to prepare for the larger assignments.

Criterion #5 - Types of Assignments: GWAR courses should include a variety of writing assignments that are distributed throughout the semester, rather than concentrated at the end.

See above (and course syllabus). The writing assignments are staggered through the semester. The total length of the formal papers will be 17–19 pages. Another 5-10 pages of less-formal lab reports and in-class writing assignments are included in the course.

Criterion #6 - In-class Attention to Writing: GWAR course syllabi should reflect significant class time devoted to instruction in writing conventions within the given discipline.

Students will receive instruction in writing in the discipline. They will be held to high standards of scientific writing in all assignments and will be graded for their English competency as well as their scientific accuracy.

Criterion #7, Number of Units: GWAR courses should be at least 3 units.

Geol 460 is a 4-unit course, of which 1 unit is field work.

Department/Program Chair/Directors

______________________________  ______________________________
Print Name                        Signature
GEOL 460: Sedimentology and Stratigraphy

Instructor: Prof. Karen Grove  
Office: Thornton Hall 516  
Phone: 338-2617  
E-mail: kgrove@sfsu.edu  
Office hours:

Course Description
This course is designed for geology majors who are in their junior or senior year. In the course we will explore the basic principles of sedimentary geology, and focus on applying basic principles to the solution of real-world problems. Sedimentary geology has many practical applications to areas of societal concern, for example, surface and groundwater flow, climate change, petroleum exploration, and tectonic evaluations. During the course, we will build toward increased complexity—starting with individual sediment particles and ending with large-scale sedimentary basins. This is a designated GWAR course; as such, we will focus throughout the semester on improving writing effectiveness.

Course Prerequisites
Required: Physical geology (Geol 110), Earth and life through time (Geol 115), Introduction to geologic techniques (Geol 120), Mineralogy and Petrology I (Geol 420), completion of English 214 or its equivalent with a grade of “C-” or better, or consent of instructor.

Course Objectives/Goals
- Students will have acquired a toolbox of basic skills that can be used to describe, identify, classify, and interpret sediments and sedimentary rocks in field and laboratory settings.
- Students will have learned appropriate techniques for dating and correlating sedimentary layers and sequences.
- Students will have sharpened their observational, critical thinking, and problem solving skills.
- Students will have improved their ability to communicate geologic information (written and oral)
- Student will have gained practice working collaboratively with a team.

Learning Outcomes
At the conclusion of this course, students will be able to
- identify and describe sedimentary features in the field and laboratory;
- interpret the basic processes that form sedimentary layers and sequences;
- identify past depositional environments based on observed sedimentary characteristics;
- measure paleocurrent directions and stratigraphic sequence, and create graphic representations of the currents and sequences;
- correlate sedimentary sequences based on lithologic characteristics;
- write clear, concise descriptions and interpretations of sedimentologic features.
Required text, materials, and other costs


*Lab manual* available for purchase through the instructor.

*In-class supplies*: 10X power hand lens and calculator. Someone in your group should be responsible for bringing the textbook to class each day.

*Field gear*: map case; field notebook; system to organize field gear; 10X power hand lens; grain-size comparator; rock color chart and Brunton compass (provided by instructor).

*Transportation* to field sites will be by university van and student vehicles. Students will share costs of transportation and food (no more than $50).

Grade Weighting (~85% individual scoring, 15% group scoring)

The GWAR requires that 60% of the grade for a 3-unit course be written assignments designed for revision and evaluated for both content and quality of writing. Since this course is 4 units, with 1 of these units devoted to field work, 45% of the grade in this 4-unit course will be related to the writing assignments (GWAR components highlighted in bold-faced italics).

Coastal environments report  
  *GWAR component*: two drafts and a final paper (~10 pages)  
  20%

Point Lobos (marine) environments  
  *GWAR component*: 2-3 page paper  
  9%

Other field and lab activities (group + individual scores)  
  Siliciclastic sediments, non-marine environments,  
  carbonate environments, Varian environmental application  
  21%

Mid-term exams (12% each)  
  24%

Final exam  
  *GWAR component*: a culminating written report (5-6 pages)  
  11%

Class participation (includes daily activities; evaluations by  
  group members and instructor)  
  10%

In-class writing assignments to be distributed throughout the semester  
  *GWAR component*  
  5%

NOTE: Instructions for primary GWAR components (coastal environments report, Point Lobos environments, final exam) are attached.

Tell me, I will forget  
Show me, I may remember  
Involveme, and I will understand

Coastal Environments and Depositional History
of the Merced Formation, San Francisco

Learning Objectives

1. To describe the types of sediments and sedimentary structures that form in a variety of coastal environments, to identify the processes that create observed features, and to use an actualistic model to help interpret ancient sedimentary successions.
2. To gain practice writing a geologic report that describes and interprets observations, and that integrates information from the geologic literature.
3. To think about the roles of global sea-level change, tectonic subsidence or uplift, and sediment supply in changing base level and creating sedimentary sequences.

Problem

You have gotten a consulting job with the Golden Gate National Recreation Area (GGNRA), who has contracted you to write a report about the coastal environments and depositional history of the Merced Formation, which is exposed along the coastal cliffs within the park. After SFSU graduate students studied the geology of the area, park personnel realized that there are many interesting stories to be told. The GGNRA wants to help park rangers know more about the geologic setting of the region and to create an informational pamphlet that will be available to the general public. Your report will provide them with the background information they need. Their first request is for a report about the Merced Formation.

To complete the report, you take a field trip to the Merced Formation and also to the modern coast to better understand the depositional environments represented in the formation. You read background literature to better understand the environments and why the environments are arranged in vertical sequence the way they are.

PART I—Field Trip to Pescadero Marsh Natural Reserve and the Pleistocene Merced Formation at Fort Funston

The goal of the first field trip is to use an actualistic model (that is, a modern example) to understand ancient sedimentary environments. At Pescadero (in San Mateo County, south of San Francisco) we will explore sub-environments of a coastal zone that includes a beach area dominated by wave processes, and an embayed area dominated by tidal processes. At Fort Funston (coastal cliffs west of SFSU campus), we will examine Pleistocene sediments that were deposited in similar sub-environments. During the trip, complete the following activities:

1. Describe the sediments and sedimentary structures that characterize each coastal facies at Pescadero. Include grain size, grain rounding, bed-form types, cross stratification types, and any other observed characteristics.
• Interpretation should be based on evidence gathered from the Pescadero marsh and beach area, and from literature references.
• Use subheadings for each facies type; include both description and interpretation in the same section and use examples from field observations.

5. Conclusions (brief discussion of main points)
6. References
• Format using the GSA style (see Geol 120 course reader or ask instructor for guidelines)
• Cited in the text where information from the source is used (e.g., Clifton et al., 1988).
• Use at least five references, including two supplied by the instructor.

Figures
1. Location map of the Merced Formation (can use map provided in field trip handout)
2. Stratigraphic column of the Merced Formation (can use column provided in field trip handout)
3. Map of Pescadero with outlines of observed coastal facies and legend (map provided by instructor)
4. Optional additional figures that contribute to the report.

Deadlines

6 October—first draft due to the instructor (include introduction; description and interpretation of facies viewed in sequences R–T, with reference to modern Pescadero observations and literature sources; Figures 1–3).
31 October—second draft due to the instructor (include all parts)
1 December—final report due to the instructor
SCORING RUBRIC FOR COASTAL REPORT

Total possible points for coastal report: 30 (will be normalized to 15% of total course grade). The report drafts (due 6 October and 31 October) are worth 5 points each, and are also important for improving the quality (and hence, the score!) of the final report. The final report (due 1 December) is worth 20 points; criteria for receiving all possible points are described below. Lesser products will obviously result in lower scores.

First Draft Report (due 6 October)

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| 5     | • Draft includes title; introduction; complete description of foreshore, backshore/eolian, and embayment facies (most important part); interpretation of the three facies types; at least 2 references cited in the text and put in a list at the end; figures 1, 2, 3.  
     | • Score based on completeness of draft and accuracy of content. |

Second Draft Report (due 31 October)

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| 5     | • Draft includes improvements of parts submitted in Draft 1.  
     | • Additions: abstract; description and interpretation of nearshore and offshore (i.e., shelf) facies; conclusions; at least 5 references cited in the text and put in a list at the end; figures 1, 2, 3.  
     | • Score based on completeness of draft and accuracy of content. |

Final Report: Title, abstract, introduction, and conclusions

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| 4     | • Report has an appropriate title.  
     | • Abstract is a concise and accurate reflection of the report’s content.  
     | • Introduction contains location, purpose, background information about the Merced Formation, methods, contents of report.  
     | • Conclusions concisely summarize the report’s main points. |

Final Report: Description of Merced Formation depositional environments

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| 5     | • All facies are described thoroughly and accurately.  
     | • Descriptions include grain composition, shape, roundness, size, sorting; sediment color; bed thickness, geometry, and contact type; sedimentary structures; fossils; diagenetic features; position in vertical sequence. |
Submarine Deposits at Point Lobos State Park, Monterey

Learning Objectives:
1. To be able to identify different types of sediment gravity flow deposits, which form in submarine canyons and fans (also sometimes on continental shelves, in shallow seas, or in large lakes).
2. To be able to identify a wide variety of sedimentary structures in the field.
3. To be able to measure and describe stratigraphic sequences.
4. To be able to measure and plot paleocurrent directions.

The Natural Environment of Point Lobos State Park

Point Lobos State Park is located about 180 km from San Francisco at the south end of Carmel Bay, which is located south of the Monterey Peninsula and Monterey Bay (Figure 1). The state park contains a large variety of natural phenomena. Trees include the Coast Live Oak, Monterey Pine, and Monterey Cypress, which is famous for its wind-blown, crooked shape. A type of vegetation that is not so lovely is poison oak! The park is best known among the public for its wide variety of sea life. Whalers Cove contains a kelp forest and is a popular scuba diving site. Visitors walking the shore can usually see otters, sea lions, and harbor seals. During the fall to spring months, visitors can see gray whales that are traveling between their summer feeding grounds in the Bering Sea and their winter habitat in the coastal waters of Baja. For geologists, the park contains a magnificent collection of sedimentary rocks in a spectacularly scenic coastal setting.

The Geology of Point Lobos State Park

Deposits of the Paleocene (lowest Tertiary) Carmelo Formation are exposed throughout the park. These deposits have both depositional and fault contacts with the underlying Cretaceous-aged granodiorite. Both rock units are part of the Salinian terrane, which has been transported at least 300 km northwestward from its original location at the southern end of the state by right-lateral motion along the San Andreas fault (Figure 2). The San Gregorio fault, a more outboard component of the San Andreas fault system, has separated part of the terrace an additional 150 km toward the northwest. Clark et al. (1984) recognized that the rocks at Point Reyes were the same granodiorite and Paleocene sediments that are found at Point Lobos and used that correlation to estimate total right-lateral displacement on the San Gregorio fault. The deposits at Point Lobos are dipping, primarily toward the northeast, and gently folded.

Field Activities

We will make detailed observations at several locations along the perimeter of the park:
1. Punta de los Lobos Marinos (Sea Lion Point), which is the lowest exposed part of the Carmelo Formation.
2. The Slot and Weston Beach, which are located along the trail to the southeast of the point. The deposits are stratigraphically upsection from Sea Lion Point.
Basin Analysis of Upper Cretaceous Sedimentary Rocks, Salinian Terrane, West-central California

Learning Objectives

- To bring together many of the elements discussed throughout the semester into a holistic analysis of basin development and change through time;
- To obtain an in-depth understanding of a part of California’s geologic history.

Resources

- Papers provided by the instructor (3).
- Chapter 16 of the textbook.
- You may consult with the instructor if you have questions about the activity. *You may NOT consult with your classmates. This is an independent, not a collaborative, activity.*

Activity

- Read the papers provided. You may use additional papers if you wish, but they are not required.
- Write a 5–6 page paper (double-spaced text, plus at least one figure) about the basin formed on the Salinian terrane during Late Cretaceous time. Include as many aspects of sedimentology and stratigraphy as you can, from individual clast types to large-scale geometries and correlations. You should refer to the paleomagnetic data, but you do not need to worry about the details, as they would only be meaningful to someone who has done this type of geophysics.
- Follow a “Scientific American” style for your paper. This style is geared to a general, scientifically-literate audience. It does not include reference citations within the paper, but includes a list of references at the end.
- You should include a location map; other figures are optional.

The paper will be evaluated according to the following criteria
(11% of course grade)

- Accuracy of the details in your paper, according to the references provided (reading comprehension)
- Organization of the paper: well-defined sections and headings; paragraphs with good topic sentences; sentences that flow clearly from one to another
- Lack of spelling and grammatical errors
- A clear, concise writing style, following the guidelines we have discussed during the semester.

Due date/time: