Learning Outcomes

Graduates of the PhD program in Geological Sciences will:

1. *(Subject Knowledge)* Know the general foundations of geoscience; appreciate its unique temporal and spatial scope; understand in depth the established facts, theories, methods and open intellectual questions of either geobiology, geochemistry, geomorphology, or geophysics; and be able to apply that understanding to complex problems.

   **Assessment Methods:** assignments and examinations in graduate lecture, lab and field courses.

   **Intent:** to the extent possible, PhD candidates will experience courses not only with a range of topical content, but also with a variety of pedagogic styles (discussion, lab and field experiments, group research projects) and assessment instruments (papers, oral presentations).

2. *(Habits of Mind)* Be able to read critically, understand, and evaluate scholarly literature; integrate and synthesize ideas therein; identify and evaluate novel and relevant research questions; formulate appropriate and effective research strategies; and communicate effectively.

   **Assessment Methods:** assignments in courses GEO 201A and B; assignments and presentations in graduate journal clubs; initial presentations in graduate seminar (GEO 250); written research proposal and oral examination components of the Qualifying Examination process.

   **Intent:** instructor-mediated peer-review and audience questions in GEO 201A and GEO 250 will prepare PhD candidates, through give-and-take, for the formal reviews in the Qualifying Examination process.

3. *(Research Skills)* Be able to apply appropriate, responsible, and ethical research protocols; gather, analyze, and interpret data; develop and sustain a set of evidence-based arguments that address comprehensively the corresponding questions or hypotheses; identify broad implications of their findings for the discipline and pose further questions; convey those findings to expert and lay audiences; respond effectively to questions; and produce publishable manuscripts.

   **Assessment Methods:** quarterly written description of research unit activities; biannual progress reviews (with mentor on occasion of graduate seminar presentation and with Graduate Committee at Spring interview); continuing presentations in graduate seminar (GEO 250); dissertation defense
4. *(Time Management)* Deliver acceptable research results within reasonable timeframes

   **Assessment Methods:** normative times and progress benchmarks as enumerated in III; Spring Quarter self-statements by students; Spring quarter interviews.

5. *(Teaching Ability)* Teach effectively for both scientists and non-scientists; i.e. be able to develop lesson plans, lecture/discussion outlines, problem sets, lab exercises and materials, field exercises, test instruments and grading rubrics as appropriate to the content and level of the course; be able to command attention, maintain a positive, disciplined and safe learning environment; be able to motivate, and encourage students; be able to manage office hours and establish a climate of open-mindedness and fairness; and be sensitive to cultural diversity of the student body.

   **Assessment Methods:** student evaluations of performance as Teaching Assistant or summer session Instructor; grade reports for GEO 301, 302.

   **Intent:** to the extent possible, PhD candidates will assist in both lower and upper division courses or in outreach programs to public schools (e.g. GEOP); successful, experienced TAs may be given opportunities to take total charge of summer courses; teaching experience helps develop the skills needed for Oral examinations and for academic careers.

6. *(Professional Development)* Be skilled, capable, and independent professional researchers

   **Assessment Methods:** conference presentations, grant applications; reviewer activities; job placement.

   **Intent:** with due regard for the time commitment, all PhD candidates will be encouraged to participate in the quest for their research funding.

7. *(Satisfaction)* Appreciate the value added by the UCR Department of Earth Sciences to their personal effort in graduate school.

   **Assessment Methods:** exit interview.
Alignment of Outcomes and Assessment Measures:

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L = opportunity to learn
A = opportunity for assessment
WASC Assessment Plan for MS Program

Learning Outcomes
Graduates of the MS program in Geological Sciences will:

1. *(Subject Knowledge)* Know the general foundations of geoscience; appreciate its unique temporal and spatial scope; understand the established facts, theories and methods of either geobiology, geochemistry, geomorphology, or geophysics; and be able to apply those methods to research problems.

   **Assessment Methods:** assignments and examinations in graduate lecture, lab and field courses.

   **Intent:** to the extent possible, MS candidates will experience courses not only with a range of topical content but also with a rich variety of pedagogic styles (discussion, lab and field experiments, group research projects) and assessment instruments (papers, oral presentations, numerical problems).

2. *(Habits of Mind)* Be able to read and understand scholarly literature; integrate ideas; evaluate research questions; communicate effectively; and appreciate the more advanced skills required to formulate original research proposals.

   **Assessment Methods:** assignments in course GEO 201A; assignments and presentations in graduate journal clubs; initial presentations in graduate seminar (GEO 250); written research statement.

   **Intent:** instructor-mediated peer-review and audience questions in GEO 201A and GEO 250, taken together with PhD candidates, will allow MS students to evaluate their own potential for PhD-level research.

3. *(Research Skills)* Be able to apply appropriate, responsible, and ethical research protocols; gather, analyze, and interpret data; develop and sustain evidence-based arguments; convey findings and respond to questions from live audiences; and contribute to publishable manuscripts.

   **Assessment Methods:** quarterly written descriptions of research unit activities; biannual progress reviews (with mentor on occasion of graduate seminar presentation and with Graduate Committee at Spring interview); continuing presentations in graduate seminar (GEO 250); dissertation defense.

4. *(Time Management)* Deliver acceptable research results within reasonable timeframes

   **Assessment Methods:** normative times and progress benchmarks as enumerated in III; Spring Quarter self-statements by students; Spring quarter interviews.

5. *(Teaching Ability)* Have had opportunities to test and develop their skills as teachers; i.e. be able to implement and enhance lesson plans, lecture/discussion outlines, problem sets, lab exercises and materials, field exercises, test instruments and grading rubrics as appropriate to the content and level of the course; be able to command attention, maintain a positive, disciplined and safe learning environment; be able to motivate, and encourage students; manage office hours and establish a
climate of open-mindedness and fairness; and be sensitive to cultural diversity of
the student body.

**Assessment Methods:** peer-reviews of research presentations; student
evaluations of performance as Teaching Assistants.

**Intent:** to the extent possible and reasonable, MS candidates will have
experience as Teaching Assistants or in outreach programs to public schools
(e.g. GEOP); the apportionment of funds and the limited normative time to the
MS degree preclude the promise that all MS students can be Teaching
Assistants. Exceptional MS candidates are not precluded from teaching
summer session courses, but preference in the competition for these positions
will be given to PhD candidates.

6. *(Professional Development)* Be skilled and capable journeyman scientists ready
either for advancement to a PhD program or for entry into commercial employment
at staff levels with prospects for promotion to project-leaders after brief
apprenticeships.

**Assessment Methods:** conference presentations, grant applications; job
placement.

**Intent:** students with PhD potential will be identified and encouraged.

7. *(Satisfaction)* Appreciate the value added by the UCR Department of Earth Sciences
to their personal effort in graduate school.

**Assessment Methods:** exit interview.
### Alignment of Outcomes and Assessment Measures:

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