

Designing Effective and Innovative Courses in the Geosciences

Part 1.1 Articulating the course context and constraints

Teaching a course involves making choices about what you will ask your students to do and why. External factors such as context of the course, student demography, and support structure are significant and should influence the choices that you will make as you design your course. The sections below ask you to consider the external factors that influence a course and explain why these factors are important to consider before you begin to set realistic goals for the students in your course. **Start by choosing a course or a portion of a course to work on.**

Task 1.1a: What are the nuts and bolts of your course?

Answer the questions below. In addition to the facts, comment both on the **challenges to designing your course posed by each factor** and on the **opportunities presented by each factor that you could take advantage of in designing your course.**

Does your course serve as a prerequisite for a subsequent course or does it prepare students for a standardized exam? If so, what?

Challenges:

Opportunities:

Does your course have prerequisites? If so, what are they?

Challenges:

Opportunities:

How big is your course, and what kinds of rooms are available for you to teach in?

Challenges:

Opportunities:

Does your course have a lab and/or on-line component, and do you teach it?

Challenges:

Opportunities:

What are your options for frequency and duration of class/lab meeting times?

Challenges:

Opportunities:

Task 1.1b: Who are your students, and what do they need?

Answer the questions below. In addition to the facts, comment both on the **challenges to designing your course posed by each factor** and on the **opportunities presented by each factor that you could take advantage of in designing your course**.

Are your students majors (or potential majors), non-majors, or both?

Challenges:

Opportunities:

Will the students in your course go on to be professionals in your discipline or (in the case of a course for majors) your subdiscipline?

Challenges:

Opportunities:

In what way might your students use what they have learned in your course in the future?

Challenges:

Opportunities:

What is the demography of students in your course in terms of age, race, gender, and ethnicity?

Challenges:

Opportunities:

Are most students in residence at the school or do they commute?

Challenges:

Opportunities:

What percentage of students in your course have high-speed computer access outside the campus library/computing center?

Challenges:

Opportunities:

Task 1.1c: What is the support structure for your course?

Answer the questions below. In addition to the facts, comment both on the **challenges to designing your course posed by each factor** and on the **opportunities presented by each factor that you could take advantage of in designing your course**.

Are graders, TAs, or other assistants available?

Challenges:

Opportunities:

Are you the default computer troubleshooter, or do students have other support staff to turn to if they run into difficulty with a computer problem related to your course?

Challenges:

Opportunities:

Does your campus have writing, quantitative literacy, or oral communications skills centers that can provide supplemental help/instruction for students?

Challenges:

Opportunities:

Are there professionals on your campus who can help faculty members with assessment?

Challenges:

Opportunities:

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Part 1.2 Setting overarching goals

In this section of the tutorial, we will ask you to focus on answering the question, "**What do I want my students to be able to do when they are done with my course?**" If this question is answered thoughtfully and realistically, the goals that you have set for your students will provide a road map for developing an innovative course that helps students achieve those goals. Assessment, sometimes viewed as a real bugbear, falls out naturally from the desire to determine whether students have met the goals.

Task 1.2a: What to *you* do as a professional in your discipline?

One very useful way to begin to approach setting student-focused goals is to think about what sorts of things *you* do simply because you are a professional in your discipline, because **your course should enable your students, at the appropriate level, to do what you do in your discipline, not just expose them to what you know.**

In the context of your general course topic, what do *you* do simply because you are a professional in your discipline? What does "analyze", "evaluate", etc. involve? Alternatively, what is unique about your world view or the view of your discipline??

Task 1.2b: Practice in critical evaluation of overarching goals

In this tutorial, we will ask you to set goals that meet very specific criteria. Below, you will find a list of overarching goals for courses, some of which meet the criteria and some of which don't.

For each of the goals listed below, answer the questions:

- Is the goal student-focused, rather than teacher-focused?
 - Does the goal focus on higher order thinking skills?
 - Could you design an activity/assignment that would allow you to determine whether students have met the goal or not (does the goal have "measurable outcomes")?
 - Is the goal concrete, rather than vague and abstract?
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1. I want to introduce students to the fundamental concepts of fluid dynamics.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?
2. I want students to appreciate the awesome power of Nature.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?
3. I want students to understand the scientific method.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?
4. I want students to be able to apply geologic knowledge to municipal planning and land use decisions.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?
5. I want students to be able to describe the seven major disasters covered in the course and explain the geologic processes involved in the disasters.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?

6. I want students to be able to understand why geologic catastrophes happen in some places but not in others.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?

7. I want students to be able to identify rocks and minerals.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?

8. I want students to be able to analyze historical and geologic records in an area and predict the likelihood of future natural disaster events.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?

9. I want students to be able to go up to an unfamiliar outcrop, ask appropriate questions, make observations and collect data, analyze their observations and data, make interpretations, and make decisions about where to proceed next in the field.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?

10. I want students to be able to evaluate old hypotheses in light of new data.
 - Student-focused?
 - Higher order thinking skills?
 - Measurable outcomes?
 - Concrete, rather than vague and abstract?

Task 1.2c: Set one to three overarching goals for your course.

What do you want your students to be able to *do* when they are done with your course? Several months down the road? Next year? Five years from now? As you write your goals, keep the following in mind:

- **Factor in context.** Who are your students, and what do they need? Remember what you wrote on course context for the tasks in Part 1.1 of this tutorial!
- **Factor in what *you do* as a professional.** Remember the list that you made in Task 1.2b above.
- **Set student-focused goals.**
- **Phrase your goals as "Students will be able to..." or "I want students to be able to..."**.
- **Avoid phrases such as "I want to expose students to..." or "I want to show students that..."**. Don't fall into the trap of writing a goal that says "I want students to be able to be exposed to...."!
- **Set goals involving higher order thinking skills.**
- **Use verbs that signal higher order thinking skills**, such as *derive, predict, analyze, design, interpret, synthesize, formulate, plan, correlate, evaluate, create, critique* and *adapt*.
- **Avoid verbs that signal lower order thinking skills**, such as *list, explain, calculate, know about, identify, describe, recognize, summarize, discuss, define, recall, paraphrase*, and *locate*.
- **Set goals that are concrete, have measurable outcomes, and provide clear direction for course design.**
- Avoid verbs such as *understand, appreciate, value*.
- Remember that there is no one right set of overarching goals for a course. Different instructors with different students will likely have different goals or phrase goals differently even if the course is on the same topic.

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Part 1.3 Setting ancillary skills goals

What ancillary skills would like to have your students improve on during your course? Ancillary skills might include writing, quantitative skills, 3-D visualization, self-teaching, peer teaching, oral presentation, working in teams/groups, critically assessing information on the Internet, accessing and reading the professional literature, and so on.

Task 1.3: Set one or two ancillary skills goals for your course.

Which ancillary skills are important enough in the context of your course that you are willing to provide timely feedback and repeated practice so that students actually improve their skills? Be realistic. You can't do everything and still address the content of the course. Choose one or two ancillary skills to work on – ones that you can commit to integrating from the beginning to the end of the semester.

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Part 1.4 Choosing content to achieve overarching goals

In this section of the tutorial, you will consider the goals you have set for your course, as well as all of the possible content topics you could include, and answer the question, "What content topics could I use to achieve the overarching goals of my course?" The goals of the course plus the broad content topics will combine to provide a framework for the activities and assignments that you will design to help students achieve the goals of the course.

Task 1.4: Choose broad content topics, and flesh those broad topics out.

List the overarching goal(s) for your course. For each goal, list the broad content topics that you could use to achieve the overarching goals of your course. Below each broad content topic, list the more specific content items that are imbedded in each broad topic and that students must master to achieve the goal.

What order might you put the broad topics in that would allow students to build the complexity of ideas and applications over time and to revisit concepts or topics in an appropriate way?

Are you constrained to include particular topics in your course in order to prepare students for subsequent courses or certification exams? If so, what are they?

Do the broad content items that you have chosen enable you to include those items that must be covered for subsequent courses or for certification exams? If not, how might you fit those content items in?

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Part 2.1 Developing a course plan in the content of goals and content topics

Now it's time to develop a plan for your course. In this section of the tutorial, you will consider how to merge the goals that you've set for your course with the content topics to develop a course plan that makes it possible for students to achieve the goals. In order to achieve the goal(s), students must have practice throughout the course. Developing a course plan in the context of the content, both broad and specific, means thinking not only about having students learn content but also about how to give students practice in the tasks that are important in the goals.

Task 2.1: Develop a draft of your course plan.

On the following page, you will find a chart where you can build a draft of your course plan. The chart provides a way to answer the following questions in the context of the sequence of topics and concepts for your course:

- What do your students need practice in during the semester in order to achieve the goals?
- What will be the order of content and concepts in each broad content topic, and how will you give students goal-related practice as they encounter content and concepts?
- How does the practice that you plan to build into the course build independence over time?

Realize that this course draft will likely go through many iterations as you develop your course and change your mind about various aspects, particularly as you consider teaching strategies, which is the next section of the tutorial. So, view this as a draft!!

Draft of Course Plan:

Overarching goal(s):		
What do students need practice in during the semester in order to achieve the goal(s)?		
Broad content topic # :	Sequence of topics and concepts within the broad content topic:	What might students do to get goal-related practice?

How does the practice that you have planned build in independence over the course of the term?

What ancillary skills goals have you set for your students? How will your course plan provide students with practice and timely feedback in these ancillary skills so that students can improve by the end of the term? You might consider adding this to the chart, perhaps in a different color.

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Part 2.2 Exploring Teaching Strategies

At this stage of the tutorial, you have set overarching goals, organized content, and developed a course plan with ideas for how to give students the practice that will make it possible for them to achieve the course goals. In this section of the tutorial, you will make choices about what you will have students do in order to learn the course content **and** practice the goals.

Task 2.2a: Learning styles inventory

Take the on-line learning styles inventory, print out the results, and read the information on Felder's site about interpreting the results. Compare your results with those of the 40 Course Design Workshop participants. What have you learned about your own learning styles that might influence your predilections for assignment/activity design, and what might you want to keep in mind in terms of addressing a variety of learning styles as you design assignments and activities for your students?

Task 2.2b: Exploring teaching strategies

Browse the various teaching strategies on the tutorial website to find ones that you might be able to use to enhance student learning and accomplish the goals in your own course. Be sure to keep in mind the context and constraints of your course. Go to the course plan that you began to develop in Part 2.1, and add teaching strategies to specific topics, along with outlines of ideas for assignments or activities using those strategies (e.g., jigsaw with geologic maps from four adjacent areas to give students practice in analyzing regional geologic history).

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Part 2.3 Exploring Assessment Strategies

At this stage of the tutorial, you have set overarching goals, organized content, developed a course plan, and selected teaching strategies for specific assignments and activities to help students achieve course goals. What kinds of assessment strategies can you use to assign grades and to determine the extent to which students have met the goals of your course?

Task 2.3: Exploring assessment strategies

Keeping the goals of your course in mind, browse the list of assessment strategies in this section of the tutorial to find strategies that you could use to assess student learning. Be sure to keep in mind the context and constraints of your course. Go to the course plan that you have developed in Parts 2.1 and 2.2, and add assessments as appropriate. You may decide that the student activities and assignments you have planned are sufficient to meet your goals, or you may decide that you need to add more and/or different strategies. Use the worksheet to check that your assessments are aligned with your goals. For each assessment, consider what the balance of lower order and higher order thinking required for the assessment.

	assessment strategy 1	assessment strategy 2	assessment strategy 3	assessment strategy 4	assessment strategy 5
overarching goal 1					
overarching goal 2					

overarching goal 3					
ancillary skills goal 1					
ancillary skills goal 2					

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Part 3.1 Following through

If you have worked your way through this tutorial, you have invested a considerable amount of effort in thinking about designing or redesigning a course or a portion of a course. You undoubtedly have terrific ideas, and you are excited (and probably a bit nervous) about teaching the course itself. At this stage, you want to make it as likely as possible that you will follow through with a successful course

Task 3.1: Developing a plan of action

Use the following table to lay out what you have to accomplish and when in order to make your course successful. A plan of action will help you avoid biting off more than you can chew and help you maximize your effort between now and the first day of classes.

Resources/materials to acquire	
Needs:	Timetable:

Assignments/activities/materials to develop	
Needs:	Timetable:

