

## 1 - Developing a project seed

Prepare a project “seed” in order to identify the research you could mentor, and prepare to work flexibly with a student on designing a project

Summarize your area of research

What are the big questions in the field?

What are some more focused questions that could be tackled by an undergrad and contribute to solving one or more of those big questions?

Pick one of your focused questions:

Briefly outline a project, as you would do it, that would help contribute to answering that question by one or more of:

- designing / building an instrument
- making a measurements and finding patterns
- making a model (mathematical or otherwise)
- comparing data to models

What would an ideal product of this project look like?

## 2 - Backwards design

Project idea:

Key elements of project outcome (e.g., a set of plots? a calculation? a build device? a computer code?)

List project tasks, working backwards from the project outcome to the earliest tasks.

Go back to your list and identify 3 - 6 key benchmarks or milestones. Place a checkbox next to these.

Identify the content, process, and attitudinal learning goals needed to accomplish those steps.

Content goals: knowledge

Process goals: "students will be able to..."

Attitudinal goals:

Identify the goals that depend on students successfully mastering another. Check the order in which they arise in the project outline

### **3 - Plan initial training task**

Project idea:

What knowledge, skills, and attitudes would a student need to have in order to get started on this project idea?

Brainstorm focused, limited tasks that would engage a student in a core aspect of the project

For initial knowledge, identify a few brief readings or videos that would convey the knowledge.

What could you ask a student to do to check that they understand that key knowledge?

A good initial task is one that:

- can be broken down into a series of concrete steps
- includes many places where the student can self-check their progress
- has many points where changes could be made to achieve different outcomes (e.g., take a median rather than a mean)

Outline a training task, in as much detail as possible. If the task involves specialized tools, outline what resources you should supply so the student can immediately pursue the main task (e.g., fully processed images if the project includes identifying spiral galaxies)