Guidelines for developing a research plan

Phase 1: Brainstorming

Areas of interest for you and your students. What are some things that you or your students are interested in that can be studied using next-generation sequencing?
Phase 2: Formulating your research question

Focusing on specific interest areas: Narrow your broad interest areas into a few potential topics that are related to next-generation sequencing.

Summarizing current knowledge: For your selected topics, summarize what you already know. Are there specific subtopics you would like to know more about? Where could you find this information?

Defining a research question: For each of the interest areas you selected above, propose a research question. A good research question should have practical characteristics of specificity and feasibility (considering safety, resources, and time), in addition to novelty and significance.

Students should discuss their research question with teachers and peers. The process of selecting an area of interest, summarizing current knowledge, and defining a research question can take a long time, but these steps are critical to a successful project!
Phase 3: Developing the research question into a proposal

**Anticipated results:** Select one of the research questions you defined above. What kind of results would you need to answer your research question? You can’t predict the outcomes in research, but it helps to begin with the end in mind. What might your results look like?

**Materials and methods:** Gather the protocols you will need to obtain the necessary results. Some questions to consider are: What different types of samples will be needed? How will samples be collected? How will they be prepared for sequencing? What kind of sequencing will you be doing? What data processing will be required?

**Samples and controls:** Things will inevitably go wrong with your project. What controls will you need to confirm your protocols are working correctly? How many samples do you need to be confident in your results?