Our “skills” learning goals are for you to gain practice and excel in these scientific methods:

1. **Design:** Apply science process skills, such as: developing hypotheses, making predictions, and designing experiments to test them (e.g. design an experiment to determine whether it's change in temperature or sunlight that causes leaves to turn red in Fall).
2. **Analyze:** Interpret evidence collecting during experiments, looking for patterns and different ways to represent data, and using logical and/or quantitative reasoning to defend or reject hypotheses (claims). (e.g. use techniques
3. **Collaborate:** Confidently cooperate in teamwork, and practice team building, team communication and leadership. (e.g. use techniques like “that's a good idea, OK, how can we improve it even more?” "Jon, you haven't spoken much, what do you think?")
4. **Communicate:** Conversation aimed at a variety of audiences important for scientists: (Ben says: "Wow, their data predicts squirrel foraging will hit light speed at 12 days, ha!" Jen responds: "Yes, but they have zero data points at that part of the graph on foraging rate.")
   1) Speaking: practice speaking and listening to others in large & small groups.
   2) Reading: practice careful and critical reading of text, identification of important points & ideas, as well as slow deliberate reading and interpretation of figures and graphs.
   3) Writing: practice composition of text, writing manuscripts, building figures and graphs.
   4) Thinking: practice identifying data and evaluating author's evidence-based arguments.
5. **Reflect:** Develop personal learning goals and reflect on your progress throughout the semester.

Our "content" learning goals are for you to understand, describe, and provide examples of how:

(Topics categorized as Organismal Biology)
1. The reproduction of cells, chromosomes, genes, and individuals leads to variation of traits among individuals. (e.g., How beach mice have light colored fur because a mutation in the melanocortin receptor gene makes it difficult for them to make dark hair pigment)
2. Interactions among organisms and the environment determine individual survival and reproduction. (e.g., How and why do Anolis lizards choose their mates?)
3. Selection (and other mechanisms) acts on individuals and leads to the evolution of populations. (e.g., Why can human misuse of antibiotics result in new species of bacteria?)
4. The interaction of the processes underlying heredity (genetics) with the surrounding environment (ecology) leads to evolution and the diversity of biological organisms observed on this planet. (e.g., What processes led to some monkey species to have trichromatic, full color vision, whereas others are dichromatic, i.e. colorblind. Does that affect their hunting for food?)
5. The persistence of an allele in a population is dependent on natural selection and other evolutionary processes. (e.g., why do the alleles causing diseases like cystic fibrosis and sickle cell anemia remain in the human population?)

(Topics categorized as Cell and Molecular Biology)
1. Information in DNA -> becomes (transcribed) information as RNA -> becomes (translated) information in the form of proteins that determine structure. (e.g. How does a cell make insulin? or How does Transcription make mRNA?)
2. The 3D structure of a molecule determines its function (and influence its evolution). (e.g. the CFTR protein looks like a roll of toilet paper in the cell membrane, turns out it's an ion channel)
3. Changes in DNA (mutations that lead to new alleles) result in changed RNA that may lead to changed protein (structure) that lead to changed function. (e.g. What DNA change leads to sickle cell anemia? or How does a three base deletion result in the disease cystic fibrosis?)
4. Some cells can capture CO2 and transform photonic* energy into chemical energy (e.g. ATP) to drive cellular processes and build cellular polymers. (e.g. How does photosynthesis work? How does a chlorophyll pigments capture light energy?)
5. Small organic molecules (nucleotides, amino acids, lipids, carbohydrates) when built into polymers can associate to create large cellular surfaces and compartments with which to perform biochemical processes (called life). (e.g. What is a lipid and how is it used to create a cell membrane? When proteins join a membrane that makes intelligence!)

*Energy from thermal vents in the ocean are OK, too.