Basic Science Concept List

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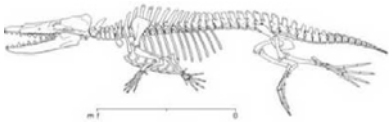

Course title:

Institution:

Semester:
Year:
Instructor:

Are you / where you...

- ❑ **The instructor of the course**
- ❑ **A teaching assistant in the course**
- ❑ **A student taking the course**

While not exhaustive (and we would appreciate it if you would concept statements below if you cover them and they are not listed), the list will enable you to make explicit to yourself, your teaching assistants and your students, which concepts you intend to cover.

It will also enable your teaching assistants (and students) to indicate what concepts they thought you covered.

Concept statements you should add to your list:

We would very much like to get a copy of your list, since this list can be more informative than the typical syllabus. Please mail or email it to us at
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CONCEPT STATEMENT AREA	emphasized	mentioned	Not covered
Science and its methods – 10 statements	❑	❑	❑
1. Science is a social endeavor that depends on a community of scientists who accept its 'rules'			
2.The preparation of results for publication, their review, and the response of the scientific community are integral parts of the scientific process.			
3. To be valid, an experiment generally must include both positive and negative controls.			
4. A positive control checks to see whether reagents and methods used produce the expected effects – whether they work. A negative control checks to see if the experimental effect observed is due to a single well-defined change in the system.			
5. Scientific questions are generally based on a working hypothesis. Questions are framed, if possible, to provide an unambiguous yes/no answer that could either disprove or be consistent with the hypothesis.			
6. If a question cannot be answered unambiguously, it needs to be reformulated. Often it must be simplified.			
7. To be useful, a published experiment must be described accurately enough, i.e. the conditions, the reagents used, etc., so that others can repeat it to verify the results.			
8. Fruitful hypotheses are generally either revised or extended; they rarely remain constant.			
9.As a hypothesis gains confirmation and is extended, it may become a well-established theory. Theories may be modified, or subsumed by other more generally applicable or accurate theories, but are rarely abandoned *in toto*.			
10. The more accurately measurements can be made, the more rigorously a hypothesis can be tested.			
Experimental Savvy – 9 statements			
1. Without positive and negative controls, experimental results are almost always uninterpretable.			
2. An well designed hypothesis leads to clear and distinct predictions that can be validated or disproven by experimental observation.			
3. Unconscious bias can enter many types of experiments; it can be best controlled for through the use of 'double-blind' experimental protocols and placebo-controls.			

4. The ability to reproduce an experiment is key; an experiment that cannot be reproduced cannot be interpreted.			
5. Investigators must honestly report their methods, observations and interpretation so that other can reproduce them.			
6. Keeping of a legible, well-dated, and complete record of experiments is important not only in terms of enabling others to reproduce or reconstruct previous experiments, but in establishing the priority of specific discoveries.			
7. Work performed in a lab, either University, public or private sector, is the property of the lab, not the investigator (this needs to be stated more accurately).			
8. To withhold information that clearly argues against the conclusions of an experimental study is as dishonest as fabricating data that supports the desired conclusion.			
9. Failure to acknowledge the contributions of others, whether past workers or co-workers is plagiarism.			

