

MARS 4910: Feb 5 / 7

Plan for Today:

- Complete research plan presentations
- Research Planning Discussion
- Research Proposal Discussion

Assignments for Next Week:

- Revise Research Plan (Due Feb 9)
- Research Proposal Intro & Methods (Due Feb 16)

The Research Plan & The Proposal

Research Plan:

- Points: 5% (MARS 4910) and 25% (MARS 4911)
- Due for MARS 4910 (By the end of Feb 9)
- Revised version Due for MARS 4910 Later

Research Proposal:

- Points: 5% (MARS 4910) and 25% (MARS 4911)
- Due for MARS 4910 (By the end of Feb 16)
- Revised version for MARS 4910 (Feb 27 / March 1)

Research Plan I

Outline: Research plans must be identical for all members of a research team. Cruise plans must include:

Names of collaborators working in the research group

Hypothesis being tested: Include the hypotheses, and the predictions derived from these hypotheses, which will be tested. For full credit, explicitly identify the independent and the dependent variables, and explain which ones are categorical and which ones are continuous.

Sampling gear needed - please be as specific as possible: (plankton nets, multi-corer, fish ID slates, wet-writing platforms, transect tapes, quadrats, sample jars, calipers, squirt bottles, sieves, formalin)

Research Plan II

Sampling locations (sites or stations):

Description: where is the site

Timing: dates stations will be visited

Location: latitude and longitude

Rationale: Why is this station selected

Samples to be collected at each site / station and list of equipment needed to process the samples

Potential hazards involved in data collection and steps to be taken to avoid those dangers

NOTE: You will be evaluated on the completeness, organization, readability, and clarity of your plan. Figures (Kaneohe Bay map showing station locations) and tables (dates, latitude / longitude, equipment) must be included.

Research Proposal

Outline: Each student will submit their own proposal. Proposals will reflect the research plan and must include:

Introduction, at least 500 words.

Here your primary goals are to establish that the study is of scientific interest, describe how your study relates to previous research, and to present your hypothesis and objectives. The text follows a logical thread leading to the hypotheses.

Material not pertinent to the hypothesis should not be included.

Research Proposal

Think of your hypotheses as the sun and all other parts of the paper as planets orbiting and born from that sun.

Without the sun the planets are dark, cold, and dead; without good hypotheses, your paper will resemble those sunless planets, traveling aimlessly through space.

State the *hypothesis* to be tested explicitly (make sure you use the term *hypothesis*)

Proposal Introduction I

- Introduction follows logical thread leading to hypotheses:

Introduce the field of study you are dealing with

State why this topic is of scientific interest
(a BIG picture statement / a FACT / a PREDICTION
are useful to catch the attention of the reader)

State why / how study is related to previous research
(what observation lead to your specific hypothesis?)

Proposal Introduction II

- Present the hypothesis in a broader context:

State the *hypothesis* to be tested explicitly
(make sure you use the term "*hypothesis*")

State how you will test this hypothesis
(make sure you use the term "testing")

State the reason why this work is important
(make sure you use the term "important")

Materials and Methods I

Materials and Methods, at least 400 words

Please refer to EV's writing guide for further suggestions:
Readers need to know how your methods will be used to test your hypothesis.

For each hypothesis: Provide clear description of your experimental design, sampling, and statistical procedures.

- Identify Dependent / Independent Variables (are they categorical / continuous ?)
- Any steps used to implement any controls
- Computer software publisher (SPSS) and version

Controls

Question: How do we avoid the influence of "outside" factors and variability?



Table 2.1. Sources of variability in experiments, and procedures for reducing confusion caused by such variability

Source of Variability	Reduction by Experimental Design
1. Variability among experimental units	Replication, interspersion, and simultaneous measurement
2. Random error in measurement of response variables	Replication
3. Change in conditions through time	Controls
4. Unsuspected side effects of treatment procedures	Controls
5. Bias of investigator	Randomized assignment of treatments to experimental units
6. Chance influences on experiment in progress	Replication and interspersion

Materials and Methods II

Analysis criteria (At least 100 words)

Include as a *separate section* following the Methods Section, the word count for this section is not included with the Materials and Methods. This is a component of Research Proposals, but typically not Research Papers.

For each hypothesis, include in the analysis criteria section:

- The response variable(s) evaluated
- The null hypothesis for each test
- The statistical procedure used to evaluate the hypothesis
- The significance level you will use.

Materials and Methods III

Hazards

Following the Analysis Criteria Section.

Potential hazards involved in data collection and steps to be taken to avoid those dangers.

Not typically included in research proposals.

MARS 4910: Feb 12 / 14

Plan for Today:

- Discussion: data synthesis and analysis
- Discussion of proposals and feed-back

Assignments for Today:

- Work on Proposal Materials and Methods