



Conrad Weiser High School

Experiments in Physiology

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COURSE DESCRIPTION:

This course provides a basic understanding of physiological mechanisms utilizing a laboratory instruction format. The laboratory experiences are designed to reinforce and expand the student's understanding of basic anatomy and physiological principles. The course content includes both general and clinical applications and is intended to prepare students for further study in the medical field. Students who plan on taking Experiments in Physiology should have successfully completed Anatomy and Physiology I and II.

COURSE OBJECTIVES:

- Execute some of the common techniques used in experimental physiology
- Compose written analyses of laboratory observations that:
 - 1) Explain the functions of selected systems in the human body
 - 2) Relate the explanations to the basic principles of science
- Formulate hypotheses for laboratory experiments, critically evaluate the design of laboratory experiments and develop an experiment of the students' own design
- Analyze experimental observations using the critical thought processes common to life sciences studies
- Effectively use and apply lab techniques, methods and equipment related to the fields of physiology
- Use basic computer technology in the field of physiology
- Explain the major concepts of membrane transport, membrane potentials, reflex functions & synaptic activity, neuroanatomy, human cardiovascular function, respiratory function, and physical fitness

INTRODUCTION

To get the most of your Experiments course you must be willing to ask questions! Remember the old saying "there is no such thing as a dumb question"? Well it's especially true when you are experimenting. When you participate in an experiments course you are learning something totally new, so you are expected to ask questions, then, search for answers.

Please don't hesitate to ask questions about these guidelines at any time.

QUALIFICATIONS:

- Complete or enroll in Anatomy and Physiology II
- Background or interest in science or education
- Strong organizational skills and attention to detail
- Excellent communication skills (verbal, written, interpersonal)
- Love of asking questions!

ASSESSMENT:

Each student will be required to prepare a **written research report** and to make a **short oral presentation** to the class outlining this research. The written research report will be worth 70% of the final assessment (30% for each of two draft proposals and 40% for the final proposal) and the oral presentation will contribute a further 20%. Please see the assignment instructions at the end of the syllabus for detailed information regarding the draft and final proposals and the oral presentation! The remaining 10% of the grade will be based on the individual student's participation in the course as determined by the instructor.

REQUIREMENTS:

You will be responsible for one experiment each marking period. You can continue an experiment through consecutive marking periods with the appropriate paperwork complete at the conclusion of each marking period.

Experiment Draft #1

What is required?

1. Definition of Goals and Objectives of your research
2. List of Definitions: Concepts within the paradigm of your research subject area
3. List of Axioms of your Research Subject Area
4. Identify points of confusion, incoherency, or lack of understanding
5. Reference List (annotated)

When is this required?

No later than Friday, Sept. 9, 2011

How should it be submitted?

Electronically, via the W drive, email, google docs, disc or other electronic medium.

How should I approach this?

1. Work with Ms. Schade to develop the scope and subject of your research (e.g., define the broad goals and/or objectives of your research project). At this point, do not attempt to define hypotheses about your research efforts.
2. Read the primary literature on the subject - start broad, narrow the focus as you gain knowledge and begin to narrow the scope of your research.
3. Explicitly define the concepts and terms of your subject matter.
4. Formulate the axioms associated with your research subject area
5. Is there any incongruency or incoherencies in the axioms of your research subject area? Spell them out.
6. Develop a literature database for your research subject area

Experiment Draft #2

What is required?

A draft proposal written as flowing text that includes the following:

1. A background (introductory) section that includes:
 - a general section that makes the context of your work clear and that includes, clearly describes and justifies (e.g. by citation) your major axioms.
 - a more specific section that leads naturally to the aim or focus of your specific research project and that includes, in a clear and logical manner, your major postulates.
2. Your overarching aim or hypothesis or research question. You should also list, any subordinate hypotheses that you intend to address to achieve your overarching aim. Please don't include every possible hypothesis here – only those that are likely to require a substantial investment of research effort in their own right.
3. The methods you intend to use to achieve your aim and, if appropriate, to test each of your hypotheses and subordinate hypotheses. For each major technique, please also state why you chose this particular method and not at least one alternative method. You may include a section on your analytical/statistical methods if you wish but there is no need to in this draft.
4. The expected outcome(s) of your research and their implications. A flow chart is likely to be helpful here.
5. A conclusion that briefly discusses your expected outcomes in the context of your background and leaves the reader with a clear picture of the relevance of your research.
6. An annotated reference list.
7. A flow chart as an appendix. This chart should clarify: the questions you intend to address in your project, the possible answers you might get to each question, the scientific implications of each answer, and the questions that flow from each implication.

When is this required?

No later than Monday, Sept. 26, 2011.

Experiment Final Report #3

Format: PLEASE READ CAREFULLY!

Your proposal must be written in either times-new roman or courier font. It must use 1.5 line spacing. It must have margins of at least 2.5 cm (1") on all sides of the paper. With the exception of the cover page, all pages must be numbered starting with 1 for the first page of the project description. Sections may not be longer than the page limits given. Tables and figures must have numbered descriptive titles and be cited in the text.

Cover Page: (one page)

This should include:

- Name & Block number
- Project title
 - This should be clear, relevant and descriptive and no more than 20 words. Good titles are usually 8 – 12 words long.

Abstract

- This should describe your project in no more than 250 words. This should include sentences on the background, the aim, the methods, the expected outcomes and the conclusion.

Project description: (maximum six pages)

This should include

1. An introduction that includes the following:
 - a general section that makes the context of your work clear and that includes, clearly describes and justifies (e.g. by citation) your major axioms.
 - a more specific section that leads naturally to the aim or focus of your specific research project and that includes, in a clear and logical manner, your major postulates.

2. Your overarching aim or hypothesis or research question (or whatever else you want to call it). You should also list, any subordinate hypotheses that you intend to address to achieve your overarching aim.
3. A methods section that includes:
 - study site(s) (if appropriate)
 - The physical methods you intend to use to achieve your aim and, if appropriate, to test each of your hypotheses and subordinate hypotheses.
 - The analytical/statistical methods you intend to use. Unless you intend to use a novel statistical approach or to develop a complex mathematical model as part of your proposal, this section can be relatively brief. It should, however, be sufficiently detailed to make the way in which you intend to assess your results clear to any reader.
4. An expected outcomes section. That discusses the expected outcomes of your research and their implications. A flow chart may be helpful here.
5. A conclusion that discusses your expected outcomes in the context of your background and leaves the reader with a clear picture of the relevance of your research.

Reference List (no page limit):

Please be sure to use this style for all citations and also for any appendices, figures and tables you choose to include in your proposal.

Appendices (optional, no page limit):

If there are lengthy additional tables or protocols that you wish to refer to in your text you may attach them as appendices. If you do so, they must be cited in the text, e.g. (Appendix 1) and have numbered descriptive titles.

When is this required?

No later than Wednesday, Oct 12, 2011.

Final Oral Assignment – The research presentation

Summary:

You are required to make a short oral presentation to the class on your proposed research. This should be a finished and polished product.

Timings:

You will be allocated 15 minutes for your presentation. You should speak for 9 to 12 minutes. The remaining time will be used for questions.

Equipment:

A projector and laptop will be provided. If you wish to use them, you should provide an electronic version of your presentation to Ms. Schade. If you need any other equipment for your presentation, please ensure that Ms. Schade is made aware of this need at least 72 hours prior to your presentation. Presenting the physiological equipment used in your experiment is highly suggested.