Contact information:

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**Assignment Guide for Fundamentals of scientific work**

**Answer the following questions (HW1)**

These questions are designed to help you think about the content of our course: Fundamentals of scientific work/Scientific work. Many of you have already answered these questions during class. Now you are required to write and submit the answers to the instructor.

**No minimum length required. Please do not exceed 200 words per answer. You do not have to write that long though. Exact copy and paste from the slides used in class is not allowed. Suggested answers used during the last class of this course are included at the end of this document, for your reference.**

**Please submit the assignment in WORD format before the due date to the instructor (see contact information) and include your first name, assignment number and submission date in the file name (For example, Faosta-HW1-20230924)**

Tips and Dates

* Suggested length: around 100 words or less
* Deadline: October 15, 2023

# Communication formats

1. You are about to choose how your study will be disseminated: what are the fundamental questions you should think about before proceeding? Explain and justify.
2. Think about the characteristics of primary research (Research articles and case histories), summarize their structure, including sections. (Introduction, literature review, methods....)
3. How would you define scientific writing style? What are its main objectives?

# Conducting a literature review -Planning the search process

1. What are the characteristics of a literature review?
2. Where can you find answers to your questions?
3. In your opinion, are colleagues a reliable source of information? Explain
4. What is PubMed useful for? Explain
5. What is the starting point of a literature review search?
6. What are some of the most important databases to help you through your search process?
7. Does the Cochrane Library contain evidence regarding etiology?
8. Can you enter your clinical question directly in your search bar? Why?

## Developing a search strategy

1. Ask a clinical question.
2. Translate the clinical question into Population/Determinant/Outcome
3. Choose the sources/databases to search.
4. Create a comprehensive search string.
5. Search for the literature (refine is necessary)
6. Export/save/email your results.

## Reference manager tool

1. How can you perform better in your review search?
2. What is a reference manager tool? Why is it helpful?
3. What are some reference manager tools that you can use?

# Scientific working techniques

## Iterative process in scientific work

1. What does iterative process in scientific work mean?
2. What activities are scientists engaged with in the Within the Exploration and Discovery area of the iteration cycle?
3. What is the largest and most important of the four areas in the iteration cycle? How would you define scientific testing?
4. How would you describe data interpretation?
5. What activities are scientists engaged with in the “Community Analysis and Feedback” area of the iteration cycle?
6. Regarding the “Benefits and Outcomes” area, how can engaging in the scientific process help us?

## Optimal Study Plan

1. Think about the steps for an optimal study design in your work. What are the major steps you would take for carrying out your study.
2. What are some of the frequent fails that you must consider when carrying out your study design?

# Terms and Procedures of empirical research

## Data and variables

1. How do you define a variable?
2. Explain what quantitative variables are. Make some examples.
3. Explain what qualitative variables are. Make some examples.
4. What is a dependent variable?
5. What is an independent variable?
6. What is a control variable?
7. What is a confounding variable? Make an example.
8. Describe both continuous and discrete variables.
9. What are the three fundamental quality criteria of scientific tests? Describe the characteristics of each.

## Which of these sentences is falsifiable?

## *(Write the number of the sentence below. Ex: 1, 2, 3…)*

1. People with high-sugar diets and sedentary activity levels are more likely to develop depression.
2. Younger people who are regularly exposed to green, outdoor areas have better subjective well-being than older adults who have limited exposure to green spaces.
3. Dogs cannot fly.
4. Women are more beautiful than men
5. Students who eat breakfast will perform better on a math exam than students who do not eat breakfast.
6. Students who experience test anxiety before an English exam will get lower scores than students who do not experience test anxiety.
7. Motorists who talk on the phone while driving will be more likely to make errors on a driving course than those who do not talk on the phone.
8. If you die you will go to heaven
9. Children who receive a new reading intervention will perform better than students who did not receive the intervention.
10. If a person does not study, they will study chiropractics

### Write the falsifiable sentences according to the structure *“if….then”*

### (If-part variable = independent variable – Then-part variable = dependent variable)

## Hypotheses

1. What is a hypothesis? What are its characteristics?
2. What is a contradiction? Make an example.
3. What is tautology? Make an example.

## Hypothesis testing

1. Exercise: Height of MalesIt’s assumed that the mean height of males in a certain city is 68 inches. However, an independent researcher believes the true mean height is greater than 68 inches. To test this, he goes out and collects the height of 50 males in the city.*How do you write the null and alternative hypotheses for this scenario?*
2. How can you define hypothesis testing and what are the main steps of hypothesis testing?
3. Describe the five steps according to your own understanding of the process.
4. Can data not be representative of the population? Why?

# IMRAD core Draft: Introduction and Methods sections

1. What is an introduction to a scientific paper and how would you write it?
2. Are previous studies of the literature mentioned in the introduction section? How?
3. How would you define the method section of a scientific article?

# Writing style for scientific work

1. What are some general recommendations about the writing style in scientific articles?
2. Are there any recommendations about the length of the sentences and paragraphs in scientific articles? Explain
3. What are some suggestions regarding abbreviations and acronyms in scientific articles?
4. How should the author deal with sensitive issues or subjects in scientific writing?

**For reference only: Exact copy and paste of these answers is not allowed. Paraphrase, add or delete content.**

**Suggested Answers used in last class (2023.09.17)**

* **IMRAD core Draft: Introduction and Methods section**

1. The introduction lays the foundation of biomedical writing and is the first portion of an article according to the IMRAD pattern. A scientific paper should have an introduction in the form of an inverted pyramid. The writer should start with the general information about the topic and subsequently narrow it down to the specific topic - related introduction. Steps taken while writing include stating the research problem and reviewing prior studies so as to identify gaps in the literature. The significance of the study should then be stated, and readers should be informed about the purpose of the study.
2. Prior studies are often mentioned in the Introduction. Usually, the authors use existing literature or research to motivate a study and advance the significance of their own paper
3. The method section of a research should describe what was done to answer the research question. This section may be called in different ways, including Materials and / or Methods. Experimental Design, Protocol, and Procedure and so on. Since this section includes an explanation of the procedures used to conduct the experiment, it is also divided into titled subsections. To have a successful method section, it is important to include the right amount of detail and to start in chronological order so as to direct the reader to the big picture before plunging into a myriad of details.

* **Writing style for scientific work**

1. When writing scientific articles, adopting the simplest style is recommended. The clarity of a statement is more important than its brevity, therefore unnecessary jargon and verbiage should be avoided.
2. Sentences should be clear and concise. They should not exceed 40 words or be less than 12. Ideally, a sentence should be comprised of around 20 words. Likewise, paragraphs in scientific articles should consist of 150 words and less than 50.
3. Abbreviations should be used consistently throughout the text. Both abbreviations and acronyms should be explained at their first appearance.
4. When referring to sensitive subjects the author should be careful about his language use to always display inclusiveness and respect. The author should also make use of gender sensitive language to avoid words or expressions that promote prejudices and stereotypes.

**Other suggestion:** When dealing with questions inquiring about the steps of a certain procedure, do not list steps one by one but paraphrase them in the form of a short paragraph:

Question Example: What are the main steps of hypothesis testing?

*Suggested answer:*

The process of hypothesis testing encompasses five fundamental steps. Firstly, researchers formulate their research hypothesis, delineating it into a null hypothesis (Ho) and an alternate hypothesis (Ha or H1). Subsequently, they embark on the journey of data collection, employing methods carefully designed to scrutinize these hypotheses. Once the data is in hand, an appropriate statistical test is selected and applied to assess its significance. The decision-making step follows, where researchers must determine whether to reject or retain the null hypothesis based on their statistical findings. Finally, the outcomes of this rigorous examination are presented in the results and discussion section of their research.