**ODAP DATA ANALYSIS PROJECT GUIDELINES (*ver* 1.2)**

Ocean Data Analysis and Presentation, ODAP

ESCI 468

Spring 2022

Dr. Robert Vaillancourt

**Project Due Dates:**

**February 21 & 23 – Present project idea to class**

**March 4th – Brief one-page project description**

**March 12 – Deadline to submit *Made in Millersville* poster abstract**

**April 12th – Poster presented at *Made in Millersville***

**April 29th – Final Research paper due in D2L drop box by 5 pm**

**April 26th & 28th – Final oral presentations**

1. **THE ASSIGNMENT**

All students are required to complete an oceanographic data analysis project and to present their results in the three most common modes of communication used in the science disciplines: (1) science research paper, (2) oral presentation, and (3) poster presentation. The project you choose is up to you but it MUST be an oceanography topic. The approach you will take is investigative. You are not writing a review paper, but rather a *scientific research paper.* The approach will follow these steps:

1. *Choose a topic and state a scientific hypothesis (the ‘thesis’).*
2. *Brainstorm your ideas with class in a brief, informal presentation to class*
3. *Investigate the problem by analyzing marine science data available in databases.*
4. *Reach conclusion and present your results as a scientific research article.*
5. *Present results to your class as a seminar.*
6. *Present your results to the wider community in poster format at* Made in Millersville *public event (virtual).*

You will pose a scientific hypothesis, and then by careful analysis of data decide whether there is ample evidence to support the hypothesis or reject it. Statistical analysis may be used as a tool to test your hypothesis, but this is not required. You may instead rely on a more intuitive approach, using the weight of the evidence to reach your conclusions.

1. **PRESENTATION FORMATS**

Both written and oral presentations must follow the traditional scientific paper format containing the following sections:

1. Abstract
2. Introduction
3. Methods and materials
4. Results
5. Discussion and conclusions
6. Figures and Tables
7. Bibliography

For guidance on correct format, style, and content, refer to these publications:

1. For guidance on the scientific paper, in Day & Gastel text read:
   1. Chapter 4 – *What is a Scientific Paper?*
   2. Section II, Chapters 7-15 – *Preparing the Text*
   3. Section III*,* Chapters 16-18 - *Preparing the Tables and Figures*
   4. Section VII, Chapters 30-34 – *Scientific Style*
2. For guidance on the oral presentation, refer to:
   1. Day & Gastel, Chapter 27 – *How to Present a Paper Orally*
   2. “*Scientifically Speaking: Tips for Preparing and Delivering Scientific Talks and Using Visual Aids*”, available on the course D2L site, under Content/Articles.
3. For guidance on creating scientific poster presentation, see:
   1. Day & Gastel, Chapter 28 – *How to Prepare a Poster*
   2. See publication *Scientifically Speaking*, available on course D2L site.
4. More guidelines for written and oral presentations:

The final oral presentations are scheduled during the final week of the semester. The first two things you need to do are:

* Present your project idea to class in brief 15-30 minute presentation (Feb 21 & 23), then:
* submit via D2L dropbox a one page summary of your topic by Friday, March 4th.

The specific requirements for the final oral and written assignments are outlined in the grading rubric found in the D2L site: Resources/Content/Oral Presentation. The salient features are:

* Topic must be pre-approved by me.
* Duration of final oral presentation should be 30 minutes, plus an additional 5 minutes for question and answer. Length of written paper is 2,500 words, excluding bibliography. Three students will be chosen at random to ask questions during the Q&A period.
* Oral presentation must be accompanied by a PowerPoint presentation (or using other similar slide presentation software).
* The final slide must be a literature bibliography, carefully and completely listing all sources of information you used.
* You must upload your PowerPoint file (saved as pdf file) to the D2L dropbox after your presentation, but before final exam period.
* You must use a minimum of five approved literature sources.
* All literature used to prepare your talk must be from approved sources (see below).

Literature research is a fundamental skill of the scientist. The explosion of the Internet has resulted in a large variety of information sources, most of which are unreliable and should NOT BE USED. A literature source is legitimate if it is from a peer-reviewed source. Peer review is a process of self-regulation by a profession or a process of evaluation involving qualified individuals within the relevant field. Peer review methods are employed to maintain standards and provide credibility to one’s work. In academia peer review is often used to determine an academic paper's suitability for publication.

Examples of APPROVED peer-reviewed literature sources:

* Science journals in a library’s holdings
* Textbooks and other published books and monographs
* Published reference books, such as the CRC Handbook series.

Examples of literature sources that are NOT APPROVED:

* Wikipedia articles
* Google Search references (unless referring to peer-reviewed literature)
* Internet web sites (anyone can publish anything on the internet!)
* Something your friend told you

If you are in doubt, come talk to me, or to the Millersville University Science Librarian, Melissa Gold, Caputo 120, Phone*:* (717) 871-2378, email: [Melissa.Gold@millersville.edu](mailto:Melissa.Gold@millersville.edu).

1. **SUGGESTED IDEAS FOR THESIS TOPICS**

The following are some topic ideas that might work well for you. Ample data should be available in on-line databases, or available through me. I will steer you towards project ideas for which I know there is ample data available and away from topics that will have a problematic paucity of supporting field data. The objective here is not for you to make significant contributions to the field, but to learn how to write a science research paper and communicate the results. I also suggest perusing your Intro to Oceanography textbook for some topic ideas. Here are a few ideas that I strongly suggest:

1. Hypothesis 1 - *The upper ocean is much more stably-stratified at low latitudes compared to high latitudes and this stratification is largely the result of heating from the sun.*
2. Hypothesis 2 - *Sunlight penetration is much greater in the upper ocean of low latitude oceans compared to high latitudes, due mainly to the presence of higher chlorophyll a biomass at higher latitudes.*
3. Hypothesis 3 – *In temperate latitudes, the upper-mixed layer depth varies seasonally, with greatest depths during the fall and winter when heat influx is least and wind stress is greatest, and shallowest depths during the spring and summer when heat flux increases and wind stress declines.*
4. Hypothesis 4 – *In temperate latitudes the onset of the spring growing season (of phytoplankton) can be detected by a rapid increase in chlorophyll* a *and oxygen concentrations, and a decline in plant nutrient concentrations (nitrate and phosphate).*
5. *Hypothesis 5 – Phytoplankton biomass (chlorophyll a) is greater in the surface ocean of higher latitudes compared to lower latitudes.*
6. **SOME SUGGESTED OCEANOGRAPHY DATABASES**

World -wide ocean databases of vertical profiles collected by research vessels:

* Ocean Data View: <https://odv.awi.de>
* National Science Foundation’s Biological and Chemical Oceanography Data Management Office: <https://www.bco-dmo.org>

Chesapeake Bay water quality monitoring data since 1984 (collected by ship):

* Chesapeake Bay Program database: <https://www.chesapeakebay.net/what/data>

Ocean Observatories Initiative (OOI) database of mooring time-series and autonomous vehicle data:

* <https://ooinet.oceanobservatories.org>
* [https://gliders.ioos.us/map/#](https://gliders.ioos.us/map/)

World-wide oceanographic data collected by Argo floats:

* <https://argo.ucsd.edu>