

## Methods and Applications Summative Assessment: Outline & Rubric

**Competency Name:** Methods and Applications

**Competency Statement:** Apply the principles, concepts, and methods of the natural sciences.

**Summative Assessment Submission Title:** Scientific Methods Project

**Competency Objectives:**

1. Identify a real world problem, which can be solved using the principles, concepts, and methods of natural sciences.
2. Apply the steps of the scientific method to a real world problem.

**Program Learning Outcome (s):** N/A

**Institutional Learning Outcome (s):** N/A

### Purpose of this Assessment

The purpose of this assessment is to identify a real world problem and apply the steps of the scientific method to identify solutions.

### Items Required for Submission

The item required for submission is a 14-16 page written report that addresses a real-world problem connected to the natural sciences.

### Step ONE: Preparation

- Identify a real-world problem connected to the natural sciences. Your problem should focus on something that can be addressed using data from reputable governmental websites. Your Scientific Methods Project will be based on this problem, so take time and thought to consider your choice. Sample problems might include:
  - Water scarcity in California
  - Air Quality Issues in New York City
  - Fracking Impacts on Health in the United States
  - Reduced Carbon Emissions for Businesses in X state
- Preview relevant literature and existing information about your problem that you will use in your literature review.
  - The purpose of a literature review is to be able to present the main ideas and salient concepts associated with your chosen topic. For instance, if you are studying the topic of air quality, the various themes that may emerge in the literature are: defining air quality, air quality and industrialization and finally, air quality and health. How would you have come up with these themes? As you read through the various journal articles, you are going to find different themes and ideas that emerge and big topic areas in the literature.
  - The majority of these research articles (4 of the 5) should have been published since 2010 to express currency in the field. It is ok to use one or two articles from an earlier time period so long as you can justify why they are important and salient to your topic.

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- We can think of a literature review as a jumping off point for the discussion and exploration of a particular topic. Whenever you are going to do research, you have to begin with the research that other people have done so that you are not reinventing the wheel.
  - The best way to find literature is to go through a library website to access journal databases. You want to do a search within the journal databases using key words that are relevant to your topic. This process will ensure that you can find a minimum of five research articles that relate to your topic.
- Become familiar with data from reputable governmental websites that relates to your problem. You will rely on this data for the methods and results section of your report. Your literature review, hypothesis, and problem statement will drive your data collection.

### FEDERAL LEVEL DATA

- U.S. Census Bureau: <https://www.census.gov/>
- U.S. Federal reserve: <http://www.federalreserve.gov/econresdata/default.htm>
- Environmental Protection Agency: <http://www.epa.gov/>
- U.S. Department of Labor: <http://www.bls.gov/eag/eag.ca.htm>
- Center for Disease Control: <http://www.cdc.gov/>
- National Institute of Environmental Health Sciences: <https://www.niehs.nih.gov/health/topics/exposure/air-pollution/>

### STATE LEVEL DATA

- California State Data: <http://data.ca.gov>
- California State Natural Resource Data: <http://ceres.ca.gov/>
- New York State Data: <https://data.ny.gov>

### COUNTY LEVEL DATA

- Humboldt County California: <http://co.humboldt.ca.us/>

### NON-GOVERNMENTAL ORGANIZATIONS

- Natural Resources Defense Council: <http://www.nrdc.org/reference/environgroups.asp>
- [http://www.climatecounts.org/scorecard\\_overview.ph](http://www.climatecounts.org/scorecard_overview.ph)

- Review APA guidelines so that you are familiar with how to apply them as you write.

## Step TWO: Completing Item 1: Written Report

The written report must include the following sections, and each section should include the relevant heading:

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## A. Introduction (1/2 page or one paragraph):

- In this section, describe the topic and explain its importance.
- Cite, as appropriate, newspaper, Internet news, or governmental sources to show that the issue is important to address.

## B. Problem Statement (1 page):

- Define the problem or issue by addressing the various aspects of the problem, such as:
  - The physical environmental factors and how this impacts the problem/issue
  - The stakeholders involved in the problem/issue
  - An understanding of the stakeholder/physical environment interaction and challenges

## C. Literature Review and Hypothesis (2-3 pages):

- Use headings to highlight three themes that emerge from the information/research articles that you review.
- Summarize what you found in your review of the literature (a minimum of 5 academic or journal articles).
- At the end of your literature review, present your hypothesis and provide evidence for your hypothesis based on your literature review.

## D. Methods (1-2 pages):

- Describe your research methods explaining when, where, and how you got your data.
- Use at least 3-4 sentences on the background of the organization from which you got this information such as mission, purpose, and funding sources.

## E. Results (2-3 pages)

- Create tables, charts, and graphs that summarize the data (at least five).
- Explain the tables, charts, and graphs without analyzing the results at this time.

## F. Analysis and Discussion (2 pages)

- Interpret the meaning of your data.
- Discuss any trends related to the issue and how the data supports (or does not support) key aspects of the problem.
- Use the Systems Framework to interpret your findings (identify the various aspects of your problem or issue and how they interrelate and affect one another.)

## G. Conclusion and Recommendations (1/2 page)

- State the overarching conclusions that you can draw from your project.
- Specify at least three recommendations and provide rationale.

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## H. References

- Include a reference page in correct 6<sup>th</sup> edition APA format.

### Step THREE: Checklist for Submission

Before you submit, check to see if you believe you have met the criteria noted below.


Did you....

- ✓ Clearly define a real world problem that includes the physical environmental factors, how these factors impact the problem/issue, include the stakeholder involved in the problem/issue, and describe the stakeholder/physical environment interaction and challenges?
- ✓ Provide a comprehensive, detailed, and well-researched review of literature for all references?
- ✓ Demonstrate an understanding of the research methods used to collect your data?
- ✓ Cite the sources for all of the data that you used? (five in the literature review)
- ✓ Demonstrate the ability to understand and evaluate your data/results?
- ✓ Illustrate the ability to develop conclusions based on your results?
- ✓ Check that your paper is logical, well written, and the required length?
- ✓ Check spelling, grammar and punctuation, APA formatting standards, and citations and reference page?

### Step FOUR: Submit Your Work

- Your completed final assessment documents should be submitted through the Final Assessment page of your competency.
- Please note, for files smaller than 10MB (i.e., most Word documents), use the corresponding “+UPLOAD STUDENT FILE” button to upload your final assessment assignments. For larger files of any type (i.e., voice-over PowerPoint files, videos, or image-heavy documents), please use the optional TEXT EDITOR to provide a URL where your grader can download your file.

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**BRANDMAN**  
University  
CHAPMAN UNIVERSITY SYSTEM

Dashboard

Competencies







Learning Journal

+ SRM FA Doc1.docx

+ Upload additional files to this assignment. This is optional

**Assignment 5**  
5. A 10- to 15-slide PowerPoint presentation with supporting voice-over

Use File Uploader

**B** *I* |   |   |  

Download URL for Assignment 5: <https://fwk.box.com/s/2nwjgkwooz6pa7wm8uzojjwerzb7sl2>

Comments (Optional)

- How you create a download URL is up to you, but various free online providers, including Google Drive, Box.com, or Dropbox, offer this service. Please make sure that the URL you provide can be accessed by anyone with the link. For further instructions on how to create public links for uploaded files, consult the support pages for your chosen provider.

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## Scoring Rubric for Summative Assessment

<i>Criterion</i>	<b>EMERGING (1)</b>	<b>DEVELOPING (2)</b>	<b>PROFICIENT (3)</b>	<b>EXEMPLARY (4)</b>
<b>Introduction and Problem Statement</b>	Poorly defines a real-world problem with little, if any, description of the physical environmental factors or stakeholders.	Partially defines a real-world problem with limited description of the physical environmental or stakeholders.	Defines a real-world problem including using physical environmental factors, stakeholders, and descriptions about the two.	Clearly defines a real-world problem including using physical environmental factors, stakeholders, and the interaction between the two.
<b>Literature Review and Hypothesis</b>	Provides a limited literature review; identifies less than two themes to use as headings; fails to presents the hypothesis with any supporting evidence; cites less than four academic sources.	Provides a partially completed literature review; identifies at least two themes to use as headings; presents the hypothesis with limited supporting evidence; cites less than five academic sources.	Provides a detailed literature review; identifies three themes to use as headings; presents the hypothesis with some supporting evidence; cites five or more academic sources.	Provides a comprehensive, detailed literature review; identifies three themes to use as headings; clearly presents the hypothesis with supporting evidence; cites five or more academic sources.
<b>Methods</b>	Provides a limited description of the research methods used and includes limited information about the organization/agency that collected the data. Includes limited information on when and how the data was collected, limited information on the mission of the	Provides a partial description of the research methods used and includes some information about the organization/agency that collected the data. Includes some information on when and how the data was collected, some information on the mission of the	Provides a description of the research methods used and includes most of the information about the organization/agency that collected the data. Includes most information on when and how the data was collected, most information on the mission of the organization that	Provides a detailed description of the research methods used and includes information about the organization/agency that collected the data. Includes information on when and how the data was collected, information on the mission of the organization that

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	organization that collected the data, and minimally cites sources, if at all.	organization that collected the data, and cites sources for some of the data.	collected the data, and successfully cites sources for all data.	collected the data, and successfully cites sources for all data.
<b>Results</b>	Creates tables, charts, and graphs that do not summarize the data and provide limited or no explanation; includes less than five.	Creates tables, charts, and graphs that weakly summarize the data and provide limited explanation; includes less than five.	Creates tables, charts, and graphs that summarize the data and provide a reasonable explanation; includes at least five.	Creates tables, charts, and graphs that clearly summarize the data and provide a detailed explanation; includes at least five.
<b>Analysis and Discussion</b>	Fails to use the Systems Framework to identify the trends in the data and does not provide an interpretation of the data.	Minimally uses the Systems Framework, partially identifies the trends in the data, and provides some interpretation of the data.	Using the Systems Framework, identifies the trends in the data and provides a reasonable interpretation of the data.	Using the Systems Framework, accurately identifies the trends in the data and provides a comprehensive interpretation of the data.
<b>Conclusion and Recommendations</b>	Provides a limited conclusion including up to three recommendations with little or no rationale.	Provides a partial conclusion including up to three recommendations with limited rationale.	Provides a reasonable conclusion including at least three recommendations with supported rationale.	Provides a detailed conclusion including at least three recommendations with well-supported rationale.
<b>Writing Mechanics</b>	The paper lacks clarity and may be confusing and does not meet the required length. Numerous errors in spelling, grammar and/or punctuation. Limited, if any, adherence to APA standards.	The paper is somewhat logical, adequately written, and does not meet the required length. Spelling, grammar, and punctuation errors are present. APA formatting standards minimally followed; citations and reference page are	The paper is logical, well-written, and the required length. Spelling, grammar, and punctuation are mostly accurate. APA formatting standards are followed; citations and reference page are mostly correct.	The paper is logical, well-written, and the required length. Spelling, grammar, and punctuation are accurate. APA formatting standards are followed; citations and reference page are correct.

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