**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. Cleaner Fuel Using HHO Browns Gas

2. Apply the steps of the scientific method to a real world problem.

**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

o 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**. Nasa article**

o We can think of a literature review as a jumping off point for the discussion and exploration of a particular topic. Whenever you are

FEDERAL LEVEL DATA

Ø U.S. Census Bureau: https://www.census.gov/

Ø U.S. Federal reserve: http://www.federalreserve.gov/econresdata/default.htm

Ø Environmental Protection Agency: http://www.epa.gov/

Ø U.S. Department of Labor: http://www.bls.gov/eag/eag.ca.htm

Ø Center for Disease Control: http://www.cdc.gov/

Ø National Institute of Environmental Health Sciences: https://www.niehs.nih.gov/health/topics/exposure/air-pollution/

STATE LEVEL DATA

Ø California State Data: http://data.ca.gov

Ø California State Natural Resource Data: http://ceres.ca.gov/

Ø New York State Data: https://data.ny.gov

COUNTY LEVEL DATA

Ø Humboldt County California: http://co.humboldt.ca.us/

NON-GOVERNMENTAL ORGANIZATIONS

Ø Natural Resources Defense Council: http://www.nrdc.org/reference/environgroups.asp

Ø 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:

o The physical environmental factors and how this impacts the problem/issue

o The stakeholders involved in the problem/issue

o 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 6th 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….

ü 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?

ü Provide a comprehensive, detailed, and well-researched review of literature for all references?

ü Demonstrate an understanding of the research methods used to collect your data?

ü Cite the sources for all of the data that you used? (five in the literature review)

ü Demonstrate the ability to understand and evaluate your data/results?

ü Illustrate the ability to develop conclusions based on your results?

ü Check that your paper is logical, well written, and the required length?

ü 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.

**Rubric**

Clearly defines a real- world problem including using physical environmental factors, stakeholders, and the interaction between the two.

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.

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 collected the data, and successfully cites sources for all data.

Creates tables, charts, and graphs that clearly summarize the data and provide a detailed explanation; includes at least five.

Using the Systems Framework, accurately identifies the trends in the data and provides a comprehensive interpretation of the data.

Provides a detailed conclusion including at least three recommendations with well-supported rationale.

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.