FAIRMONT STATE UNIVERSITY

**MEMORANDUM**

TO: Faculty Senate

FROM: Jack Kirby JEK

DATE: March 8, 2017

SUBJECT: Curriculum Proposal #16-17-14

Ocean Issues & Society

I recommend approval of the attached Curriculum Proposal 16-17-14. This proposal seeks to create a new science course (Ocean Issues & Society) which would satisfy General Studies Outcome 15 – Natural Science.

Dr. Christina Lavorata
Dr. Don Trisel
Dr. Deb Hemler
Ms. Leslie Lovett
Ms. Laura Ransom
Dr. Shayne Gervais

FAIRMONT STATE UNIVERSITY

**MEMORANDUM**

TO: Curriculum Committee

FROM: Jack Kirby JRK

DATE: February 14, 2017

SUBJECT: Curriculum Proposal #16-17-14

Ocean Issues & Society

I recommend approval of the attached Curriculum Proposal 16-17-14. This proposal seeks to create a new science course (Ocean Issues & Society) which would satisfy General Studies Outcome 15 – Natural Science.

Dr. Christina Lavorata
Dr. Don Trisel
Dr. Deb Hemler
Ms. Leslie Lovett
Ms. Laura Ransom
Dr. Shayne Gervais

**CURRICULUM PROPOSAL** (Submit one hard copy and an electronic copy to the Associate Provost by the second Tuesday of the month.)

| | |
|---|---|
| **Proposal Number:** | **# 16-17-14** |
| **School/Department/Program:** | **Science & Technology: Biology, Chemistry, Geoscience** |
| **Preparer/Contact Person:** | **Dr. Deb Hemler** |
| **Telephone Extension:** | **4393** |
| **Date Originally Submitted:** | **2/14/17** |
| **Revision (Indicate date and label it Revision #1, #2, etc.):** | |
| **Implementation Date Requested:** | **8/15/2017** |

I. **PROPOSAL**. Write a brief abstract, not exceeding 100 words, which describes the overall content of the proposal.

**This proposal requests that a new course: SCIE 2XXX: Ocean Issues & Society be added to the FSU catalog. This 100% online course was developed to satisfy general studies outcome 15- Natural Science. We currently have only two online SCIE general studies science courses, which fill quickly. An additional online course would alleviate pressure for overrides on these existing courses. In addition, this course will be used to satisfy a course requirement for a future proposal for the creation of an Earth & Space Science 5-Adult certification.**

II. **DESCRIPTION OF THE PROPOSAL**. Provide a response for each letter, A-H, and for each Roman Numeral II–V. If any section does not apply to your proposal, reply N/A.

A. Deletion of course(s) or credit(s) from program(s)
**N/A**

Total hours deleted. **0**

B. Addition of course(s) or credit(s) from program(s)
**N/A**

Total hours added. **0**

C. Provision for interchangeable use of course(s) with program(s)

D. Revision of course content. Include, as an appendix, a revised course description, written in complete sentences, suitable for use in the university catalog.

**N/A**

E. Other changes to existing courses such as changes to title, course number, and elective or required status.
**N/A**

F. Creation of new course(s). For each new course

1. Designate the course number, title, units of credit, prerequisites (if any), ownership (FSU or shared) and specify its status as an elective or required course. If you are creating a shared course, attach a memo from the Deans of the affected Schools explaining the rationale for the course being shared.

**Course number: SCIE 2XXX**
**Course Title: Ocean Issues & Society**
**Course credits: 4 credits**
**Ownership: FSU**
**Status- general studies elective**

2. Include, as an appendix, a course description, written in complete sentences, suitable for use in the college catalog.

**See Appendix A. Course Catalog Description**

3. Include, as an appendix, a detailed course outline consisting of at least two levels.

**See Appendix B. Course Outline**

4. In order to meet the requirements as outlined in Goal One of the Strategic Plan, please include Outcome Competencies and Methods of Assessment as an appendix. Examples are available upon request from the Chair of the Curriculum Committee.

**See Appendix C. General Studies outcome table.**

G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).

Describe how this proposal affects the hours needed to complete this program. Specifically, what is the net gain or loss in hours? Use the format for Current and Proposed Programs in Appendix A.

**N/A to any particular existing degree program. The addition of this general studies class does not impact any existing programs on campus.**

III. **RATIONALE FOR THE PROPOSAL**.

A. **Quantitative Assessment**: Indicate the types of assessment data, i.e., surveys, interviews, capstone courses, projects, licensure exams, nationally-normed tests, locally developed measurements, accreditation reports, etc., that were collected and analyzed to determine that curricular changes were warranted. Quantitative data is preferred.

   a. **Course Schedule Analysis: For many years Meteorology SCIE 1210 was the only online science course that satisfied the general studies natural science outcome. Every section of this course filled to capacity every time it was offered. Last year, an online chemistry 1101 course and an Earth & Sky online course were added to the catalog. Despite the addition of two online courses, the Oceans class was offered in the Fall 2016 (as a SCIE 1199 course) and quickly filled to capacity. Seats were still available in almost all of the face-to-face sections of Human Biology and Science that Matters, suggesting that three online general studies courses are not sufficient to meet the student desire for online courses.**
   b. **WV Department of Education added Earth & Space Science (ESS) as a required course for all ninth grade students in the State. We currently have no certification for ESS. Ohio Valley University currently has the only certification program and Concord University is in the process of approving a program. Fairmont State would be the third to offer an ESS certification in the state. This course will need to be in place when the certification program is designed and approved.**
   c. **Praxis ESS Exam- The licensure test which Earth & Space Science preservice teachers take contains oceanography concepts. The course, as part of an ESS certification, would enhance content knowledge and expose students to socio-science economic issues.**

B. **Qualitative Assessment**: Based upon the assessment data above, indicate why a curricular change is justified. Indicate the expected results of the change. Be sure to include an estimate of the increased cost, or reduction in cost of implementation. FOR EXAMPLE: Will new faculty, facilities, equipment, or library materials be required?

   a. **The student feedback from the course offered in Fall of 2016 was well received. Qualitative data includes an end of course survey with a sample of comments included:**

      "**I would just like to say that I learned a lot in this class. I feel that the things that I learned is something that everyone needs to learn about because it could help change the world for the better. I can now say that choosing to take this class for one of my electives was one of the best decisions I made"**

      **"I enjoyed the PSA video. It was different way of explaining what I had learn other than taking test or writing a paper"**

      **"I think [the class] was fair especially for an online class. It is sometime a little more difficult to completely understand a topic without face to face lecturing"**

b. **Given the data from the course schedules, many FSU students prefer the flexibility of online courses to satisfy their general studies. Adding an additional online course to the course schedule would help satisfy this need.**
c. **Once the Earth and Space Science Certification proposal is drafted, this course would immediately serve as a major requirement.**
d. **No new faculty will be required to teach this course. The course was developed in the spring of 2016 as part of a grant buy-out and implemented by those faculty in Fall 2016.**
e. **No new facilities, equipment, or library materials will be required since all resources are provided online.**

IV. Should this proposal affect any course or program in another school, a memo must be sent to the Dean of each school impacted and a copy of the memo(s) must be included with this proposal. In addition, the Deans of the affected schools must sign below to indicate their notification of this proposal.

By signing here, you are indicating your college's/school's notification of this proposal.

| College/School | Dean | Signature |
|---|---|---|
| **Science & Technology** | **Dr. Don Trisel** | |
| | | |
| | | |
| | | |

V. Should this proposal affect any course to be added or deleted from the general studies requirements, a memo from the chair of the General Studies Committee indicating approval of the change must be included with this proposal.

**This course was submitted to the General Studies Committee on February 10, 2017. This submission is included in Appendix C.**

VI. ADDITIONAL COMMENTS.

**Appendix A: Course Catalog Description**

**SCIE 2XXX FSU Ocean Issues & Society……..4 hrs.**
This online project-based science course is designed to teach science concepts within the theme of ocean issues such as Coral Bleaching, Offshore Drilling, Garbage Gyres, and Dead Zones. The fifteen modules focus on the biology, chemistry, physics, and geology content and processes needed to understand ocean issues. Each module explores student understanding of the issue, promotes ocean science literacy, investigates impacts on the ocean and/or terrestrial environment, and requires application projects requiring engagement with science, technology, and societal needs.

**Appendix B. Ocean Issues & Society Course Outline**

1. Stranger to Blue Water (Defining an Ocean)
    a. Ocean Geography and Intro to Plate Tectonics
    b. Ocean Literacy
2. Oil, that is, Black Gold, Texas Tea (Offshore Drilling)
    a. Seafloor structure
    b. Oil and Gas Formation
    c. Oil and Gas Exploration
3. The Tide is High But I'm Moving On (Tidal Energy)
    a. Gravity
    b. Tides
    c. Energy
4. Johnny Tsunami or There is no "Tide" in Tidal Wave (Tsunamis)
    a. Plate motion
    b. Earthquakes
    c. Tsunami warning
5. I Saw Red (Red Tides or Algal Blooms)
    a. Taxonomy
    b. Cycles: Nitrogen and Phosphorus
    c. Algal Blooms
6. Reefer Madness (Coral Bleaching)
    a. Photosynthesis
    b. Symbiosis
    c. Coral Classification
    d. Coral Bleaching
7. That's Rubbish (Garbage Gyres)
    a. Watersheds
    b. Currents
    c. Density
    d. Garbage Gyres
8. Acid Rap (Ocean Acidification)
    a. Acids/bases & pH

   b. Calcium carbonate and Shell formation
   c. Water chemistry
   d. Ocean acidification
9. Make it a Hurricane Before I go Insane (Ocean Storms)
   a. Meteorology
   b. Storm classification
   c. Hurricane formation
10. The Floating Dead? (Dead Zones)
   a. Water chemistry (dissolved oxygen)
   b. Runoff
   c. Dead zone formations
11. One Fish Two Fish (Overfishing)
   a. Food webs
   b. Trophic levels
   c. Population ecology
   d. overfishing
12. Exotic is Not Always Good (Invasive Species)
   a. Ecosystems
   b. Biomes
   c. Competition by invasive species
13. Drawing a Line in the Sand (Sea Level Rise)
   a. Thermal expansion
   b. Climate change
   c. Topographic maps
   d. Sea level rise
14. Boy Meets Girl (El Nino/La Nina)
   a. Climate zones
   b. Climate & weather
   c. Ocean circulation
   d. El Nino/La Nina effects
15. Gone Coastal (Coastal Environment Degradation)
   a. Coastal environment classification
   b. Barrier Islands
   c. Coastal wetland ecology

16. The Final Countdown (Culminating Project)-
   a. Connecting Climate Change to Ocean Issues
   b. Applying course content

# Appendix C

## General Studies Course Inclusion Worksheet

1. **Course: Ocean Issues and Society – SCIE 2XXX**

   *Course Description: This online project-based science course is designed to teach science concepts within the theme of ocean issues such as Coral Bleaching, Offshore Drilling, Garbage Gyres, and Dead Zones. The fifteen ocean issue modules focus on teaching the biology, chemistry, physics, and geology content and processes needed to understand the issue. Each module explores student understanding of the issue, promotes ocean science literacy, investigates impacts on the ocean and/or terrestrial environment, and facilitates projects requiring engagement with science, technology, and societal needs.*

2. **Faculty Contact (name/email): Deb Hemler (dhemler@fairmontstate.edu) and Sean Harwell (sean.harwell@fairmontstate.edu)**

3. **Date submitted: 2/10/17**

4. **Submitted for General Studies Attribute(s): Outcome 15: Natural Science.** Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization.

   In the table provided below, the yellow highlight indicates the specific part (attribute) of the outcome which the assessment addresses. The four assessments:

   a. Content quizzes (overall score)- basic science literacy
   b. Hurricane tracking lab (rubric of multiday project)- scientific inquiry
   c. El Nino/ La Nina graph data analysis (scoring guide)- analysis and quantitative literacy
   d. Ocean Issue Frameworks (overall on scoring guides)- connection of science to everyday life and contribution to civilization

**5. General Studies Mapping Table**

| a. Course Outcomes | b. General Studies Mapping | c. Direct assessment measures | d. Student Evaluation Tool | e. Satisfactory performance standards |
|---|---|---|---|---|
| **Upon successful completion of this course, students will be able to…** *(Enter <u>all</u> course outcomes below.)* | **The associated course outcome maps to the general studies outcome…** | **Student performance with respect to this course outcome will be measured by…** | **Student performance on the direct assessment measure will be evaluated using** … | **Satisfactory student performance on the direct assessment measure will consist of**… |
| 1. Accurately use the vocabulary of basic principles, facts, and theories pertaining to the science of oceanography to enhance their basic scientific literacy. | Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization. | Twelve module quizzes serve as summative assessments for science content.<br>Example: 2.2 Seafloored Quiz (Appendix A), | Average scores on auto-graded quizzes (n=12) in BlackBoard.<br>Example: 2.2 Seafloored Quiz with Key (Appendix A) | Class average of 70% on the quizzes. |
| 2. Engage in scientific inquiry when investigating ocean phenomenon. | Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should | Hurricane tracking activity (9.2 Track Star) has students use live data to track, record, and predict the path of a hurricane. | Lab Rubric used to score student submissions (Appendix B) | 80% of students will score a 7 out of 10 or higher on the assignment. |

| | | | | |
|---|---|---|---|---|
| | understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization. | They will evaluate the process to determine intricacies of using science to make predictions.<br><br>Example Appendix B | | |
| 3. Demonstrate the ability to analyze, problem solve, quantitatively manipulate data, and interpret or evaluate data that pertains to oceans. | Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization. | El Nino/La Nina Activity (14.4 Prepare for the Worst) provides data for events that have occurred from 1965 to 2010. Students analyze the quantitative data and make inferences based on this data. After interpretation, they predict the impact on West Virginia crop production. | Assignment Scoring Guide (Appendix C) | 75% of students will score a 17.5 out of 25 on the final product |
| 4. Use new found science knowledge and skills to identify ecological and societal impacts and suggest viable solutions to remediate effects on local and global communities. | Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life | Ocean Issue Framework assignments are constructed for all ocean issues. This assignment requires students to describe the impacts of the ocean issue, suggest viable solutions, and make | The average score on all (n=13) of the Ocean Issue Framework Assignments | 80% of students scoring an average of 70% (7 out of 10) on all Ocean Issue Framework submissions |

| | | | | |
|---|---|---|---|---|
| | and how the natural sciences contribute to the general welfare of civilization. | recommendations for remediation. | (see Appendix D for sample scoring guide) | |

**6. Chair's Letter is attached at the end of the document.**

# Appendix A: Scientific Literacy Sample Quiz with answers

**Course Outcome:** Accurately use the vocabulary of basic principles, facts, and theories pertaining to the science of oceanography to enhance their basic scientific literacy.

**General Studies Outcome**: Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization.

## 2.2 "Seafloored"

Below one example of course quizzes which are auto-graded in BlackBoard providing immediate feedback. Each quiz is tailored to the content and objectives for all module objectives. All quizzes given in the course will be compiled and averaged to determine student mastery of content knowledge.

Module 2 Objectives:

- identify and describe the two major divisions of the ocean floor
- make connections between plate tectonics and seafloor structures
- identify living organisms associated with seafloor structures.
- explain ways the seafloor has been explored

1. The ocean floor is divided into two regions:
    a. Continental margin and ocean basin
    b. Sea floor and continental shelf
    c. Continental margin and ocean trench
    d. Continental slope and sea floor

2. Which of the following is **NOT** considered a deep-sea floor structure?
    a. Seamount
    b. Rift Valley
    c. Island Arc
    d. Submarine canyon

3. This seafloor structure can go on to form volcanic islands
    a. Hydrothermal vents
    b. Seamounts
    c. Guyot
    d. Mid-ocean ridge

4. The nearly flat region of the sea floor that slopes very gently toward the ocean basin from the continent is the
    a. The continental margin
    b. The continental slope
    c. The continental shelf
    d. The continental break

5. Black smokers or chimney shaped vents on the bottom of the ocean are known to occur at
    a. Continental margins
    b. In trenches
    c. Scattered across the ocean basin
    d. Associated with hydrothermal vents

6. Life in thermal vents has a surprising way of surviving, with no light, they rely on this process for energy.
    a. Fusion
    b. Telekinesis
    c. Photosynthesis
    d. Chemosynthesis

7. What does sonar use to allow us to see the structure of the seafloor?
    a. Energy Waves
    b. Sound Waves
    c. Light Rays
    d. Radio Waves

8. When two ocean plates diverge (pull-apart) which of the following is formed?
    a. Continental shelf
    b. Mid-ocean ridge
    c. Trench
    d. Submarine canyon

9. A continent has a gradual incline to the sea with no trenches. What kind of continental margin would this be?
    a. Passive
    b. Subduction
    c. Active
    d. Slip-strike

10. Who came up with the idea for continental drift, that eventually lead to plate tectonics?
    a. Ralph Waldo Emerson
    b. James Hutton
    c. Carl Spitzweg
    d. Alfred Wegener

# Appendix B: Inquiry Assessment and Rubric

**Course Outcome:** Engage in scientific inquiry when investigating ocean phenomenon.

**General Studies Outcome:** Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization.

## 9.2 Tracking Hurricanes

This assignment will take you a few days, but I promise it won't be too hard. You are going to do some storm tracking! Follow this link. The last page of this document will be used to map your storms so at least three of them (or you can use paint to draw on an electronic copy). If you choose to draw on the tracker maps you can simply scan or take a picture of your completed map to turn it in.

**Part 1: Historic Storms**
Let's do a practice run by mapping one of the four famous storms on pages 3 and 4. After you map the storm, label the map with which storm you picked. Make this the first page of your submission. What did you observe about the paths of the historic hurricanes? What affects the path a storm will take?

**Part 2: Hurricane Data Collection**
Here comes the big one! Over the next 5 days you are going to use this link to track a tropical storm (swirl symbol) and a disturbance (X symbol). Use one storm tracking map to track the progress of your tropical storm or hurricane and another map to track your disturbance.

Day 1: Locate a tropical storm and mark it on your map using a particular color pen or pencil. You will also describe the properties of the storm and disturbance in a table below (one table for each). Make sure you give each of your tables a number and title. You can get the description for storm characteristics by hovering your mouse over the disturbances and storms. Once you have looked at all of your observations, you should use a different color pen or pencil to predict the path and distance you think the storm will go and mark this on your map.

Days 2: Using your original colored pen or pencil mark the actual path the storm and disturbance took and record the storm properties in your table. Using the same colored pen you used in Day 1 to mark your prediction, make another set of predictions from the current points of the storm and disturbance.

Days 3-5: Repeat procedures for Day 2

If you want to track a storm or disturbance in the pacific you can search "pacific hurricane tracking chart" and use one of those charts.

Provide information on the storms you tracked and upload your map into your submission document.

**Part III: Observations**
What did you observe about your hurricane and storm as you mapped them over the five days?

**Part IV: Prediction/ Forecast**
Where do you predict your storm and hurricane will be in 2 days? Why?

| Table 1: (Storm name or Disturbance and what you are observing) | |
|---|---|
| Date | Description |
| | |
| | |
| | |
| | |
| | |

What do you predict will happen to their intensities in 2 days? Why?

**Part V: Conclusion**

What did you learn about the behavior of hurricanes and storms by doing this activity? How easy is it to predict the path of a hurricane or tropical storm to prevent loss of life and property damage?

Track Star (Hurricane Tracking) Rubric

| Criteria | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|
| Part 1: Historic Data Map) (3 points) | | Correctly maps all days of the historic storm | Correctly maps the location of the storm but forgets to identify the storm being mapped OR omits a day label | Either does not provide one of the locations; or does not label the dates for the storm | Does not include a map or follow directions for storm mapping |
| Part 1: Observations (2 points) | | | Provides an accurate observation about the path of the mapped storm and includes all factors affecting the path of the storm | Omits either the observations about the path and severity of the storm OR does not provide factors affecting storm path | Does not make an observation or observation does not reflect what is found on the map |
| Part 2: Map 1 (4 points) | Correctly records storm locations; marks 5 days; identifies the storm being tracked; labels the dates on the map | Omits 1 of exemplary criteria | Omits 2 of exemplary criteria | Omits 3 of exemplary criteria | Does not include a map or follow directions for tracking a storm |
| Part 2: Map 2 (4 points) | Correctly records storm locations; marks 5 days; identifies the storm being tracked; labels the dates on the map | Omits 1 of exemplary criteria | Omits 2 of exemplary criteria | Omits 3 of exemplary criteria | Does not include a map or follow directions for tracking a storm |

Track Star (Hurricane Tracking) Rubric

| Criteria | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|
| Part 2: Map Predictions (2 points) | | | Includes predictions for future storm locations for 5 days | Omits some of storm locations | Absent or omits more than 3 predictions |
| Part 3: Observation (2 points) | | | Provides thoughtful observations about the strength, direction, or path of the storms | Either makes observations about only one of the two mapped; or does not fully provide observations (leaves out path or strength) | Absent or does not provide observations appropriate to the map |
| Part 4: Future Prediction (2 points) | | | Provides predictions for both storm and disturbance and reasonable rationale for both | Provides either a prediction and rationale for one OR does not provide a reasonable explanation for both predictions | Absent or does not provide reason prediction and rationale |
| Part 5: Conclusion ( 2 points) | | | Provides a thoughtful answer about both content or processes learned AND the issues related to predicting hurricane paths | Provides a thoughtful answer about both content or processes learned OR the issues related to predicting hurricane paths ( is weak on one of the two responses) | Absent or does not provide reasonable answer for what was learned and the issues associated with tracking storms |

# Appendix C: Analysis Assessment and Scoring Guide

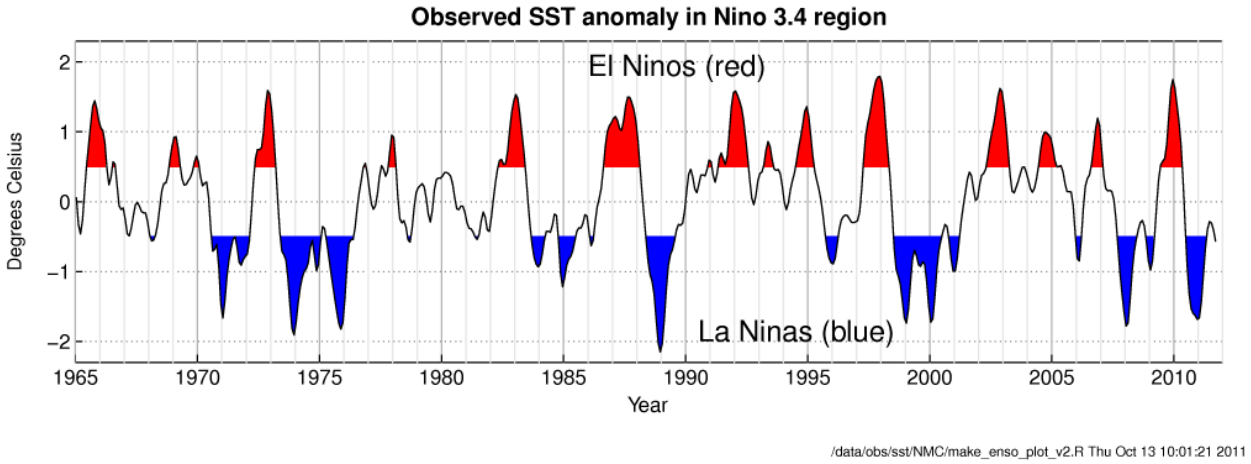
**Course Outcome:** Demonstrate the ability to analyze, problem solve, quantitatively manipulate data, and interpret or evaluate data that pertains to oceans.

**General Studies Outcome:** Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization.

### 14.4 Interpreting Science Data, to Recognize Patterns to Make Predictions

In this assignment you will be creating a brochure informing farmers of the conditions they will face during an El Nino year. You will look for information about the four sections of the United States (north east, north west, south east, south west). These farmers need to know what to expect so they don't lose their crops; not only will they lose their income we will lose our food!

**Part I: (9 points)**
You will be looking at this link called "El Ninos of the Past". There are some patterns in the graph we want you to look at and some predictions to make. These will be tricky, but remember they are just predictions.




- What unit of measurement is on the x-axis? Range? Year, 45 years (1 point)
- What unit of measurement is on the y-axis? Range? Temperature, 4 degrees C (1 point)
- When was the ocean the warmest? 1998 (1 point)
- When was the ocean the coldest? 1989 (1 point)
- Do you see a pattern now that the data is graphed? Explain. Yes, you can see the regular ups and downs (1 point)
- How many El Ninos occured between 1965-2010? 17 (1 point)
- Is there always a La Nina after an El Nino? Explain. No, but it is more likely. (1 point)
- When do you predict the next El Nino year will be? Explain. (1 point)
- When do you predict the next La Nina year will be? Explain. (1 point)

**Part II: (5 points)**
Next you will need to investigate how each region, of the United States, is affected by the El Nino so you can let the farmers know what to expect.

- How does El Nino impact the weather in the different regions? Overall the El Nino related temperature and precipitation impact can be seen October-March. (2 points)
- Where do those regions get their weather? Weather for these regions come from the Pacific in the West. (1 points)
- What kinds of weather will the different regions see? Texas to Florida will see more precipitation, Northwest to North central will experience warmer weather, and Northeast will experience drier conditions. (2 points)

**Part III: (11 points)**
In your brochure you will focus on West Virginia farmers to make recommendations. West Virginia is a large producer of hay, corn, cotton, apples, and wheat. Which of these crops would survive during an El Nino year in West Virginia and which would perish?

- What are the weather conditions like in West Virginia during El Nino? West Virginia is in the Northeast and will experience drier weather. (1 point)
- Which of the crops would you recommend the farmers plant and which should they avoid? During an El Nino year farmers will want to plant hardier plants that can handle drier, cooler conditions. Corn and Soybean are likely to struggle more though in some regions corn may able to scrape by. Wheat will likely do better in this season as far as crops go (2 points)
- What makes those crops thrive more than the others in those conditions? During an El Nino year farmers will want to plant hardier plants that can handle drier, cooler conditions. Corn and Soybean are likely to struggle more though in some regions corn may able to scrape by. Wheat will likely do better in this season as far as crops go (2 points)

Be sure to cite your sources in APA or MLA format and include an appropriate picture for your newspaper article. (2 points)

You can find Brochure Templates for word by opening a new document and searching for templates, searching for them on Google, or just creating one yourself. Be creative! (4 points)

# Appendix D: Scoring Guide Sample Ocean Issue Framework

**Course Outcome:** Use new found science knowledge and skills to identify ecological and societal impacts and suggest viable solutions to remediate effects on local and global communities.

**General Studies Outcome:** Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization.

<table>
<tr><td colspan="2">1. State the issue – In this section you will include the issue and a brief description which defines the issue.</td></tr>
<tr><td>2. Environmental Effects:<br>a. In this section you will list specific environmental effects<br>b. These effects pertain to the environment and organisms (excluding humans)<br><br>(2 pts)</td><td>3. Identified causes:<br>a. These are the identified causes of each of the stated environmental effects.<br>b. Each letter should correlate to the same letter of the environmental effects.<br><br>(2 pts)</td></tr>
<tr><td>4. Stakeholders (who is effected):<br>a) These are the specific people whose lives are impacted.<br>b) Business and Industry which are impacted<br>c) Interest groups<br>d) Towns or community interests<br><br>(1 pt)</td><td>5. How it affects stakeholders:<br>a) You should correlate in the same way you did for Environmental Effects (#3) and Identified Causes (#3) above.<br><br>(2 pts)</td></tr>
<tr><td colspan="2">6. Possible Solutions to eliminate issue:<br>• Include anything that could eliminate the issue.<br>• Include anything that might remediate the issue<br>• Include any mitigation that is being done<br><br>(2 pts)</td></tr>
<tr><td colspan="2">7. Potential Citizen Actions (to help reduce or eliminate problem):<br>• Include things that we can personally do to help reduce or eliminate the problem<br>• Think hard on these since this is your chance to show how we can help even from WV<br><br>(1 pt)</td></tr>
</table>

Oceans, Issues, and Society
Course Outline

| Module Name | Ocean Issue | Science Content | Project |
|---|---|---|---|
| 1. Stranger to Blue Water | Defining an Ocean | Earth & Space Science (Ocean Literacy) | Proposition statement to the General Studies Committee |
| 2. "Oil, that is, Black Gold, Texas Tea" | Offshore Drilling | Geology (Seafloor Structures/Oil and Gas Formation) | Scratch project |
| 3. The Tide is High but I'm Holding On | Tidal Energy | Physics (Gravity, Tides, Tidal Energy) | Tidal Power Plant Analysis |
| 4. Johnny Tsunami ( or There is no Tide in Tidal Wave) | Tsunami's | Geology (Plate Tectonics, Tsunami Propagation) | PowerPoint voiceover/video |
| 5. I Saw Red | Algal Blooms | Biology (Taxonomy, Red Tide, Nitrogen/Phosphorus Cycle) | Newspaper Article |
| 6. Reefer Madness | Coral Bleaching | Biology (Photosynthesis, Symbiosis, Corals) | Aquarium Design Project |
| 7. That's Rubbish! | Ocean Garbage | Meteorology (Watersheds, Density, Currents) | Google Earth Adventure |
| 8. Acid Rap | Ocean Acidification | Chemistry (Acids/Bases, Water Chemistry, Shell formation) | Infographic |
| 9. Make it a Hurricane Before I Go Insane | Hurricane Disasters | Meteorology (Storm Classification, Hurricane formation) | Application Questions |
| 10. The Floating Dead? | Dead Zones | Chemistry/Biology (Water Chemistry (DO), Runoff) | Awareness PowerPoint |
| 11. One Fish Two Fish | Overfishing | Biology (Food-web/chains, Trophic levels, Population Ecology) | Regulation Proposal |
| 12. Exotic is not always good | Invasive Species | Biology (Ecosystems, Ocean Biome) | Google Site |
| 13. Drawing a Line in the Sand | Sea Level Rise | Meteorology/Physics (Climate Change, Thermal Expansion) | Topographical Map Scenario |
| 14. Boy meets girl | El Nino/La Nina | Meteorology (Climate Zones, Climate vs Weather) | Informative Brochure |
| 15. Gone Coastal | Coastal Environment Degradation | Geology/Biology (Estuaries, Coastal Wetland Ecology, Barrier islands) | Group Issue Analysis |
| 16. The Final Countdown | All of the above | All Subjects | Culminating Project (book) |

*Department of Biology, Chemistry and Geoscience*

1201 Locust Ave, Fairmont WV 26554
Phone: (304) 367-4363 • Fax: (304) 367-4304
Steven.Roof@fairmontstate.edu • www.fairmontstate.edu

February 9, 2017

James Matthews, Ph.D.
General Studies Committee
Fairmont State University

Dear Dr. Matthews,

This letter is to confirm that I am aware that Dr. Deb Hemler and Mr. Sean Harwell are submitting the course Ocean Issues & Society for consideration for the General Studies Program. The course has been developed as a fully online course and was field tested as an SCIE 1199 course in Fall of 2016. They are currently in the process of writing a curriculum proposal for inclusion in the Fairmont State University catalog. The course is designed to satisfy **Outcome 15 Natural Science**: *Equipped with basic scientific literacy and methods of inquiry, analysis, and description in the natural sciences, students should understand the role of science in everyday life and how the natural sciences contribute to the general welfare of civilization.* I support the proposal to include this course as an elective to satisfy general studies Outcome 15.

Respectfully

Steven Roof

Steve Roof, Ph.D.
Chair Biology, Chemistry, & Geoscience
College of Science and Technology