



## **Next Generation Science Standards Series**

### **Planning A NGSS Unit with Stem Emphasis**

**EDUO 9540** One Semester unit/credit

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**Understanding NGSS (K-12) EDUO 9539 is a prerequisite**

### **Other Courses In the Next Generation Science Standards Series**

#### **Understanding NGSS (K-12)**

**EDUO 9539** Two semester units/credits

Instructors: Gina Bergskaug and John Boucher

#### **Planning a NGSS Unit Emphasizing Math and ELA**

**EDUO 9541** One semester unit/credit

Instructors: Gina Bergskaug and John Boucher

**Understanding NGSS EDUO 9539 (K-12) is a prerequisite**

### **Course Description**

With the guidance of a course template, teachers will develop a successful STEM Next Generation Science Standard teaching unit. Website resources will provide information to aid in the planning the Stem NGSS unit.

### **Course Goals**

Upon completion of this course the teacher will have:

- 1) developed a NGSS teaching unit involving at least one STEM lesson
- 2) created one STEM teaching lesson plan
- 3) related the STEM lesson in #2 to the unit in #1
- 4) plan for future improvements based upon assessments in lesson #2
- 5) communicated how to teach the plan in #2

### **Course Objectives**

In carrying out the goals of this course the teacher will:

- 1) Read, study and respond to given website resources concerning STEM NGSS
- 2) Analyze the students for whom the NGSS unit plan will be prepared
- 3) Produce a teaching unit plan based on the results of #2
- 4) Make a complete STEM NGSS teaching lesson plan as part of the unit in #3

- 5) Develop classroom management plans with the help of the findings of #1&2
- 6) Identify all elements that will be used in #4
- 7) Describe how the elements in #4 will be interwoven through the plan
- 8) Create assessment strategies that reflect how successful #4, 5, 6&7 were
- 9) Consider future plans based upon #8
- 10) Write out instructions for a substitute so she/he can teach the plan.

**Grading Rubric.**

| Exemplary: A+ to A-                                                                                      | Acceptable: B+ to B-                                        | Unacceptable:<br>Must be resubmitted                                                  |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Responses are will organized with specific details excellently expressed and every requirement completed | Material is relevant as it connects to the each assignment  | Ideas are not clear or relevant and not well organized                                |
| Shows ability to transform knowledge into very successful teaching lessons                               | Shows the ability to transform knowledge into the classroom | Shows little or no understanding of the how to transform knowledge into the classroom |
| Creatively and clearly assess the present for future use                                                 | Assessment techniques are adequate                          | Few or no facts or specific details of how well the teaching unit was received        |

**Course Materials**

The following website resources are course materials to be read, studied and responded to.

1. [http://www.nextgenscience.org/sites/ngss/files/Appendix%20%20-%20Engineering%20Design%20in%20NGSS%20-%20FINAL\\_V2.pdf](http://www.nextgenscience.org/sites/ngss/files/Appendix%20%20-%20Engineering%20Design%20in%20NGSS%20-%20FINAL_V2.pdf)
2. <http://stem.browardschools.com/science/science-elementary/>
3. <http://stem.browardschools.com/science/science-elementary/science-elementary-lesson-plans/>
4. <http://www2.ivcc.edu/mimic/nsf/Middle%20School%20Activities/STEM%20Activities%20Handbook.pdf>
5. <http://marsed.asu.edu/stem-lesson-plans>
6. <http://www.k12center.org/rsc/pdf/herman.pdf>

## Assignments

### A. Knowledge

After reading and studying the resource in website #1 respond to **A1-5**

1. [http://www.nextgenscience.org/sites/ngss/files/Appendix%20%20-%20Engineering%20Design%20in%20NGSS%20-%20FINAL\\_V2.pdf](http://www.nextgenscience.org/sites/ngss/files/Appendix%20%20-%20Engineering%20Design%20in%20NGSS%20-%20FINAL_V2.pdf)

Because of your knowledge of how engineering and technology intertwines with the NGSS, your principal has asked you to define the terms science, engineering and technology as they relate to NGSS at a PTA meeting. These terms mean something different to the parents' generation. Explain in A1-3 how you can effectively define the following.

- A1.** science
- A2.** engineering
- A3.** technology

One of the parents at the PTA meeting belongs to a group of engineers. She asks you to address the group at their next meeting. The engineers are interested in how you make your science curriculum emphasizing engineering and technology relevant to the student's life.

- A4** Summarize what you will tell the engineers.

Find and read in website #1 about the three component ideas (define, optimize and develop solutions) for the grade that you teach.

- A5** How will or have you incorporate(d) these three components in your science program?

### B. Planning - NGSS Unit Plan with at least one lesson involving STEM

Follow the template below B1-6 to create the NGSS unit plan.

- B1** description and title
- B2** goals
- B3** objectives

Use the above **description, goals and objectives** designed for **this** course as a guideline in creating B1-3.

- B4** Describe the students the unit is intended for - include the following:
  - academic and language abilities,
  - learning modalities,
  - different intelligences,
  - cultural differences
  - maturity

**B5** List the lessons involved in the unit and what NGSS standards they will involve – indicate which one(s) emphasize STEM.

**B6** calendar - create a calendar (or pacing guide) that details sequence, flow, and timing as you put all the lessons of your teaching unit together

*Look over website resources #2-6 studying the areas that relate to your grade level. Use the information to help develop your STEM NGSS teaching plan (C1- 13)*

#2 . <http://stem.browardschools.com/science/science-elementary/>

#3. <http://stem.browardschools.com/science/science-elementary/science-elementary-lesson-plans/>

#4. <http://www2.ivcc.edu/mimic/nsf/Middle%20School%20Activities/STEM%20Activities%20Handbook.pdf>

#5. <http://marsed.asu.edu/stem-lesson-plans>

#6. <http://www.k12center.org/rsc/pdf/herman.pdf>

**C. Individual lesson plan** This plan is one listed on your calendar (B5) that emphasizes STEM.

#### **Classroom Management**

**C1** What classroom management and community building strategies will you use for providing a safe classroom that will encourage risk taking?

**C2** What strategies will you use to foster a sense of belonging and ownership for students?

#### **Elements of the Plan**

Identify the elements listed below that will be used in this teaching plan.

**C3** text books

**C4** materials and resources (print, video, audio, online, visual, other)

**C5** activities

**C6** discussion

**C7** other

If any of the elements listed (C3-7) are not employed - explain why.

**C8)** Explain how each element relates as it is woven throughout the plan

**C9)** Discuss how each element influences B4 (students), and C1&2 (management).

#### **Assessment**

**C10** What strategies will be used to assess pre-knowledge.

**C11** Which ongoing techniques will be used to assess each of the elements as the unit progresses?

**C12** Describe culminating assessment methods and or activities.

**C13** How will you use the results of the assessments in C10-13 to design future classroom planning?

**Calendar**

**C14.** Create a calendar (or pacing guide) that details sequence, flow, and timing of your teaching plan.

**C15.** Explain the calendar as it relates specifically to **Elements** and **Assessment**.

**Relationship to Unit Plan**

**C16** Discuss how this Stem NGSS teaching plan and its standards relate to B1-5 of the unit plan.

**Instructions**

**C17** In case you are absent when the lesson is to be presented, write out instructions so the substitute can easily follow the plan without additional communication.

**Website Resources**

**C18.** Which website resources (#2-6) did you find the most useful as you created your STEM NGSS teaching plan – why?