MODIFIED UBD LESSON PLAN

STEM 101

COURSE: Middle School		
UNIT: Electronics/Coding	**EXERCISE:** Servo Motor Challenges	**TIME FRAME:** 2-3 Hours

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🏛 PREPARATION: *Summary of "to do's" that the teacher should understand and prepare before bringing this lesson to the classroom.*

Information:
Before starting this exercise, students should have an understanding of material covered in:

- ✓ Videos and Presentations in Content Knowledge section

Teachers will need to ensure that the proper supplies are available for students to build their solutions.

Materials:
- See supply list in the Electronics/Coding unit on the Stem site

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📖 SAFETY: *Summary of safety strategies in the lesson.*

Shock: Students will be working with electricity. Extra care should be observed when working with electricity.

S1 DESIRED RESULTS:

ESTABLISHED GOALS:

Problem Solving Techniques and Applications Standards:

Teachers should use the STEM Academy Standards Correlation System available in the STEM Connections area of a unit to extract specific standards and insert these standards here.

TRANSFER:
Students will be able to independently use their learning to…

- Become familiar with the Arduino board and associated components to learn the basics of computer science in order to use the tools to solve more complex problems.

MEANING:

UNDERSTANDINGS
Students will understand that...

- Microcontrollers are used for many different purposes
- Designs can incorporate microcontrollers to assist in solving problems

ESSENTIAL QUESTIONS
Students will keep considering...

- What other types of circuits and microcontrollers exist;
- What other characteristics a microcontroller should have

ACQUISITION OF KNOWLEDGE AND SKILL:

Students will know...

- Conduct an experiment using a servo motor and program it to rotate.

Students will be skilled at...

- Proper handling and assembling of electrical components
- Proper programming of microcontrollers

S2 EVIDENCE:

EVALUATIVE CRITERIA:

- Circuit constructed correctly
- Program uploaded correctly
- Program executed

ASSESSMENT EVIDENCE:

Performance Task(s):

Students will be assigned a series of experiments to complete in order to demonstrate their learning.

The exercise is:

> Write a program so that your servo motor will switch from 0 to 45 degrees at 1 second intervals.

Other Evidence:

- Activities

- Online Quiz

S3 LEARNING PLAN: *Summary of Key Learning Events and Instruction*

Outline:

1. Set Introduction
   Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. Teachers and students use it to build low-cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments.

2. Activities
   Write a program so that your servo motor will switch from 0 to 45 degrees at 1 second intervals.

3. Student Questions
   Make yourself available for any questions any of your students may have.

4. Quiz
   At the conclusion of the activity have your students complete the corresponding online quiz

Progress Monitoring:

- The instructor will need to monitor the classroom, checking student's work and ensuring students are on task and following directions.
- Ensure students store their projects at the end of class and leave all materials in the room.
- At the end of the activity, post student projects in the room and provide appropriate feedback.

DIFFERENTIATION: *Summary of Key Differentiation Techniques*

Please use this space to insert your differentiation techniques. Depending on the needs of students, various techniques might be needed in a classroom, therefore use the information below and experts in the area needed to design your plan for differentiation.

The ASCD Study Guide for Integrating Differentiated Instruction and Understating by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe

Integrating Differentiated Instruction and Understating by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe
ISBN-13: 978-1416602842
ISBN-10: 1416602844

Differentiating Reading Instruction
by Laura Robb.
ISBN13: 9780545022989

A Teacher's Guide to Differentiating Instruction
The Center for Comprehensive School Reform and Improvement

CAREER CONNECTIONS: *Summary of Career Opportunities Associated with this Lesson*

Good sources for career connections:

Occupational Outlook Handbook
http://www.bls.gov/ooh

The National Career Clusters® Framework
http://www.careertech.org/career-clusters

KEYWORDS: *Please Insert Keywords from this Lesson with their Definitions*

Digital Pins: How the pins work and what it means for them to be configured as inputs or outputs.

Analog Input Pins: Details about the analog-to-digital conversion and other uses of the pins.

PWM: How the analogWrite() function simulates an analog output using pulse-width modulation.

Memory: The various types of memory available on the Arduino board.

Use resources like dictionary.com to find definitions to your keywords