Lesson Plan

# Lesson 08: Prepare for the Final Exercise

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| **Lesson Overview** | | | |
| **Lesson Length** | 3 hours (180 minutes) | | |
| **Overview** | This lesson will provide students with a review of the content from Lessons 1 through 7, in preparation for the final exercise. The final exercise is a formal evaluation of the Python scripting language at the fundamental level. This exercise requires students to apply their knowledge of the Python scripting language, and tests their ability to analyze real-world data using Python.. | | |
| **Objectives**   * **Domain:** Cognitive * **Level:** Applying | Using conditionals, loops, Python dictionaries, local data, the CSV Library, and the Glob Library, students will be able to:   * TLO 1: Examine the implications of using computation to solve a problem   + ELO 1.1: Discuss best practices for using computation to solve a problem   + ELO 1.2: Suggest types of problems that can be solved through computation   + ELO 1.3: Show how computation can solve a problem * TLO 2: Recognize key computer science concepts   + ELO 2.4: Recognize how queries operate * TLO 3: Demonstrate the ability to build basic scripts using Python scripting language   + ELO 3.1: Use various data types and structures in Python Scripting   + ELO 3.2: Collect data using Python scripting   + ELO 3.3: Extract data using Python scripting   + ELO 3.4: Develop advanced data structures using Python scripting | | |
| **Instructional Methods** | Informal lecture, demonstration, guided discussion, practical exercises | | |
| **Assessment Strategies** | Informal: Guided and practical exercises  Formal: N/A | | |
| **Materials and Equipment Needed** | Required:   * SBU * Jupyter Notebook * Python   Optional:   * N/A | | |
| **Background Resources** | Resource:   * NGA SME * Technical facilitators   Subject matter/content questions may be referred to:   * Jeremy DeBrow, Course Manager   [Jeremy.R.Debrow@nga.mil](mailto:Jeremy.R.Debrow@nga.mil)  [Jeremy.R.Debrow@coe.ic.gov](mailto:Jeremy.R.Debrow@coe.ic.gov)  National Geospatial-Intelligence College (NGC) HDNPE Branch  Unclassified: 571-557-7583 | | |
| **Comments** | ELOs 1.1, 1.2, and 1.3 are meant to be covered throughout the entire lesson (informal lecture and assessment). Instructors will be expected to facilitate a classroom discussion that identifies problems best suited to be solved computationally, best practices for solving those problems, and potential solutions. | | |
| **Lesson Sequence** | | | |
| **Lesson Topic** | **Instructional Method** | | **Time**  **(mins)** |
| Introduction | Informal lecture, guided discussion | | 5 |
| Computational Thinking & Assessment | Informal lecture, guided discussion, demonstration, guided exercise, practical exercise | | 20 |
| Python Data Types & Assessment | Informal lecture, guided discussion, demonstration, guided exercise, practical exercise | | 60 |
| Data Structures & Assessment | Informal lecture, guided discussion, demonstration, guided exercise, practical exercise | | 45 |
| Flow Control & Assessment | Informal lecture, guided discussion, demonstration, guided exercise, practical exercise | | 45 |
| Getting Data & Assessment | Informal lecture, guided discussion, demonstration, guided exercise, practical exercise | | 45 |
| Conclusion | Informal lecture | | 5 |
| **Lesson Outline** | | | |
| **Introduction** | | | |
| Introduction | * **Attention** (to be personalized by instructor) * **Motivation** (to be personalized by instructor) * **Overview** (to be personalized by instructor)   + Learning objectives   + Lesson topics/main points * **Rules of Engagement** (to be personalized by instructor) | | |
| **Body** | | | |
| ***Lesson Topic*** | ***Main Points/Notes*** | ***Personalization*** | |
| Computational Thinking  (*Facilitator Note: Assessments embedded throughout each review.*) | **Informal Lecture/Guided Discussion/Demonstration/Guided Exercise/Practical Exercise (20 minutes)**  **8.1. Objectives**  **8.2. Overview**  *(Facilitator Notes:*   * *Have students load the U\_CSCI2011\_L08\_Prepare\_for\_the\_Final\_Exercise\_SG\_V3.0.ipynb file to begin the session.)* * *Refer back to Lesson 1 and relate the four steps of problem-solving using Computational Thinking (Decomposition, Pattern Recognition, Abstraction, & Algorithm Design) to lessons, exercises, examples, student questions/comments, etc., as appropriate throughout this lesson.* * *See instructor’s notebook for guidance for discussion points and guided exercises.)* |  | |
| Python Data Types and Data Structures | **Informal Lecture/Guided Discussion/Demonstration/Guided Exercise/Practical Exercise (60 minutes)**  **8.3. Computational Thinking**   * Step 1: Decomposition * Step 2: Pattern Recognition * Step 3: Abstraction * Step 4: Algorithm Design   **8.4. Python Data Types**  (*Facilitator Note: Exercises are embedded within each review. See the notebook for details)*   * 8.4.1. BooleanValues and Operators   + 8.4.1.1. Comparison Operators   + 8.4.1.2. Membership Operators   + 8.4.1.3. Logic Operators * 8.4.2. Reserved Python Keywords   + 8.4.2.1. Built-In Functions * 8.4.3. Numbers   + 8.4.3.1. Arithmetic Operators   + 8.4.3.2. Assignment Operators   + 8.4.3.3. Casting * 8.4.4. None   **8.5. Python Data Structures**  (*Facilitator Note: Exercises are embedded within each review. See the notebook for details)*   * 8.5.1. Sequences * 8.5.2. Lists * 8.5.3. Tuples * 8.5.4. Strings * 8.5.5. Unordered Collections * 8.5.6. Sets * 8.5.7. Dictionaries * 8.5.8. Common Operations Across Data Structures |  | |
| Flow Control | **Informal Lecture/Guided Discussion/Demonstration/Guided Exercise (45 minutes)**  **8.6. Flow Control**  (*Facilitator Note: Exercises are embedded within each review. See the notebook for details)*   * 8.6.1. If Statements   + 8.6.1.1. Flow Control Exercise (see notebook for details) * 8.6.2. For Loops   + 8.6.2.1. For Loops Exercises (see notebook for details) * 8.6.3. While Loops   + 8.6.3.1. While Loops Exercise (see notebook for details) * 8.6.4. Break and Continue   + 8.6.4.1. Break and Continue Exercises (see notebook for details) |  | |
| Getting Data | **Informal Lecture/Guided Discussion/Demonstration/Guided Exercise (45 minutes)**  **8.7. Getting Data**  (*Facilitator Note: Exercises are embedded within each review. See the notebook for details)*   * 8.7.1. Loading a Local Data File   + 8.7.1.1. Local Data File Exercise * 8.7.2. Getting Data with the CSV Library   + 8.7.2.1. CSV File Exercises * 8.7.3. The Glob Library   + 8.7.4.1. Glob Library Exercises   *(Facilitator Note: Poll the class for any questions about the functions and library covered in Getting Data. Work through questions in the code cells in the notebook.)* |  | |
| Administrative Notes | N/A |  | |
| **Assessment** | | | |
| ***Assessment Type*** | ***Instructions/Prompts/Notes*** | | |
| Guided Exercise | See the facilitator notes located above for additional guidance. All exercises will be conducted inside of the Jupyter Notebook lesson file. | | |
| Practical Exercise | See the facilitator notes located above for additional guidance. All exercises will be conducted inside of the Jupyter Notebook lesson file. | | |
| **Conclusion** | | | |
| Conclusion | * **Final Summary** (to be personalized by instructor)   + Review learning objectives   + Review lesson topics/main points * **Remotivation** (to be personalized by instructor) * **Closure** (to be personalized by instructor) * **Next Lesson Introduction** (to be personalized by instructor) | | |