**Agriculture & Soil Chemistry Pacing Guide**

Based on a 50-60 minute period

Approximately 135 Days of Lessons

(FFA & Agriscience has the remainder)

**UNIT 1 - AGRISCIENCE LAB PRACTICES**

**Length of time: 16 Days - 3 weeks**

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| **Length** | **Topic(s) and/or Labs** | **NGSS and Ag Standards Covered** | **Materials** |
| **1 day** | What is Chemistry |  | On-line or text book on What is chemistry |
| **2 day** | The Scientific Method |  | ASC1.01.a. [Sci. Method slides](https://drive.google.com/open?id=1yNM-Ho9R71Jp_LWCSl9kt05DKd8ag0c4AoO1peNHtac)  ASC1.01.b. Practice worksheet (hypothesis, variables, data collection, data analysis)  **ASC1.03. Key Assignment -** [**See mini-lab handout**](http://drive.google.com/open?id=1tc9SomNOWywFwkCuHjkn2XRXqBYplWCE6KwNeu2zBa8)  ASC1.04. [Lab report guidelines](http://drive.google.com/open?id=10MmEKcVfCInKD6YjgsG2TSBowzQR0nUfWtT_qM22xpA)  Use Fruit Juice lab (Endo & Exothermic energy) |
| **2 days** | Safety and Equipment |  | ASC1.02.a. [Safety](https://drive.google.com/open?id=1yNM-Ho9R71Jp_LWCSl9kt05DKd8ag0c4AoO1peNHtac)  ASC1[Notes](https://drive.google.com/open?id=1yNM-Ho9R71Jp_LWCSl9kt05DKd8ag0c4AoO1peNHtac).02.b.Safety Quiz  Various beakers and glassware, heating plates, and other types of equipment you use in the class. |
| **2 days** | Measurements  (systems, conversions  uncertainty) |  | Worksheets on measurements  Rulers and scales  Presentation on significant figures and data analysis |
| **2 days** | Matter and Change  (properties of Matter, classification of Matter & changes in Matter) |  | ASC2.01.a. [Mixtures, Elements and Compounds Slides](https://docs.google.com/presentation/d/1R1fu6DLA2Wd_4vgDWvQm2cxzxHzFWSazqHcgbxiJsCk/edit#slide=id.p3)  ASC2.01.b. Notes Page |
| **5 days** | ASC2.2 Electrons & Periodic Table |  | ASC2.02.a. [Exploring the periodic table packet](https://drive.google.com/drive/u/0/folders/1_eSTAuGpFHWdERFbR-b9vbAmQpA-URq6)  ASC2.02.b. Atoms Family  Battle of Elements (plays like battleship board game)  Use Periodic Table introduction form Teachers paying Teachers |
| **5 days** | ASC2.3 Atomic model |  | ASC2.03 Atomic Basics Handout  Molecular Model Kits (i.e. Pasco scientific) |
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**UNIT 2 - THE NATURE OF SOIL**

**~45 DAYS - 9 weeks**

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| **Length of Lesson** | **Topic(s) Covered** | **NGSS and Ag Standards Covered** | **Materials** |
| **2 days** | ASC2.4 Rock Cycle |  | ASC2.04.a. Rock Cycle Slides  ASC2.04.b. Rock Cycle Game  **2.04.c. Key Assignment - Sedimentary Rock Lab** |
| **5 days** | ASC1.3 Mini-Lab 1: Soil Structure & Composition  ASC1.4 Proper Lab reports  -Lab observations (2 days) |  | **ASC1.03. Key Assignment -** [**See mini-lab handout**](http://drive.google.com/open?id=1tc9SomNOWywFwkCuHjkn2XRXqBYplWCE6KwNeu2zBa8)  ASC1.04. [Lab report guidelines](http://drive.google.com/open?id=10MmEKcVfCInKD6YjgsG2TSBowzQR0nUfWtT_qM22xpA)  Lab on soil texture using Mason Jars. |
| **2 days** | Measuring Soil Quality  Microbial Activity in soil |  | Using CO2 sensors to determine health and quality. |
| **2 days** | Soil Fertility and how to test for its nutrients |  | **Key assignment-** pH & conductivity test  Soil Testing procedure, Soil Analysis Reports |
| **2 days** | ASC3.9 Salinity |  | Lab - use Soil salinity sensor lab |
| **4 days** | Buffering Capacity of Soil |  | Investigating soil acidity: Comparing pH and buffering capacity of various soils |
| **3 days** | ASC2.6 Soil Triangle |  | ASC2.06.a. Soil Triangle Handout  ASC2.06.b. Soil Triangle Activity  ASC2.06.c. The Dirt on Soil - Worksheet  Use soil sieves to determine texture |
| **3 days** | ASC2.7 Collect & Test Soil Samples: Physical **(Texture)** |  | ASC2.07.a. Soil Sampling Slides  ASC2.07.b. Soil Texture Test Lab  ASC2.07.c. Part 2 of test lab  ASC2.07.d. Soil Studies Worksheet |
| **4 day** | ASC2.10 Ions (Cation Exchange Capacity) |  | ASC2.10.a. Ions Slides  ASC2.10.b. Cation, Anion Worksheet  ASC2.10.c. Narrative Element Story  (suggested as homework)  Cation exchange VDO |
| **2 days** | ASC2.16 Soil Maps |  | ASC2.16.a. Smithsonian Soil Webquest  ASC2.16.b. Web Soil Survey Guide |
| **3 days** | Ionic and Metallic Bonding |  | Electron dot Diagrams  Animations and VDOs of Ionic bonds  Practice problems in naming compounds |
| **3 days** | Covalent Bonding |  | Lewis Electron Dot Structures and the Octet rule  Use molecular models |
| **10 days** | Types Chemical reactions |  | ASC3.07.c. Chemical Equations Slides  ASC3.07.d. Balancing Equations with Skittles  Balancing Equations Resource link:  <http://teachnlearnchem.com/Equations.htm>  ASC3.07.h. Types of Reactions Worksheet  Lab on Classifying Chemical reactions |

**UNIT 3 - WATER QUALITY**

**~60 DAYS 12 weeks**

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| **Length of Lesson** | **Topic(s) Covered**  **(Key Assignment)** | **NGSS and Ag Standards Covered** | **Materials** |
| **5 days** | ASC3.10 Quality water sources |  | How do we measure the quality of our waters?  <http://water.epa.gov/learn/resources/measure.cfm>  Have students break into groups and prepare a 60 second presentation on each item scientists test for to check for water quality.  ASC3.10 Water Testing Field Trip/Water Collection/Testing Lab |
| **5 days** | Water Quality Index |  | Lab Water Quality Index  WQI Ratings |
| **5 days** | Soil Erosion |  | Lab Soil erosion and runoff. |
| **10 days** | ASC3.13 Groundwater and Aquifers |  | ASC3.13.a. Groundwater and Aquifers Slides  Resource:How do Scientists find groundwater - Use URL:  [http://water.usgs.gov/edu/gwhowtofind.htm](http://water.usgs.gov/edu/gwhowtofind.html)l  ASC3.13.b. Groundwater Contamination Reading resource  ASC3.13.c. Groundwater Pollution Lab  ASC3.13.d. [**Key Assignment**](https://docs.google.com/document/d/1TuJ9kxnG8U5R2g5r5UNTc7E0EaTAjtc8610hGwb0ZCk/edit) Groundwater Contamination Lab |
| **5 days** | ASC3.6 Data Analysis:  -significant figures  -conversions |  | ASC3.06.a. Scientific Measurements Slides  ASC3.06.b. Sig Figs Worksheet  ASC3.06.c. Precision Vs. Accuracy BullsEye Worksheet |
| **15 days** | ASC3.7 Stoichiometry  -Moles  -Molar Mass  -Mole calculations  -Limiting Reactants  -% Composition  -% Yield of reaction |  | ASC.3.07.a. Basic Stoichiometry Slides @ VDOs  ASC3.07.b. Stoich Notes  ASC3.07.c. Chemical Equations Slides  ASC3.07.e. Stoich [Smores Lab](http://img.docstoccdn.com/thumb/orig/36439562.png)  ASC3.07.f. Moles Tutorial Worksheet  ASC3.07.g. How Many Moles Are In Your Name?  ASC3.07.h. Types of Reactions Worksheet  ASC3.07.i. Mole Ratio Slides  ASC3.07.j. More Calculation  Mole Ratio Resource Link <http://teachnlearnchem.com/Formula.htm>  Formula Resource Link:  <http://teachnlearnchem.com/Formula.htm>  Stoichiometry Resource Link: <http://teachnlearnchem.com/Stoichiometry.htm>  Nuts and Bolts lab  Cookie lab (For moles and Mass) |
| **10 days** | Gas Laws |  | Boyle's Law: Lab  Charles' Law: Lab  Gay-Lussac's Law: lab |
| **5 days** | ASC3.8 Solution and Solubility  -Molarity  -Toxicity |  | ASC3.08.a. Molarity, Solutions, and Solubility Slides  ASC3.08.b. Molarity Murder Mystery  ASC3.08.c. Molarity of Lemonade  OPTION: Solutions lab- create a fertilizer and calculate the percentage of element present  Resource:Explanation of molar mass - Use URL:  <http://chemistry.stackexchange.com/questions/1116/percent-composition-of-nitrogen-in-fertilizer>  Resource: Calculating pounds of N in a fertilizer bag:  Use URL:  <http://www.greenviewfertilizer.com/articles/how-much-nitrogen-in-fertilizer>[b.ca/$department/deptdocs.nsf/all/agde](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex3791)  Resource: List of available nutrients in different fertilizers:  Use URL:  [http://www1.agric.gov.ax3791](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex3791) |

**UNIT 4 - Plants and Soil Management**

**~16 DAYS 3 weeks**

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| **Length of Lesson** | **Topic(s) Covered** | **NGSS and Ag Standards Covered** | **Materials** |
| **3 days** | ASC4.1 Plant essential nutrients and nutrient deficiencies  Key Assignment 1: Begin Lab Set Up (Planting of Seeds, Data Collection) |  | [ASC 4.01a Plant Nutrients and Deficiencies ppt](https://docs.google.com/presentation/d/1sc7Loh8Ch5cDd1oFPPTD8SvHsmkYwdPJAV_4aE3y6cw/edit#slide=id.p15)  [ASC 4.01b PLant Nutrients and Deficiencies student notes](https://docs.google.com/document/d/1HfcwOkBC6J30GTuq6XtFR30Kt1po0dsC5x61DeGOr-U/edit)  Teacher’s Note: Keep all soil samples from unit 2. All planting to be done using Soil from unit 2- do not throw out when complete as they will be used for the duration of the unit.  Students should select from the following seed type, encouraging variation: Alfalfa, White Clover, Red Fescue. |
| **3 day** | ASC4.2 Soil NPK testing  Key Assignment 1: Data Collection |  | [**ASC 4.02 Key Assignment Soil NPK Testing**](https://docs.google.com/document/d/1hX_u9obolth9s3u4eXjL_PfBGHP4yDcOBBB295n86Ok/edit)  ASC4.02.b. Nitrogen Cycle in Ag LP  ASC4.02.c. Legume Activity  ASC4.02.d Legumes and Nitrogen  ASC4.02.e. Nitrogen Scramble |
| **4 days** | ASC4.3 Soil Amendments  -organic and synthetic  How to read a fertilizer label  Key Assignment 1: Data Collection |  | [ASC 4.03a Soil Amendments ppt](https://drive.google.com/open?id=1GbgwEmgS3hphZNtaz_Kw2sGnxONoPk7_Xz2JiNotW1g)  [ASC 4.03b Soil Amendments Student Notes](https://drive.google.com/open?id=1w94YABeReEQ4TI5huBRTYI-9EQWNA0Kcr1xsG62FQ_0)  Day 2: [ASC 4.03c Reading a Fertilizer Label Activity](https://drive.google.com/open?id=1M3khKBH61miqkT84PlpusCvJ5AlUK4TFETiMxjIpYZA)  Materials Needed: Various Types of Fertilizers (Granular & Liquid)  ASC4.03.d. Fertilizer Label Activity  ASC4.03.e. Fertilizer Homework |
| **2 days** | ASC4.6 Nutrient availability   * review plant essential nutrients * nitrogen cycle * pH nutrient availability * Cation Exchange Capacity |  | [ASC 4.06a Analyzing Nutrient Availability ppt](https://docs.google.com/presentation/d/1rCtbdJO6F2f6TcptDmuPZF8ZV6ZwLptmqrDZSgyN0Rs/edit#slide=id.ga5008ebf4_0_425) |
| **4 days** | ASC2.12 Soil Testing: Chemical & Nutrient Properties Lab |  | ASC2.12 Key Assignment - Chemical and Nutrient Properties Lab using leaf tissue as well as soil tess |