**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 QuizVarious beakers and glassware, heating plates, and other types of equipment you use in the class. |
| **2 days** | Measurements(systems, conversionsuncertainty) |  | Worksheets on measurementsRulers and scalesPresentation 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 FamilyBattle 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 HandoutMolecular 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 SlidesASC2.04.b. Rock Cycle Game**2.04.c. Key Assignment - Sedimentary Rock Lab** |
| **5 days**  | ASC1.3 Mini-Lab 1: Soil Structure & CompositionASC1.4 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 QualityMicrobial 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 testSoil 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 HandoutASC2.06.b. Soil Triangle ActivityASC2.06.c. The Dirt on Soil - WorksheetUse soil sieves to determine texture |
|  **3 days** | ASC2.7 Collect & Test Soil Samples: Physical **(Texture)** |  | ASC2.07.a. Soil Sampling SlidesASC2.07.b. Soil Texture Test LabASC2.07.c. Part 2 of test labASC2.07.d. Soil Studies Worksheet |
| **4 day** | ASC2.10 Ions (Cation Exchange Capacity) |  | ASC2.10.a. Ions SlidesASC2.10.b. Cation, Anion WorksheetASC2.10.c. Narrative Element Story(suggested as homework)Cation exchange VDO |
| **2 days** | ASC2.16 Soil Maps |  | ASC2.16.a. Smithsonian Soil WebquestASC2.16.b. Web Soil Survey Guide |
| **3 days** | Ionic and Metallic Bonding |  | Electron dot DiagramsAnimations and VDOs of Ionic bonds Practice problems in naming compounds |
| **3 days** | Covalent Bonding |  | Lewis Electron Dot Structures and the Octet ruleUse molecular models |
| **10 days** | Types Chemical reactions  |  | ASC3.07.c. Chemical Equations SlidesASC3.07.d. Balancing Equations with SkittlesBalancing Equations Resource link:<http://teachnlearnchem.com/Equations.htm>ASC3.07.h. Types of Reactions WorksheetLab 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 IndexWQI Ratings |
| **5 days** | Soil Erosion |  | Lab Soil erosion and runoff. |
| **10 days** | ASC3.13 Groundwater and Aquifers  |  | ASC3.13.a. Groundwater and Aquifers SlidesResource:How do Scientists find groundwater - Use URL:[http://water.usgs.gov/edu/gwhowtofind.htm](http://water.usgs.gov/edu/gwhowtofind.html)lASC3.13.b. Groundwater Contamination Reading resource ASC3.13.c. Groundwater Pollution LabASC3.13.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 SlidesASC3.06.b. Sig Figs WorksheetASC3.06.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 @ VDOsASC3.07.b. Stoich NotesASC3.07.c. Chemical Equations SlidesASC3.07.e. Stoich [Smores Lab](http://img.docstoccdn.com/thumb/orig/36439562.png)ASC3.07.f. Moles Tutorial WorksheetASC3.07.g. How Many Moles Are In Your Name?ASC3.07.h. Types of Reactions WorksheetASC3.07.i. Mole Ratio SlidesASC3.07.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 labCookie lab (For moles and Mass) |
| **10 days** | Gas Laws |  | Boyle's Law: LabCharles' Law: LabGay-Lussac's Law: lab |
| **5 days** | ASC3.8 Solution and Solubility-Molarity-Toxicity  |  | ASC3.08.a. Molarity, Solutions, and Solubility SlidesASC3.08.b. Molarity Murder MysteryASC3.08.c. Molarity of LemonadeOPTION: Solutions lab- create a fertilizer and calculate the percentage of element presentResource: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/%24department/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/%24department/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 deficienciesKey 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 testingKey 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 LPASC4.02.c. Legume ActivityASC4.02.d Legumes and NitrogenASC4.02.e. Nitrogen Scramble |
| **4 days**  | ASC4.3 Soil Amendments-organic and syntheticHow to read a fertilizer labelKey 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 ActivityASC4.03.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 |