DJUSD Board of Education: _____

Secondary Course Description

COVER PAGE

1. Course Title: Chemistry and Agriscience

2. Transcript Title / Abbreviation: Ag Chem

3. Transcript Course Code / Number (Office Use Only):

4. School: DSHS

5. District: Davis Joint Unified School District

6. Department: Agriculture

7. Graduation Requirement it meets: CTE, physical science

13. Subject Area:

- [ ] History/Social Science
- [ ] English
- [ ] Mathematics
- [X] Science
- [ ] Language other than English
- [ ] Visual & Performing Arts
- [X] DJUSD Graduation Elective
- [X] College Prep Elective (will seek UC/CSU approval)

8. Length of Course: 1 year

14. Grade Level(s): 9, 10, 11, 12

9. Graduation Credits: 10

15. UC/CSU Requirement: Lab D

10. School / District Web Site: http://www.djusd.net

16. Seeking "Honors" Distinction? [ ] Yes [X] No

11. CBEDS Course Code:

17. GPA Types:

12. School Contact

Name: Alex Hess

Title/Position: CTE Coordinator / DSHS Agriculture Teacher

Phone: 530-757-5700 Ext.:

Fax:

E-mail: ahess@djusd.net

18. Credit Value:

- [ ] 0.5 (half year or semester equivalent)
- [ ] 1.0 (one year equivalent)
- [ ] 2.0 (two year equivalent)
- [ ] Other: _____

19. Was this course previously approved by UC? [X] Yes [ ] No

If so, in what year? _____ Under what course title? __ Agriculture and Soil Chemistry _____

20. Pre-Requisites: Algebra 1 or IM-1

Co-Requisites: Algebra 1 or IM-1

21. Preliminary Approval - Secondary Site Principal Signature (Must be signed before proceeding to Step 22):

_____

22. Date Course Proposal with Preliminary Approval (Step 15) sent to Associate Superintendent, Educational Services: _____

23. Review & Approval:

Date		Signature
12/6/17	Site Curriculum and Instruction Leadership Team	Signature/Title _____
_____	Secondary Department Articulation/Collaboration	Signature/Title _____

Secondary Principal Signatures: _____ _____

Date: _____ _____ _____

BACKGROUND INFORMATION

Brief Course Description:

This course explores the physical and chemical nature of soil as well as the relationships between soil, plants, animals and agricultural practices. Students will examine properties of soil and land and their connections to plant and animal production. Using knowledge of scientific protocols as well as course content, students will develop an Agriscience research program to be conducted throughout the first semester of the course. To complete that whole project each student will investigate and test an Agriscience research question by formulating a scientific question related to the course content, formulating a hypothesis based on related research, conducting an experiment to test the hypothesis, collecting quantitative data, and forming a conclusion based on analysis of the data. The result of this research program will be an in-depth research and experimentation paper that is technically written, based on scientific protocol, and cited using APA formatting. Additionally, students will develop and present a capstone soil management plan for agricultural producers, using the content learned throughout the course. Throughout the course, students will be graded on participation in intracurricular FFA activities as well as the development and maintenance of an ongoing Supervised Agricultural Experience (SAE) program.

Context for Course:

List the State/District Standards addressed in this course.

Please view the attach excel spreadsheet titled *UCCI Agriculture Series Courses: Course 2: Agriculture and Soil Chemistry* for a list of California Department of Education CTE Anchor & Pathway Standards, NGSS Standard, Science and Engineering Practices, and Crosscutting Concepts addressed in the course. Standards addressed are presented by unit of instruction planned for the course.

History of Course Development:

Newly revised CTE Model Curriculum Standards designed to prepare all students to be both Career **and** College ready were adopted In January of 2013. In 2014, statewide efforts to update secondary agriculture curriculum and standards ensued. Secondary agriculture education professionals and the University of California Curriculum Integration Institute worked closely together to develop integrated agriculture courses that were applied, career oriented, and academic in nature as well as support materials and services for those implementing a rigorous program of agriculture education. Three pre-approved UC/CSU lab courses were developed (one life science, one physical science, and one inter-disciplinary).

The proposed course adopts the second in the series titled Agriculture & Soil Chemistry and represents the second course adoption. The capstone course (#3 in the sequence) Advanced Interdisciplinary Science of Sustainable Agriculture, was adopted in April/May of 2015 and reflects an update to the existing Agriscience pathway capstone formerly titled Agriscience Systems Management.

The course allows agriculture students choosing to take an Agriscience Pathway to complete a coherent sequence of courses. The sequence (1. Ag Bio, 2. Ag. & Soil Chem, and 3. Adv. Int. Sci. of Sust. Ag.) allows for CTE preparation, allows for access to A-G courses while pursuing alternative routes to graduation, prepares students for success in discipline specific technical fields and multiple post-secondary college opportunities, and is open to all students to explore while learning and preparing for similar trades, occupations, and careers.

COURSE GOALS AND/OR MAJOR STUDENT OUTCOMES

Maintaining positive interpersonal relationships, acting as stewards of our natural resources, and demonstrating respect for physical and social environments is promoted through engaged activities that demonstrate our role and responsibilities in a global society.

Academic Excellence: Each student will determine and pursue a Certificate of Excellence (FFA proficiency award) in at least one major content area of the class while achieving academic success across each unit of instruction.
Post-secondary success: Each student will prepare a career and college success plan aligned with their expressed career goal.
Social Development: Students, through a variety of academic and social experiences, will learn to appreciate differences and understand the commonalities between all people. Each student will plan, prepare, and implement a leadership activity aligned with the FFA program of activities.
(adapted from 2014 District adopted objectives and strategies)

COURSE OBJECTIVES

- Students demonstrate proficiency in practicing scientific methods and processes while addressing issues related to human managed and natural resource systems.
- Students develop expertise in identifying authentic agricultural problems and implement an experiment they design to address the issue.
- Students utilize principals of chemistry to analyze trade-offs associated with soils management in plant based production systems and natural systems.
- Students will propose methods for addressing water and soil contaminants associated with animal production systems.
- Students analyze trade-offs inherent in interacting with natural systems for human needs.
- Students will apply knowledge and understanding of chemistry to resolve issues associated with water and soil management practices within California's agri-food system.
- Students will convey basic knowledge and understanding of sustainability and sustainable agriculture systems approaches.

The student will be able to:

1. Access research material from the library, Internet, and other sources to complete increasingly challenging assignments as self-directed learners. In depth study of soil and water chemistry is designed to build knowledgeable problem solvers in agriscience professions.
2. Acquire advanced agricultural skills, develop knowledge and respect for a diversity of agricultural practices that are based on scientific principals and quantitative reasoning, and become advocates for agricultural practices that assure stewardship of water and soil resources for generations to come.
3. Prepare for advanced post-secondary level education in agriscience.
4. Demonstrate ability to solve problems and think critically by effectively completing challenging group and individual projects and assignments. The combination of science labs and academic research enables students to use complex, creative thinking skills for the purpose of reaching sound conclusions.
5. Develop and enhance computer skills while working on individual and group projects to practice and refine written, oral and multimedia communication skills.
6. Develop advanced communication, leadership and research skills, which will contribute to personal and post-secondary success.

COURSE OUTLINE

Unit One:
Agriscience Practices
Key Assignments

ASC1.1 Soil Structure and Composition Mini-Lab - Calgon Testing

ASC1. 2 Water and Soil Management Mini-Lab - Water Percolation

ASC1.3. Plant and Soil Management Mini-Lab - Nutrient Uptake

ASC1.4. Animal and Soil Management Mini-Lab - Animal Manure Amendment

ASC1.5. Technology Mini-Lab - Soil Moisture Testing

ASC1.6. Agriscience Research Project Proposal

Unit Two:
The Nature of Soil
Key Assignments
ASC2.1. Sedimentary Rock Lab

ASC2.2. Collect and Test Soil Samples: Physical Properties (figure out what elements might be in them based on chemical properties)

ASC2.3. Background Scholarly Research and Forming a Hypothesis

ASC2.4. Test Soil Samples: Chemical Properties

ASC2.5. Experimental Design and Conducting Experimentation

ASC2.6. Creating Soil Maps

ASC2.7. Soil Management Project

Unit Three:
Water and Soil Management
ASC3.1. Soil Erosion and Runoff Lab

ASC3.Water Quality Testing

ASC3.3. Analyzing data, interpreting data and forming conclusions.

ASC3.4.Tillage Practices and the Impact they have on Runoff, Erosion and Soil Chemistry

ASC3.5. Ground Water Contamination and Aquifer Lab

ASC3.6.Irrigation Practices in Agriculture

ASC3.7. Semester One Capstone Project

Unit Four:
Plants and Soil Management
ASC4.1.Plant Requirements from Soil Lab

ASC4.2. Soil Management Project

ASC4.3. Plant and Soil Interactions

Unit Five:
Animals and Soil Management
ASC5.1. Nutrient Deficiencies in Livestock

ASC5.2. Livestock and Water Quality

ASC5.3.Livestock Waste Management

ASC5.4. Soil Management Project

Unit Six:
Soil Sustainability
ASC6.1.Phytoremediation Lab

ASC6.2.Tillage Protocols: Impact on Soil Structure and Soil Sustainability Lab

ASC6.3.Land Use Planning Model

ASC6.4.Agriculture Issue Debate and Policy Proposal

ASC6.5. Soil Management Project

Capstone Project and Portfolio

1.Soil Management Capstone Project

2. Course Portfolio

TEXTS AND SUPPLEMENTAL INSTRUCTIONAL MATERIALS

Title, Author, Publisher, Edition:
Environmental Science Fundamentals and Applications and Chemistry

Previously Adopted? [x] **Yes** [ ] **No (If no, provide information directly below)**

Cost per book	Total Cost	Budget Source

Other:
Supplemental Materials:

- Environmental Science and Technology Second Edition Agriscience & Technology Chapters 10, 13, 14 & 15
- Environmental Science 10th Edition; G. Tyler Miller, Jr. Chapters 9, 13 & 14
- Environmental Science 7th Edition; Bernard J. Nebel & Richard T. Wright, Prentice Hall
- The Science of Agriculture A Biological Approach 2nd Edition; Ray V. Herren; Delmar Thomson Learning
- Agriscience Fundamentals and Applications 6th Edition; L. DeVere Burton, Cengage Learning
- Environmental Science 1st Edition, 2013; Michael Heithaus; Karen Arms; Houghton, Mifflin, Harcourt

DIFFERENTIATED INSTRUCTIONAL METHODS AND/OR STRATEGIES

Instructional Methods and Strategies utilized to facilitate student learning are as follows:

Inquire-based learning, both independently and in cooperative groups, is a key component of the class.
Laboratory activities and field excursions both employ a hands-on approach to inquiry based investigation and require students to use specific processes rooted in the scientific method (observing, problem identification, proposing explanation, hypothesis testing and analysis).

Students practice skills utilized by professionals in the field of agriculture which prepares them for post-secondary study and/or work in this field.

Students have multiple opportunities for written expression using both writing prompts and student projects. Writing prompts used throughout the course facilitate concept development by students and the associated self and peer assessment leading to rewrites promote further understanding by students.

Worksheets throughout units allow students to assess their level of understanding and quantitative problems requiring data analysis and calculations provide practice with the type of analysis conducted by professionals in the field.

Students are exposed to current theories and prevailing lines of thought in the field through their reading of selected articles drawn from both the scientific and popular media and in nonfiction works. They are required to expand what they gain from these readings and support their own viewpoints through Socratic seminars and literature circles.

As this is a college prep class, teacher led lectures presented through PowerPoint and discussions

are used to disseminate and explore information throughout the year. Technology is a key component with visual media interwoven throughout to help illustrate the material.

Concept maps are used to help students grasp concepts such as the interrelations between animal production systems, soil conservation practices, and water quality.

A student response system ("iphones as clickers") is used both for reviewing material and incorporated into lectures to assess student understanding on a real time basis.

Demonstrations are incorporated into to aid in student learning.

Incorporating student interests to facilitate learning is a key component of any good classroom environment. Student choice is integrated into projects and activities throughout the year as its value in terms of student excitement and role in the learning process is key.

ASSESSMENT METHODS AND/OR TOOLS

Assessments for this course are multifaceted and not restricted to formal exams at the completion of a unit. Examples of assessments are as follows:

Laboratory Activities: Inquire-based learning, both independently and in cooperative groups, is a key component of the class. Laboratory activities employ a hands-on approach to inquiry based investigation and through the use of the scientific method students ideas and their application have influence the direction of the learning process. Employment of scientific processes, the ability to interpret data, and summative conclusions are used to evaluate student work.

Field Excursions: Students practice skills utilized by professionals in the field and are assessed based upon their observations in the field, precision of procedures learned and analysis of observations.

Tests and Quizzes: Quizzes designed for students to assess their level of understanding prior to a test and unit exams serve as a traditional measure of student's mastery of concepts. The majority of questions on tests and quizzes are open ended and require written responses rather than simply multiple choice and true false questions.

Writing Prompts: Written responses by students to prompts facilitate concept development and the associated self and peer assessment leading to rewrites promote further understanding.

Socratic Seminars: Student contributions to group discussions and ability to step out of their "comfort zones" are key for this component. Assessments are made based on original thought, persuasive arguments, contribution to discussions.

Review and Extension Worksheets: Worksheets and problem sets used throughout units allow students to assess their level of understanding and quantitative problems requiring data analysis and calculations provide practice with the type of analysis conducted by professionals in the field.

Participation: Students are evaluated based upon their participation in class discussions and

sharing of insights in both small group and whole class situations. Teacher observations of student mastery of material as also assessed through conferencing with students.

Other tools and methods as they come available and can relate to hands-on instructional activities and provide reliable measure for determining student gains and development in the content area.

ASSESSMENT CRITERIA

FFA Participation and Leadership Development 10%

SAE and Proficiency Certification 10%

Labs and lab reports 25%

Quizzes, Tests, Exams (to include capstone project and portfolio sem2) 25%

Assignments 25%

Participation 5%

HONORS COURSES ONLY

Indicate how this honors course is different from the standard course.