**Oregon State University**

**College of Agricultural Sciences**

**Department of Horticulture**

**Syllabus**

**Course Name** Plant Nutrition

**Course Number** HORT 316-001

**Course Credits** 4 Credits

Winter Term 2019

Lecture ALS 4000 Mon, Wed, Fri 1:00-1:50 pm

Recitation ALS 0012 Sec.10: Thursday 1:00-1:50 pm

Sec.11: Thursday 2:00 -2:50 pm

Sec.12: Thursday 3:00 - 3:50 pm

**Instructor** Alec Kowalewski, Department of Horticulture.

Email: alec.kowalewski@oregonstate.edu

Phone: 541-737-5449

**Office Location** ALS 4147

**Office Hours** 2:00 to 2:50 pm Monday and Wednesday, and

12:00 to 1:00 pm Friday

**Prerequisite** CSS 205 or CSS 305 or SOIL 205. You should have a familiarity with the general structure and growth habits of plants. A general knowledge of commonly used plant materials in landscapes, fruit and nut crops, forestry, conservation and restoration efforts are also useful.

**Suggested Text** Principles of plant nutrition. Mengel, Konrad and Ernest A. Kirkby. Dordrecht; Boston : Kluwer Academic Publishers, 5th Edition, 2001.

**Course Description**Students will learn basic concepts and principles of plant mineral nutrition that will provide a basis for solving practical nutritional problems in horticultural crops. Areas covered include mineral nutrients, nutrient availability in the soil and plant uptake, nutrient deficiencies and toxicities and their causes and remedies, and plant and soil analysis.

**Measurable Student Learner Outcomes**

* Describe the principles governing plant mineral nutrition.
* Identify the key components of the essential plant nutrient elements.
* Summarize the effects of plant nutrition on yield responses and crop quality.
* Recall the basis for and methods used to evaluate plant and soil fertility status.
* Demonstrate an introductory level of evaluating nutrient deficiency and toxicity symptoms, soil analysis, and plant analysis.
* Analyze the physiological principles of mineral nutrition and predict how these can be manipulated for successful horticultural crop management.

**Evaluation of Student Performance**

**Exams**180 points. Three exams (includes final exam) covering the weekly course content (60 points each). All exams are closed book and notes.

**Exam 1** – Friday, February 1

**Exam 2** – Friday, February 22

**Exam 3** – Monday, March 18 at 2:00 pm, ALS 4000

<http://catalog.oregonstate.edu/ChapterDetail.aspx?key=371#Section4007>

**Pop Quizzes**50 points. Pop Quizzes: Ten, five point, pop quizzes will be given throughout the semester totaling. Students without excused absences will not be able to make up missed quizzes and will receive a zero for each missed quiz.

**Micronutrients** 60 points. Students will be divided into small groups, the groups will be assigned a plant and a micronutrient. The will design and present lectures on micronutrients covering the topics provided within the Micronutrient study guides starting February 25.

**Experiment**60 points. Each recitation group will be subdivided into small groups. Each group will be responsible for establishing and collecting data on a fertility project throughout the term. On Thursday March 7, the groups will present their projects to the others within the respective recreation section.

**Recitation** 100 points. Recitation participation points (10 points per recitation) will be awarded based on student attendance and group activity.

**Grading** Course grades will be based on total cumulative points (450)

B+ = 87 - 89 % C+ = 77 - 79 % D+ = 67 - 69 %

A = 94 - 100% B = 84 - 86 % C = 74 - 76 % D = 64 - 66 %

A- = 90 - 93% B- = 80 - 83 % C- = 70 - 73 % D- = 60 - 63 %

F = < 60%

**Lecture**  ALS 4000 Mon, Wed, Fri 1:00-1:50 pm

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| **Date** | **Day** | **Lecture Topic** | **Chapter** |
| 7-Jan | Mon | Introductions - Micronutrient | Chap  1 and 2 |
| 9-Jan | Wed | History and essential nutrients |
| 11-Jan | Fri | Nutrients in the soil |
| 14-Jan | Mon | Movement of nutrients to roots | Chap  3 and 4 |
| 16-Jan | Wed | Nutrient uptake by the plant |
| 18-Jan | Fri | Long distance transport |
| 21-Jan | Mon | **Martin Luther King Day** | Chap  5 |
| 23-Jan | Wed | Long distance transport |
| 25-Jan | Fri | Plant nutrient content |
| 28-Jan | Mon | Plant growth response | Chap 7 |
| 30-Jan | Wed | Exam Review |
| 1-Feb | Fri | **Exam 1** |
| 4-Feb | Mon | Nitrogen | Chap  7 and 9 |
| 6-Feb | Wed | Haber Process, and Fertilizer Worth Spreading |
| 8-Feb | Fri | Nitrogen Cycle, and Phosphorus Crisis |
| 11-Feb | Mon | Phosphorus | Chap  9-11 |
| 13-Feb | Wed | Potassium |
| 15-Feb | Fri | Sulfur |
| 18-Feb | Mon | Calcium | Chap 12 |
| 20-Feb | Wed | Magnesium |
| 22-Feb | Fri | **Exam 2** |
| 25-Feb | Mon | **Student Lecture Series –**  **Iron, Manganese,**  **Zinc, Copper,**  **Molybdenum, Boron,**  **Chlorine, and Nickel** | Chap  13-17 |
| 27-Feb | Wed |
| 1-Mar | Fri |
| 4-Mar | Mon | Chap  18-19 |
| 6-Mar | Wed |
| 8-Mar | Fri |
| 11-Mar | Mon | Calcareous and Acidic Soils | Handouts |
| 13-Mar | Wed | Saline and Heavy Metal Soils |
| 15-Mar | Fri | Exam Review |
| 18-Mar | Mon | **Final Exam at 2:00 pm** | |

**Recitation** ALS 0012 Sec.10: Thur. 1:00-1:50 pm

Sec.11: Thur. 2:00 -2:50 pm

Sec.12: Thur. 3:00 - 3:50 pm

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| **Date** | **Day** | **Recitation Topic** |
| 10-Jan | Thurs | 1.     Establish projects in East Greenhouse |
| 17-Jan | Thurs | 2. Nitrogen fertilization rates and assignment |
| 24-Jan | Thurs | 3. Guest Speaker: Gloria O’Brien  Topic: Making nutrient solutions (East Greenhouse),  Collect data on projects |
| 31-Jan | Thurs | 4. Phosphorus fertilization rates and assignment,  Collect data on projects |
| 7-Feb | Thurs | 5. Guest Speaker: Clint Mattox  Topic: Collecting a soil sample and interpreting results  Collect data on projects |
| 14-Feb | Thurs | 6. Sample experiment presentation,  Potassium fertilization rates and assignment,  Collect data on projects |
| 21-Feb | Thurs | 7. Guest Speaker: Gloria Ambrowiak  Topic: Soil Science (Central Analytical Laboratory)  Collect data on projects |
| 28-Feb | Thurs | 8. Guest Speaker: Tyler Hoskins  Topic: Pour through nutrient sampling  Collect data on projects |
| 7-Mar | Thurs | **9. PowerPoint presentations of**  **project results to classmates** |
| 14-Mar | Thurs | **10. PowerPoint presentations of**  **project results to classmates** |

**Weekly Content**

The course is organized on Canvas by weekly modules. Within each module you will find reading assignments, a study guide, lectures slides and notes.

**Disability Access Services:**

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at (541) 737-4098.

**Reach Out for Success:**

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it’s important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)