



| Course Information | | | | | |
|--|---|------------|-------------------------------------|-------------------------|--|
| Code: | AGG61009 | Course: | FISIOLOGÍA VEGETAL Y AGROTECNOLOGÍA | | |
| Coordination Area / Program: | FAC. INGENIERÍA: ING. AGROINDUSTRIAL | | | Mode: Presencial | |
| Credits: 04 | Tipo de hora | Presencial | Virtual | H. Totales | Autonomous Learning Hours: 128 |
| | H.Teoría | 32 | 0 | 32 | |
| | H.Práctica | 32 | 0 | 32 | |
| | H.Laboratorio | 32 | 0 | 32 | |
| Period: 2024-02 | Start date and end of period: del 19/08/2024 al 08/12/2024 | | | | |
| Career: INGENIERÍA AGROINDUSTRIAL | | | | | |

| Course Pre-requisites | | |
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| Code | Course - Credits | Career |
| FC- P-IAL BIOYBIOMOL | BIOQUÍMICA Y BIOLOGÍA MOLECULAR | ING AGROIND |

| Course Coordinators | | | |
|--------------------------|----------------------|--------------------|-----------------------------------|
| Surname and First Name | Email | Contact Hour | Contact Site |
| BUGARIN FERRE, ALEJANDRA | abugarin@usil.edu.pe | 03:00 - 05:00 p.m. | 3rd floor - Building C - Campus 1 |

| Instructors |
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| You can check the timetables for each teacher in their INFOSIL in the Classes Development Teachers option Teachers . |

| Course Overview |
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| Plant Physiology and Agrotechnology is a theoretical-practical and experimental subject of the specialty that contributes to the competency of Problem Solving in Agroindustrial Engineering. Its purpose is to provide students with knowledge that allows them to learn about the diverse physiological processes of plants in order to obtain quality products for agroexport. It includes the development of the following thematic axes: the processes that regulate the growth, development and reproduction of plants: mineral nutrition, water relations, photosynthesis, bioenergetic metabolism, hormonal regulation of flowering, senescence and germination and their interactions with the environment. It relates the different physiological processes that occur in plants to obtain a global vision of the functioning of the plant under natural and cultivation conditions that influence quality. This course will develop the ability to acquire new knowledge as needed, using appropriate learning strategies. The creditable product of the course is the final project of the course in which a report is presented with the problem statement, objectives, methodology, discussions and conclusions. |

| Professional and/or General Competencies | | | |
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| Career/Program | Abbreviation/ Name of the competency | Level of the competency | Expected Learning |
| Agroindustrial Engineering | CP2: Solution of agro-industrial engineering problems | N2 Designs products, packaging or processes based on research to solve complex problems of agro-industrial engineering and other relevant disciplines in the program domain, satisfying their requirements. | <ul style="list-style-type: none"> Identifies complex problems of agro-industrial engineering and other relevant disciplines in the program domain for the definition of requirements taking into account the needs of users and their environment. Describe products, packaging or processes |

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| | | | <p>to solve complex problems of agro-industrial engineering and other relevant disciplines in the program domain in order to satisfy their requirements, taking into account the needs of users and their environment.</p> <ul style="list-style-type: none"> • Designs products, packages or processes based on research to solve complex problems of agro-industrial engineering and other relevant disciplines in the program domain, achieving to satisfy their identified requirements. |
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| General Course Result | Unit Result |
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| <p>At the end of the course, the student prepares a final project of the course in which a report is presented with the problem statement, objectives, methodology, discussions and conclusions, considering the physiological processes that regulate the growth, development and reproduction of plants and their interactions with the environment, as well as agro-technology concepts such as mechanized harvesting and agricultural automation.</p> | <p>1. At the end of the unit, the student prepares the first part of the final work of the course where he/she recognizes the importance of plant physiology and relates it to an agricultural crop, taking into account the solution to an engineering problem.</p> |
| | <p>2. At the end of the unit, the student identifies the importance of climate, agrotechnology and the use of new varieties oriented to intensive agriculture. Furthermore, the student identifies the consequences of climate change on food production and the technologies applied in agriculture, focusing on precision agriculture applications as a key tool to optimize production.</p> |

| Development of activities | | |
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| <p>Unit Result 1: <i>At the end of the unit, the student prepares the first part of the final work of the course where he/she recognizes the importance of plant physiology and relates it to an agricultural crop, taking into account the solution to an engineering problem.</i></p> | | |
| <p>Session 1: <i>At the end of the session, the student identifies the processes that regulate plant growth.</i></p> | | <p>Semana 1 a 2</p> |
| Learning Activities | Contents | Evidence |
| <p>-Define the concept of plant cell and identify plant morphology. - Identify the main plant functions and their importance in food production. -Understand the relevance of water in plants. - Relate the concepts of photosynthesis, respiration and transpiration to plant species, as well as their importance in agricultural crop production.</p> | <p>-Introduction to plant science. -The plant and the plant cell. - Introduction to plant physiology. - Photosynthesis, respiration and transpiration. -Plant hormones - Resolution of cases</p> | <p>-Solution of a case presented by the teacher.</p> |
| <p>Session 2: <i>At the end of the session, the student relates soil characteristics to a fertilization rate per crop and to agriculture with food production.</i></p> | | <p>Semana 3 a 5</p> |
| Learning Activities | Contents | Evidence |

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| -Identify Soil Characteristics. - Understand how important macroelements, secondary elements and micronutrients are in plant nutrition and the consequences of its deficiency in agricultural crops. -Understand the implication of soil fertilization in agricultural crops production. | -Soils -Soil physical, chemical and biological characteristics -Soil's role in agriculture and food production -Mineral nutrition - Fertilization -The Soil Profile - Resolution of cases posed by the teacher. | -Case of critical reading according to professor indications solved by student. |
| Session 3: <i>At the end of the session, the student identifies the importance of water for plant development as well as irrigation techniques for crop production.</i> | | Semana 6 a 9 |
| Learning Activities | Contents | Evidence |
| -Identify the importance of water in both soils and plant physiology. - Identify how plants take water and distribute within the plant. -Identify the irrigation techniques for crop production. | -Soil water retention -Soil solution - Water and the plant -Water uptake and transport inside the plant - Evapotranspiration process -Water requirements for crop production - Estimation of irrigation -Irrigation programming -Resolution of cases | -Case of critical reading according to professor indications solved by student. |
| Unit Result 2: <i>At the end of the unit, the student identifies the importance of climate, agrotechnology and the use of new varieties oriented to intensive agriculture. Furthermore, the student identifies the consequences of climate change on food production and the technologies applied in agriculture, focusing on precision agriculture applications as a key tool to optimize production.</i> | | |
| Session 4: <i>At the end of the session, the student recognizes the differences between weather and climate, recognizes the importance of meteorological conditions on food production and for making decisions in agriculture.</i> | | Semana 10 a 10 |
| Learning Activities | Contents | Evidence |
| -Identify the importance of climate and weather on crop production. - Identify the importance to weather variability on intensive agriculture. | -Definition of climate and weather - Making decisions at different scales -Main meteorological parameters that influence agriculture -Type of weather stations | -Case of critical reading according to professor indications. |
| Session 5: <i>At the end of the session, the student recognizes the new varieties used for food production, their characteristics, and applications in agriculture.</i> | | Semana 11 a 11 |
| Learning Activities | Contents | Evidence |
| -Identify the importance of agrobiotechnology. -Identify the importance to use new varieties oriented to intensive agriculture. | -Definition of Agrobiotechnology and importance in Agriculture. - Agrobiotechnology in Agriculture: yields and productivity - Biosecurity. -Varieties oriented to intensive agriculture. -Improved varieties and certified seeds. - Genetic modified organisms. - Resolution of cases | -Case of critical reading according to professor indications. |
| Session 6: <i>At the end of the session, the student recognizes the technologies applied by agroindustrial companies to achieve good management of their crops.</i> | | Semana 12 a 13 |
| Learning Activities | Contents | Evidence |
| -Identify the technology applied to Good Agricultural Practices and how the agroindustrial companies use to achieve good management of their crops. | Technology applied to Good Agricultural Practices: -Machinery for soil preparation. Salinity, Sodicity, Acidic soils -Irrigation systems -Fertirrigation -Pest and diseases control. -Harvesting machinery. -Resolution of cases. | -Case of critical reading according to professor indications. |
| Session 7: <i>At the end of the session, the student recognizes the impact of Climate Change in agricultural and food production.</i> | | Semana 14 a 14 |
| Learning Activities | Contents | Evidence |

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| -Identify the consequences of climate change in food production. | -Climate Change and agricultural production. -Consequences of climate change in food production. | -Case of critical reading according to professor indications. |
| Session 8: <i>At the end of the session, the student recognizes the Applications of precision farming by agroindustrial companies to achieve good management of their crops.</i> | | Semana 15 a 16 |
| Learning Activities | Contents | Evidence |
| - Identify the precision farming and how the agroindustrial companies use the data to improve their production. | -Precision farming and data management. -Definition - Applications of precision farming. - Peruvian cases of use of precision farming | -Case of critical reading according to professor indications. |

| Methodology |
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| <p>The course will be developed based on the following methodologies: The course will be developed based on the following methodologies: project based learning, to promote collaborative work of students and their active participation through each of the topics covered, developing their social skills. The methodology is suitable for the development of the course in the face-to-face modality. The teacher is the motivator and mediator of the learning process. The materials used for consultation and research will be books and specialized publications. Likewise, seminars will be held where quantitative problems will be solved to reinforce.</p> <p>Graduate Attributes [AG-I07] Engineering Knowledge: Applies knowledge of mathematics, natural sciences, computer science, and fundamental and specialized engineering knowledge to develop solutions to complex engineering problems.</p> |

| Assessment System | | | | |
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| Each of the items of the evaluation scheme and the final grade of the course are rounded to whole numbers. The final grade of the course is the weighted average of the corresponding items: permanent evaluation, partial exam and final exam. | | | | |
| The averages calculated components of the item 'Permanent Evaluation' will keep your calculation with 2 decimals. | | | | |
| Type Evaluation | %Weighing | Observation | Week Assessment | Rezag. |
| Continuous Assessment | 70% | | | |
| Activities | 20% | Laboratories, activities and exhibitions every week of the course | Semana 15 | No |
| Assignments | 50% | | | |
| Assignment 1 | 50% | Practice 1 | Semana 6 | No |
| Assignment 2 | 50% | Practice 2 | Semana 12 | No |
| Prueba_Fin | 30% | Written evaluation of all course contents. | Semana 15 | Si |
| Evaluación Final | 30% | Creditable product (final work) | Semana 16 | No |

| Attendance Policy | |
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| Total Percentage Absences Permitted | 30% |
| Class attendance is mandatory. The student who reaches or exceeds the limit of thirty percent (30%) of absences in the course, defined by the total of effective hours, will be disqualified from taking the final evaluation, corresponding to said evaluation with a grade of zero (0). | |
| In hybrid classrooms, only synchronous virtual participation (via zoom) is allowed, up to a maximum of 50% of the total course. | |

| Basic Required Reading |
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[1] Horst Marschner (Ed.) (2011). *Mineral Nutrition of Higher Plants*. Elsevier Science & Technology, ProQuest Ebook Central: <https://ebookcentral.proquest.com/lib/bibliosil-ebooks/detail.action?docID=858643>

[2] Hillel, D. (1998). *Environmental Soil Physics*. Academic Press: <https://dewagumay.wordpress.com/wp-content/uploads/2011/12/environmental-soil-physics.pdf>

[3] Allen, R.G., Pereira, L.S., Raes, D., Smith, M. (1998). *Crop Evapotranspiration. Guidelines for computing crop water requirements*. FAO Irrigation and drainage paper 56: <https://www.fao.org/4/X0490E/X0490E00.htm>

| References Supplementary |
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[1] Weil, R.R. & Brady, N.C. (2008). *The Nature and Properties of Soils*. 15th Edition. : Prentice Hall.

| Prepared by: | Approved by: | Validated by: |
|---|-------------------------------------|----------------------------------|
| BUGARIN FERRE, ALEJANDRA / HIDALGO GOMEZ, YASSER ARAFAT / | OLIVERA MONTENEGRO, LUIS ALBERTO | Office of Curriculum Development |
| Date: 17/08/2024 | Date: 17/08/2024 | Date: 17/08/2024 |