Center for International Programs and Sustainability Studies
Course Name: Agroecology and Sustainable Food Systems
Course Code: ENV 4030
Total Contact Hours: 60
Pre-Requisites: It is recommended, but not mandatory, that students complete a basic biology and/or ecology course prior to entering this course.

COURSE DESCRIPTION

This course examines different agriculture and food production systems **from an ecological perspective**, considering the systemic model and integrated agroecological management, to offer answers that promote sustainability and regenerativity for food production systems design.

After studying the fundamentals and most important ecological processes, diverse applications to agricultural systems will be analyzed within the framework of the imitation of natural systems, including ancestral and novel technologies and methods. The elements of **consumption and production** that affect current food production systems and the **production and management of energy** from **alternative sources** will also be analyzed and students will explore **their own role in the food production system**, and **creation of new solutions.**

After this course, students will show capacities, skills and attitudes important for the design and development of regenerative projects in agroecology and sustainable food production.

Field trips will provide opportunities for direct observation and interaction in different system designs and their particular operation in Costa Rica, many times applicable to

international realities. This course usually interacts with other CIPES courses such as Tropical Botany and Sustainable Development, among others; the course demands extra class reading and preparation for lectures, outside activities, and assignments.

CLOTHING AND FOOTWEAR REQUIREMENTS

It is necessary for foreign students to have clothes both for warm climate and for cold (not extreme), as well as closed shoes (hiking shoes and rubber boots if possible) since many field trips are made to highlands, rainy zones, and sometimes to areas with the possible presence of snakes, insects, and other animals. We've never had an accident under those circumstances, but we want our students to be as comfortable and safe as possible. The appropriate clothing and footwear also facilitate the field work of this course.

AUDIENCE

This course is structured for international students attending the Study Abroad Program at an LCI Education university campus. However, courses are not exclusive to foreigners so local degree-seeking students may enroll in this course. Some of the courses are also taught in Spanish as part of our Bachelor´s in Sustainability Management or Business Administration programs.

This is a theoretical-practical course and explores/responds to the following inquiry according to the professional/disciplinary profile:

How to design efficient agroecological and food production systems that can promote and exemplify regenerative and sustainable systems management?

To answer this question, the following regenerative topics will be studied:

- Theoretical foundations of Ecology of Agriculture
- Systems approach
- Plants and environmental elements

- Systems interactions
- The design of alternative agroecological systems
- Alternative food production systems
- Soil building and organic waste management
- Integrated pest management
- Transition to sustainability and regenerative management: Permaculture and Analog Forestry.

Throughout the course the following skills will be promoted:

- Ability to analyze the problems of conventional agriculture and the need for sustainable food production systems.
- Ability to determine strengths, needs and improvement opportunities in agricultural systems.
- Ability to propose alternative, sustainable and regenerative designs of agroecological systems.

Among the values and attitudes that will be promoted among students are the following:

- Empathy with the environment
- Self-awareness
- Solidarity in relationships with others
- Equity
- Teamwork and leadership
- Systemic thinking
- Logical and communicative intelligence
- Interest in solving problems
- Interest in learning to learn
- Negotiate knowing how to inspire trust and empathy

COMPETENCIES, CRITERIA AND EVIDENCE

The competencies for Veritas University are reflexive and integrated actions that respond to the professional profile and to the problems of the context, with suitability and ethical commitment, integrating the know-how, the know-how, and the knowledge to know in a perspective of improvement.

Below are both the disciplinary and general competencies, linked to their criteria and evidence of performance for this course.

Competences	Key competences	Learning Assessments
Disciplinary Integrates the best agroecological practices to propose alternative designs to agriculture and conventional food production systems, in accordance with ecological principles and considering the maxims of sustainability and regenerative management.	Analyzes complex agroecological systems and food production systems considering the use and integration of alternative techniques and methods, research, analysis and interdisciplinary diagnosis.	Current event presentation Field Trip report an onsite design Group research and presentation Individual presentation Creative presentation
	Analyzes the importance of planning and emulation of natural systems in sustainable agroecological design through the integration of best practices in organic agriculture, permaculture, and analog forestry systems.	Current event presentation Field Trip report and onsite design Group research and presentation Individual presentation Creative presentation
	Applies concepts of ecology and alternative practices of agriculture, food production, and energy generation systems in the design of	Written report, oral presentation and sustainable agroecological system design model.

	agroecological systems, according to the principles of sustainability and regenerative management.	Creative presentation
Generic/Core		
Integrates knowledge, skills and attitudes to continuously learn and through one's life pursuing an efficient development in the knowledge-based society.	Learning to learn	Written report, oral presentation and sustainable agroecological system design model Current event presentation Field Trip report and onsite design Group research and presentation Individual presentation Creative presentation
Builds the necessary knowledge, skills and attitudes to learn how to communicate orally and in written form in the different disciplines that make up the curriculum.	Communicate thoughts of the discipline orally, iconically, and in written form.	Current event presentation Field Trip report and onsite design Group research and presentation Individual presentation Creative presentation
Integrates the necessary knowledge, skills, and attitudes to learn teamwork and leadership techniques.	Execute teamwork and leadership.	Written report, oral presentation and sustainable agroecological system design model Group research and

		presentation Creative presentation
Integrates the necessary knowledge, skills and attitudes to learn interpersonal communication techniques.	Relate well to others Manage and solve conflicts Negotiate reliably and empathetically Speak responsibly Listen attentively	Written report, oral presentation and sustainable agroecological system design model Group research and presentation Creative presentation

COURSE CONTENT

Unit 1. Problems in Agriculture

1.1 The Green Revolution: a brief history of conventional agriculture

1.2 Current Conventional Agriculture goals and methods.

1.3 Consequences of Conventional Agriculture practices

1.4 Heterotrophy and food chains importance in agriculture

1.5 Integration importance in agriculture

1.6 Sustainability of Conventional Agriculture

Unit 2. Agroecology spectrum

2.1 Organic agriculture principles and fundamentals

2.2 Organic agriculture types

2.3 Organic agriculture methods, practices, and certification.

2.4 Agroforestry and Analog Forestry

2.5 Permaculture

2.6 Ecofeminism

Unit 3. History of Agriculture

3.1 Aztec chinampas

3.2 Terracing in the Andes

3.3 Nomadic Herding - The Maasai example

3.4 Lactase persistence

3.5 New husbandry and the turnip introduction to Great Britain

Unit 4. Ecology in Agriculture

4.1 Ecology fundamentals

4.2 Ecological interactions

4.3 Forms of energy and entropy

4.4 Photosynthesis and primary production

4.5 Energy Production and Transfer in Agriculture

4.6 Energy costs and efficiency in Agriculture

Unit 5. **Soil**

5.1 Soil characteristics (structure, texture, color)

5.2 Soil formation

5.3 Soil biotic interactions

5.4 Plant nutrient acquisition and Cation Exchange Capacity (CEC)

5.5 Soil horizons and orders

5.4 Soil management: organic matter and composting

Unit 6. Nutrient cycling and Decomposition

6.1 Biogeochemical cycling

6.2 Macronutrients and Micronutrients

6.3 Nitrogen cycle, importance, and ecological impact.

6.4 Phosphorus cycle importance, and ecological impact.

6.5 Potassium cycle importance, and ecological impact.

6.6 Mycorrhizae

6.7 Decomposition fundamentals

Unit 7. Adaptations relevant to agriculture

7.1 Basic plant systems and their functions

7.2 The process of photosynthesis and its implications

7.3 Photosynthesis types and agroecology

7.4 Allocation

7.5 Light adaptations

7.6 Temperature adaptations

7.7 Water adaptations

METHODOLOGY

The methodology is planned as experiential learning using Paolo Freire's educational guidelines, from a constructivist perspective and, the competency-based model. Classes are of an interactive nature, stimulating the collective construction of knowledge; so, the students can recognize, by their own means, the context in which they are and how they can use it to understand the topics of the course for use in their future careers.

This course implements **active methodology**, in which the student is subject of its own learning at all stages. Within this methodology both **inductive and deductive** methods are

applied as well as various techniques in an **eclectic** way. **Research** on the essential concepts of Ecology and Agroecology is encouraged, both **individually and in groups**, through the study of cases that exemplify concrete situations that challenge the proposals of Agroecology in the search for sustainability and regenerative systems and exemplify the application of good agroecological practices. Likewise, different activities are used to exemplify the applications of the discipline in different contexts and to promote the ability to analyze and solve specific problems.

A **project** is carried out in **small groups**, in which a **sustainable agroecological design** is proposed, emphasizing **efficiency** by applying the knowledge covered during the course and the **scientific method.** Students are asked to frame the project within the field of Agroecology, but the system proposed can vary from urban gardens to school gardens, community gardens, production farms, educational farms, Permaculture systems, Analog Forestry systems, among others. The purpose of the project is to apply the concepts and applications of efficiency and regenerativity/sustainability in an agroecological design. The student must demonstrate a high **level of analysis**, consider the great number of factors that must be involved in the design and make the proposal **applicable to reality**; that is, the design must be **achievable**.

Along the course the expository method is used by the professor and students, individually and in groups, always promoting the participation of students through their direct intervention in discussions, broadening concepts and analysis of the topics discussed in class. Since research is a pillar of the course, the topics to be discussed and exposed in class are first researched at the bibliographic level by the students and then used and presented in group or individual work products. The field techniques as well as the direct and participatory learning is reflected in reports, in which the scientific method is also applied.

The role of the **professor** is to **mediate, facilitate and guide the teaching and learning process,** allowing **students to build and self-regulate learning,** based on their previous and

significant knowledge; the student is active, the teaching-learning process is collective and socialized. It also fosters social integration, the development of **group work skills, community feeling and respect, without neglecting individualization.**

EDUCATIONAL RESOURCES

In order to guarantee good development of the course, therefore to guarantee learning, the following resources are available: an updated bibliographic database, multimedia equipment that students can use for their individual presentations; whiteboards and other school equipment for weekly sessions, and readings provided by the educator. All of these complement the suggested projects and provide the students with higher possibilities of knowledge own ship. Most of the lessons will take place in the classroom. During independent work periods, students will be able to attend the institution.

A campus library, study rooms, and computer labs are available for the students´ independent work time. Free Wi-Fi connection for students, educators, and staff is provided on campus, which gives students the possibility to work not only in the library or computer labs, but also around campus.

LEARNING ASSESSMENT

In order to make the course or program better competencies-based evaluation compiles and evaluates evidence by taking into account feedback providing pre-established criteria. The course evaluation must be aligned with the competencies and the teaching methodology. There is a rubric for each evaluation resource, and the details will be provided in **CANVAS LMS**. Even though the rubric grants a grade, it is also a quantitative and qualitative description of the students´ performance. The rubrics include the core and discipline key competences.

ASSIGNMENTS	PERCENTAGE VALUE
Current event presentation	10%
Creative presentation	5%
Group research and presentation	10%
Field trip reports (one report and one onsite design !0% each)	20%
Individual presentation and self-assessment	15%
Final Project: Agroecological Design This includes 2 progress revisions, peers assessment, and self assessment.	40%
Total:	**100%**

LEARNING STRATEGIES

The following learning strategies will be developed:

1. **Regional Current Event Presentation:**

   This is an oral presentation of a current topic of interest logically structured. The presentation provides the important points of a wide range of information previously researched by the student, reinforcing analysis and synthesis abilities. Oral presentations allow the student to delve into a specific topic through research and develop communication; discussion and information organization skills. These presentations will generate a space for group discussion. The specific topics to be discussed are of free choice, referring to **national or regional agricultural issues**. Students use extra class time to research and prepare the presentation, articles and/or sources to be presented must **be approved by the professor through Canvas at least 7 days before deadline**. Each student

orally presents the researched event, a personal and research-based point of view, and a generating question for discussion and analysis with the class. **The approved topic with the presentation (if PPT is used, which is NOT mandatory) must be uploaded to Canvas at least the day before presenting.** The time for presenting is 15 minutes maximum including discussion. **This assignment is 10% of the total grade.**

2. **Field trip reports**

Field trip reports allow students to analyze the agroecological systems visited, from the perspective of Ecology and of Agroecology as a discipline that emulates nature and sustainability.

Students analyze the particular design of the site visited, the existing environmental, economic, social and design-based reality and provide ideas for improvement. Each field trip has clear objectives given by the professor, specific content that will be covered, and techniques to put into practice.

There are two mandatory field trips in this course, which are not excursions or vacations. Only students enrolled in this course may attend. Lodging and main meals are covered by the course.

Field work can include volunteer activities in lowlands or highlands facing hot or cold weather that might be considered harsh or strenuous for students without previous experience in fieldwork.

Activities can also be lectures on site provided by the site´s owners, lecturers, or professor. Punctuality is expected for all activities including departure, return and scheduled meal times.

Some of the national parks and reserves are in faraway areas of the country or places with difficult access so students who get motion sickness from long bus rides might

be uncomfortable in these field trips.

Students must carry small notebooks (or phones) to write down information provided by professor, guides or project's owners, and anything they see or learn while in the field and what they think about it, especially things related to what has been or will be studied in class.

Each person's notes will be unique, not only in that each person notices different things, but also interprets similar things differently. Notes help students write the field trip report, which is a formal paper that mirrors the field trip experience and learning.

Due to the nature of the course, several plant species will be identified, as well as their uses, production techniques, among other characteristics and ecology habits, this information often needs to be extended through bibliographical research.

As there are two fieldtrips, one includes a report and the other an Onsite Design Presentation:

The Report:

The report summarizes the activities covered during the trip, discusses the results of the applied techniques and compares the general observations with the theoretical content learned in class and researched by students, includes conclusions derived from observations and the obtained results, and recommendations are made at the application level of the visited sites. A high level of analysis and bibliographic research is expected for the preparation of the reports. TThis is a 10% assignment and is performed in groups.

The report is four (4) 1.5-spaced pages minimum (not including images, appendices or references section) extending to a maximum of ten pages, depending on the amount of activities performed during the trips. This is a formal paper that follows the general format indicated for the rest of written assignments, including APA style for in-text references and references section and must be uploaded to the corresponding section on Canvas on or previous deadline.

The Onsite Design:

This is also a 10% group assignment, which is completely developed onsite, so no report is required. Materials necessary for the assignment will be provided during the trip. The design is meant to apply specific strategies learned in class, and the groups will count with the professor guidance at all times. Each group presents the design and one member of each group uploads a picture of it to the corresponding section on Canvas.

3. **Agroecological system design.**

In the project method, students apply and build their learning through the realization of a project, in which they plan, execute and evaluate a series of activities in order to **solve a problem**. It seeks to confront the students to situations that lead them to apply what they learn to solve problems or propose improvements in the communities where they live, study, wish to live or simply wish to improve. In this way, deep analysis of current and ideally national and international problems are promoted, as well as the resolution of problems of global interest. In addition, attitudes and values necessary for collaborative work and life skills are promoted and developed. A written report is included, in which the results of the bibliographic research that accompanies each part of the project and the integration of all the elements and ideas are shown. A three-dimensional model is built with reused materials which allows visualizing the design of the system itself. Each model must be defended to prove its importance and efficiency. The project is evaluated in phases, each one of them includes improvements and advances for the final project.

This project represents a **40% of the final grade, co-evaluation (peer assessment) is applied.** Presenting time, including questions, activities, and discussion will be **20 minutes. The report must be uploaded to Canvas on deadline.**

Each group decides to integrate different elements to their project, which must be supported at all phases under the framework of **regenerativity/sustainability, integrality and efficiency** principles. Inclusion of social and educational objectives is a must. Examples of possible projects are: educational farms (in universities, schools or other educational centers), Urban gardens, Community gardens, farms, sustainability centers, among any other possible and needed systems for the cities or the field. With the guidance of the professor different aspects must be considered for the project, such as the following:

- Clear problem to be assessed and "solved"
- Clear objectives.
- Clear methodology and materials.
- A realistic, approximate budget.
- Area measure and description (topography, urbanity, classical activities, climate, soil type etc.)
- Ecological description of the site and use of this description to design.
- Ecological data relevant for the design
- Environmental needs of the site to be healthy and productive
- Data about the amount of people that will directly or indirectly benefit from the project
- Description of the different systems included in the design and their integration (efficiency and interconnections - Systems approach)
- Description of the expected results in a certain period: Environmental, economic, educational, and social impact

- Analysis of Elements
- Others

Several lessons of the course will be dedicated to the first designing steps of the project so that the professor can guide each group and help building the main needed ideas for the project. There will be 1 session for initial guiding, 2 sessions for revisions of project progress and a final session for project presentation. Students will dedicate extra class time to build the project.

Sessions dedicated to the project:

- **Session #1:** The professor explains the basic elements that must be included in the project and how the scientific method is applied to the project. Students discuss possible ideas and form groups, list a preliminary list of possible sources for research.
- **Session#2:** Each group presents the first project progress **including a proper and clear design draft (drawing)** of the project idea, some ecological information of the site, a list of systems to include and elements to consider for implementation, a central problem to be solved through the project, three objectives that will guide the project's performance, and a basic methodology to show the "step by step" implementation plan of the project. Professor and classmates provide observations and improvement recommendations. **(5% from total grade)**
- **Session #3:** Each group presents the second project progress including an improved design draft (drawing) of the project idea, the improved list of elements to consider (including budget and ecological conditions), improved problem and objectives, improved methodology, a list of possible results and solutions to negative results, and explain the route of energy investment and production of the system, showing the efficiency and regenerativity of the design. Classmates and professor provide observations and improvement ideas.

By this session each group must have had acquired most materials for model building from Verita's recycling warehouse or the Lego's storing place **(8% from total grade).**

- **Session #4:** Each group presents the final model, explains its efficiency and the role of each system in accomplishing the project's objectives and central problem solving. The project is defended, and the report delivered. **(20% from total grade)**

4. **Group work presentation:**

   Group work allows developing important attitudes, values, and skills, such as tolerance, respect, solidarity, leadership, teamwork, and communication, as well as knowledge integration and equity. The assignment consists of **research on a given topic** (delegated by the professor) and includes a **presentation** using **PPT**, Prezi, or another useful tool. Each group member must **participate actively** in research and during the presentation, members of the class not presenting act as a public and with the professor randomly ask questions to the presenters about the topic. The group must **bring a generating question for class discussion** and can bring an **evaluation or interactive activity** too. Presenting time plus questions and discussion will be **20 minutes maximum**, depending on the number of students enrolled; the presentation must be **uploaded to Canvas at least the day before presenting.** The assignment is **10% of total grade**, **Co-evaluation (peer assessment)** will be applied.

   Each group chooses one of the following topics:

   - Lactase persistence,
   - The case of the Aztec Chinampas
   - Terracing in the Andes,
   - Nomadic herding: the Maasai example
   - New husbandry and the turnip introduction to Great Britain.

5. **Individual presentations:**

   Individual presentations are meant to develop specific skills and abilities such as research, analysis and synthesis, self-confidence, time management, and responsibility.

   1. Choose a topic of your interest related to Agroecology.
   2. Upload the **topic and possible sources** to research about it to the corresponding section on Canvas. Presentation topic and sources must be approved by the professor through Canvas **at least 7 days before deadline.**
   3. Once your topic and sources are approved, use extra class time to research and prepare your presentation. **There is no report, so the presentation must reflect a high level of research, analysis, and effort.**
   4. Present to the class using PPT, Prezi, PowToon, or another useful presentation tool, even posters are allowed.

   The presentation must be uploaded at least the day before presenting to the corresponding section on Canvas. Presenting time plus questions and discussion will be 15-20 minutes' maximum depending on the number of students enrolled.

   Your peers will also grade your work and performance (3%). This assignment is 15% of total grade.

6. **Creative presentation:**

   This is an opportunity for students to communicate a theoretical content in a creative way. Students choose a topic included in the course contents and develop it through an artistic way (painting, acting, playing an instrument/song, building up a model, creating poetry, using Information and Communication Technologies (ICT), any other creative tool. Presenting time must be between 5 and 10 minutes. Submitting a topic and **a plan for the creative presentation must be done through Canvas at least 7 days before the deadline. This is a 5% activity.**

The plan includes:

- Topic and specific contents to be presented.
- Description of the activity to be presented.
- Description of the creative component to be implemented.
- Explanation of why you picked the topic and artistic technique.

Along the course sessions, several activities will be performed, such as group discussions, brainstorming, topic summaries, small in class research, posters and summary cards creations, expert on specific topics visits and lectures, and laboratory activities when possible.

ATTENDANCE

Regarding classes:

1. Students are only allowed a two (2) **non-consecutive (back-to-back) class absences**. A student shall fail the course if more than two absences are registered by the professor. Administration does not control attendance.
2. Three **late arrivals** to class (arrival after the first 15 minutes) are treated as one absence. Attending class 30 minutes late without an official justification will also count as an absence.
3. In the case of an **absence from any assignment evaluated in class** (presentations, evaluations, field trips, etc.) a student will be given a grade of zero unless an official document is presented within **one week** of the absence.
4. If a student presents an official document to excuse the absence, the missed assignment is to be presented on that same day.

Regarding field trips:

5. An unjustified **absence on a field trip** will immediately result in the loss of all points assigned to that specific trip. However, if an official document justifying the absence is presented, 50% of the assignment points may be obtained upon presentation of a complementary research assignment, to be agreed upon with the professor, within one week of the field trip.

6. An absence on a field trip may be justified should two course field trips coincide. In such a case, and to avoid losing points, students shall be able to opt for carrying out a research assignment.

CODE OF CONDUCT

Professors have the right to expel a student from the classroom should he / she/ they:

1. Be disruptive in the classroom.
2. Behave in a disrespectful way.
3. Be under the influence of alcohol.
4. Be under the influence of any illegal drug.
5. Shows hygiene or odor problems that may disturb other students.

ELECTRONIC DEVICES

The use of cell phones, smartphones, or other mobile communication devices is disruptive and is therefore prohibited during class. **Please turn all devices OFF and put them away** when class begins. Devices may be used only when the professor assigns a specific activity and allows the use of devices for internet search or recording. Those who fail to comply with the rule must leave the classroom for the remainder of the class period. Using devices while the professor or other peers are lecturing, or presenting is perceived as a lack of interest and disrespectful.

STUDY ABROAD PROGRAM POLICIES

The student must comply with the provisions of the Study Abroad Program Policies available on the Canvas/Omnivox platform.

BIBLIOGRAPHY

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Vandermeer, J.H and Perfecto, I. (2018). Ecological Complexity and Agroecology. Routledge, New York.

Most of these texts will be available in the library. Specific sections from these texts and readings from other sources will be assigned in class.

CHRONOGRAM

This chronogram can change according to the course needs.

Week	Contents	Learning strategies
1	**Introduction to each other and to course** **Unit 1. Problems in Agriculture** 1.1 The Green Revolution: a brief history of conventional agriculture 1.2 Current Conventional Agriculture goals and methods. 1.3 Consequences of Conventional Agriculture practices	Course introductions, syllabus and outline reading. Professor's lecture. Brainstorming activity. Group topic analysis.

2	**Unit 1. Problems in Agriculture** 1.4 Heterotrophy and food chains importance in agriculture 1.5 Integration importance in agriculture 1.6 Sustainability of Conventional Agriculture **Unit 2. Agroecology spectrum** 2.1 Organic agriculture principles and fundamentals 2.2 Organic agriculture types 2.3 Organic agriculture methods, practices, and certification.	Brainstorming activity. Professor's lecture. Mental map and posters activity. Group topic analysis. Topic summary-revision Brainstorming activity. Professor's lecture. Group topic analysis.
3	**Unit 2. Agroecology spectrum** 2.4 Agroforestry 2.5 Analog Forestry 2.6 Permaculture 2.7 Organic Agriculture in Costa Rica	Professor's lecture. Group topic analysis. Current event presentation Verita's garden visit -Calculating a land perimeter - Needs and Yields analysis group activity Workshop: Oyster Mushrooms production: inoculation

4	**Unit 2. Agroecology spectrum** 2.6 Permaculture (continuation) Design Project Session #1 2.8 Analog Forestry **Unit 3. History of Agriculture** 3.1 Aztec chinampas 3.2 Terracing in the Andes 3.3 Nomadic Herding - The Maasai example 3.4 Lactase persistence 3.5 New husbandry and the turnip introduction to Great Britain	Design Project Session #1 Permaculture observation activity at Verita's garden (Design introduction) Topic summary-revision Analog Forestry lecture and design activity. Group Research Presentations Topic summary-revision
5	**Unit 4. Ecology in Agriculture** 4.1 Ecology fundamentals 4.2 Ecological interactions 4.3 Forms of energy and entropy 4.4 Photosynthesis and primary production 4.5 Energy Production and Transfer in Agriculture 4.6 Energy costs and efficiency in Agriculture	Brainstorming activity. Professor's lecture. Group work: classification summary cards/mental map Current event presentation Group analysis of the topic. Kahoot activity.
6	**Unit 5. Soil** 5.1 Soil characteristics (structure, texture, color) 5.2 Soil formation	Brainstorming activity. Professor's lecture. Current event presentation

	5.3 Soil biotic interactions 5.4 Plant nutrient acquisition and Cation Exchange Capacity (CEC) 5.5 Soil management: organic matter and composting 5.4 Soil horizons and orders	Group work: research and results' sharing activity.
7	**Unit 5. Soil (continuation)** 5.5 Soil management: organic matter and composting: **Verita's garden activity**	Brainstorming activity. Professor's lecture. Kahoot activity. Project development session Topic summary-revision
8	**Unit 6. Nutrient cycling and Decomposition** 6.1 Biogeochemical cycling 6.2 Macronutrients and Micronutrients 6.3 Nitrogen cycle, importance, and ecological impact. 6.4 Phosphorus cycle importance, and ecological impact. 6.5 Potassium cycle importance, and ecological impact.	Brainstorming activity. Professor's lecture. Expert visit (on any topic of the course previously covered) or Film analysis. Field Trip Report #1

9	**Unit 6. Nutrient cycling and Decomposition** 6.6 Mycorrhizae 6.7 Decomposition fundamentals 6.8 Decomposition processes 6.9 Compost Systems	Brainstorming activity. Professor's lecture. Project development session and Draft presentation
10	**Unit 7. Adaptations relevant to agriculture** 7.1 Basic plant systems and their functions 7.2 The process of photosynthesis and its implications 7.3 Photosynthesis types and agroecology 7.4 Allocation 7.5 Light adaptations 7.6 Temperature adaptations 7.7 Water adaptations 7.8 Tropical crops	Professor's lecture. Group analysis of the topic. Topics summary Workshop: fermented food and drinks.
11	**Student's chosen topics**	Individual presentations Field Trip report #2 delivery
12	All topics integration into project's presentation. Course closure	Final project presentation: Written report, oral presentation and sustainable agroecological system design model.


SUSTAINABLE
DEVELOPMENT GOALS


2 ZERO HUNGER
6 CLEAN WATER AND SANITATION
8 DECENT WORK AND ECONOMIC GROWTH
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
14 LIFE BELOW WATER
15 LIFE ON LAND