



EARTH UNIVERSITY

COURSE SYLLABUS

Name of the Course: Tackling Environmental Issues: How to Measure, Manage, and Mitigate our Impact

Course code: RCN 502

Number of credits: 3

Quarter: 2

Year: 2019

Names of the Professors: Jane Yeomans, Ph.D.; Irene Alvarado, Ph.D.

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COURSE DESCRIPTION

This course provides a theoretical foundation and the practical tools for the study of business and the environmental impact of human activities in a global context. It seeks to ensure that externalities are valued in the economic context of the enterprises and considered in the decision-making process.

The course explores different methodologies for evaluating sustainability and assessing the social and environmental impact of our actions as individuals and companies.

The course offers students an opportunity to identify and directly assist in the development of decisions to control, mitigate, and compensate for the environmental and social impacts of businesses and individuals.

COURSE OBJECTIVE

To assess environmental and social impacts of daily activities, as individuals and economic enterprises, from the perspective of sustainable development, and with an emphasis on reducing our carbon footprint.

SPECIFIC OBJECTIVES OF THE COURSE

At the end of the course, students should be able to:

1. Understand the concept of sustainability.
2. Identify the externalities related to the different economic activities.
3. Learn to calculate the CO₂ emission and the compensation or mitigation cost.
4. Understand the concepts of ecological footprint and water footprint.
5. Examine the concepts, models and technologies for wastewater treatment and their role in the water resource conservation.
6. Examine the technologies for solid waste treatment and their social, economic, and environmental impacts.
7. Determine the carbon emissions of economic activities and investigate alternatives for reducing the carbon footprint

CONTENTS OF THE COURSE

This course provides practical tools, technical skills, and a theoretical foundation for the examination and measurement of environmental and social impacts of business and other economic activities on the local environment. It seeks to ensure that various externalities are valued within economic enterprises, exploring different theories and methodologies for evaluating sustainability and assessing the social and environmental impact of our actions as individuals, organizations, and businesses. The course offers students a unique opportunity to identify, and directly assist, in the development of decisions to control, mitigate, and compensate for the environmental and social impacts of businesses and individuals within a real-world Costa Rican rural context.

REQUIREMENTS: use of calculator, use of Excel (computer), ability to travel by boat, take samples, do interviews, ability to swim, ability to work in the field

ADDITIONAL REQUIREMENTS: bathing suit, solar protector, mosquito repellent, cap, swimming goggles or snorkel, water bottle, long pants, long sleeve shirt, work boots or hiking boots

METHODOLOGY AND RESOURCES

The methodology used in this course is learn-by-doing, with participatory activities and exercises for each learning objective. This methodology also includes field trips and final projects.

FIELD TRIPS

- Three excursions on a two-day field trip to the western coast of Costa Rica
- A one-day field trip to a sustainable farm in a community near the university campus
- A two-part, one day field trip around the EARTH University campus

FINAL PROJECTS

- A final report on the evaluation of the Tortuga Island environmental Impact (must be presented in groups)
- An environmental plan for a community or a farm (individual presentations)

As this is a very dynamic course, with activities and exercises in the classroom, the field and in the community, the following schedule is included to guide the student in their learning process.

LEARNING OBJECTIVES' SCHEDULE

Day	Description	Requirement /activities	Professor
Monday	Breakfast at EARTH		Jane Yeomans
	Water footprint	Presentation, including a short video	
	Calculating water footprints	Activity	
	"Raíces" Farm, don Rodolfo Douglas	Work on the farm Lunch Tour of the farm	
	How big is your footprint?	Activity	
	Return to EARTH and dinner at EARTH		
Tuesday	Breakfast at EARTH		Jane Yeomans
	Introduction to solid waste management	Field trip, on campus Activity, system designs	
	Secondary Material Recovery Center		
	Introduction to wastewater management		
	Integrated Livestock Farm, Swine and Dairy		
	Banana Packing Plant		
	EARTH's landfill and compost facility		
	Lunch at EARTH		
	Food Processing Laboratory	Field trip, on campus Activity, system designs	
	Periurban Gardens		
	Central campus, wastewater treatment system, septic tanks and biodigesters		
Dinner at EARTH			
Wednesday	Breakfast at EARTH		Jane Yeomans
	Review of systems' designs	Exercise	
	Discussion of designs and field trips		
	Wastewater treatment	Presentation	
	Lunch at EARTH		
	Rapid evaluation of water quality	Exercise	
	Presentation of results		
Dinner at EARTH			

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Day	Description	Requirement /activities	Professor
Thursday	Breakfast at EARTH	Home work/ activity	Irene Alvarado
	Short course presentation and requirements	Team formation	
	Lecture - Sustainability: past, present and future. What is environmental economics?		
	Swimming test at the pool		
	Lunch at EARTH		
	Lecture: market failure and the identification of externalities.	Home work	
	Dinner at EARTH		
Friday	Breakfast at EARTH		Irene Alvarado
	Homework presentation and group feedback		
	Lecture: Analyzing the carbon foot print of economic activities	Team work	
	Planning activity at the pineapple plant	Be ready to work at a working packing plant. Security measurement must be followed	
	Lunch at EARTH		
	Field Trip: Banana Packing Plant Exercise		
	Preparation seminar: Getting ready for Tárcoles		
	Dinner at EARTH		
Saturday	Breakfast at EARTH	Be ready for a trip of 4 hours, approximately. Water samples will be taken in a river infested with crocodiles - security measures must be strictly followed.	Irene Alvarado
	Travel to Tárcoles		
	Lunch on route to Tárcoles		
	Jungle Crocodile Safari Exercise		
	Travel to Playa Azul	Consumption of alcohol is not allow at any time.	
	Exercise in Playa Azul		
	Travel to Puntarenas		
	Dinner in Route to Puntarenas		
	Lodge in Puntarenas		
Sunday	Breakfast at the hotel	Be ready for a 2-hour catamaran trip and snorkeling, in addition to individual activities. Consumption of alcohol is not allow at any time.	Irene Alvarado
	Travel to Isla Tortuga		
	Snorkel Exercise		
	Lunch in Isla Tortuga		
	Measurements + Interviews		
	Dinner in route		
	Overnight stay in hotel San José		

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Day	Description	Requirement /activities	Professor
Monday	Breakfast at the hotel		
	Travel to EARTH		
	Lunch at EARTH		
	Free time		
Tuesday	Breakfast at EARTH		Jane Yeomans
	Solid waste analysis protocol (SWAP)	Presentation	
	Calculating types and quantities of wastes generated at EARTH	Exercise	
	Presentation of results		
	Lunch at EARTH		
	Determining what management technology is best for the type of waste generated at EARTH	Presentation	
	Calculating different management options	Exercise	
	Presentation of results		
	Landfill design	Presentation	
	Classification of EARTH final disposition facility	Exercise	
	Presentation of results		
	Dinner at EARTH		
Wednesday	Breakfast at EARTH		Jane Yeomans
	Calculating the cost benefits of recycling and landfilling solid waste	Presentation	
	Economics of final disposition alternatives	Exercise	
	Lunch at EARTH		
	Presentation of results	Exercise	
	Compost production	Presentation	
	Compost facility design		
Dinner at EARTH			
Thursday	Breakfast at EARTH		Jane Yeomans
	Cost benefits of composting solid organic waste	Exercise	
	Presentation of results		
	Lunch at EARTH		
	Create a wastewater treatment model for a municipal domestic wastewater and a model for a rural dairy farm wastewater.	Final report	
	Dinner at EARTH		

Day	Description	Requirement /activities	Professor
Friday	Breakfast at EARTH		
	Course wrap up and final presentation	Jane Yeomans & Irene Alvarado	
	Lunch at EARTH		
	Travel to San José		

LEARNING ASSESSMENTS (EVALUATION)

	Prof. Irene	Prof. Jane
Class participation/discussion	5 %	5 %
Field trip participation	3 x (7 %)	5 %
Field trip reports	2 x (20 %)	10 %
Activity/class reports	2 x (10 %)	7 x (10 %)
Final report	--	10 %
Project-Oral Presentation	14 %	--
Total	100 %	100 %

RELEVANT POLICIES (NORMS) FOR THE DEVELOPMENT OF THE COURSE

- The course is governed by the standards, policies, responsibilities, and academic procedures established by EARTH University.
- Attending the planned activities for this course program is compulsory. Consequently, the student is responsible for attending and being on time for all activities, according to the pre-established schedule.
- Arriving late for an activity will be considered an unjustified absence and it will be up to the professor to determine if the student will be allowed to participate.
- Use of mobile devices and any other electronic devices is prohibited in the classroom, unless otherwise specified by the professor.
- Being professional, formal, and respectful of your classmates and faculty, as well as being proactive and a self-learner, are very important assets for this course.

BIBLIOGRAPHY

Economic valuation of the environment

http://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S0034-77442004000600002
<file:///C:/Users/ialvarad/Downloads/29645-Article%20Text-84087-1-10-20170629.pdf>
<https://ecochronicle.net/2013/08/14/no-easy-solution-for-tarcoles-contamination/>

ADDITIONAL READING MATERIALS (OPTIONAL READINGS)

Marine Biodiversity of Costa Rica, Central America

<https://aida-americas.org/en/blog/t%C3%A1rcoles-most-contaminated-river-central-america>
http://siteresources.worldbank.org/INTSAREGTOPWATRES/Resources/CostaRica_Tarcoles_Background_FINAL.pdf

BIBLIOGRAFIC REFERENCES (MANAGING RESOURCES)

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- Mekonnen, MM. and Hoekstra, AY. 2011. The green, blue and grey water footprint of crops and derived crop products. *Hydrology and Earth System Sciences*, vol. 15, p. 1577-1600. Also available on-line at: <http://waterfootprint.org/media/downloads/Mekonnen-Hoekstra-2011-WaterFootprintCrops.pdf>.

- Mekonnen, MM. and Hoekstra, AY. 2012. A global assessment of the water footprint of farm animal products. *Ecosystems*, vol. 15, p. 401–415. Also available on-line at: <<http://waterfootprint.org/media/downloads/Mekonnen-Hoekstra-2012-WaterFootprintFarmAnimalProducts.pdf>>.
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PROFESSORS' BIOGRAPHIES

Jane Yeomans is a Professor of Research at EARTH University. She obtained her M.Sc. in soil microbiology from the University of Guelph in Canada and her Ph.D. in soil microbiology and biochemistry from Iowa State University. She has been working at EARTH University since 1998. During this time, she has taught courses in Physics, Integrated Waste Management, and Environment and Sustainable Food Systems.

She also coordinates the senior thesis project course and proposal-writing course. She has taught a number of short courses organized by EARTH International Academic Relations Office, including topics on the sustainability of wastewater and solid waste management, sustainable agriculture, and proposal and technical writing.

She has been the principal investigator for numerous projects including "Development of an Integrated Waste Management Plan for Ordinary Solid Waste in Rural Communities in Latin America" and "Sustainable Agricultural Practices in Citrus Production in Los Chiles, Costa Rica".

Irene Alvarado Van der Laat graduated from the Agronomy Faculty of the University of Costa Rica with a BFA in Agricultural Engineering. She has an MBA with a focus in Marketing from the Technological Institute Costa Rica and a Ph.D. from the Universidad Latina in Economical and Business Sciences.

She has been working at EARTH University since 1992, first as the Academic Program Administrator and Director of Marketing of EARTH University's Products (1996-2000), and since 2000, as a full time faculty member in the area of the Entrepreneurial Projects Program.

She also has been involved in the private sector as a General Manager, President of agro-export-tourist companies. In the political arena, she has been a representative of Costa Rica at the United States Department of State's for Environmental Protection and Sustainable Development Program and recently as a Director for the Costa Rican Minister of Economic and Exportation Board, named by the current President of Costa Rica. She is also part of the advisory board of the Sustainability Laboratory, based in New York and Israel.

She is the recipient of the "Best Research Award" at the VII International Entrepreneur Congress, El Salvador (2004), The Galpin Fellowship Foreignness Award (Connecticut, 2010), and recently received the distinction of becoming an Honorary Professor at the Universidad Autónoma de Peru (October, 2014)