OCN/SUST/CEE 441: Principles of Sustainability Analysis

Sample Syllabus
Holmes Hall 224
University of Hawaii at Manoa

Instructor: Dr. Michael Cooney (956-7337); mcooney@hawaii.edu). Office hours @ POST 104B, T. Th. 12:30 – 1:20 or by appointment.

Course Objective: To present and review three methods/approaches to execute a sustainability analysis of a particular product or process, and to understand the limitations of each in terms of their qualitative and quantitative accuracy.

Course Description: This course will introduce students to the principles of sustainability and how to analyze/quantitate it through various approaches including Systems Analyses, Target Plots, and Life Cycle Analysis. Emphasis will be placed upon the initial identification, description, and boundaries of the production process or system to be analyzed, as well as the need to calculate inventories in terms of material and energy input and outputs. Students will also gain experience with professional Life Cycle Analysis software (SimaPro) to calculate environmental impacts (e.g., Carcinogens, Ozone Layer Depletion, Aquatic Ecotoxicity, Global Warming, Aquatic Eutrophication…) relative to footprint of a typical person in North America or Europe. Finally, students will be introduced to how these analyses fit into Environmental Impact Assessments and Environmental Management Systems.

Materials/Requirements: Course notes, reading and lecture material will be posted via Laulima. Students will be given accounts to use SimaPro software.

Alignment with Manoa ILO's. This course is particularly aligned with ILO 3c: Stewardship of the national environment (respect for natural resources and sustainability). Also, ILO 3a: Continuous learning and personal growth (life-long learning, ethical behaviors and judgements). Also ILO 2a: Think critically and creatively (applying questioning and reasoning, generating and exploring new questions, being information literate).

Structure: Two 95 minute classroom lectures per week, homework assignments, and lab based use of SimaPro software. Students are highly encouraged to begin working on (SimaPro) projects ***as early as possible*** in order to avoid server crashes at the deadline as (i) the software lab has only 6 available work stations and (ii) the software database program can crash if inundated with users at one time (i.e. a few hours before the deadline). **Late home works will not be accepted** on account of near deadline server crashes so the students are (again) advised to start SimaPro projects well before deadlines.

Grading: Letter, scored on absolute scoring of in class midterms, homeworks, one target plot analysis with short report, five life cycle analyses assignments, and a final exam. The course grade will offer the following opportunities for points:

Midterm I	10 points
Midterm II	10 points
Homework 1	5 points
Homework 2	5 points
Homework 3	5 points
Homework 4	5 points
Target Plot Report	15 points
SimaPro assignment Bottle…Processes	5 points
SimaPro assignment Simple Shed	5 points
SimaPro assignment Coffee Maker	5 points
SimaPro assignment Product Stages	5 points
SimaPro assignment WWTP	5 points
Final Exam	15 points
CES course Survey	5 points
Total	100 points

Exam makeups will not be granted with the exception of medically excused absences or *legitimate* disruption to the student's schedule (i.e. a documented transportation failure or delay). Documentation requirements will be strict. **The final exam is scheduled by the university and is absolute**. Students are advised to make travel arrangements with this time commitment in mind.

Grading: Letter grades will be assigned on an ***absolute scale*** as follows:

95 – 100	A+	70 - 75%	B-
90 – 95%	A	65 - 70%	C+
85 – 90%	A-	60 –65%	C
80 - 85%	B+	50 – 60%	C-
75 - 80%	B	40 – 50	D+

Homeworks: Homework and SimaPro assignments are to be turned in via Laulima upload. Students are advised to read the directions for each and to follow the defined format. Uploads not following the format will likely be downgraded. **Late home works will not be accepted**.

Target Plot Report: The course will require the execution of a sustainability analysis using the target plot method to evaluate the relative sustainability of a simple shed fabricated using three materials of construction: steel, concrete, and wood. The analysis will extend from the cradle to grave and include the use phase. The report must follow the given template(s) without exception. Deviations from the report format will not be accepted. Long winded text is not desired and will result in reduced scores. Succinct and accurate text descriptions, however, that directly address the requested information is preferred and will result in improved scores. **No makeups will be allowed.**

SimaPro Assignments: The course will require the execution of several SimaPro assignments. The assignments will require each student to individually code into SimaPro a model of the process. All SimaPro projects are supported with varying degrees of step by step instructions and in class examples to walk you through the steps of modeling each process in SimaPro. While all efforts have been made to have these guides be completely accurate, there will possibly be some inconsistencies, especially since from time to time the software is uploaded. As lectures will go over each assignment in class, using the software, students will be held to coding the model accurately. For each assignment, students must submit all assessment plots requested in the Laulima assignment to receive credit. **Late assignments will not be accepted**.

OCN/SUST/CEE 441Course			
Class	**Due**	**Reading Material**	**Topics**
1/8		PP slides: Intro. to Sust.	SimaPro: Intro to Env. Impact
1/10		PP slides: Intro. to Sust.	SimaPro; Intro to Env. Impact
1/15		Article by Muga et al	Target Plot Analysis
1/17	Homework 1	BITE microalgae paper	Systems Analysis
1/22		al, 2010	Systems Analysis
1/24	Homework 2		Systems Analysis
1/29		Article on LCA Boundary	Introduction to Life Cycle Analysis
1/31	Homework 3	Kadam et al, 2002	Introduction to Life Cycle Analysis
2/5			**Review**
2/7	Homework 4		**Midterm I**
2/12		SimaPro Notes	SimaPro Example: Bottle…Processes
2/14			SimaPro Example: Bottle…Processes
2/19			SimaPro Example: Bottle…Processes
2/21	Plots Bottle…Processes		SimaPro Example: Simple Shed
2/26			SimaPro Example: Simple Shed
2/28			SimaPro Example: Simple Shed
3/5			SimaPro Example: Coffee Maker
3/7	Plots Simple Shed		SimaPro Example: Coffee Maker
3/12			SimaPro Example: Coffee Maker
3/14			SimaPro Example: Bottle…Product Stages
3/19			**Spring Recess**
3/21			**Spring Recess**
3/26			**Kuhio Day**
3/28	Plots Coffee Maker		SimaPro Example: Bottle…Product Stages
4/2		WST LCA paper	SimaPro Example: Bottle…Product Stages
4/4			Introduction to WWTP Example
4/9			SimaPro Example: WWTP
4/11	Plots…Product Stages		**No Class (study for Midterm)**
4/16			**Midterm II**
4/18	Plots WWTP		**No Class**
4/23			Introduction to Environmental Impact
4/25			Introduction to Environmental Management
4/30	Report Target Plot		**No Class**
5/2			**No Class**
5/9	12:00 – 2:00 PM		**Final, Holmes 224**