

Course Syllabus

Course No: EDNS 377 Title: Engineering and Sustainable Community Development (ESCD)

Class Meetings: Tue and Thurs 3:30 to 4:45 pm, Marquez Hall 222

Instructor: Juan C. Lucena, Professor and Director, Humanitarian Engineering

- Email: jlucena@mines.edu (best way to contact. I check email regularly from 5am to 8 pm)
- Phone: 303-273-3564 (leave message and I will try to answer in 48 hours **but email is best**)
- Office Hours: Tue and Thurs: 2 pm to 330 pm (Engineering Annex Building)

Teaching Assistant: Dorothy Walch, Shultz Scholar, Humanitarian Engineering

- Email: dwalch@mymail.mines.edu. Contact by email if you need to set an appointment.

Course Description: This course is an introduction to the relationship between engineering and sustainable community development (SCD) from historical, political, ideological, ethical, cultural, and practical perspectives. Students will study and analyze different dimensions of community and sustainable development and the role that engineering might play in them. Also students will critically explore strengths and limitations of dominant methods in engineering problem solving, design, and research for working in SCD. Students will learn to research, describe, analyze and evaluate case studies in SCD and develop criteria for their evaluation. **Note:** This is an Area 1 course for the Engineering for Community Development minor.

Required Course Readings:

- Lucena, Schneider and Leydens. 2010. *Engineering and Sustainable Community Development*. Morgan & Claypool (available at CSM bookstore)
- All other **required readings** available on Canvas

Learning Objectives: By completion of this course, you will be able to

1. Identify ideologies, events, institutions, and actors in the history of development and how these relate to specific development projects where engineers participate.
2. Understand at least one theoretical framework and one approach to listening in order to begin working with community towards SCD.
3. Identify, describe and analyze the potential contributions that engineering can make to SCD as well the limitations that engineering has as an approach to SCD.
4. Evaluate the strengths and limitations of Engineering Problem Solving (EPS), industry-based engineering design, and engineering knowledge with respect to SCD.
5. Provide and critically assess definitions of SCD to analyze and evaluate project-based case studies in engineering and development.

Teaching Philosophy: Here are my core beliefs about teaching and learning:

I believe that **education should be about students' learning** more than about teachers' teaching. Teachers should trust students and facilitate their learning. Students come to my classes with a set of experiences, previous knowledges (note the plural), expectations, conceptions and misconceptions that shape how they learn. Our collective job (not just mine but yours as well) is to make these explicit, to critically assess how these enhance (or hinder) your learning, and to provide you with a new set of experiences, knowledges and hopefully a new way of looking at the world. More than giving you a grade, my main responsibility is to help you acquire a life-long commitment to "check your knowledge", i.e., to critically question what you know (and don't know), how you came to know it, how you came to not know certain things, what you know it for, and to get ready to acquire new knowledge for new circumstances. Your responsibility is to learn this skill and apply it for the rest of your life.

I believe that **student learning is an evolutionary process** that requires time to process and question new ideas and concepts. The acquisition of new knowledge, especially one that might challenge your core beliefs and values about engineering and progress, often elicits strong resistance. Our shared responsibility is to acknowledge this and help you move beyond this resistance. As resistance fades away as the semester unfolds, your learning should increase, your thinking should become more sophisticated and your attitude for new knowledge becomes more welcoming. This course is built in such a way that will allow you the opportunity to evolve in your learning.

I believe that the **creation and acquisition of new knowledge is a social process**. You will have plenty of opportunities to develop and process your own individual ideas but soon you will be co-creating and co-acquiring knowledge with your peers. Pair and group activities in the classroom are fundamental elements of this collaborative process. **Hence your active participation in these will be highly valued and influence your grade.** Yet the writing of quizzes and papers is an individual activity where you are expected to follow CSM's honor code.

I believe that our **writing is a reflection of our ideas**. To produce good, clear and powerful writing, we need to have good, clear and powerful ideas (and vice versa). This requires close and in-depth reading, a commitment to listening, opportunities to test ideas with others, time to reflect about these exchanges, and a continuous engagement with your own drafts. Hence good writing cannot happen the night before a paper is due. My responsibility is to guide you towards good readings, help you develop your listening, provide you with opportunities to test ideas with others, and allow you ample time between the assignment of a paper and its due date. Your responsibility is to engage the readings, be willing to listen, share your ideas with others, and give yourself plenty of time to outline, draft, edit and re-edit your writing.

Furthermore, I believe in the **power of diverse ideas and arguments**. All of us come into this course with opinions (weak and strong). Our collective responsibility is to turn these into powerful and well-supported arguments that can hopefully have an impact on the world. To do this we need a respectful and nurturing environment to share opinions and explore ways to turn them into well-crafted arguments. Hence one of my primary roles is to construct and maintain such classroom environment, constructively challenge your opinions and help you transform them into well-supported arguments. Your role is to be open to this challenge and to be respectful of the classroom environment and of others' attempts at transforming their opinions.

Course Policies:

This course consists of in-depth reading, lectures, in-class collaborative exercises, films, quizzes, written assignments and presentations. As educator, one of my responsibilities is to put great deal of effort and thinking in developing these elements and offering them to you to help you learn. **As student, your responsibility is to reciprocate this effort by seriously exploring the reading assignments, being prepared to discuss them in class, actively participate in collaborative learning, and effectively and critically incorporate this material in quizzes, papers, group presentations and, better yet, in your own thinking and practices.**

As I expect you to evaluate the quality of my teaching and mentoring, you should expect me to evaluate the quality of your learning and intellectual growth in this course. Ours is a partnership of teaching, learning, exploration and, hopefully, trust. Hence you should expect that higher quality of discussion, exploration and writing will warrant you higher grades while lesser quality or incomplete work will warrant you lower grades. Your grades are based on both the **quality** of your performance (not so much on how many hours you spend working), your level of **commitment** to the learning process and course objectives, and your willingness to take risks by challenging your beliefs about energy and society. **Specifically, here are my expectations of you in this course:**

- complete all assigned readings on time, be ready to discuss and engage them in class, and use them effectively throughout the course.
- attend scheduled class meetings regularly since without you the learning environment will be void of your perspective and your potential to teach and learn from others.
- participate in class discussions and activities regularly by raising questions and **making contributions that are relevant and enhance the learning of other students**, including making mistakes so you and others can learn from these. **If you text, browse online, do other homework or fall asleep you will be robbing the class from your ability to teach others and your participation grading will be affected accordingly.**
- complete all quizzes, papers and presentations on the assigned dates, displaying commitment to learning, scholarship and further inquiry.
- commit to CSM's policy on academic integrity (see below) when completing all written work in this course.

GRADING:

Class attendance (100 pts): Now that you understand my teaching philosophy, it should be clear that class attendance is extremely important and valued. Hence 10 points will be deducted from these 100 points for each unexcused absence. Excused absences are **ONLY** the following: **official sport varsity team travel, a medical condition excused in writing by a doctor, a personal matter excused in writing by the Dean of Students, job interviews documented by employer, jury duty, military duty or common examinations indicated in writing by the department giving the exams.**

Participation, commitment and respect for the learning process (100 pts): In this grading category I highly value four elements:

1. **engagement** (e.g., are you legitimately interested in class activities or are you falling asleep or TEXTING or chatting with your neighbor? Are you seriously engaging the material, readings, and questions as demonstrated by how you write your quizzes and papers?);
2. **relevance** (e.g., how relevant and constructive are your contributions to the learning environment? how relevant are your written and oral answers to the questions at hand?);
3. **being on time with and respectful of your work** (e.g., are you turning in work well presented, on time, and keeping up with the readings when they are due?);
4. **respect** (e.g., are you respectful of others' perspectives and of the classroom environment? Are you turning in quality work that reflects respect and commitment towards this class?).

I welcome many types of contributions to class discussion and two in particular. Comments that feature a knowledge claim supported by well-structured, logical, and relevant evidence that advance everyone's collective understanding. Note that well-supported claims are not just stated opinions. Second, I recognize that not all thoughts come out fully formed, so I also invite exploratory contributions to class discussion, comments that are characterized more by questioning and inquiring than by answering and defending a position. I will begin actively seeking student participation early in the course in order to give everyone an opportunity to first feel comfortable with the classroom climate, topics, nature of discussion, instructor, and process writing. **Since TEXTING, online searching and/or doing homework for other courses have become pervasive and disrupting activities, I must clearly state that doing any of these in class will significantly impact your grade. Please do not be surprised if in-class TEXTING or using a computer results in a low participation grade. No open computers in class unless we are doing research as a group.**

Papers (600 pts):

One proposal, three (3) papers and one (1) presentation are required for this course. Papers will increase in complexity and points as your learning, knowledge and critical thinking evolve. Specific writing and presentation guidelines and expectations will be distributed later. **Late papers will incur in a 30-point penalty for every day after the due date.** The expected point distribution is as follows:

- **Proposal** on engineering for development projects that you want to analyze (**50 pts**) (see approved topics below)
- **Paper 1** on historical and ideological dimensions of development (**100 pts**)
- **Paper 2** on community dimensions of development (**150 pts**)
- **Individual Student Presentations** (**50 pts**)
- **Paper 3** on engineering and community development (**250 pts**)

Quizzes (200 pts):

Every now and then, you will write in-class an/or take-home quizzes on key concepts from the readings, key questions or explorations of additional resources (e.g., Engineering for Change (E4C) projects) that emerge throughout the course. These will help you develop your ideas and gain clarity on key concepts as you move towards more complex writing in your papers. Points for each take-home quiz will be determined at the time of assignment. **There are no make up quizzes unless you have an excused absence (see above).**

ALL WRITTEN WORK MUST BE SUBMITTED BOTH ELECTRONICALLY ON CANVAS AND ON PAPER IN CLASS.

Grading scale: A = 933+; A- = 900-932; B+ = 866-899; B = 833-865; B- = 800-832; C+ = 766-799; C = 733-765; C- = 700-732; D+ = 666-699; D = 633 -665; D- = 600- 632; F < 600. **This scale will be strictly observed. Please do not expect any rounding off.**

Policy on academic integrity/misconduct: The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining an fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student's academic achievements, and giving credence to the university's educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed. The complete policy is [online](#).

Students with Disabilities: In guidance put forth by the Department of Justice and the Office for Civil Rights, it is incumbent upon us as an institution to ensure that students know where to seek assistance for disability-related accommodations or information. Inclusion of a disability support statement in syllabi is a national best practice and standard supported by ADA enforcement agencies and AHEAD (Association on Higher Education and Disability), as part of a multi-pronged approach to supporting an inclusive culture on campus.

As such, please include the following statement (*italicized*) in your course syllabi at Mines. Additionally, please make sure to underscore the statement pertinence and directive as part of your course welcome.

Disability Support Services - The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you are registered with Disability Support Services (DSS) and I have received your letter of accommodations, please contact me at your earliest convenience so we can discuss your needs in this course. For questions or other inquiries regarding disabilities or academic accommodations, I encourage you to visit disabilities.mines.edu for more information.

Discrimination, Harassment and Title IX - All learning opportunities at Mines, including this course, require a safe environment for everyone to be productive and able to share and learn without fear of discrimination or harassment. Mines' core values of respect, diversity, compassion, and collaboration will be honored in this course (More information can be [found here](#)) and the standards in this class are the same as those expected in any professional work environment. **Discrimination or harassment of**

any type will not be tolerated. As a participant in this course, we expect you to respect your instructor and your classmates. As your instructor, it is my responsibility to foster a learning environment that supports diversity of thoughts, perspectives and experiences, and honors your identities. To help accomplish this:

- Course rosters are provided to the instructor with the student's legal name. I will honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.
- If something is said or done in this course (by anyone, including myself) that made you or others feel uncomfortable, or if your performance in the course is being impacted by your experiences outside of the course, please report it to:
 - Me (if you are comfortable doing so)
 - Wellness Center- Counseling (<https://www.mines.edu/counseling-center/>)
 - Speak Up (<https://www.mines.edu/speak-up/>)- Anonymous Option

In this course, we will cultivate a community that supports survivors, prevents interpersonal violence, and promotes a harassment free environment. Title IX and Colorado State law protects individuals from discrimination based on sex and gender in educational programs or activities. Mines takes this obligation seriously and is committed to providing a campus community free from gender and sex-based discrimination. Discrimination, including sexual harassment, sexual violence, stalking, and domestic violence, is prohibited and will not be tolerated within the Mines campus community. If these issues have affected you or someone you know, you can access the appropriate resources here: <http://www.mines.edu/title-ix/>. You can also contact the Mines Title IX Coordinator, Karin Ranta-Curran, at 303-384-2558 or krcurran@mines.edu for more information. It's on us, all of the Mines community, to engineer a culture of respect.

Approved topics for papers on community development projects on

- Artisanal and Small Scale Mining in Colombia or Peru
- Engineers Without Borders Projects

SCHEDULE

(Due to the flexibility needed to schedule external speakers, readings might change at times. Students will be informed in advance.)

I. WHAT IS DEVELOPMENT?

DATE	TOPIC	READING/ASSIGNMENT DUE
Tue 8/21	Introduction	Self-assessment and interpretation of course objectives.
Thu 8/23	The roots of development	Watch the film “End of Poverty” before class https://www.youtube.com/watch?v=DrRiU2nuDpU
Tue 8/28	What is development?	Frank, Leonard. “The Development Game.” Easterly, William. 2006 “Planners vs. Searchers” from <i>The White Man’s Burden</i> .
Thu 8/30	What is development?	Jackson, Jeffrey. 2005. “Building Dams” and “Fixing Dams” from <i>The Globalizers: Development Workers in Action</i>
Tue 9/4	History of engineers and development	Lucena, Schneider, Leydens. 2010. “Engineers and Development: From Empires to Sustainable Development” from ESCD Book.
Thu 9/6	Student process	Bring computers to class to research your proposal
Tue 9/11	Engineers and small development	Williams, Bess. 2007. “Small-Scale Technologies for the Developing World: Volunteers for International Technical Assistance, 1959-71.”
Thu 9/13	Engineers and big development	Jackson, Jeffrey. 2005. “The Expats” from <i>The Globalizers: Development Workers in Action</i> .

II. SUSTAINABLE COMMUNITY DEVELOPMENT (SCD)

Tue 9/18	What is community?	Lucena, Schneider, Leydens. 2010. “Engineering with Community” from ESCD Book. (pp. 85- 116)
Thu 9/20	Student process	Watch the film “The Power of Community” on your own before class. https://www.youtube.com/watch?v=99WCn_nFSAY&t=170s Proposal due
Tue 9/25	What is sustainable development?	Bridger and Luloff, “Toward an interactional approach to sustainable community development”
Thu 9/27	What is sustainable development?	One past student paper applying B&L criteria to evaluate a community development project

III. HOW HAVE ENGINEERS ENGAGED COMMUNITIES

Tue 10/2	How have engineering students engaged	Lucena, Schneider, Leydens. 2010. “Why Design for Industry Will Not Work as Design for Community” from ESCD Book.
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	communities?	
Thu 10/4	Student process	Watch 3 short episodes of the film “Extreme Design” on your own before class. https://www.youtube.com/watch?v=btE1piOUV80&list=PL91Vj-oGkaPYt6_xGZsdedGeeDgmdG3wC&index=1
Tue 10/9	How should engineers engage communities?	Lucena, Schneider, Leydens. 2010. “ Building Organizations and Mapping Communities in Honduras” from ESCD Book.
Thu 10/11	Student process	Video on Re-imagining reporting from WFP-Honduras (https://www.youtube.com/watch?v=5OqeKtgiTHU) Paper 1 due
Tue 10/16	Fall Break	No class

IV. SUSTAINABLE COMMUNITY DEVELOPMENT (SCD) CRITERIA

Thu 10/18	Local economic diversity	Polack, Paul. 2009. "It all Starts with Making Money" and "Design for the Other 90 Percent" from <i>Out of Poverty</i>
Tue 10/23	Political autonomy	Gaynor, Andrea, et. Al. 2013 How Can Engineers Learn From The Past? A Potential Role for History in Engineering Education. <i>Intl Jour of Eng, Social Justice and Peace</i>
Thu 10/25	Reduce energy and use of materials	-Baillie, Caroline. 2010. Mapping the Territory in Buenos Aires (chap 4) from <i>Needs and Feasibility: The Case of Waste fir Life</i> . -Young, David. 2006. Feasibility of renewable energy storage using hydrogen in remote communities in Bhutan. <i>Intl J of Hydrogen Energy</i>
Tue 10/30	Social justice	Nieusma, D. and D. Riley. 2010. Designs on Development: Engineering, Globalization, and Social Justice. <i>Engineering Studies</i> .
Thu 11/1	Student Process	Videos of Nokero and plastic bottle lights and assess using 5 criteria Paper 2 due
Tue 11/6	Student presentations	7-8 students (8-10 min each)
Thu 11/8	Student process	Classroom activity: Apply ESCD criteria to HE summer camps or Jennifer DeBoer
Tue 11/13	Student presentations	7-8 students (8-10 min each)
Thu 11/15	Student process	Classroom activity: Apply ESCD criteria to CGIU project or Jennifer DeBoer
Tue 11/20	No class meeting	Work on individual paper 3
Thu 11/22	Thanksgivings	No class
Tue 11/27	How can engineers be partners and leaders in SCD?	Lucena, Schneider, Leydens. 2010. “Beyond Engineers and Community: A Path Forward” from ESCD Book.
Thu 11/30	Student process	
Tue 12/4	Student process	
Thu 12/6	Last day	self-assessment and reflection
Finals wk		Paper 3 due

