



A. JAMES CLARK

SCHOOL OF ENGINEERING

ENCE 689P/489P COURSE SYLLABUS, SUMMER 2020

LEARNING FROM THE PAST: INKA WATER/LAND MANAGEMENT PRACTICES AND THE FUTURE OF SUSTAINABILITY



Instructor: Natasha Andrade, Ph.D.

Email: nandrade@umd.edu

Office: 0160 Glenn L. Martin Hall

Instructor: Alba Torrents, Ph.D.

Email: alba@umd.edu

Office: 1153 Glenn L. Martin Hall

COURSE DESCRIPTION

Sustainable development has been in the spotlight in the last decade, however, few scholars agree on what this development should look like. In truth, sustainability is an ideal that is hard to achieve. It can take many different forms and depends heavily on location. In this course, we focus on Peruvian water and soil management, two very important aspects of sustainable development. We learn how pre-Inka and Inka civilizations managed their local resources and were able to generate empires that thrived in harsh environments. We develop important skills and take a critical-thinking and interactive approach to understanding the needs of local Peruvian communities and what sustainability should look like for them in the future. We will develop and awareness for the needs and wants of other people and develop cross-cultural skills as we immerse ourselves in Peru's rich language and culture.

Course Prerequisite: CHEM 135 or MATH 140 or ENST 140 or ENSP 101 or equivalent



COURSE LEARNING OUTCOMES

- Empathize with a different culture and perspective
- Develop self-awareness through the exploration of cultural values, beliefs, and history
- Understand Peru's history, culture, unique landscape, and economy
- Recognize the principles/techniques used for sustainable development in the present and past
- Compare the qualitative/quantitative benefits and drawbacks of sustainable technologies
- Explain complex and multi-disciplinary analysis of water/land management
- Explain the uses, benefits, and drawbacks of water management techniques
- Evaluate existing water management technologies and their applicability in the local context
- Apply engineering principles to solve problems
- Design a water management system based on community needs and feedback
- Construct a water management system in country that will benefit the local native community

COURSE EXPECTATIONS

This is a 3-credit, 600 and 400-level course and, as such, all students are expected to meet or exceed general standards of responsibility and self-discipline appropriate for such classes. This includes standards for attendance, completion of assignments, and overall participation in the learning environment as noted below. At all times, students are expected to:

- Be prepared and remain open-minded to new ideas and experiences
- Create and maintain a learning environment based on respect and scholarship
- Contribute productively to class discussions and group work
- Be on time for class and all class-related activities and submit all assignments on time
- Serve as representatives of the University of Maryland
- Abide by the University of Maryland Code of Academic Integrity and the Code of Student Conduct.

COURSE RELATED POLICIES

It is the student's responsibility to understand his/her rights and responsibilities as expressed in the policies. Policies relevant to Graduate Courses are found here:

<https://academiccatalog.umd.edu/graduate/policies/academic-record/>. Policies relevant to Undergraduate Courses are found here: <http://ugst.umd.edu/courserelatedpolicies.html>.

READING MATERIAL

No required textbook. We use ELMS/Canvas as the Learning Management System. To access ELMS go to www.elms.umd.edu. Enter your UMD directory ID and password. You will find this study abroad course listed under "My Courses." The course will be set up in ELMS/Canvas prior to departure. All assignments should be completed **by the ELMS assignment deadline.**



COPYRIGHT NOTICE

All course materials are copyrighted. Course materials that exist in a tangible medium, such as written or recorded lectures, PowerPoint presentations, handouts and tests, are copyright protected. Students may not copy and distribute such materials except for personal use and with the instructor's permission.

IMPORTANT NOTE: This syllabus, along with course assignments and due dates, are subject to change. ELMS announcements will be sent out to the students in case a change is made. It is the student's responsibility to check ELMS for corrections or updates to the syllabus.

ELECTRONIC DEVICE POLICY

Cell phones are strictly prohibited in class and should be turned off or silenced. Students are encouraged to have Wi-Fi enabled laptops and tablets available during class for note-taking and conducting in-class research. Surfing the internet, checking email, and texting during class is rude and distracting, please don't do it.

REQUIRED TECHNOLOGY

Students need access to a laptop computer, notepad, or other technology to access the course website and to submit assignments. Internet access will be provided in the accommodations. Internet access may or may not be available in the classroom. Students are encouraged to download materials prior to the class in which they are needed.

COURSE STRUCTURE & ASSIGNMENTS

COURSE TOPICS

- Sustainable communities
 - Official definition of sustainability
 - Characteristics of sustainable cities
- Inka culture
- Inka patrimony
 - Construction techniques
 - Material sources and architectural techniques
- Pre-Inka/Inka water management
 - Water sources
 - Irrigation practices
 - Drainage systems
- Pre-Inka/Inka land management
 - Carbon cycle
 - Construction for management (lava stones)
 - Microclimates and agriculture
- Social Analysis
- Sustainable Design
 - Stakeholder Analysis and Site Design



GRADING

Journals	Individual	15%
Participation and Class Engagement	Individual	20%
Technical Problem Assignments	Individual	25%
Final Design Project and Presentation	Group	40%

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
100-98	97.99 -94	93.99 -90.0	89.99 -87	86.99 -84	83.99 -80	79.99 -77	76.99 -74	73.99 -70	69.99 -67	66.99 -64	63.99 -60	59.99 -0

IMPORTANT NOTE: Students are responsible for submitting assignments on time in class or online according to the assignments' requirements. Late assignments will receive a grade penalty of 20%. Late assignments will not be accepted, under any circumstance, after grades have been released.

JOURNALS (15%)

Journal #1 – Prior to departing for the program, students will conduct their own research and prepare a 1-page paper that will:

- Highlight a specific aspect of Peruvian culture (each student will be assigned a topic)
- Demonstrate the student's expectations for travel to Peru
- Answer the following questions:
 - What are the characteristics of a sustainable city today?
 - What were some of the characteristics of cities 1000 years ago (in Peru and elsewhere)?
 - How do you think culture plays influences the idea of sustainability?
- Include links used during the student's research

Journal #2 – Reflection on technical and cultural site visits

Journal #3 – Reflection on technical and cultural site visits

Journal #4 – Reflection on technical and cultural site visits

Journal #5 – After the program is finished, students will compose a reflection summary that will:

- Highlight the student's cultural experience traveling in Peru
- Include a re-evaluation of their initial travel expectations
- Include final thoughts on the student's design project and how this design could be used in other countries or other native communities in Peru

PARTICIPATION AND CLASS ENGAGEMENT (20%)

- Country Profile Presentation – Students will prepare a 5-minute presentation based on their Journal #1 and present this work in Class #1.
- Assigned Site Visit Information and Presentation – Students will be assigned a site that we will visit. The student will study the site prior to our trip and prepare a short 3-minute presentation about the site. This presentation will be delivered at the site when we visit it. Students should



A. JAMES CLARK SCHOOL OF ENGINEERING

make this presentation entertaining and it should contain information about the site that is not easily found on the internet (i.e., no Wikipedia information, try to think about what a tour guide would present).

- Attendance and Class Participation – This component of students' grade will assess the overall interest, participation, and interaction of each student in the different aspects of this study abroad course (lectures, site visits, technical problem assignments, final design project). Throughout the program, the faculty will assess students through one-on-one integration and discussions with the group. Students are expected to be on time for all meetings and activities; any lateness will result in a grade deduction. If a student misses a scheduled event due to an unexcused absence, the participation grade will be reduced to one half of the grade. A second unexcused absence will result in a zero participation grade.

TECHNICAL PROBLEM ASSIGNMENTS (25%)

Students will solve technical problem assignments over the course of the program related to course lectures and site visits. The technical problem assignments will consist of calculation-based problems and interpretation of the mathematical results with regards to application of the calculations to a real-world scenario and its possible impacts in the environment, economy, and society.

FINAL DESIGN PROJECT AND PRESENTATION (40%)

Water/Land Management Design Project

On the first day of classes, students will be exposed to the current situation of local native communities. They will receive instruction on basic knowledge regarding the community, including language, culture, social issues, economic issues, and environmental issues. Later, while visiting the native community and experiencing their way of life, they will hear the needs of the community representatives, and, while working with a non-profit organization, students will design and implement the project. Students will work in teams to perform research to acquire information for the design of a water and land management system that will fit the needs of the native community.

The learning outcomes for project are:

1. Apply knowledge of water/land management design to the specific situation in Peru.
2. Empathize with a different culture and perspective.
3. Perform a stakeholder analysis to identify how each stakeholder can be impacted by the project.
4. Contribute effectively to the team's decisions.
5. Incorporate possible changes to the design according with the communities' feedback.
6. Problem-solve any issues of material sourcing and provide changes to the design accordingly.
7. Make and explain reasonable assumptions that incorporate the local ecosystem.
8. Produce a functional design that can be implemented within the trip period.



TENTATIVE COURSE SCHEDULE

Date/Time	Activity
TBD	Pre-Departure Meeting – 4:00 PM
Day 1, August 11 th Tuesday	<p>Morning – Arrive in Peru (Look for UMD sign or instructors). Transfer to accommodation, check-in, call/email home</p> <p>Afternoon – Informal walking of downtown</p> <p>Evening – Group Dinner –7:30 PM [provided]</p> <p><i>Assignments due:</i></p> <ul style="list-style-type: none"> • Journal #1 • Assigned Site Visit Information
Day 2, August 12 th Wednesday	<p>Morning – Walking Tour of Cusco – 9:30 AM</p> <p>Afternoon – Class #1 – 1 PM</p> <p>Evening – Free time</p> <p><i>Assignments due:</i></p> <ul style="list-style-type: none"> • Journal #1 Presentation (in class, 10-minute individual presentation)
Day 3, August 13 th Thursday	<p>Morning – Class #2 – 9 AM</p> <p>Afternoon – Site Visit #1 – 1:00 PM</p> <p>Evening – Free time</p> <p><i>Assignments due:</i></p> <ul style="list-style-type: none"> • Technical Problem-Solving Assignment #1
Day 4, August 14 th Friday	<p>Morning and Afternoon – Site Visit #2 – 8:30 AM</p> <p>Evening – Free time</p>
Day 5, August 15 th Saturday	<p>Morning and Afternoon – Site Visit #3 – 8:30 AM</p> <p>Evening – Free time</p>
Day 6, August 16 th Sunday	<p>Morning – Class #3 – 9 AM</p> <p>Afternoon – Class #4 – 1 PM</p> <p>Evening – Free time</p> <p><i>Assignments due:</i></p> <ul style="list-style-type: none"> • Technical Problem-Solving Assignment #2 • Journal #2
Day 7, August 17 th Monday	<p>Morning – Class #5 – 9 AM</p> <p>Afternoon – Site Visit #4 – 1 PM</p> <p>Evening – Free time</p>



A. JAMES CLARK
SCHOOL OF ENGINEERING

	<p><i>Assignments due:</i></p> <ul style="list-style-type: none"> Journal #3
Day 8, August 18 th Tuesday	<p>Morning – Trip to native community – 7 AM Afternoon – Design Project – 1 PM Evening – Free time <i>Assignments due:</i> Technical Problem-Solving Assignment #3</p>
Day 9, August 19 th Wednesday	<p>Morning and Afternoon – Design Project – 8 AM Evening – Free time</p>
Day 10, August 20 th Thursday	<p>Morning and Afternoon – Design Project – 8 AM Evening – Free time</p>
Day 11, August 21 st Friday	<p>Morning and Afternoon – Design Project – 8 AM Evening – Free time</p>
Day 12, August 22 nd Saturday	<p>Morning – Design Project Presentations – 8 AM Afternoon – Design Project Presentations – 1 PM Evening – Free time <i>Assignments due:</i></p> <ul style="list-style-type: none"> Final Project Report Final Project Presentation Peer Evaluation Journal #4
Day 13, August 23 rd Sunday	<p>Morning – Return to Cusco – 8 AM Afternoon and Evening – Free time</p>
Day 14, August 24 th Monday	<p>Morning and Afternoon – Trip to Machu Picchu Pueblo – 8:30 AM Evening – Group Dinner – 7:00 PM [provided]</p>
Day 15, August 25 th Tuesday	<p>Morning and Afternoon – Site Visit #5 – 5:00 AM Evening – Return to Cusco</p>
Day 16, August 26 th Wednesday	<p>Depart for USA <i>Assignments due:</i></p> <ul style="list-style-type: none"> Journal #5 – Final Reflection (Date TBD)