Environmental Resources Engineering
Major Courses Flow Chart

This flow chart does not represent a recommended four-year plan, but instead shows the earliest semester that an ERE major can take a course while meeting the course's prerequisites. Students should work with their advisor to determine the best combination of classes to take each semester.

ERE faculty recommend that ERE students:
- a) Submit a Major Contract during their first year at HSU.
- b) Apply for graduation before completing 90 units.
- c) Take the Graduate Writing Proficiency Exam (GWPE) at least one year before their expected graduation date.
- d) Take the Fundamentals of Engineering (F.E.) within +/- six months of graduation.
- e) Seek advisor approval to select or substitute electives.

Note: As indicated by the dark gray box below, the pairs of courses ENGR 211/225, 325/331, and 333/326* should be taken concurrently.

Updated CAE 11/03/16
CHEM 328: Brief Organic Chemistry
4 Units
If you want to take brief organic chemistry, I highly recommend it. Depending on what you want to do with your environmental engineering degree, organic chemistry is a fundamental subject that comes up everywhere. The class itself is a lot of work so be ready to spend over 10 hours a week practicing how reactions work and what's actually going on in a system. You will come out knowing more than you thought you would. Luckily, I got to take it with Puminam Punthasee (Known as Pete) while he was teaching at HSU this past year. His teaching methods and busy homework assignments were the main reason this class was fun, so I would recommend taking it with someone who keeps you engaged and busy. It's a lot of work but the knowledge you gain is worth it!

FISH 320: Limnology
3 Units
ERE students are not required to take the lab portion of this class, although it can give you a better understanding of stream ecology. However, the first half of the lab is VERY similar to the ENGR 351 lab. This course involves memorization of lake characteristics for classification purposes.

BIOL 330: Principles of Ecology
4 Units
Some statistics will be involved. If you've taken ENGR 322, then you will be well prepared for it though. The labs are fun because you spend a considerable amount of time in the field taking measurements. Over the course of the semester you do labs in the Arctata Community Forest, the dunes, and at the fisheries lab. There is a group project, but it isn't that difficult and requires a short paper of less than 1000 words.

PHYX 315: Electronic Instrumentation
3 Units
This class can be conceptually difficult and has a lot of homework, but it is a lot of fun hands on work. The exams require meticulous calculation in an hour's time, so really be prepared to identify the equations and problem solving approaches for a variety of problems.

SOIL 363: Wetland Soils
3 Units
This class covers the basics of wetland delineation and soil characteristics. You will gain hands-on experience by using standard techniques in determining the parameters that define wetlands. This class has a steep learning curve initially (if you have never taken a soils course), but eventually becomes easier. The rigor of this course is not high, as many of the tests and techniques learned are very subjective. There are many weekend field trips with a chance to practice technique and get your hands dirty (weekly labs are cancelled directly before any weekend field trips). This class is most applicable to students interested in groundwater, hydrology, water resources and, of course, wetlands. The principles learned in this course will certainly aid in your understanding of these subjects (although direct cross-over may not occur).

GEOL 306: General Geomorphology
3 Units
A general knowledge of geology or having taken an intro class is helpful. Some things to be familiar with are: basic concepts of plate tectonics and earth's internal structure, basic ideas of structural geology including strike & dip, kinds of faults, kinds of folds, outcrop patterns, basic rock types & origins, and ability to identify them in hand specimen and in the field, ability to read & use a topographic map, ability to read & interpret a geologic map. Labs are a lot of work and make up 60% of the course. The instructor in the fall puts less emphasis on labs, and is a little easier.
SOIL 467: Soil Physics

3 Units

“State/transport of matter and energy in soil; physical processes governing soil/water energy relationships.” “Course goals: Describe, classify and evaluate soil resource attributes, learn how aqueous solutions, gases, and heat exist statically and dynamically in soils, gain an appreciation for soil architecture; primary particles, aggregation, pore space, and pore size distribution, know how soils are characterized in terms of specific surface area, mineralogy, and density, learn about soil strength, apply the above principles to different situations in civil engineering, pedology, hydrology, environmental science, and agriculture.”
**ENGR 418: Applied Hydraulics**

3 Units

Many different software tools are introduced and utilized in this course. I would recommend downloading them on your personal computer so that you can use them again in the future. You learn about both closed AND opened channel flow, not just one. This is a good class to take to prepare you for the workforce! Students that have taken this class have been told by employers that they use the same software.

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**ENGR 421: Advanced Numerical Methods for Engineers IV**

3 Units

This course is not offered frequently; if this is a design elective you are interested in, take it if you are eligible when it is offered.

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**ENGR 434: Air Quality Management**

3 Units

This course is not offered frequently; if this is a design elective you are interested in, take it if you are eligible when it is offered. Nature, causes, and effects of air pollution; air quality standards, their measurement and control; Gaussian Plume model; particulate and gaseous pollutant control devices. Engineering design applications. [Prereq: CHEM 110, ENGR 416. Weekly: 2 hrs lect, 3 hrs lab.] Check back in at beginning of next semester.

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**ENGR 435: Solid & Hazardous Waste Management**

3 Units

This class will offer an overview of the major areas of the waste management hierarchy -- reducing, reusing, recycling, and responsible disposal -- with a special focus on solid waste transformation technologies (composting, anaerobic digestion, recycling, incineration). The course emphasizes quantitative analyses pertaining to the processes for the management of municipal solid waste. The course will be taught using lectures and hands-on labs, and students will prepare a final project throughout the course of the semester.

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**ENGR 441: Hydrology II**

3 Units

Hydrology II builds on the basic hydrology taught in ENGR 440 with additional development of rainfall-runoff models and use of HEC-HMS for analysis and forecasting. The course focuses on stochastic hydrology with in-depth statistical analysis (mostly using R) and understanding climate projections and their use in engineering design. The course would be most useful to students planning to go to graduate school in water resources topics or work for water resources planning and management agencies. All laboratory activities are computer-based analyses.
ENGR 443: Groundwater Hydrology
3 Units
Groundwater Hydrology is an interdisciplinary course that covers topics from hydrology, geology, soils, transport phenomena, etc.. The course project uses the ModelMuse GUI with ModFlow code to model the groundwater in a basin selected by the professor. Modeling is time consuming, but very intriguing if you put in the time and effort. To be successful in this class, cut the procrastination and get your work done with time to ask questions. The exams were not difficult, but also do not count for as much of your grade as conventional engineering classes. Be sure to get started on the project as early as possible, and ask questions along the way. Don't get caught up in the model, write the report as you gain understanding and attain results, not after the model is complete. Modeling is not difficult once you know the process, but can take a very long time if you don't get help. I am very glad I took this course, and it may have been the best design elective that I took at HSU. Remember, video tutorials are your friend. Good Luck!

ENGR 445: Water Resources Planning and Management
3 Units
This course focuses on the management of water resources in California using a systems approach. Students complete a literature review and then a project. Students often use an optimization method to address the objective in their project. This course usually includes a field trip to the CADWR-USBR Joint Operations Center in Sacramento, as well as Oroville and Shasta Dams. If you liked systems you might like this class as it has been called “Systems 2” by some.

ENGR 448: River Hydraulics
3 Units
This course focuses on the processes and morphology of rivers, and discusses river engineering in the context of river restoration. In the past students have completed a literature review and a design project. This course goes on several field trips to local creeks and rivers which have had restoration work completed.

ENGR 451: Water and Wastewater Treatment Engineering
4 Units
“Sanitary survey, reactor kinetics, screening, sedimentation, filtration, colloid destabilization, disinfection, conventional and land based biological treatment, solids treatment and disposal.” Learned detailed information about how each unit process operates on a micro and macro scale in the treatment train for both water and wastewater. Wrote a facilities plan for a proposed change to an existing water or wastewater treatment plant.

ENGR 452: Design of Water Treatment & Reuse Systems
3 Units
This design elective course focuses on the design of potable water treatment systems, including those for direct and indirect potable reuse of wastewater. Students complete a design project over the course of the semester; it is important to start early and work consistently to have a successful project.
ENGR 455: Engineered Natural Treatment Systems
3 Units
In the past this class has been split into two sections: Low Impact Development (LID) design and Wetland Treatment Systems design. Each section had a design project associated with it. The LID portion of the course involved following actual city design manuals and using city design calculators to design an LID system. In addition to the engineering design process, the class focused on learning state and local laws and learning how to interpret these legal documents into appropriate designs.

The wetland treatment portion of the class focused on the design and technical presentation of a wetland treatment system. We learned the different design aspects and biological/chemical process of an entire wetland treatment system.

You should not procrastinate on the projects. Not only are these projects helpful when finding a job, the process you go through to complete these projects you will do over and over again in the working world. As you progress through the design process you will find errors in your work or places where you need more data. Correcting for these additions will take time and if you wait till the last minute you may not have the time to make those corrections. Deadlines are very real in the working world and managing your time efficiently to produce your best work possible is very important. Eventually someone will be paying you to write that report and it must be of high quality and accurate. Why not practice that level of quality before thousands of dollars are on the line?

ENGR 471: Thermodynamics and Energy Systems II
3 Units
This course is a continuation of ENGR 331 that covers entropy, efficiency, Rankine Cycle, Refrigeration Cycle, Brayton Cycle, Stirling Cycle, Adiabatic saturation process, and fuels and combustion. Went on a field trip to the Fairhaven Biomass Power Plant. Students complete a semester long project and get to pick their topic. You should pick something that interests your entire group so that everyone is motivated and enjoys the project.

ENGR 473: Building Energy Analysis
3 Units
This class pulls from topics covered in thermodynamics and applies them to building energy modeling. In the past there has been a project with an actual client. There will be exposure to useful software for modeling HVAC systems in buildings.

ENGR 475: Renewable Energy Power Systems
3 Units
This class offers a systems scale approach to designing and analyzing renewable power systems. In the past this class has had a semester long project with a real client, so it is best to start the project as early as possible. This course focuses primarily on solar energy but also touches on wind and micro-hydro briefly.
ENGR 477: Solar Thermal Engineering  
3 Unit  
(Ben will talk with Peter)

ENGR 481: Selected Topics with Engineering Design  
3 Unit  
This course is offered when a design elective can be offered that is not already listed in the catalog such as when a visiting faculty member is willing to teach a new course, or a new design elective course is in development. This course counts as one of the required design electives.

ENGR 498: Directed Design Project  
1-3 Unit  
Three units of this course count as a required design elective. Students work one on one with a faculty member to produce a design report on a mutually decided topic.