

Environmental Engineering FAQs

(Created by team of graduating environmental engineering students)

What is Environmental Engineering?

- Civil engineers who specialize in environmental engineering apply scientific theories and principles to minimize the impact of society on the environment. They ensure that the use of water, land, and air resources are sustainable, and that environmental pollution and degradation are minimized.
- The courses that you will take in upper years have a heavier focus on fluids, soils, and basic chemistry. You will look at how air, water, and soil systems interact with each other, and how human interference –contaminants for example– can impact these systems on local, regional, and global levels.
- In the common civil 2nd year you will have a chance to experience several structurally focused courses, as well as environmental courses. Some 2nd year courses which align to the environmental engineering program are: *Introduction to Environmental Engineering*, *Engineering Fluid Mechanics*, and *Geology for Engineers*. These courses are also important for structural engineers; however, they will give you a feel for the Environmental Engineering program focus.

What is the difference between the Environmental and Structural options?

- Many students think that civil engineering refers only to structural engineering. However, civil engineering encompasses other fields, including environmental engineering, geotechnical engineering, and wind engineering.
- At Western you will graduate with a degree in “Civil Engineering” regardless of the specialty you choose. Therefore, you will be an accredited Civil Engineer that is not restricted to work in any particular sub-discipline.
- The different degree options at Western allow you to tailor your education to your particular interests without necessarily limiting you to working in this area. That is one of the benefits of the broad Civil Engineering degree offered by Western. You can learn more about a certain field that motivates and interests you yet you are accredited across the broad range offered by the entire Civil Engineering career field.
- Because of this design of the program, there are many common courses between the structural and environmental options. First and second year are entirely common and about half of the courses in third and fourth year are common. So the choice between the two focuses on select courses in third and fourth year that align with your interests.
- In the common civil 2nd year you will take courses that will give you a feel for structural engineering, such as: *Introduction to Structural Engineering* and *Structural Theory and Design*. You will also take *Introduction to Environmental Engineering* which will provide some insight into the problems that environmental engineers tackle.
- It is important to know that you are not limited to only the electives associated with your chosen degree option. Many structural students take environmental electives, and vice versa, in their upper years.
- Differences and similarities are shown in the Table on the last page of this document.

What type of courses do you take in Environmental Engineering?

- The courses you will take throughout 3rd and 4th years will be largely focused on soil, surface water, and ground water, with many opportunities to learn specific applications of environmental engineering.
- Very useful upper year course information:
http://www.eng.uwo.ca/undergraduate/upper_year/next.html

- Here are some of the details:

Required 3rd year Env. Eng. courses (which differ from the structural students):

- Drinking Water Quality and Treatment
- Numerical Modeling for Environmental Engineers
- Watershed Hydrology
- Municipal Engineering design
- Water Resource Management
- Wastewater Treatment

Required 4th year Env. Eng. courses (which differ from the structural students):

- Environmental Design for Waste Disposal
- Environmental Hydraulics Design

Some of the electives available to 4th year environmental engineering students:

- Air Pollution
- Environmental Applications of Nanotechnology
- Subsurface Contamination by Hazardous Industrial Chemicals
- Water Pollution Design
- Hydrogeology

Course descriptions are available for all of these courses here:

<http://westerncalendar.uwo.ca/2016/pg1420.html>

What type of courses should I enjoy to enjoy this program?

- In your first year if you enjoy statics and chemistry, then this may be an indicator that environmental engineering is the right choice for you. However, you do not need to excel at these 2 courses to excel in - and enjoy - the environmental engineering program.
- Remember when selecting a discipline, try to avoid basing your discipline selection on grades. Select a discipline you're most excited for and base your decisions on the courses you enjoy the most!
 - One graduating student said "I always enjoyed chemistry but did not get good grades in both high school and first-year chemistry. I found 3rd year and 4th year to be a lot of fun and being taught chemistry from a civil/environmental engineering (practical) perspective made it much easier for me!"

What is the difference between the Environmental Engineering program and Green Process Engineering program?

- Environmental Engineering and Green Process Engineering are very different disciplines.
- Green Process Engineering is a sub-field of Chemical engineering. Like Chemical Engineering, it is focused on developing processes and products. These generally involve reactors and plants and their optimization. The chemistry and other principles involved are taught in the context of a highly controlled system designed to achieve key objectives.
 - Some of the distinguishing features of the Green Process program include the emphasis on green chemistry, green power, solar and biofuel cells, and the conversion of waste such as agricultural by-products to biodiesel and bioethanol products.
- Environmental Engineering is a sub-field of Civil Engineering. Like Civil Engineering, it is focused on 'the great outdoors' and the intersection of civil society (i.e., cities, farms, industry, infrastructure) and the ecosystems they inhabit. The chemistry and other

principles involved are taught in the context of the complexity of natural systems and trying to reduce our negative impact on the environment.

- Some of the distinguishing features of the Environmental Engineering program include the causes of flooding, managing water demand and fresh water supply, the causes of toxic algae blooms, the interaction of pollutants and soil and groundwater, engineering waste water treatment and solid waste landfill management, sustainability principles in developed and developing contexts.

How much chemistry is required in environmental engineering? If I'm bad at chemistry will I struggle?

- An understanding of chemistry is important in environmental engineering. With that said, most professors when introducing chemistry topics will go over the basics and are very open to questions and are available for extra help outside of class hours.
- It is understood that students entering Civil Engineering are not often big chemistry fans and this is taken into account.
- You don't necessarily need to be strong in chemistry but throughout this program you will build an understanding of the important principles. Most of the environmental courses you take will have sections which involve the use of chemistry to understand the interactions and processes that are happening.
 - From a student: "the chemistry sections are taught by civil engineering professors in the context of environmental engineering problems; this perspective made it easier for me to grasp. "

Is this field growing?

- Yes. According to the University of Waterloo: "Over the next decade, there's a forecasted 24% jump in jobs for civil engineers and 31% employment growth for environmental engineers."¹
- According to the US Dept of Labour, general growth in engineering is projected to be 4%, in civil to be 8%, and in environmental engineering to be 12%. Environmental engineering showed the highest growth rate over the next 10 years of all engineering professions except biomedical engineering.²
- There is an increasing societal demand for environmental consciousness and the governments of most countries are strengthening laws to protect and remediate the environment.
- This means a higher demand for creative professionals to fix past mistakes and prevent new ones.
- As this is a growing and exciting field of engineering. Now is the time to get involved so you can become a vital asset and a leader in this field. Because this field is so small and growing so quickly, there are numerous opportunities to advance as a young professional.

What types of careers are available?

- There are numerous types of positions available depending on what field you would like to go into. Here are some common fields/jobs where environmental engineers tend to find employment:

¹ Jobs in civil and environmental engineering. (2016). Retrieved April 27, 2017, from <https://uwaterloo.ca/civil-environmental-engineering/future-undergraduate-students/jobs-civil-and-environmental-engineering>

²US Dept of Labor, Occupational Outlook Handbook for Environmental Engineers (2016). Retrieved May 8, 2017 from: <https://www.bls.gov/ooh/architecture-and-engineering/environmental-engineers.htm>

- Forecasting and mitigating climate change impacts
 - Green infrastructure
 - Drinking water services
 - Water resource management
 - Clean up of contaminated sites
 - Design of municipal infrastructure
 - Informing policy development
 - Protecting, expanding, managing water resources
 - Contaminated site remediation
 - Wastewater treatment
 - Drinking water treatment
 - Storm water management with low impact development (LID)
 - Environmental management
 - Regulatory Compliance
 - Project management
 - Building surveying, development, and construction
 - Renewable energy sources
 - Air quality
 - Landfill engineering
 - Graduates of environmental engineering have gone on to environmental careers with top companies including: AE, AECOM, Bellatrix Exploration, CAWST, CH2MHill, Dillon Consulting, EarthFX, Geosyntec, GM BluePlan, Golder Associates, Google, Imperial Oil, Savron and more.
 - Environmental engineers from Western, with an accredited Civil Engineering degree, have the skill set for many civil and general engineering positions. Here are some positions that past environmental engineering students have had:
 - TransCanada, Pipeline Integrity, Corrosion Threat Management
 - OPG, Nuclear Engineering and Applied Science
 - Union Gas, Engineering Construction Intern
- They also get recruited in banking and also go on to graduate degrees in a wide array of areas within engineering and further degrees outside of engineering (e.g., law, medicine).

Where are, these jobs located?

- Environmental engineering jobs are not location specific, there are many options in any location you would like to be. Environmental engineering jobs are spread out across the country and additional opportunities exist internationally.
- Depending on the types of jobs you choose you can have an opportunity to work in the field or in the office. Many office jobs are in major cities such as Toronto, Calgary and Vancouver. However, there are many positions –both field and in office– in more remote areas and smaller towns.
- Often Environmental positions begin with being based in an office in a major urban centre but being responsible for a lot of field work. This is valuable on the job training and getting an understanding for field conditions. Future career developments often move into project management and leading teams of professionals. Mixing office and work from home is increasingly common.
- Working for large, international companies with offices around the world provides an opportunity for moving around to different types of work within the company and also moving around the world, if desired.

What are some other opportunities to learn about the Environmental Engineering program?

- “Introduction to Environmental Engineering” course in 2nd year
- Undergraduate summer research position with an engineering prof. Find a professor doing research in an area of interest. Full list and profiles here:
<http://www.eng.uwo.ca/civil/people/faculty.html>
- Speaking with environmental professors (knock on their door, email to setup a meeting).
 - Jason Gerhard, Clare Robinson, Ernest Yanful, and many others are always happy to discuss with students considering this area
- Speaking with upper year students
- Environmental Engineering industry night

Some of the highlights and benefits of the Environmental Engineering degree option:

- Outstanding projected job growth
- There are many opportunities to advance quickly in this field
- People tend to be very passionate about their jobs in environmental engineering, which can make the learning and work environment more fun and rewarding.
- Currently, the class sizes are small (approx. 10-20 people), which can create a sense of community, encourage teamwork amongst your peers, and allows you to get individual help more often.
- There are many career options in any location you would like to live.
- The classes are so much fun!
- Opportunity to have a very fulfilling educational experience and career. Make a positive difference in the world!

