

WATER RESOURCES ENGINEERING (WRE)

School of Engineering, College of Engineering and Physical Sciences

Water resources engineering focuses on the use and management of land and water resources to meet the needs of society and water-dependent ecosystems. Students gain knowledge of the hydrologic and hydraulic behaviour and connections between our surface and groundwater flow systems. They gain knowledge of the sources and movement of contaminants. This knowledge is applied to design systems to convey water and strategies to protect the quantity and quality of freshwater resources. Water resources engineering encompasses: water security, flood and drought warning and mitigation; urban stormwater management; prevention and control of erosion; irrigation and drainage for agricultural lands; impacts of climate change, protection and remediation of groundwater systems; and restoration of lakes, rivers and wetlands. The diverse challenges impact urban, rural and Indigenous communities in Canada and around the world. The supply and recovery of water for municipal, industrial and agricultural purposes is considered in the context of resource conservation and aquatic ecosystem protection. Water resources engineering addresses societal water needs for sustainable production of food and energy for an increasing global population in a world with a changing climate.

Major Requirements (Honours)

This is a major within the degree: Bachelor of Engineering (calendar.uoguelph.ca/undergraduate-calendar/degree-programs/bachelor-engineering-beng/).

Code	Title	Credits
Semester 1		
CHEM*1040	General Chemistry I	0.50
ENGG*1100	Engineering and Design I	0.75
ENGG*1500	Engineering Analysis	0.50
MATH*1200	Calculus I	0.50
PHYS*1130	Physics with Applications	0.50
Semester 2		
CHEM*1050	General Chemistry II	0.50
CIS*1500	Introduction to Programming	0.50
ENGG*1210	Engineering Mechanics I	0.50
MATH*1210	Calculus II	0.50
PHYS*1010	Introductory Electricity and Magnetism	0.50
Semester 3		
ENGG*2230	Fluid Mechanics	0.50
ENGG*2400	Engineering Systems Analysis	0.50
GEOG*2000	Geomorphology	0.50
MATH*2270	Applied Differential Equations	0.50
STAT*2120	Probability and Statistics for Engineers	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
or MICR*2420	Introduction to Microbiology	
Semester 4		
ENGG*2100	Engineering and Design II	0.75
ENGG*2120	Material Science	0.50

ENGG*2550	Water Management	0.50
ENGG*2560	Environmental Engineering Systems	0.50
MATH*2130	Numerical Methods	0.50
0.50 restricted electives		0.50
Semester 5		
ENGG*3240	Engineering Economics	0.50
ENGG*3260	Thermodynamics	0.50
ENGG*3590	Water Quality	0.50
ENGG*3650	Hydrology	0.50
ENGG*3670	Soil Mechanics	0.50
0.50 restricted electives		0.50
Semester 6		
ENGG*3100	Engineering and Design III	0.75
ENGG*3220	Groundwater Engineering	0.50
ENGG*3430	Heat and Mass Transfer	0.50
HIST*1250	Science and Technology in a Global Context	0.50
1.00 restricted electives		1.00
Semester 7		
ENGG*3340	Geographic Information Systems in Environmental Engineering	0.50
ENGG*4000	Proposal for Engineering Design IV	0.00
ENGG*4360	Soil-Water Conservation Systems Design	0.75
ENGG*4370	Urban Water Systems Design	0.75
1.00 restricted electives		1.00
Semester 8		
ENGG*4150	Water Resources Engineering Design IV	1.00
ENGG*4250	Watershed Systems Design ¹	0.75
1.00 restricted electives		1.00

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ENGG*4250 Watershed Systems Design can be taken in Semester 6

Restricted Electives

(see Program Guide for more information)

The Engineering Program requires Water Resources Engineering students to complete the following combination of elective credits to complete their program:

- 1.00 credits from the WRE-1 Water Resources Engineering electives
- 1.00 credits from the WRE-2 Environmental and Water Resources electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.

Co-op Requirements (Honours)

This is a major within the degree: Bachelor of Engineering (calendar.uoguelph.ca/undergraduate-calendar/degree-programs/bachelor-engineering-beng/).

The Co-op program in Water Resources Engineering is a five year program, including five work terms. Students must follow the academic

work schedule as outlined below (also found on the Co-operative Education website: <https://www.recruiitguelfph.ca/cecs/>).

Academic and Co-op Work Term Schedule

Year	Fall	Winter	Summer
1	Academic Semester 1	Academic Semester 2	Off
2	Academic Semester 3 COOP*1100	Academic Semester 4	COOP*1000 Work Term I
3	Academic Semester 5	COOP*2000 Work Term II	COOP*3000 Work Term III
4	Academic Semester 6	Academic Semester 7	COOP*4000 Work Term IV
5	COOP*5000 Work Term V	Academic Semester 8	N/A

Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary

(26.00 Total Credits)

Code	Title	Credits
Required Core Courses		19.50
WRE-1 Water Resources Engineering Electives		1.00
WRE-2 Environmental and Water Resources Electives		1.00
Complementary Studies Electives		2.00
Co-op Work Terms		2.50
Total Credits		26

Recommended Program Sequence

Code	Title	Credits
Semester 1 - Fall		
CHEM*1040	General Chemistry I	0.50
ENGG*1100	Engineering and Design I	0.75
ENGG*1500	Engineering Analysis	0.50
MATH*1200	Calculus I	0.50
PHYS*1130	Physics with Applications	0.50
Semester 2 - Winter		
CHEM*1050	General Chemistry II	0.50
CIS*1500	Introduction to Programming	0.50
ENGG*1210	Engineering Mechanics I	0.50
MATH*1210	Calculus II	0.50
PHYS*1010	Introductory Electricity and Magnetism	0.50
Summer Semester		
No academic semester or work term		
Semester 3 - Fall		
COOP*1100	Introduction to Co-operative Education	0.00
ENGG*2230	Fluid Mechanics	0.50
ENGG*2400	Engineering Systems Analysis	0.50

GEOG*2000	Geomorphology	0.50
MATH*2270	Applied Differential Equations	0.50
STAT*2120	Probability and Statistics for Engineers	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
or MICR*2420	Introduction to Microbiology	

Semester 4 - Winter

ENGG*2100	Engineering and Design II	0.75
ENGG*2120	Material Science	0.50
ENGG*2550	Water Management	0.50
ENGG*2560	Environmental Engineering Systems	0.50
MATH*2130	Numerical Methods	0.50
0.50 restricted electives		0.50

Summer Semester

COOP*1000	Co-op Work Term I	0.50
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Semester 5 - Fall

ENGG*3240	Engineering Economics	0.50
ENGG*3260	Thermodynamics	0.50
ENGG*3590	Water Quality	0.50
ENGG*3650	Hydrology	0.50
ENGG*3670	Soil Mechanics	0.50
0.50 restricted electives		0.50

Winter Semester

COOP*2000	Co-op Work Term II	0.50
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Summer Semester

COOP*3000	Co-op Work Term III	0.50
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Semester 6 - Fall

ENGG*3340	Geographic Information Systems in Environmental Engineering	0.50
ENGG*4360	Soil-Water Conservation Systems Design	0.75
ENGG*4370	Urban Water Systems Design	0.75
1.00 restricted electives		1.00

Semester 7 - Winter

ENGG*3100	Engineering and Design III	0.75
ENGG*3220	Groundwater Engineering	0.50
ENGG*3430	Heat and Mass Transfer	0.50
HIST*1250	Science and Technology in a Global Context	0.50
1.00 restricted electives		1.00

Summer Semester

COOP*4000	Co-op Work Term IV	0.50
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Fall Semester

COOP*5000	Co-op Work Term V	0.50
ENGG*4000	Proposal for Engineering Design IV	0.00

Semester 8 - Winter

ENGG*4150	Water Resources Engineering Design IV	1.00
ENGG*4250	Watershed Systems Design ²	0.75
1.00 restricted electives		1.00

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ENGG*4250 Watershed Systems Design can be taken in Semester 7

Restricted Electives

(see Program Guide for more information)

The Engineering Program requires Water Resources Engineering students to complete the following combination of elective credits to complete their program:

- 1.00 credits from the WRE-1 Water Resources Engineering electives
- 1.00 credits from the WRE-2 Environmental and Water Resources electives
- 2.00 credits from Complementary Studies electives

Consult the Program Guide for further information on the prerequisite requirements specific to each elective. Students can take a maximum of 1.50 credits at the 1000 level from the above list of electives.