

Water Quality Science
Associate of Applied Science | 60 credits

Campus: Vermilion

First Year

| FALL SEMESTER 2026 – 17 credits | | Prerequisites | Credits | Hr Lc/Lb |
|--|--|-----------------------|----------------|-----------------|
| BIOL 1561 – General Biology of Cells (MnTC Goal 3) | | (CLR) | 4 | (3/2) |
| CHEM 1200 – Introduction to Chemistry (MnTC Goals 3 & 10) | | (MATH 0200) | 4 | (3/2) |
| <u>OR</u> CHEM 1521 – General Chemistry 1 (MnTC Goal 3) | | (MATH 1220) | | |
| WQAL 1651 – Water Treatment | | (CLR, CLW, MATH 0100) | 3 | |
| WQAL 1652 – Wastewater Treatment | | (CLR, CLW, MATH 0100) | 3 | |
| WQAL(WSHD) 1656 – Environmental Compliance | | (CLR, CLW, MATH 0100) | 3 | |

| SPRING SEMESTER 2027 – 14 credits | | Prerequisites | Credits | Hr Lc/Lb |
|--|--|--------------------------|----------------|-----------------|
| BIOL 1562 – General Biology of Organisms (MnTC Goals 3 & 10) | | (BIOL1561) | 4 | (3/2) |
| WQAL(WSHD) 1255 – Water Resource Field Visits | | | 2 | (0/4) |
| WQAL 1257 – System Hydraulics | | (CLR, CLW, MATH 0200) | 3 | (2/2) |
| WQAL(WSHD) 2265 – Water and Wastewater Analysis 1 | | (CHEM 1200 or CHEM 1521) | 5 | (2/6) |

| SPRING or SUMMER TERM 2027 – 2 credits | | Prerequisites | Credits | Hr Lc/Lb |
|---|--|--|----------------|-----------------|
| WQAL 2220 – Water Resources Internship* | | (WQAL 1651, WQAL 1652, WQAL 2265; 2.0 GPA) | 2 | |

Second Year

| FALL SEMESTER 2027 – 13 credits | | Prerequisites | Credits | Hr Lc/Lb |
|--|--|--------------------------|----------------|-----------------|
| ENGL 1231 – College Composition 1 (MnTC Goal 1) | | (CLW) | 4 | |
| POLS 1320 – State and Local Government (fall) (MnTC Goals 5 & 9) | | (CLR) | 3 | |
| WSHD(NRT) 2258 – Soils and Hydrology | | (BIOL 1200 or BIOL 1561) | 3 | (2/2) |
| WQAL 2269 – Water and Wastewater Analysis 2 | | (WQAL 2265) | 3 | (1/4) |

| SPRING SEMESTER 2028 – 14 credits | | Prerequisites | Credits | Hr Lc/Lb |
|--|--|--|----------------|-----------------|
| BIOL(NRT)2455 – Limnology (MnTC Goal 3) | | (BIOL 1200 or BIOL 1561) | 3 | (2/2) |
| MATH 1200 – Liberal Arts Math (MnTC Goal 4) | | (MATH 0200) | 3 | |
| <u>OR</u> MATH 1220 – College Algebra (MnTC Goal 4) | | (MATH 0300) | | |
| NRT 2315 – Introduction to Geographic Information Systems | | (NRT 1211 or WQAL 1656) | 2 | (1/2) |
| PHIL 1230 – Ethics (MnTC Goals 6 & 9) | | (CLR, CLW) | 3 | |
| <u>OR</u> SOC 1200 – Introduction to Sociology (MnTC Goals 5 & 7) | | (CLR) | | |
| WQAL(WSHD) 2267 – Watershed Management | | (WQAL / WSHD1656; NRT2315 or concurrently) | 3 | (2/2) |

*Internship requirement may be completed outside of class as early as the first spring semester, allowing for Class D Exam qualification following graduation.

Additional Recommended Courses:

Students planning to transfer are advised to complete both CHEM 1521 General Chemistry 1 and CHEM 1522 General Chemistry 2.

Program Description

The Water Quality Science AAS degree program is designed to prepare students for entry-level positions with the potential and skills to advance to supervisory and management positions in water operations, wastewater treatment, environmental laboratory work, equipment maintenance, public health work, and environmental engineering technical work. Upon completion of this program, students are eligible to take the Minnesota Department of Health (MDH) Water Supply System Operator and Minnesota Pollution Control Agency (MPCA) Wastewater Operator Certification Class D examinations. Graduates may elect to continue their education toward a baccalaureate degree.

To accommodate a variety of schedules and learning preferences, students can choose course sections that are either online (asynchronous or synchronous) or in person for the first fall semester. The internship and other program courses require in-person attendance to gain valuable practical experience in water operations. The campus's Water Resource and Research Facility at the Outdoor Learning Center supports the program's hands-on curriculum. The Outdoor Learning Center is also a student housing option – lakeside cabins provide a unique and immersive living experience.

Employment Opportunities

Careers focus on providing clean public drinking water, and on reclaiming that water, appropriately disposing of contaminants, and increasingly extracting nutrients (such as phosphorus) and energy capture during water reclamation processes. Occupational titles include Water Treatment Operator, Drinking Water Production Facility Operator, Wastewater Treatment Facility Operator, Water Consultant, and various specialist titles with infrastructure departments such as pump, pipe, and control system servicers. Demands for skilled water operators continues to increase, driven by the essential need for clean water. Graduates of this program are eligible to take the Class D Water and Wastewater Operator exams. This certification increases employment options in water operations industries, where employment opportunities currently exceed qualified personnel availability. Water / Wastewater Operators have extraordinary job security, with the vast majority of professionals in the industry working straight through to retirement. Current industry pay typically starts at or above \$50K per year, plus benefits. Minnesota North College has an approximate 100% placement rate for students graduating from this program and desiring a career in water operations.

Students desiring a career in a different industry yet focused on water resource management, can pursue positions with regulatory agencies such as MPCA, MDH, and Minnesota Department of Natural Resources (MN DNR), and support organizations such as Minnesota Rural Water Association (MRWA) and Minnesota Wastewater Operators Association (MWOA). Employment may be as a field scientist, entry-level hydrologist, or water resource specialist. Positions are also available in chemical / process manufacturing, education, and research.

Advantages of the two-year Water Quality Science AAS degree program over the Water Operations diploma (which is completed after the first year plus internship) include additional knowledge and skills applicable to careers in this field, the option to transfer to a baccalaureate program for additional opportunities for employment, and being one year closer to Class C Operator examination eligibility.

Program Learning Outcomes

Graduates of this program will:

1. Demonstrate principles and responsibilities of managing water resources.
2. Know and understand drinking / potable water production processes, and 'wastewater' treatment processes as they are relevant to water operations industry careers.
3. Acquire knowledge and abilities necessary to pass Class D Water and Wastewater Operator Exams following program completion.
4. Learn and understand laboratory and field analytical procedures necessary for water / wastewater operator careers, and how they are used for facility functionality and permit compliance.
5. Learn, understand, and apply industry regulatory components to maintain permit compliance and efficient and effective operations.
6. Work independently and in teams to collect information, identify possible problem alternatives, and select the better solution to hydrologic / hydraulic situations.
7. Describe important concepts relating to laboratory analyses, water / wastewater operations, hydraulic principles, watersheds, and environmental law and policy.
8. Apply technology and fundamental principles of water resource management through research reports, laboratory procedures, and field applications.
9. Know, understand, and utilize local, state, and federal laws to demonstrate how policy changes influence the environment.
10. Use current technology to assist with surface water resource characterization and management – flow meters (flowing water), hand-held multi-meters (pH, temperature, turbidity, dissolved oxygen), water sampling devices (surface and at-depth), and lake bottom sediment sampling devices.
11. Learn and use up-to-date GIS and GPS technology to interpret and create professional maps specific to project-specific objectives.
12. Know, understand, and use the scientific method: hypothesize, test, evaluate, and select an appropriate solution through theory and practical applications.

Transfer and Articulation Agreements

This degree program allows transfer to many universities as a third-year student. Students planning to transfer to a baccalaureate degree program are advised to meet with their Minnesota North College advisor, as well as connect with the university to facilitate course and credit transfer. Articulation Agreements with University of Minnesota – Crookston and Bemidji State University are both in the renewal process. Also, a specific Transfer Guide created by the University of Wisconsin–Stevens Point facilitates transfer of this degree program to one of several related programs there.

Program Faculty Contact

Dr. O'Niell Tedrow, Ph.D. (oniell.tedrow@minnesotanorth.edu, preferred; or 218-235-2133, seldom used)

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