Technical Science (TSCI)

TSCI 110. Intro to Water & Wastewater. 4 Credits.
Introduction to drinking water and sewerage/wastewater treatment systems. Topics include plant layout, process control, distribution and collection systems, federal and state regulations, facultative lagoons, and industrial treatment processes and laboratory procedures. The laboratory procedures are not the kinds of experiences that satisfy the laboratory science requirement. This course does not meet the laboratory science requirement.

TSCI 111. Env. Health/Safety Water/Waste. 1 Credit.
Provide students with fundamental knowledge of maintaining a safe, healthful work environment, as well as protecting the local community and environment, as well as protecting the local community and environment from potential hazards generated by water and wastewater system activities.

TSCI 112. Wastewater Lagoon Systems. 1 Credit.
Provide students with a basic knowledge of wastewater lagoon systems including: 1) origins of wastewater lagoon treatment; 2) what constitutes wastewater; 3) management of a system; 4) rules and regulations governing operation of a system as well as sampling, testing and monitoring; 5) wastewater collection systems and lagoon structure 6) the biological, chemical and natural physical treatment processes that occur in a system 7) different types of lagoon systems, discharge options, disinfection choices, sludge removal options; and safety and security concerns and how all these issues pertain to operation and maintenance 8) collecting wastewater lagoon samples for testing as well as the importance of monitoring influent and effluent flows and sludge accumulation 9) basic information about common wastewater problems and offer guidance in identifying causes and solutions; and 10) math calculations common to wastewater treatment.

TSCI 113. On-site Wastewater Systems. 1 Credit.
Provide students with fundamental knowledge of 1) proven and experimental on-site wastewater treatment systems including septic tanks, grease tanks, aerobic treatment units, fixed activated sludge treatment, recirculating sand filter, trickling filter, mound system, subsurface drip system, and peat fields. 2) site evaluations and design considerations; 3) on-site sewage disposal laws, regulations, and permitting procedures; 4) inspections and complaint investigations, 5) unacceptable systems, 6) operation and maintenance, 7) public health and environmental considerations; and 8) public relations and public education.

TSCI 114. Sm Public Drink Systems. 1 Credit.
Provide students with a basic knowledge of drinking water treatments systems including 1) the fundamentals of water 2) science concepts related to the treatment of water 3) water hydraulics 4) the common components of a water distribution system 5) safety concerns when working in water treatment and water distribution systems 6) regulatory requirements for water systems in Montana 7) common math calculations used in drinking water systems.

TSCI 115. Industrial Wastewater Systems. 1 Credit.
Provide students with fundamental knowledge of 1) the types of industries, including but not limited to dairy, paper, mining, oil and coal, that produce and must treat wastewater in Montana; 2) the methods used for treating industrial wastewater; 3) the common issues related to most industrial wastewater will including chemicals, pH, BOD, COD, solids and others 4) pretreatment of industrial wastewater prior to discharge to a municipal wastewater treatment system 5) rules and regulations related to treatment and discharge of industrial wastewater; and 6) the Montana Department of Environmental Quality's operator certification requirements and exam process.

TSCI 116. Wastewater Coll Systems. 3 Credits.
Provide students with fundamental knowledge of 1) the importance and responsibilities of wastewater collection system operator 2)the need for collection system operation and maintenance 3) the components of and typical layouts of collection systems 4) safety procedures for the construction, inspection and testing of sewers, inspection of manholes, and underground construction and repair 5) rules and regulations related to treatment and discharge of wastewater and 6) the Montana Department of Environmental Quality's operator certification requirements and exam process.

TSCI 117. Pumps/Motor Operation. 1 Credit.
Provide students with introductory concepts of pumps and motors used in water and wastewater industry and general operation, maintenance and troubleshooting of each. Various types of pumps will be discussed including centrifugal, submersible, dose, screw and sludge pumps. Attention will also be given to hydraulic conditions and pump devices for the efficient use of pumps. Tours of the local water and wastewater systems will provide students the opportunity to see the pumps and motors in-line and operational.

TSCI 119. Valves and Hydrants. 1 Credit.
Valves and Hydrants are discussed.

TSCI 205. Distribution Systems. 3 Credits.

TSCI 208. Water & Wastewater School. 2 Credits.
This course will introduce students to current topics of importance to the field of water and wastewater operations in addition to having the opportunity to review material in preparation for taking the State of Montana Certification examinations.

TSCI 210. Backflow Prevention. 3 Credits.
Provide students with a basic knowledge of understanding of field testing methods on 4 valves; pressure vacuum breakers, spill resistant vacuum breakers, reduced pressure principle assemblies, and double check assemblies. Students will gain knowledge in hydraulics, backflow and backsiphonage, types of cross connections, and degrees of hazard and state and federal regulations. Completion of this course and the written and practical exams will result in certification by ABPA as a backflow prevention assembly tester.

TSCI 230. Intro to Groundwater Concepts. 3 Credits.
An introduction to the basic concepts governing groundwater including geology, chemistry, contamination, contaminant transport, and remediation techniques. Attention will be focused on the use of groundwater as a source for municipal supply. Includes some laboratory applications. The laboratory procedures are not the kinds of experiences that satisfy the laboratory science requirement. This course does not meet the laboratory science requirement.

TSCI 231. Wastewater Processes. 3 Credits.
An introduction to industrial and municipal wastewater treatment and preliminary, primary, and tertiary treatment processes and methods. Specific topics covered include characteristics of wastewater, sampling and testing procedures for wastewater analysis, sludge treatment and disposal, activated sludge process control, legal aspects of sewage disposal, chlorination records and report keeping, maintenance and operation, and safety. Concurrent enrollment in TSCI 232 is required. Prerequisites: TSCI 110, CHMY 121, and M 121.

TSCI 232. Wastewater Processes Lab. 2 Credits.
Laboratory and on-site activities associated with wastewater treatment and analysis. Concurrent enrollment in TSCI 231 is required. This course is taken in conjunction with the lecture portion of the course (TSCI 231) meets the laboratory science requirement.
Course Fees: $21.50

TSCI 233. Water Treatment Processes. 3 Credits.
Water treatment processes including collection and distribution, sedimentation, filtration, chlorination, softening, aeration, fluoridation, corrosion and odor control, maintenance water bacteriology and chemistry, and basic hydraulics and electricity. Concurrent enrollment in TSCI 234 is required. Prerequisite: TSCI 231.
Course Fees: $21.50

TSCI 234. Water Treatment Processes Lab. 2 Credits.
Laboratory and on-site activities associated with water treatment processes and water analysis. Concurrent enrollment in TSCI 233 is required. This course taken in conjunction with the lecture portion of the course (TSCI 233) meets the laboratory science requirement.

TSCI 298. Cooperative Education. 1-12 Credits.
A planned and supervised work-learning experience in industry, business, government, or community service agencies related to water quality studies. Prerequisites: TSCI 111, two semesters attendance and MSU-Northern, approval of advisor, Dean of the College of Education, Arts and Sciences, Nursing, and cooperative education coordinator. Pass/Fail only. This course does not meet the laboratory science requirement.

TSCI 304. Fuels and Lubricants. 3 Credits.
Petroleum products and their application to the fuel and lubricating requirements of automotive and diesel vehicles. Laboratory tests related to octane, distillation, volatility, viscosity, carbon residue, API degree, and dropping point of greases. Chemical analysis will be made by gas chromatography and infrared. Includes lecture and laboratory hours. This course does meet the laboratory science requirement.

TSCI 320. Environmental Analytical Tech. 2 Credits.
Focuses upon the chemical, physical, and biological analytical techniques that are commonly used in performing environmental health and water quality assessments, and involves extensive field and laboratory work. Offered alternate years. Prerequisite: basic chemistry course. This course does meet the laboratory science requirement.

TSCI 415. Pollution Prevention. 3 Credits.
An in-depth examination of the process of systematically developing and implementing a pollution prevention program, focusing on developing an awareness of technology applications which have potentially harmful environmental impacts. Case studies and field experience are included such as Decision Support Systems and Water Quality Models. This course does not meet the laboratory science requirement.

TSCI 420. Applied Water Quality Technolo. 3 Credits.
Applied water quality technology.

TSCI 498. Cooperative Education. 1-12 Credits.
A planned and supervised work-learning experience extending the student's learning experience in industry, business, government, or community service agencies related to water quality studies. Prerequisites: Cooperative Education 298 or Junior standing and approval of advisor, Dean of the College of Education, Arts and Sciences, Nursing, and cooperative education coordinator. Pass/Fail only. This course does not meet the laboratory science requirement.