



# Nuclear Technology

Program No: 10-624-1

Associate Degree in Applied Science

Degree Completion Time: Four Terms

In general, an academic year consists of two terms; however, degree completion time may vary based on student scheduling needs and class availability.

2013-2014

Catalog No.	Class Title	Credit(s)
<b>Term 1</b>		
10624105	Health Physics Calculations and Statistics	3.00
10624110	Nuclear Technology and Regulations	3.00
10660105	DC Fundamentals	3.00
10804118	Intermediate Algebra w Applications	4.00
10801195	Written Communication OR 10801197 Technical Reporting	3.00
<b>Total</b>		<b>16.00</b>
<b>Term 2</b>		
10624114	Nuclear Systems and Sources	3.00
10624122	Radiation Physics	3.00
10624123	Radiation Physics-Lab	2.00
10660110	AC Fundamentals	3.00
10620157	Hydraulics Industrial	2.00
10801196	Oral/Interpersonal Communications	3.00
<b>Total</b>		<b>16.00</b>
<b>Term 3 (Summer)</b>		
10806134	General Chemistry	4.00
10624118	Radiation Biology	3.00
<b>Total</b>		<b>7.00</b>
<b>Term 4</b>		
10624149	Reactor Plant Components	4.00
10809122	Introduction to American Government	3.00
10806154	General Physics I	4.00
10624138	Radioactive Materials Management	2.00
10624132	Radiological Emergencies	2.00
10624134	Radiation Shielding	2.00
10624135	Radiation Shielding Lab	1.00
<b>Total</b>		<b>18.00</b>
<b>Term 5</b>		
10624140	Radiochemistry	2.00
10809198	Psychology-Introduction to	3.00
10624145	Applied Health Physics	3.00
10624156	Nuclear Technology Program Internship OR 10624146 Applied Physics Lab (2 cr)	2.00
<b>Total</b>		<b>10.00</b>
<b>Term 6 (Summer)</b>		
10624148	Reactor Theory and Operation	3.00
<b>Total</b>		<b>3.00</b>
<b>Program Total</b>		<b>70.00</b>
<b>Note:</b>	<p>Program start dates vary; check with your counselor for details or see <a href="http://gotoltc.edu/pdfs/coursecalendar.pdf">http://gotoltc.edu/pdfs/coursecalendar.pdf</a>.</p> <p>Various classes have prerequisites. Check with your counselor.</p> <p>Curriculum and program acceptance requirements are subject to change.</p>	

## About the Career

The increasing use of radiation and radioactive materials in today's world has created a demand for nuclear technicians. The Nuclear Technology program offers the student a unique opportunity to obtain the specialized training in demand by businesses and organizations licensed to utilize radioactive materials. This program can result in starting salaries higher than many four-year degree programs. It is also an excellent springboard for a four-year degree in the high-demand field of health physics and radiation safety.

## About Shared Programs

Nuclear Technology classes are offered at LTC's main campus with ITV broadcasting to Northeast Wisconsin Technical College's campus in Green Bay. The Nuclear Technology program is a shared program with Northeast Wisconsin Technical College.

## Careers

Graduates of LTC's Nuclear Technology program have a wide variety of career opportunities waiting for them in:

- Nuclear Power Facilities
- Radioactive Waste Handling Facilities
- Radiopharmaceutical Companies
- Universities and National Laboratories
- Medical Facilities
- U.S. Department of Energy Sites
- Hospitals
- Emergency Management

## Admissions Steps

- Submit Application and \$30 Processing Fee
- Complete an Assessment for Placement (Accuplacer or ACT)
- Submit Official Transcripts (High School and Other Colleges)
- Meet with Program Advisor
- Complete Functional Ability Statement of Understanding Form

## Program Outcomes

You'll learn to:

- Work safely within industrial and radiological hazard areas.
- Understand and communicate nuclear technology-related concepts effectively in both oral and written formats.
- Diagnose equipment requiring electrical or mechanical repair and carry out preventive maintenance procedures.
- Perform radiological surveys for radiation and radioactive contamination.

- Follow procedures for operating and maintaining systems and equipment at nuclear facilities.
- Participate in applying nuclear technologies to a variety of industrial, medical, and research processes.
- Apply your knowledge in a variety of related occupational jobs such as reactor plant operations, maintenance, quality assurance, etc.

## Approximate Costs

- \$132 per credit
- Other fees vary by program (books, supplies, materials, tools, uniforms, health-related exams, etc.)

## Functional Abilities

Functional abilities are the basic duties that a student must be able to perform with or without reasonable accommodations. At the postsecondary level, students must meet these requirements, and they cannot be modified.

## Entrance Assessment Scores

Accuplacer	ACT
Arithmetic - 100	Mathematics - 20
Reading - 79	Reading - 18
Sentence Skills - 86	English - 18
Elem. Algebra - 55	Elem. Algebra - NA

# Transfer agreements are available with the following institutions:

Bellevue University  
Capella University  
Concordia University  
Excelsior College  
Franklin University  
Herzing University

Lakeland College  
Marian College  
Ottawa University  
Silver Lake College  
Thomas Edison State College  
University of Phoenix

Upper Iowa University  
UW-Green Bay  
UW-Oshkosh  
UW-Stout

IMPORTANT: For more information on these agreements, visit [gotoltc.edu/transfer](http://gotoltc.edu/transfer).

## 10620157 Hydraulics - Industrial

...prepares the learner to identify hydraulic component symbols; adjust a pressure relief valve; analyze the operation of a pilot operated relief valve; analyze Pascal's law; evaluate flow, velocity, work and power in industrial hydraulic circuits; analyze meter-in, meter-out, and bypass flow control circuits; evaluate the characteristics of hydraulic pumps, motors; directional and control valves; identify basic hydraulic control valves; and assemble hydraulic circuits.

**PREREQUISITES:** *Math equivalency requirements met or 31457318 Trades Math Industrial Maint and 31457318T1 Trades Math Industrial Maint 1, 31457318T2 Trades Math Industrial Maint 2 or 10804118 Intern College Algebra or COREQUISITE: 10804114 Tech Math 1B*

## 10624105 Health Physics Calculations and Statistics

...prepares the learner to solve linear and exponential equations, logarithms, plot graphs, determine counting statistics and reliability, and work with geometry and trigonometry problems.

**CONDITION:** *106241 Nuclear Technology Admissions Requirements Met*

## 10624110 Nuclear Technology and Regulations

...introduces the learner to atomic and nuclear structure; radioactivity and basic dosimetry; regulation standards; and Title 10 Parts 19, 20, 30 and 35 of the Code of Federal Regulations.

**CONDITION:** *106241 Nuclear Technology Admissions Requirements Met*

## 10624114 Nuclear Systems and Sources

...introduces the learner to the major components of natural/man-made background sources, x-ray tubes and applications, medical-used radioactivity materials, accelerators, nuclear gauging devices, non-ionization radiations, and electricity/research nuclear reactors and associated health physics topics.

**CONDITION:** *106241 Nuclear Technology Admissions Requirements Met or Nuclear Tech Dominion Grant*

## 10624118 Radiation Biology

...prepares the learner to convert measuring units and activity to dose rates, predict the effect of radiation on living cells and human organs, evaluate radiation risk, and calculate internal doses.

**PREREQUISITES:** *10624110 Nuclear Tech/Reg & 10624105 Hlth Phys Calc/Stats & 10624114 Nuclear Syst/Sources & 10624122 Rad Phys & 10624123 Rad Phys-Lab & 10804118 Intern Alg w Apps or 10804113 Tech Math 1A & 10804114 Tech Math 1B*

## 10624122 Radiation Physics

...introduces the learner to health physics-related physics, including the properties of radiation's; interactions of radiation with matters; basic principles of radiation detection and measurement; and different kinds of radiation detectors; i.e., gas-filled and solid-state detectors.

**PREREQUISITE:** *10624105 Health Phys Calculations & Statistics, 10624110 Nuclear Technology & Regulations, 10804118 Intern Algebra w Applications and CONDITION: 106241 Nuclear Technology Admissions Requirements Met*

## 10624123 Radiation Physics-Lab

...expands the learners ability to perform calculations, select instruments, and analyze samples. This course is associated with 624-122, Radiation Physics.

**COREQUISITE:** *10624122 Radiation Physics and 10624110 Nuclear Technology & Regulations*

## 10624132 Radiological Emergencies

...prepares the learner to understand a radiological emergency within the commercial nuclear power industry and explain how it is prevented, mitigated, and the proper preparations should an emergency occur. A radiological emergency is displaced radioactive substances in solid, liquid, or gaseous form in amounts which may result in doses to plant workers, plant equipment, the environment, or the public, that exceed company, state, and federal limits or regulations. Post-accident actions will be described as well as company, state, and federal regulations on radioactive releases and doses.

**PREREQUISITES:** *10624110 Nuclear Technology and Regulations and 10624105 Health Physics Calculations and Statistics and 10624114 Nuclear Systems and Sources*

## 10624134 Radiation Shielding

...provides the learner with the skills to calculate radiation attenuation from various geometric radioactive sources, determine the effect of neutron radiation on materials, and estimate the exposure rate from various sources with or without shielding materials.

**PREREQUISITE:** *10624122 Radiation Physics*

## 10624135 Radiation Shield-Lab

...expands the learner's ability to perform shielding of ionizing radiation sources and to measure the penetration of beta and gamma radiation.

**COREQUISITE:** *10624134 Radiation Shielding*

## 10624138 Radioactive Material and Management

...introduces the learner to the proper methods used to dispose of radioactive waste in liquid, solid, gaseous forms; determine waste classification, evaluate methods used to process low-level and high-level waste, determine the package/label requirements, proper type of transport container, shipment quantity classification, storage distance for people and film during shipments by rail/vessel/public roads, proper shipping name and UN number; completion of proper shipping papers; document materials inventory/shipments.

**PREREQUISITES:** *10624105 Health Physics Calculations & Statistics, 10624110 Nuclear Technology & Regulations, 10624114 Nuclear Systems & Sources*

## 10624140 Radiochemistry

...prepares the learner to separate dissolved, suspended, liquid, and ionic radioactive components; perform qualitative and quantitative analysis of samples; and prevent the production of radioactive material by using proper chemical control.

**PREREQUISITES:** *10624122 Radiation Physics and 10806134 General Chemistry or 10806174 General Chemistry or High School Chemistry Equivalent*

## 10624145 Applied Health Physics

...prepares the learner to issue dosimetry, calculate neutron dose, monitor personal exposure, calculate radioactive airborne activity concentration, estimate radioactive airborne concentration, issue respirators, determine contamination levels, recommend protective clothing, reduce the spread of contamination, conduct an ALARA audit, reduce the total radiation exposure, maintain records, and estimate exposure to internal organs.

**PREREQUISITE:** *10624122 Radiation Physics*

## 10624146 Applied Health Physics Lab

...expands the learner's ability to perform applied health physics tasks as covered in Applied Health Physics, 624-145 and should be completed within the same semester. Students will take the NUF Exam on an additional date specified by instructor.

**COREQUISITE:** *10624145 Applied Health Physics*

## 10624148 Reactor Theory and Operation

...introduces the learner to the basic reactor types, the fission process, reactivity/criticality, reactor kinetics, heat removal, residual/decay heat, basic reactor types, nuclear plant water chemistry, and reactor thermodynamics.

**PREREQUISITE:** *10624122 Radiation Physics and 10624132 Radiological Emergencies*

## 10624149 Reactor Plant Components

...introduces basic mechanical and electrical components used by nuclear power plants such as different types of piping, valves, pumps, ejectors, filters, turbines, heat exchangers, compressors, lubrication systems, valve actuators, breakers, transformers, relays, and other equipment.

**PREREQUISITES:** *10624110 Nuclear Technology and Regulations and 10624105 Health Physics Calculations & Statistics and 10804118 Intermediate Algebra w Applications and COREQUISITE: 10624114 Nuclear Systems and Sources*

## 10624156 Nuclear Technology Program Internship

...internship enhances the student's ability to apply technical skills to work productively, communicate effectively, and demonstrate appropriate ethics and behavior in a professional workplace environment.

**PREREQUISITES:** *10624122OL Radiation Physics Online or 10624105 Health Phys Calculations, 10624110 Nuclear Tech & Regulations, 10624114 Nuclear Systems & Sources, 10624122 Radiation Physics, 10624118 Radiation Biology, 10660105 DC Fund, 10660110 AC Fund*

## 10660105 DC Fundamentals

...prepares the student to follow safety procedures; maintain a safe and healthy work environment; convert values to scientific and engineering notations; calculate math quantities; describe basic atomic theory; identify basic electrical terms; use established symbols standards; describe DC voltage characteristics and current sources and electrical resistance; measure and analyze electrical quantities in series and parallel circuits; and desolder/solder single lead components.

**COREQUISITES:** *10804118 Intermediate Algebra with Applications*

## 10660110 AC Fundamentals

...prepares the student to analyze electrical circuits using phasers and AC math, analyze AC waveforms, measure and analyze AC power, analyze capacitors and inductors in DC and AC circuits, analyze AC circuits containing reactance and calculate resonance, apply the elements and properties of basic measuring circuits, and describe transformer characteristics.

**PREREQUISITES:** *10660105 DC Fundamentals or 10660105C1 DC Fundamentals (3 cr) or 10605105 DC Fundamentals or 10605105C1 DC Fundamentals (3 cr)*

## 10801195 Written Communication

...teaches the writing process, which includes prewriting, drafting, revising, and editing. Through a variety of writing assignments, the student will analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Keyboarding skills are required for this course. It also develops critical reading and thinking skills through the analysis of a variety of written documents.

**PREREQUISITE:** *10831103 Intro to College Wrtg or CONDITION: Written Comm Prepared Learner (Accuplacer Wrtg min score of 86 or Equivalent) and COREQUISITE: 10838105 Intro Rdg & Study Skills or CONDITION: Reading Accuplacer min score of 74 or equivalent*

## 10801196 Oral/Interpersonal Comm

...provides students with the skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects.

**COREQUISITE:** *10838105 Intro Reading and Study Skills or CONDITION: Reading accuplcer minimum score of 74 or equivalent*

## 10804118 Intermediate Algebra with Applications

...offers the learner algebra content with applications. Topics include properties of real numbers, order of operations, algebraic solution for linear equations and inequalities, operations with polynomial and rational expressions, operations with rational exponents and radicals, algebra of inverse, logarithmic and exponential functions.

**PREREQUISITES:** *Accuplacer Math score of 100 and Accuplacer Algebra score of 55 or equivalent or 10834110 Elementary Algebra w Apps and COREQUISITE: 10838105 Intro Reading and Study Skills or CONDITION: Reading accuplacer minimum score of 74 or equivalent*

## 10806134 General Chemistry

...covers the fundamentals of chemistry. Topics include the metric system, problem-solving, periodic relationships, chemical reactions, chemical equilibrium, properties of water; acids, bases, and salts; and gas laws.

**PREREQUISITE:** *10804196 or 10804113 College Tech Math 1A or 10804109 Alg for Gen Chem or 10804121 Tech Math I or 10804195 College Tech Math 1 or 10804115 College Tech Math 1 or equiv or 10834110 Elem Algebra and 10838105 Intro Rdg & Study Skills or equiv*

## 10806154 General Physics 1

...presents the applications and theory of basic physics principles. This course emphasizes problem-solving, laboratory investigation, and applications. Topics include unit conversions and analysis, vectors, translational and rotational kinematics, translational and rotational dynamics, heat and temperature, and harmonic motion and waves.

**COREQUISITE:** *10804197 College Tech Math 1B or 10804114 College Tech Math 1B or 10804114M1 College Tech Math 1B Mod 1 & 10804114M2 College Tech Math 1B Mod 2 or 10804115 College Tech Math 1 or 10624105 Health Physics Calc & 10804118 Intern Algebra*

## 10809122 Introduction to American Government

...introduces American political processes and institutions. It focuses on rights and responsibilities of citizens and the process of participatory democracy. Learners examine the complexity of the separation of powers and checks and balances. It explores the role of the media, interest groups, political parties and public opinion in the political process. It also explores the role of state and national government in our federal system.

**COREQUISITE:** *10838105 Intro Reading and Study Skills or Accuplacer Reading score of 74 or equivalent*

## 10809198 Intro to Psychology

...introduces students to a survey of the multiple aspects of human behavior. It involves a survey of the theoretical foundations of human functioning in such areas as learning, motivation, emotions, personality, deviance and pathology, physiological factors, and social influences. It directs the student to an insightful understanding of the complexities of human relationships in personal, social, and vocational settings.

**COREQUISITE:** *10838105 Intro Reading and Study Skills or Accuplacer Reading score of 74 or equivalent*