



Electronic Engineering Technology

Overview

- Two-and-a-half year (28-month) diploma (including common first year)
- Exchange District Campus (formerly Princess Street Campus), Winnipeg
- Co-op work experience:
 - Year 1 - optional co-op work term
 - Year 2 - mandatory elective: co-op placement OR Engineering Technology Report
- Credit transfer opportunities: Lakehead University, University of Manitoba, University of Victoria
- Accreditation:
 - Certified Technicians and Technologists Association of Manitoba (CTTAM)
 - Nationally accredited and internationally recognized program
- International applicants contact RRC Polytech's International Education Office at intled@rrc.ca or 204-632-2143 for information on this program and space availability

Description

After successfully completing the first year of [Electrical Engineering Technology](#), you can choose to enroll in the Electronic Engineering Technology specialization. The program prepares you for a career in the modern electronics industry. Upon completion, you will have the knowledge and skills required to test, repair, and design a wide range of electronic equipment.

You will learn about many technologies, including:

- Different types of electronic circuits used for amplifiers
- AM/FM radio
- Programmable logic
- Control systems
- Biomedical applications
- Microprocessor control
- High-frequency circuits
- Other technologies important to industry

You will also learn the basics of computer network infrastructure and internet protocols. For the final project you will put all your skills to use by designing, building, and troubleshooting your own electronic invention.

When necessary, students will be given priority selection of their second year specialization based on their first year Grade Point Average (GPA).

This program has been recognized by the Canadian Forces. Visit <http://www.forces.gc.ca/en/education-training.page> for recognition information.

Admission Requirements

Successful completion of the first year of the [Electrical Engineering Technology](#) program

Who Should Enrol?

To be successful in this program you need an inquisitive mind and you should enjoy working on practical problems. You will be working with equipment that requires hand and finger coordination, so manual dexterity is important.

You should have the desire to enhance your language skills because jobs in this field will ultimately require you to issue clear verbal instructions on site and to write concise reports for management.

As many students have found this program academically demanding, you should be prepared to set aside two to three hours each evening for assignments.

Locations, Dates and Fees

Please check back later for future start dates.

Costs *(estimates only; subject to change)*

Program/Student Fees	
Year 2	\$7,174.00 ¹
Year 3	\$3,203.00
Books and Supplies	
Year 2	\$890.00
Year 3	\$470.00
Program/Student Fees (International)	
Year 2	\$18,968.00
Year 3	\$9,520.00

¹ Students register into Electrical Engineering Technology for Year 1. Program fees include a coop term at \$1023

Students may apply for financial assistance through the Manitoba Student Aid program. For general information on applying please call [204-945-6321](tel:204-945-6321) or [1-800-204-1685](tel:1-800-204-1685), or visit their website at www.manitobastudentaid.ca, which also includes an online application. For detailed information, please visit one of the [RRC Polytech Student Service Centres](#) or call [204-632-2327](tel:204-632-2327). Applicants requiring financial assistance should complete their student loan applications well in advance of the class start date.

Courses and Descriptions

Year 2	
Term 4Credit Hours	
CIRC-2091 Communication Circuits	4
COMM-2010 Technical Communications 2	0
DCOM-1000 Digital Communications	3
DEVC-2005 Analog Devices and Applications	4

DIGI-2224 Digital Systems	3
EMBD-2000 Embedded Systems 1	4
MATH-3007 Advanced Calculus	4
MEAS-2121 Electronic Measurements	2
Term 5Credit Hours	
COMM-3049 Technical Communications 3	0
CTRL-1000 Control Systems	4
DCOM-2001 Routing & Switching	4
DEVC-2149 Industrial Electronics	4
DIGI-2002 Digital Signal Processing	5
EMBD-3000 Embedded Systems 2	4
MANU-2009 Printed Circuit Board Manufacturing and Layout	4
Term 6Credit Hours	
Electives	
PROJ-2002 Engineering Technology Report	9
WRKE-2007 Co-Op Work Experience	9
Year 3	
Term 7Credit Hours	
CIRC-2022 Circuits & Fields	4
COMM-3005 Technical Thesis	2
ETHC-1002 Professional Ethics	3
PROJ-2000 Project Management	2
PROJ-3000 Final Project	4

STAT-1001 Statistics and Quality Assurance	3
Electives	
BMED-1001 Biomedical Applications	4
DCOM-3002 Wireless Applications	4
DCOM-3005 Digital Mobile Cellular Tech	4
DIGI-3002 Advanced Digital Signal Processing	4
BMED-1001 Biomedical Applications	
<p>This course is designed to provide students with an overview of the field of Biomedical Applications. Keeping math, physics, and chemistry to a minimum, students will be briefly introduced to cell biology, anatomy, and physiology. We will then focus on biomaterials, bioinstrumentation, Biomedical sensors, biosignals processing, X-ray imaging, CT-scan, nuclear medicine, ultrasound, magnetic resonance, and lasers.</p> <p>Prerequisites: DEVC-2149</p>	
CIRC-2022 Circuits & Fields	
<p>This is a course in communications principles and a continuation of CIRC-2091. Topics include transmission lines, waveguides, antennas, radio wave propagation, and link analysis.</p> <p>Prerequisites: CIRC-2091, MATH-3007 and MEAS-2121</p>	
CIRC-2091 Communication Circuits	
<p>This course is designed to help students understand and analyze fundamental concepts and circuits in a communications system.</p> <p>Prerequisites: DEVC-2004 and CIRC-2001</p>	
COMM-2010 Technical Communications 2	
<p>This two hour workshop builds on the learning from COMM-1043. The focus is on developing core communication skills that enable the written documenting and informal oral presenting of technical information. A PASS is required to progress to COMM-3049.</p> <p>Prerequisites: COMM-1152;</p>	
COMM-3005 Technical Thesis	
<p>This course is a review of report writing, oral presentations, and job search techniques. It introduces planning, writing, and presenting a formal report and participating in meetings. Students will produce written reports on projects required in co-requisite courses and present oral briefings common in industry.</p>	

Prerequisites:

[COMM-1152](#)

[PROJ-3000](#) or [PROJ-3002](#) is a corequisite.

COMM-3049

Technical Communications 3

This two hour workshop builds on the learning from COM-1043 and COMM-2010 by applying core communication skills to job search documents and techniques. A PASS is required to progress to COMM-3005.

Prerequisites:

[COMM-2010](#);

CTRL-1000

Control Systems

This course introduces students to modelling, analysis, and design of dynamic systems. Block diagrams and input/output representations are used. Analytical and numerical techniques are used to simulate dynamic systems and obtain system response. Models for electrical and electromechanical systems are developed in terms of linear time-invariant differential equations which can be solved to obtain the system response in the time domain. Laplace transform is used to obtain response of dynamic systems. The corresponding transfer function representation and Bode plots are used to provide graphical representation of the frequency response of the system and investigate stability. Feedback control is presented in terms of speed and position control of a DC motor, and proportional- integral-derivative (PID) controller design.

Prerequisites:

[CIRC-2002](#), [MATH-3007](#), [DEVC-2005](#), and [PHYS-2001](#)

DCOM-1000

Digital Communications

This course will provide students with an in depth knowledge of communications concepts. The focus will be on serial communications. Serial communications is introduced using the RS232 standard as a learning tool. Students will learn about link characteristics, flow control, protocol design, LANs and WANs, telephone communication, fiber optic link characteristics, and design and modulation methods.

Prerequisites:

[DEVC-2004](#)

DCOM-2001

Routing & Switching

This course is a study of routing and switching for Local Area Networks (LANs) and Wide Area Networks (WANs). Students will learn how to configure a Cisco router, troubleshoot networks, and implement basic security. Students will also learn how to configure a Cisco switch, implement virtual local area networks (VLANs), and IEEE 802.1q trunking. The course concludes with an investigation of wide area network (WAN) protocols.

Prerequisites:

[DCOM-1000](#)

DCOM-3002

Wireless Applications

This introductory course to Wireless LANs focuses on the theory, design, planning, implementation, operation, and troubleshooting of Wireless LANs. It includes a comprehensive overview of technologies, security, and design best practices with particular emphasis on hands-on skills in the following areas: wireless LAN setup and troubleshooting, 802.11 (a, b, and g) technologies, WLAN applications, site surveys and link design, WLAN products, WLAN security, and emerging wireless technologies.

Prerequisites:

DCOM-2001

DCOM-3005

Digital Mobile Cellular Tech

(No description available at this time)

Prerequisites:

[CIRC-2091](#) [CIRC-2022](#);

DEVC-2005

Analog Devices and Applications

This course starts the discussion of frequency response of transistors. Special emphasis is then placed on feedback theory, linear and non-linear applications of operational amplifiers, and specific analog devices in electronic applications such as active filters, function generators, timers, and regulated power supplies (both linear and switched)

Prerequisites:

[DEVC-2004](#);

DEVC-2149

Industrial Electronics

This course provides students with the knowledge and skills applicable to electronic devices, circuits, and systems used in industrial settings. Students will have a clear understanding of general industrial electronics techniques and the ability to both analyze and tackle practical industrial electronics problems. Students will learn the principles of operation, characteristics and applications of optoelectronic devices, transducers and sensors, triggering devices, power control semiconductors, and two-terminal devices used for protection and other applications. They will design, measure, and troubleshoot applications using triggering circuits, alarm and protection circuits, as well as light, speed, and temperature controllers.

Prerequisites:

[DEVC-2005](#)

DIGI-2002

Digital Signal Processing

Students will gain familiarity with digital signal processing operations that include sampling, digital filtering, signal synthesis, spectral analysis, and mathematical tools such as the Discrete Fourier Transform, Fast Fourier Transform, and z-Transforms. Frequency response and stability of digital signal processing systems will also be examined, as well as the basics of Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters.

Prerequisites:

[EMBD-1000](#) [MATH-3007](#)

DIGI-2224

Digital Systems

This course continues the applications of digital logic first studied in DIGI-1030 Digital Logic, using VHSIC Hardware Description Language (VHDL) and the Altera Quartus II Programmable Logic Development Environment. The course initially covers the fundamental syntax of VHDL as applied to combinational logic (gates) and sequential logic (latches and flip-flops). This is then followed by a series of applications using VHDL, such as counters, shift registers, design of a Universal Asynchronous Receiver/Transmitter (UART), and state machines. Techniques of digital-to-analog conversion are also studied.

Prerequisites:

[DIGI-1003](#)

DIGI-3002

Advanced Digital Signal Processing

This course is a continuation of DIGI-2002 Digital Signal Processing. It begins with an examination of

sophisticated computational techniques, such as the Fast Fourier Transform (FFT) and windowing. Later, students will work with a Texas Instruments Digital Signal Processing Kit (DSK) to learn how to develop their own programs in polling and interrupt-driven forms. Students will work on DSP projects with applications that include audio effects and communication systems.

Prerequisites:

[DIGI-2002](#)

EMBD-2000

Embedded Systems 1

Each unit of this course consists of a project. Each project involves microcontroller interfacing and C language programming. The projects will build on one another, resulting in a functional, stand-alone embedded controller. Along the way the student uses internal and external peripherals to accomplish each unit's goal. Topics include: interfacing to a matrix keypad and an LCD module, hardware interrupts and serial packet communication. Students will maintain a portfolio of their lab assignments for hand in at the end of the course.

Prerequisites:

[EMBD-1000](#);

EMBD-3000

Embedded Systems 2

This course is designed to enhance the knowledge and skills necessary to use a microcomputer for real-world industrial applications. Starting with the software and hardware applications from Embedded Systems 1 as a user interface, Embedded Systems 2 adds the use of peripherals such as digital-to-analog and analog-to-digital converters, sensors, and actuators. Students interface electronic signals to the peripherals while issuing interrupt control in their programs. Peripheral control using Application Programming Interface (API) functions, TCP/IP implementation, and Windows programming are also introduced.

Prerequisites:

[EMBD-2000](#);

ETHC-1002

Professional Ethics

This course prepares students for being engineering technology professionals by exploring critical thinking, ethical behavior, and the legal and professional accountabilities that apply in the workplace. The industry's code(s) of ethics and practical case studies are used as the learning focus.

MANU-2009

Printed Circuit Board Manufacturing and Layout

This course is an introduction to the design, manufacture, and prototyping of high speed Printed Circuit Boards. Through the use of lectures, software, and projects, the student will design and layout a microcontroller board with analog inputs, high current outputs, and a switching power supply. Topics will include the creation and editing of component footprints. Managing component libraries. Designing for the manufacture and testing of high speed PCBs will be discussed, practiced, and verified.

Prerequisites:

[MANU-1052](#) and [WRKS-1038](#)

MATH-3007

Advanced Calculus

A course in applied mathematics is key to understanding and analyzing core material in Electrical Engineering. Topics in particular include Fourier series and its application to analyzing signal spectra and the use of Laplace transforms in solving for the response of electric circuits.

Prerequisites:

[MATH-2013](#)

MEAS-2121 Electronic Measurements

This course provides practical application of instruments, interpretation of results, analysis methods, and documentation of data from different instruments. Topics include impedance matching and frequency response. The proper use of instruments for measuring signal power levels for a wide range of frequencies is emphasized.

Prerequisites:

[CIRC-2002](#)

PROJ-2000 Project Management

This course is an introduction to project management, using the context of final projects in the EET program. Students will build a project plan, charter, work breakdown structure, Gantt chart, and risk matrix for their final project. Other topics will include the triple constraint, project life cycle, scheduling, and safety.

Prerequisites:

[PROJ-3000](#) or [PROJ-3002](#) is a corequisite.

PROJ-2002 Engineering Technology Report

Students will research and critically analyze an industry-related problem to synthesize possible solutions for the chosen problem. Students will write a technical report to document their process and make recommendations for addressing the problem analyzed. The report will also demonstrate students' ability to communicate effectively and concisely, and to format the delivery of information in a manner consistent with industry practices.

PROJ-3000 Final Project

This course enables students to put into practice the knowledge and expertise acquired during previous semesters. Students apply previous knowledge to the area of their interest, and are taught the following group related activities: safety, feasibility study, specification, quotation, design, planning, documentation, group dynamics, problem analysis, selection of components to the design, testing concepts, and acceptance testing. Co-requisite: COMM-3005 Technical Thesis.

STAT-1001 Statistics and Quality Assurance

This course is designed to educate electronic engineering technology students to make quick, and probably right, decisions in their personal lives and in their professions, where timely obtained information and the implementation of the information are crucial. This course deals with the introduction to basic statistical concepts and techniques, and their applications in technical work. The main topics covered in this course are the presentation and analysis of data, continuous and discrete probability distributions, estimations of means and proportions, linear regression and correlation and quality control. These topics are well coordinated with relevant industrial applications through assigned problems and handouts. This course introduces the student to the concept of quality programs in the workplace. They will learn what quality is and why it is important to business.

Prerequisites:

[MATH-2013](#);

WRKE-2007 Co-Op Work Experience

(No description available at this time)

CO-OP/Practicum Information

Co-operative education integrates classroom theory with related on-the-job-training by alternating terms of

academic study and employment.

This program offers a co-operative education stream to give you direct industry experience, introduce your abilities to local employers, and help finance your schooling.

Year 1 includes an optional co-op work term. Year 2 includes a mandatory co-op work term. Only students enrolled in the first or second year of Electronic, Electrical or Instrumentation Engineering Technology are eligible to enrol in the co-op work term.

Computer/Laptop Requirements

Online learning is a critical component of course delivery in all Red River College Polytechnic programs. To ensure each student has the tools they need to achieve their academic goals, all Red River College Polytechnic students require, at minimum:

1. Off-campus access to a current computer with a webcam
2. A high-speed internet connection:
 - Recommended minimum speed: 10 mbps for download, 3 mbps for upload
 - Slower internet connection speeds may result in audio and video issues. Please keep in mind that if others in your home are using the same internet connection at the same time as you are, you may also experience audio and video issues.

The following are computer requirements for online learning, labs and assessments in this program:

- Computer type: Windows PC laptop. Mac (Apple), Chromebook or Smartphone is not acceptable.
- Note that although a Windows PC desktop is acceptable for software capabilities, at times the portability of a laptop may be required.
- Please review the [Computer Specifications](#) for this program.
- Please note that any anticipated costs are not included in Books and Supplies estimates.

Please refer to <https://www.rrc.ca/future-students/computer-requirements/> for further information on Computer Requirements for Students.

Transfer Credit Opportunities

Transferring credits to other post-secondary institutions

- Lakehead University
A bridging program* allows graduates to enter the third year of an engineering program.
- University of Manitoba
Course credit has been available on an individual course-by-course basis.
- University of Victoria
A bridging program* allows graduates to enter the third year of an engineering program.

*Bridging programs and entrance requirements are subject to change and should be checked before you apply.

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a process which documents and compares an individual's prior learning gained from prior education, work and life experiences and personal study to the learning outcomes in College courses/programs. For more information, please visit www.rrc.ca/rpl.

Employment Potential

Graduates have found employment in a broad range of electronics-related occupations, including:

- Research and development
- Assisting in project development
- Technical sales
- Selling and servicing electronic equipment
- Design
- Quality control

Many graduates are in supervisory and managerial positions.

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Red River College Polytechnic endeavours to provide the most current version of all program and course information on this website. Please be advised that classes may be scheduled between 8:00 a.m. and 10:00 p.m. The College reserves the right to modify or cancel any course, program, process, or procedure without notice or prejudice. Fees may change without notice.