



Data Science and Machine Learning

Overview

- Two year diploma program
- August and January entry dates (Please note: Some classes in the January intake will run in the evening)
- Exchange District Campus, Winnipeg
- Mandatory Work Integrated Learning term (Co-op work experience or industry project)
- Classes take place between 8 am and 6 pm
- Classes are held on campus on Mondays, Tuesdays, and Wednesday mornings and online on Wednesday afternoons, Thursdays, and Fridays
- You need to provide your own laptop computer that meets the requirements for the program
- International applicants please visit [Academic Program, Dates and Fees](#) for a listing of programs for international students, current availability and online application instructions.

Description:

Recent advancements in computer hardware and machine learning algorithms have driven a rapid growth in the use of data science and machine learning across all economic sectors, with applications in robotics and automation, healthcare, finance, and government. Because of this, there is now a huge demand for developers and data analysts with skills and experience in these fields. In the Data Science and Machine Learning program, you will:

- Study the fundamental concepts in mathematics and statistics that make these technologies possible.
- Gain the skills to collect / organize data and use analytics to inform decisions.
- Implement current machine learning algorithms to address common needs in industry.
- Develop the skills to effectively communicate technical ideas with other developers as well as those without technical knowledge.
- Experience working with industry to develop code for real applications in data science and machine learning.

Graduate Profile:

By the end of the program a Data Science and Machine Learning graduate should be able to:

- Determine appropriate machine learning techniques based on the problem domain data and identified goals.
- Determine programming language appropriate to the goal or project.
- Conduct research by completing a literature review, collaborating with others and using other research techniques as required to acquire data, domain knowledge and summarize existing approaches and techniques in a domain area.
- Train industry standard machine learning models to establish predictive relationships between data inputs and desired outputs that remain effective and accurate when presented with new unseen data.
- Prepare data for use in machine learning models through data revision and quality improvement in order to interpret and draw conclusions from statistical analysis of visualized and contextualized data.

- Create a software product that uses machine learning and software development skills appropriate to identified goals.
- Verify and validate a software product to ensure that it meets specifications and fulfills its intended purpose.
- Communicate effectively in all interactions by using active listening as well as written, verbal and non-verbal communication skills (power skills), reading technical literature and documentation of processes.
- Manage data in compliance with regulatory standards through continuous learning from regulatory bodies and ethical behavior.
- Demonstrate professionalism, personal integrity and accountability in all roles and responsibilities, maintaining professional and ethical standards and accreditation as necessary.

Admission Requirements

Your Academic History

If your academic history includes any of the following, please visit [My Education](#) for important information: post-secondary studies at an institution other than Red River College Polytechnic; Modified (M), English as an Additional Language (E), or GED high school courses; or home schooling; international secondary (high school) studies.

The college requires transcripts verifying your complete academic history including any public or private high school, college, university, or technical institute you have attended.

Please check the [Program Overview](#) page, to see if this program is for Manitoba residents only.

DOCUMENT SUBMISSION

Upload Through Your Future Student Account

- Scan your document(s) and save the file. Ensure you keep your original documents as the College may request to see them at any time.
- Go to apply.rrc.ca and log in.
- Click on your application, then Supplemental Items & Documents.

If you do not have a Future Student Account or require assistance, please contact our Student Service Centre at [204-632-2327](tel:204-632-2327).

Internationally Educated Applicants - visit www.rrc.ca/credentials for credential assessment information.

Submission of required documentation indicating proof of completion of admission requirements is due within 15 days of applying unless otherwise noted in the program's admission requirements.

However, if you apply within 6 weeks of the program start date, admission requirements are due within 5 days of applying.

Regular Admission Requirements

1. Grade 12

- Submit proof of graduation from or enrolment in Grade 12, including one credit in each of the following:
 - Grade 12 English (40S)
 - Grade 12 Math (40S) (excluding Accounting 40S)
- If you provide proof of enrolment at time of application, your official final grades indicating successful completion must be submitted by July 15 for fall enrolment or by the deadline specified in your admission letter.

- If you are required to complete an English language assessment, do not submit your transcripts until requested to do so. See English Language Requirements (ELRs) for more information.

and

2. English Language Requirements (ELRs)

- Answer this question to determine if you meet this program's ELRs:
Have I successfully completed 3 years of full-time high school (secondary) education in Canada, the United States, or an [ELR exempt country](#) where English was the language of instruction?
 - If YES, you meet English language requirements. Apply and then submit your transcripts* for review
or
 - If NO, submit proof of meeting an [ELRs option](#). If you choose the English language assessment option, review [this program's approved assessments and required levels](#).
or
 - If you completed all of your education in Canada, the United States, or an [ELR exempt country](#) in English but you did not graduate high school, submit your transcripts* for review.
- * If your transcripts are from the USA or an [ELR exempt country](#), we will assess an [International Credentials Assessment Fee](#) to be paid before your transcripts will be reviewed.

Mature Student Admission Requirements

If you are 19 years of age or older and have been out of high school for a minimum of one year at time of application, and you do not meet the regular admission requirements, you may apply under the Mature Student admission requirements.

1. Academic Requirement

- High school graduation is not required, but you must have successfully completed or be enrolled in one credit in each of the following:
 - Grade 12 English (40S)
 - Grade 12 Math (40S) (excluding Accounting 40S)
- If you provide proof of enrolment at time of application, your official final grades indicating successful completion must be submitted by July 15 for fall enrolment or by the deadline specified in your admission letter.
- If you are required to complete an English language assessment, do not submit your transcripts until requested to do so. See English Language Requirements for more information.

and

2. Meet Regular Admission Requirement 2

English Language Assessments

⚠ The College reserves the right to modify this information without notice or prejudice.

🕒 ASSESSMENT RESULTS MUST BE DATED NO MORE THAN TWO YEARS PRIOR TO YOUR APPLICATION DATE!

Approved English Language Assessments

English Language Assessment	Minimum Scores for Certificates, Diplomas and Advanced Diplomas, and Post Graduate Certificates, Post-graduate Diplomas	Minimum Scores for Bachelor Degrees and Creative Communication
CAEL Online or In-Person	Overall band score of 60	Overall band score of 70 and Writing of 60

English Language Assessment	Minimum Scores for Certificates, Diplomas and Advanced Diplomas, and Post Graduate Certificates, Post-graduate Diplomas	Minimum Scores for Bachelor Degrees and Creative Communication
IELTS Academic Level	Overall 6.0 and No band below 5.5	Overall 6.5 and No band below 6.0
Password Skills	Overall 6.0 and No band below 5.5	Overall 6.5 and No band below 6.0
LINC Certificate	7	8
Duolingo Language Test	115 and above+ with a min. of 95 in each section	125 and above with a min. of 100 in each section
New English for Academic and Professional Purposes	Successful completion of the program 5 (min 70%)	Successful completion of the program 5 (min 70%)
PTE	54 overall Min 50 in each skill	60 overall Min 55 in each skill band
TOEFL-ibt Academic Level	80 (20L, 20S, 19R, 21W)	90 (22L, 22S, 22R, 24W)
Academic English Program for University and College Entrance Program (AEPUCE)	Successful Completion	Successful Completion
CELBAN	N/A	N/A

Who Should Enrol?

You should enjoy working with numbers and data and have an aptitude for math. You need fundamental computer skills such as keyboarding, managing files and folders, installing and managing software, maintaining your computer (updates, virus and security checks). You should also have some aptitude for understanding programming or scripting languages. You need to think analytically, identify patterns, and show persistence to solve problems.

The program is suited to people who have no prior related work experience or post-secondary education.

Locations, Dates and Fees

Next Estimated Term 1 Start Date (subject to change)

Location	Start Date	
Manitou a bi Bii daziigae	Aug 25, 2025	Apply Now

Costs (estimates only; subject to change)

Program/Student Fees	
Year 1	\$15,413.00
Year 2	\$9,615.00
Books and Supplies	
Year 1	\$2,000.00 ¹
Year 2	\$150.00
Program/Student Fees (International)	
Year 1	\$21,827.00
Year 2	

¹ Includes an estimate of \$1600 for the purchase of a laptop

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 1	
Term 1Credit Hours	
COMM-1173 Communication Strategies	3
COMP-1296 Introduction to Programming Logic	6
COMP-1702 Introduction to Data Science and Machine Learning	6
MATH-1202 Statistics for Data Science and Machine Learning	6
MATH-1204 Linear Algebra for Data Science and Machine Learning	6
Term 2Credit Hours	
COMM-2172 Communication for the Workplace	3
COMP-1701 Transforming Data Into Databases	6
COMP-2040 Python Essentials With Data Analysis	6
COMP-2702 Data Management	6
COMP-2704 Supervised Machine Learning	6
Year 2	
Term 3Credit Hours	
COMM-2176 Communication for Systems and Innovative Thinking	3
COMP-3703 Introduction to Artificial Intelligence	6
COMP-3705 Unsupervised Machine Learning	6
Electives	
COMP-2036 Introduction to Bioinformatics	

COMP-3702
Information and Data Architecture

6

COMP-3704
Neural Networks and Deep Learning

6

COMP-3706
Robotics and Automation

6

Term 4 Credit Hours

Electives

COOP-4001
Data Science and Machine Learning Co-op

6

PROJ-4001
Data Science and Machine Learning Industry Project

6

COMM-1173
Communication Strategies **RPL**

Everyone communicates, but are they doing it well? Communicative competence takes practice and self-awareness. In this foundational course, students will learn through discovery and project-based activities to practice approaching situations critically and collaboratively. By developing their communication skills, students will improve their interpersonal ability, intercultural competence, and digital fluency to prepare for success in the workplace and beyond. The strategies students will gain in this course will be useful throughout their program and in their chosen industry.

COMM-2172
Communication for the Workplace **RPL**

This foundational course focuses on essential communication skills for entering and advancing in industry. Students will develop skills for effective resumes, cover letters, and job interviews that are tailored to the specific needs of prospective employers. Additionally, students will enhance their interpersonal skills and digital fluency while applying speaking, writing, and collaboration techniques crucial for job searching, adapting to new roles, and achieving long-term career goals. Students will also develop strategies for continuous learning to remain competitive in an ever-changing job market.

COMM-2176
Communication for Systems and Innovative Thinking **RPL**

Students will build on the skills they practiced in Communication Strategies by focusing on the information technology sector. Students will develop their ability to think at a systems level by analyzing problems to come up with innovative solutions. Learners will collaborate to manage, analyze, and communicate information to various audiences across different channels. This collaboration will involve active listening, networking, and persuasion strategies in an information technology context.

Prerequisites:
COMM-1173

COMP-1296
Introduction to Programming Logic

This course is intended to serve as an introduction to programming concepts. Students will be introduced to high-level modeling and common numeral systems used by computer programmers. Boolean operations will be explored with importance placed on the student's ability to analyze, interpret and re-write word problems as Boolean expressions. Students will explore other core concepts such as assignment, sequence, iteration, decision, modular abstraction, arrays, and strings.

COMP-1701
Transforming Data Into Databases

This is a data-focused course to develop confidence with quick data handling, parsing, structuring, and manipulating datasets for various database types. By viewing, understanding, and normalizing datasets, students will produce Entity Relationship Diagrams (ERDs) and other visual data schemas. Students will learn basic Structured Query Language (SQL) and NoSQL (not only SQL) data types, key-value pairs, and document stores. Students will develop basic to advanced commands including complex JOINS, advanced mathematical and string functions, and full-text search indexing functions. Students will tune the performance and execution times of queries using common practices of indexing and de-normalization.

COMP-1702
Introduction to Data Science and Machine Learning

In this course, students will be introduced to the fields of Data Science and Machine Learning (DSML) and how they are used in real business applications. Students will get an introduction to the industry standard tools and technologies used in this field and learn definitions and meanings of common terms. They will analyze real case studies of how industry has applied the tools of DSML to improve their performance. By the end of this course, students will be able to contrast how DSML tools have impacted performance metrics in industry, compared to conventionally used methods.

COMP-2036
Introduction to Bioinformatics

This course is an introduction to some of the basic techniques and algorithms of bioinformatics through coding challenges in an industry standard programming language. Topics covered include locating ori-C in small genomes, finding regulatory motifs in small genomes, graph algorithms, and the genome reconstruction problem.

COMP-2040
Python Essentials With Data Analysis

Learn the fundamentals of Python programming and data analytics. Starting with the fundamental building blocks, this course will focus on teaching Python programming fundamentals before moving to more comprehensive examples. The course will also introduce students to data science and machine learning as they are used in business applications. Using tools such as the Jupyter Notebook, NumPy, Pandas, Matplotlib and Seaborn, you will learn about the basics of interpreting and preparing data for analysis.

Prerequisites:

[COMP-1296](#)

COMP-2702
Data Management

This course covers steps to manipulate and manage data from raw source formats to functional structures where it can be exploited more readily as a valuable information asset. Students will learn industry standard techniques to inspect and visualize data for statistical, aggregate, and design pattern characteristics, and then manipulate the data into suitable representations within relevant data genre models that include relational, document, and network databases. Students will also learn methods to maintain data security using encryption, anonymization, sanitization, roles access, and walled infrastructures. Furthermore, learners will acquire competencies in maintaining data integrity through versioning, backups, archiving, and restoration approaches at various stages of an established data pipeline.

Prerequisites:

[COMP-1702](#) [MATH-1202](#)

COMP-2704
Supervised Machine Learning

Supervised machine learning is a subfield of machine learning where algorithms are trained on labelled data to

classify items or predict outcomes. This course builds upon concepts to describe how supervised learning algorithms are constructed and coded. Students will use Python to develop the code for supervised learning algorithms including polynomial regression, support vector machines and decision trees; data will be used to train, validate and test these models for common use cases in business and data science.

Prerequisites:

[MATH-1204](#) [MATH-1202](#)

AND [COMP-2040](#)

COMP-3702

Information and Data Architecture

In this course, students will create blueprints for data management systems, identify potential data sources (internal and external), and create a plan to integrate, centralize, protect and maintain information and data.

Prerequisites:

[COMP-2702](#)

COMP-3703

Introduction to Artificial Intelligence

Artificial intelligence (AI) is the ability of computers to learn from data and make decisions by running code. In this course, you will learn the role of logic and probability in AI algorithms, and how statistical machine learning and neural networks are used. These tools will be applied in the completion of course projects where you will develop code for important AI use cases.

Prerequisites:

[COMP-1702](#) [COMP-2040](#)

COMP-3704

Neural Networks and Deep Learning

Deep learning is one of the most important recent advancements in machine learning, with an ever-growing list of applications that include finance, medicine, computer vision, and language processing. The course first introduces the perceptron as a fundamental building block before moving onto more complicated neural network architectures. Students learn how leading architectures are constructed from tools in linear algebra and how to develop, train and test these networks using code.

Prerequisites:

[COMP-2704](#)

COMP-3705

Unsupervised Machine Learning

Unsupervised machine learning is a subfield of machine learning where models are trained to identify clusters and find relationships in unlabelled data. This course builds upon concepts from previous courses to describe how unsupervised learning algorithms work, as well as how they are constructed and coded. Students will use Python to develop the code for clustering models, Autoencoders and topic models; real data will be used to train, validate and test these models for common use cases in business and data science.

Prerequisites:

[COMP-2704](#)

COMP-3706

Robotics and Automation

This course is an introduction to the exciting field of robotics and automation. Working with Robot Operating System (ROS2) locally and cloud services like AWS RoboMaker, students will gain experience with important concepts such as vision, motion control and processing sensor data. Students will learn how Robot Operating System interacts with and controls physical hardware.

Prerequisites:

COMP-2704

COOP-4001

Data Science and Machine Learning Co-op

Co-operative education integrates related on-the-job experience with classroom theory by incorporating a term of paid or unpaid employment within the terms of academic study. Students are given the opportunity to practice and apply the skills gained during the academic semesters of their program as productive full-time employees on their work term. Students are provided with an intense 4-week program of job search and resume development workshops to prepare them for the recruitment process. Placement of eligible students occurs in either January or May. Each work placement is a minimum of 16 weeks. Student performance will be monitored and evaluated by both the department and the employer. Each student will participate in a midterm review of their employment midway through the semester.

Prerequisites:

Take [COMM-1173](#) [COMP-1296](#) [COMP-1702](#) [MATH-1202](#) [MATH-1204](#) [COMP-2040](#) [COMM-2172](#) [COMP-1701](#) [COMP-2702](#) [COMP-2704](#) [COMM-2176](#) [COMP-3703](#) [COMP-3705](#) Take two electives from: [COMP-2036](#) [COMP-3702](#) [COMP-3704](#) [COMP-3706](#)

MATH-1202

Statistics for Data Science and Machine Learning

An understanding of statistics is fundamental in the study of data science and machine learning. This course is designed to familiarize students with sampling methods and estimations, presenting and describing data, probabilities and hypothesis testing.

MATH-1204

Linear Algebra for Data Science and Machine Learning

This course is a gentle introduction to the topics of linear algebra. Students begin with a review of foundational concepts in algebra and graphing linear equations before moving on to the core topics of geometry, vectors and matrices. By the end of this course, students will understand how vectors can represent data, and how matrix operations are used to manipulate this information and obtain results.

PROJ-4001

Data Science and Machine Learning Industry Project

The Industry Project option provides real world experience in applying data science and machine learning skills to a project requiring cross-functional teamwork while meeting client requirements and completing deliverables outlined in the project charter. Project teams will work jointly with industry partners (including Entrepreneurs-in Residence) at the ACE Project Space facility. Each project team will evaluate, analyze, plan, research, model, design, document, develop, test, and manage a project. Project requirements could include new development, applied research, or enhancing the functionality of an existing system. This option also provides practice to further develop soft skills that includes interpersonal, verbal, and written communication through teamwork and collaboration with project stakeholders. All team members will enhance their critical thinking, problem solving, research, independence, and life-long learning skills.

Prerequisites:

Take [COMM-1173](#) [COMP-1296](#) [COMP-1702](#) [MATH-1202](#) [MATH-1204](#) [COMP-2040](#) [COMM-2172](#) [COMP-1701](#) [COMP-2702](#) [COMP-2704](#) [COMM-2176](#) [COMP-3703](#) [COMP-3705](#). Take two electives from: [COMP-2036](#) [COMP-3702](#) [COMP-3704](#) [COMP-3706](#).

CO-OP/Practicum Information

A critical component of your education is the opportunity to integrate course theory with real life learning. One term of your program will be dedicated to a Work Integrated Learning (WIL) experience, either a Co-op

Education work experience or an industry project at the ACE Project Space. This is normally done after students have completed all courses in the first three terms of the program.

Co-operative Education (Co-op Ed) integrates related on-the-job experience with classroom theory by incorporating a term of paid employment within the academic program. The employer, the student and the College form a partnership to extend the learning process beyond the College into the professional business world. It is a proven training system where everyone shares in the benefits. A limited number of co-op positions are assigned through a competitive process each term. A Co-op tuition fee is charged to all students registered in a Co-op work term to cover work placement development, pre-employment instruction, and employment-related monitoring.

Industry Project provides students with experience working as a team to create a real-world IT solution in the ACE Project Space. Students may be assigned to work with an Entrepreneur in Residence to develop a product for a startup company or an application for a small business or non-profit organization. Students work in cross-functional teams using the Agile methodology for project management. This means students work closely with customers and need to meet deadlines. A fee is charged to all students registered in an industry project term.

Computer/Laptop Requirements

You need a laptop computer that meets the [specifications](#) for the program. These [requirements](#) are higher than for other programs at RRC Polytech, so you need to review them before purchasing your computer.

Please review the requirements

at <https://catalogue.rrc.ca/files/File/catalogue/LaptopandInternetSpecsACE.pdf>

You need to bring your laptop to all classes that take place on campus. The College provides free high speed internet access on campus. For online classes, you are responsible for your own high speed internet connection.

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.

Graduation Requirements

To graduate, students need to meet these requirements:

- A minimum overall program GPA of 2.0 (as per RRC Policy A12)
- A minimum passing course grade requirement of D (50%)
- Students need to complete all compulsory courses

To graduate from Data Science and Machine Learning, all students must complete a total of 14.5 full-course equivalents and one term of Work Integrated Learning for a total of 87 credit hours within six years of the date of your initial enrolment. You are responsible for ensuring you take the appropriate courses to meet the requirements for graduation.

Academic Advising Service

Our academic advising service can provide information about our full-time programs, explain program admission requirements, and help you select the right program to meet your career and academic goals. We can also connect you with helpful people, resources, and supports.

- For more information visit [academic advising](#).
- If you are an Indigenous student, you can contact an [Indigenous Admissions Advisor](#).

- If you are an international student, you can contact [International Education](#).

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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.