



MATH-102 – Introduction to Discrete Mathematics

University Arts and Science

Effective Term & Year: Fall 2022

Course Outline Review Date: 2025-03-01

Program Area: Math and Sciences

Description:

Discrete mathematics plays an important role in logical thought and in computer science programming. This course provides an introduction to a variety of post-secondary mathematics which do not require calculus. MATH 102 is intended both for students who wish to see useful and real life applications of mathematics and for those needing to learn more about algorithms and problem solving in the context of computer science. Topics include: binary, octal, and hexadecimal number systems, formal logic, set theory and set algebra, Boolean algebra, introductory graph theory, algorithms and simple coding, and an introduction to formal mathematical proofs.

Program Information:

This course may be used as three (3) credits towards an Associate of Arts or an Associate of Science degree from the College of the Rockies.

Delivery Methods: On-campus (Face-to-Face)

Credit Type: College of the Rockies Credits

Credits: 3

Course type/s: Sciences

Instructional Activity and Hours:

| Activity | Hours |
|---|-------|
| Classroom, Directed Studies or Online Instruction | 45 |

| | |
|----------------------------|-----------|
| Seminar/Tutorials | |
| Laboratory/Studio | |
| Practicum/Field Experience | |
| Co-op/Work Experience | |
| Other | |
| Total | 45 |

Course Requisites:

- Complete 1 of the following
 - Earned a minimum grade of C+ (65%) in at least 1 of the following:
 - **MATH080** – Mathematics – Advanced Level
 - **PREC 11** – Pre-Calculus 11
 - **FOM 11** – Foundations of Mathematics 11
 - **STAT 12** – Statistics 12
 - **CS 12** – Computer Science 12
 - Completed at least 1 of the following:
 - **MATH101** – Finite Mathematics 1 (3)
 - **MATH103** – Differential Calculus (3)
 - **MATH104** – Integral Calculus (3)
 - **STAT106** – Statistics (3)
 - Or Foundations of Math 11 and 70% or higher in Foundations of Math 12.

Flexible Assessment: Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see <https://www.bctransferguide.ca/> or <https://transferalberta.alberta.ca> . For more transfer credit information, please visit <https://www.cotr.bc.ca/Transfer>

All requests for course transfer credit from institutions in British Columbia or elsewhere should go to the College of the Rockies Enrolment Services office.

Textbook Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

Essentials of Discrete Mathematics, 3rd Edition by David J. Hunter, (2017) Jones and Bartlett Learning

Please see the instructor's syllabus or check COTR's online text calculator <https://textbook.cotr.bc.ca/> for a complete list of the currently required textbooks.

Learning Outcomes:

Upon the successful completion of this course, students will be able to:

- employ a variety of formal problem solving methods;
- examine, strengthen and formalize methods of approaching mathematical problem solving;
- read about, interpret and find applications for all the concepts studied;
- add, subtract, multiply and divide in binary, octal and hexadecimal number systems;
- identify the various symbols used in logic, and determine the validity of propositions and arguments;
- work with sets, Venn diagrams, and the laws which govern them;
- identify the components of a Boolean algebra, and solve problems in both general and specific cases;
- apply various techniques and laws to simplify Boolean expressions, including consensus and Karnaugh Maps;
- identify algorithms and the structures of decisions and loops;
- write simple programs in pseudocode and with flowcharts;
- recognize concepts of graph theory and be able to define the components of a graph, draw specified graphs, and make conclusions about the connectivity of graphs;
- prove whether or not Eulerian or Hamiltonian circuits exist, and find the ones that do;
- solve puzzles, using graph and logic theory;
- write simple, clean, mathematics proofs for statements about discrete structures, and
- possibly even discover that math can be both enjoyable and useful.

This course will help students:

- use written and oral communication skills effectively, employing methods appropriate to message and context;
- think clearly and critically, fusing experience, knowledge and reasoning into considered judgment;
- identify, interpret, and solve problems, effectively implementing and evaluating proposed

- strategies; and
- apply mathematics to real life applications.

Course Topics:

- Binary, Octal, and Hexadecimal Number Systems
- Operations in Number Systems
- Logic and logical inference
- Conditional statements, propositions, truth tables, and logic laws
- Proof techniques (direct, contradiction, and induction)
- Set Theory, Venn Diagrams, and set algebra
- Boolean Algebra, Laws, and Simplification
- Introductory Graph Theory – graphs, digraphs, trees Euler and Hamiltonian graphs
- Algorithms and simple coding

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

Evaluation and Assessments

Assessment Type: On-Campus (face-to-face)

| Assessment Type | % of Total Grade |
|------------------------------|------------------|
| Assignments/Quizzes | 20% |
| Midterms (best two of three) | 30% |
| Final Exam | 50% |
| Total | 100% |

Grade Scheme

| A+ | A | A- | B+ | B | B- | C+ | C | C- | D | F |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| >=90 | 89-85 | 84-80 | 79-76 | 75-72 | 71-68 | 67-64 | 63-60 | 59-55 | 54-50 | <50 |

Evaluation Notes: A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

Additional Evaluation Information:

No rewrites will be granted for any assignments or exams within this course.

Please see the instructor's syllabus for specific classroom policies related to this course, such as details of evaluation, penalties for late assignments and use of electronic aids.

Student Attendance/Absence

- As adult learners, students are expected to attend all classes. Attendance is taken as a means of monitoring student success. In the event of illness or other unavoidable cause of absence, the student should notify the appropriate instructor as soon as possible.
- Students must attend all clinical/preceptorship experiences. If illness or other unavoidable absence occurs, the student must notify the appropriate instructor prior to the time s/he is expected.
- Unexcused/excessive absences from clinical/preceptorship may mean students must withdraw from the program.

Written Assignments

- Assignments about clients must be written using the clients' INITIALS ONLY.
- A 15% penalty will be applied for each day past due date for late assignment submissions. If any assignment is more than three days late, it will be assigned a grade of "0".

Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a "0" on the exam.

Academic Policies:

College of the Rockies policies related to courses can be found at <https://cotr.bc.ca/about-us/college-policies/> and include the following:

- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
- Policy 2.5.8 Academic Performance
- Policy 2.5.3 Grade Appeal
- Policy 2.4.9 Student Concerns Re Faculty

Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to

this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.