

MAST 332/COMP 367
Techniques in Symbolic Computation
Winter 2023

- Instructor:** Dr. A. Atoyan, Office: LB 1041.24 (SGW), Phone: 514-848-2424, Ext. 5221
Email: armen.atoyan@concordia.ca
- Office hours:** Wednesdays, 13:30-15:00.
- Textbook:** *A Concrete Introduction to Higher Algebra*, by L. N. Childs, 3rd Edition.
The textbook will be available at:
<https://www.bkstr.com/concordiastore/home>
- Prerequisites:** MAST 234 or COMP 248, MAST 217 or COMP 238.
- Software:** *MAPLE (version 17 or higher)*. In this course the software is only used as a computational *tool*, not as an object of study in itself. Although there will be a brief overview of Maple procedures in the beginning of the course, an elementary knowledge of Maple is implied. **All the assignments, the tests, and the final examination are written using MAPLE.**
- Laptops (optional):** The classroom for this course does not have hardwired computers installed. Therefore, although not mandatory, for efficient work in class students are encouraged to bring their laptops to the classroom and follow the course more interactively using the Concordia WIFI system.
- Course Description:** This course is an application-oriented introduction to symbolic computation based on concepts in linear algebra, number theory and modular algebra.
- Assignments:** Assignments will be given, and should be submitted, online through Moodle as MAPLE files. Assignments are an important part of the learning process in this course and contribute 10% to the final grade.
- Midterm Test:** There will be **one Midterm test** based on the material learned in the previous weeks (1-6) which will contribute up to 30% to your final grade (see the Grading Scheme). It will be held in week 7, on **Wednesday February 22, 2023**, in a computer-equipped classroom during the regular class time.

NOTE: It is the Department's policy that tests missed for any reason, **including illness**, cannot be made up. If you missed the midterm because of illness (**to be confirmed by a valid medical note**) the final exam can count for 90% of your final grade, and 10% will be contributed by the assignments.

Final Exam: The Final Examination will be 3 hours long (**closed-book** exam, no notes or electronic material is allowed) written using MAPLE in the lab equipped with computers. Students are responsible for finding out the date and time of the final exam once the schedule is posted by the Examinations Office. Conflicts or problems with the schedule of the final exam must be reported directly to the Examinations Office, *not* to the Instructor. **Students are to be available until the end of the final exam period.** Conflicts due to travel plans **will not** be accommodated.

NOTE: There are **no supplemental or alternate exams** for this course.

Grade: The final grade will be based on the higher of (a) and (b) below:
(a) 10% for the assignments, 30% for the class test, 60% for the final exam.
(b) 10% for the assignments, 10% for the class test, 80% for the final exam.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Course Contents: Maple commands and procedures (an overview)
Number-theoretic problems, modular arithmetic
Diophantine Equations and Bezout's Identity
Congruences, congruence classes and applications
Finite fields and Rings
Fermat's and Euler's theorems and applications
Hill Cryptosystem
Error-correcting codes
Public key encryption schemes (e.g. RSA)
Polynomial Rings
Polynomial Congruences
Chinese Remainder Theorem and applications

Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: concordia.ca/students/academic-integrity." [*Undergraduate Calendar, Sec 17.10.2*]

Use of Zoom

Note: Zoom is included as an institutionally-approved technology. This means we have been assured of the privacy protections needed to use freely within the classroom)

Zoom might be used in this course to facilitate learning at a distance. It may be used to record some or all of the lectures and/or other activities in this course. If you wish to ensure that your image is not recorded, speak to your instructor as soon as possible.

Also, please note that you may not share recordings of your classes and that the instructor will only share class recordings for the purpose of course delivery and development. Any other sharing may be in violation of the law and applicable University policies, and may be subject to penalties.

Behaviour

All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the [Code of Rights and Responsibilities](#) which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property

Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the [Academic Code of Conduct](#) and/or the [Code of Rights and Responsibilities](#). As specified in the [Policy on Intellectual Property](#), the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances

In the event of extraordinary circumstances and pursuant to the [Academic Regulations](#) the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.