

Math 2120/AM2811 Course Outline

1. Course Information

Math 2120/AM2811: Linear Algebra II, Winter 2024. 3 lecture hours.

List of Prerequisites

AM2811: (Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B, or Mathematics 1600A/B) and (Numerical and Mathematical Methods 1414A/B or Calculus 1301A/B or Calculus 1501A/B, or the former Applied Mathematics 1413 or the former Applied Mathematics 1414A/B). Integrated Science 1001X with a minimum mark of 60% can be used in place of Calculus 1301A/B. In practice, the prerequisite for AM2811b in Winter 2024 will be Math 1600A/B.

Math2120: Math 1600A/B.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Math Department Counsellors and Science Academic Counselling) to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

Instructor	Email	Office	Phone	Office Hours
Dr. Lindi Wahl	lwahl@uwo.ca	MC267	x88795	Thursdays 9:30-11am MC267
TA: TBD				

Instructor office hours will be in person and will be set by a poll of the class during the first week. The TA will offer a mix of in-person and online office hours from week to week, including 2 hours of in-person tutorials per week as scheduled by the registrar.

3. Course Syllabus, Schedule, Delivery Mode

Course Content: The Gram-Schmidt process; similarity and orthogonal diagonalization; abstract vector spaces and linear transformations over arbitrary fields; change of basis; inner product spaces; norms and distance; least squares and Fourier approximation; singular value decomposition. Applications to differential equations and other topics will be emphasized throughout the course.

Learning Outcomes: After the successful completion of this course, you should be able to:

- correctly identify abstract vector spaces and linear transformations
- compute orthogonal bases and changes of bases for an abstract vector space
- compute norms, distances and inner products in various vector spaces
- compute least squares minimization and singular value decomposition
- compute and express solutions to systems of differential equations in vector notation
- prove elementary properties of vector spaces involving similarity, orthogonality, inner products, norms and distance

Course delivery: in person.

Approximate Syllabus:

Week of course	Topics (from textbook, see below)
Weeks 1 - 4	5.0 - 5.5
Weeks 5 - 8	6.0 - 6.7
Weeks 9 - 12	7.0 - 7.5

Contingency plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

4. Course Materials

Textbook: Chapters 5, 6 and 7 of *Linear Algebra: A Modern Introduction*, by David Poole, are required. There is a custom e-textbook available through the Western Bookstore that contains only the chapters we need. If you already own or have access to the full textbook (any edition), there is no need to buy the custom edition.

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. All course material (other than the textbook) will be posted to OWL.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements: None, other than access to the OWL course site.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Weekly in-class quizzes (best 8 out of 10, Mondays)	20%
Periodic in-class diagnostics (best 8 out of 10)	10%
Midterm Examination (Saturday March 2, 9:30-11:30am) [Midterm Make-up: Weds March 6, 5pm-7pm]	30%
Final Examination (scheduled by the registrar)	40%

A student must achieve a weighted average grade of 50% on the midterm and final exam in order to pass the course. This weighted average will be calculated as $(30 * (\text{midterm grade}) + 40 * (\text{final exam grade})) / 70$. If the weighted average is below 50, a course grade of 45 will be assigned.

Quizzes and Diagnostics: On Mondays, starting January 15, class will begin with a 10-15 minute in-class quiz. On Wednesdays and Fridays distributed throughout the course, a 5-10 minute "diagnostic" will be given to assess learning and comprehension. Diagnostics will take many forms such as answers to short questions completed in small groups, written explanations of concepts, or short answer questions. **There will be no make-ups for quizzes or diagnostics.**

Examinations: A detailed list of chapters and sections which will be covered on each test or exam will be posted to OWL. All material covered up to the end of the course will be considered testable on the final exam. The exams will weight each topic in the course approximately as weighted in the lectures. The practice problems assigned at each lecture are the best guide to material that is testable. The practice problems change from one year to the next, and are not generally available in advance. However before any midterm or final, a comprehensive list of assigned practice problems will be posted on OWL.

Practice practice practice: The material in this course is really fun and challenging, but it builds up. Practice problems will be assigned for every lecture, and it is recommended that you book fixed times in your weekly schedule when you will work on AM2811/Math2120 practice problems.

Working together: Working in pairs or groups outside of class, talking about problem solving strategies and studying together is encouraged.

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth less than 10% of the overall course grade (quizzes and diagnostics):

There will be no make-ups for quizzes or diagnostics, however only the best 8 of 10 of each type will contribute to the final grade. If a student has legitimate and unavoidable reasons to miss more than 4 of these 20 assessments, please discuss the situation with the instructor during office hours.

Assessments worth 10% or more of the overall course grade (midterm exam):

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Students with approved absences from the midterm exam will be able to write the midterm make-up exam, Weds March 6th 5pm-7pm. Note that this exam will have a different set of questions from the regularly scheduled midterm examination.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a make-up Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

6. Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence **in writing at least two weeks prior to the holiday** to the course instructor. Please consult University's list of recognized religious holidays (updated annually) at

<https://www.edi.uwo.ca>

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

7. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Calculators will not be allowed for the midterm or the final exam.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Although the intent is for all assessments to be conducted in person, should any university-declared emergency require tests and examinations to be conducted online, these will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support

is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.