Information

Instructors: Dr. Christophe Audouze & Dr. Geoffrey Scott

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<th>Lec 0101</th>
<th>Lec 0102</th>
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| Instructor | Christophe Audouze  
  Institute for Aerospace Studies  
  Bahen Center, room 2120  
  40 St. George street  
  c.audouze@utoronto.ca | Geoffrey Scott  
  Department of Mathematics  
  Bahen Center, room 6256  
  40 St. George street  
  gscott@math.toronto.edu |
| Lectures | Mon 15:00-16:00 SF1105  
  Thu 15:00-16:00 SF1105  
  Fri 12:00-13:00 SF1105 | Mon 16:00-17:00 KP108  
  Thu 16:00-17:00 MB128  
  Fri 11:00-12:00 MB128 |

Office Hours: To be announced. You can also schedule an individual, after-class appointment with us by email.

Course websites:
- https://sites.google.com/site/caudouze/home2/teaching-2

Teaching Assistants: To be announced.

About this course

Description: MAT185 is a continuation of linear algebra studied in ESC103H1 (Engineering Mathematics and Computation). This course will provide a strong background in the theoretical foundations of linear algebra. Focus will also be made on various applications coming from computational engineering sciences to illustrate how theory can be put into practice.

Objectives: By the end of this course you will be able to
- Be familiar with theoretical results from linear algebra
- Understand the proofs of all the theorems you encounter
- Make links between mathematical concepts and some engineering applications
- Solve some numerical problems using the Matlab software

Topics covered: The essential topics in this course are vector spaces, subspaces, bases, basis extension and reduction theorems, rank and dimension formula, coordinates and change of basis, determinants, diagonalization of matrices, linear transformations. Examples of engineering applications (including electrical circuits, numerical resolution of discretized partial differential equations) will be covered through assignments making connections with ESC103H1 and ECE159 (Fundamentals of Electric Circuits). We may end up covering fewer or more topics than this, time permitting.
Prerequisites: ESC103H1 and the first 3 chapters of the notes (see references).

References: Our lectures will follow the notes. The course begins at chapter 4 meaning that you must be familiar with the first 3 chapters of the notes. We will post a pdf of notes chapters on Blackboard (https://portal.utoronto.ca). The supplementary volume from Nicholson is intended as a source of exercises which will be covered during tutorial classes.

- Supplementary volume: Linear Algebra with Applications, by W. K. Nicholson, all editions.

Assessment

Homework: There will be three homework assignments. Homeworks will be collected at the start of class on the day it is due. You may work with others on homework to share ideas, but make sure you personally understand all the solutions you submit and that you write all your homework solutions yourself. No late homework will be accepted except for illness or other legitimate (approved) reason.

Tests: There will be one midterm test which will be 90 minutes long and one final exam covering the entire work course and that will be 2 hours 30 minutes long. No aid is permitted.

Missed Tests: Consideration for absence from a term test due to illness or extraordinary circumstances will require the student to present formal documentation.

Showing up late for an Exam: All students usually try to show up to an exam on time. However, if a student is late, the student may still sit the exam for the time remaining, so long as no one has left the exam room before the student shows up. On exam days, students should allow enough time to get to campus so that they will still be on time, even with TTC delays and/or flat tires.

Grading criteria: Your final grade is calculated in the following way:

- 25% Homework
- 35% Midterm Test
- 40% Cumulative Final Exam (date to be established)

Notes

Missed class: It is in the best interests of all students to attend all the lectures. However, if you miss a lecture, please download the course material, get notes from your classmates, and then be prepared to ask specific questions about the lecture to the TA or instructor during office hours. Do NOT ask the TA or instructor to give a second delivery of the lecture.

Academic integrity: The University of Toronto considers cases of academic misconduct to be quite serious. The UofT Code of Behavior on Academic Matters (see http://www.artsci.utoronto.ca/osai/The-rules/code/the-code-of-behaviour-on-academic-matters) is a detailed document describing policies regarding misconduct, which includes

- quoting another person’s ideas in your work without clear acknowledgement
- using or possessing an unauthorized aid or obtaining unauthorized assistance in taking an exam or writing a paper
- submitting forged or altered documentation for excuses for missed exams

Any of these offenses will result in referral to the central academic integrity office and consequences that the University deems appropriate after investigation.
Class policies: To avoid disturbance we kindly ask you not to use your cell phones or your laptops during class.

Accessibility: University of Toronto is committed to accessibility. If you require accommodations for a disability or have an accessibility concern about this course, please contact Accessibility Services as soon as possible:

https://www.studentlife.utoronto.ca/as

Tentative schedule of lectures

This week-by-week schedule is a guide only.

<table>
<thead>
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<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Chapters of the notes</th>
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<tbody>
<tr>
<td>1</td>
<td>Jan. 9 - Jan. 13</td>
<td>Introduction &amp; Vector Spaces</td>
<td>4.1 - 4.3</td>
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<tr>
<td>2</td>
<td>Jan. 16 - Jan. 20</td>
<td>More on vector Spaces &amp; Subspaces</td>
<td>4.4 &amp; 5.1 - 5.3</td>
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<tr>
<td>3</td>
<td>Jan. 23 - Jan 27</td>
<td>Linear independence, bases and dimension</td>
<td>6.1 - 6.3</td>
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<tr>
<td>4</td>
<td>Jan. 30 - Feb. 3</td>
<td>More on bases/dimension &amp; row and column spaces</td>
<td>6.4 &amp; 7.1 - 7.2</td>
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<td>Homework #1 (8.33%) due Feb. 2</td>
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<tr>
<td>5</td>
<td>Feb. 6 - Feb. 10</td>
<td>Rank of a matrix and dimension formula</td>
<td>7.2 - 7.4</td>
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<tr>
<td>6</td>
<td>Feb. 13 Feb. 17</td>
<td>Coordinates and changes of basis</td>
<td>8.1 - 8.4</td>
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<td>Homework #2 (8.33%) due Feb. 16</td>
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<td>Feb. 20 - Feb. 24</td>
<td>READING WEEK</td>
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<tr>
<td>7</td>
<td>Feb. 27 - Mar. 3</td>
<td>Determinants</td>
<td>9.1 - 9.2</td>
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<td>8</td>
<td>Mar. 6 - Mar. 10</td>
<td>More on determinants</td>
<td>9.3 - 9.5</td>
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<td>Midterm Test (35%) Mar. 9</td>
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<tr>
<td>9</td>
<td>Mar. 13 – Mar. 17</td>
<td>Eigenproblems</td>
<td>10.1 - 10.2</td>
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<tr>
<td>10</td>
<td>Mar. 20 - Mar. 24</td>
<td>Diagonalization</td>
<td>10.3 - 10.4</td>
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<td>11</td>
<td>Mar. 27 - Mar. 31</td>
<td>More on eigenproblems</td>
<td>10.5 - 10.7</td>
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<td>Homework #3 (8.33%) due Mar. 31</td>
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<td>12</td>
<td>Apr. 3 - Apr. 7</td>
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<td>13</td>
<td>Apr. 10 - Apr. 13</td>
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Cumulative Final Exam (40%)
Date to be announced.