Course Description: Presents the essential ideas and methods of linear algebra and differential equations, emphasizing the connections between and the applications of both subjects. The course is designed for students in the sciences and engineering.

Prerequisites: Math 2411 is required.

Eligibility: You cannot receive credit for both this class and MATH 3191 or MATH 3200.

Who should take this class (Rationale): This class is primarily designed for engineers and scientists with knowledge of calculus who want to prepare for upper level classes in their field. Topics such as control theory, Fourier analysis, regression and analog circuitry, among others, draw on content from this class.

Who should not take this class: Math majors should not take this class, and if you are interested in a math minor, or graduate school, you should strongly consider MATH 3191 and MATH 3200 instead.


Overall learning objectives: The course has four major learning objectives:

- To understand the relevance of differential equations to physical models;
- To implement analytic solution methods for ODEs and IVPs;
- To understand basic linear algebra topics including vectors, matrices, linear systems, orthogonality, eigenvalues, and its importance to the rest of math;
- To utilize tools from linear algebra to solve differential equations.
Addressed learning outcomes:

- Core knowledge areas: Students will acquire an operational understanding of linear algebra.
- Core skills: Students will acquire analytical skills for problem solving.
- Essential learning outcomes: By emphasizing the connections between various branches of mathematics, (including, trivially, linear algebra and differential equations) students will develop their problem solving and creative thinking skills from this class. Many quiz and exam questions will in some way require an understanding of how calculus and linear algebra can be used to solve ODEs, and in turn how those ODEs can be used to understand physical phenomena.

Grading policy: Your final grade will be determined as follows:

- Quizzes (worst 2 quizzes dropped) 40%
- Midterm Exam 30%
- Final Exam 30%

Grading Scale: Your final grade will be determined by the final percentage of the available points that you have earned:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>85 – 100%</td>
</tr>
<tr>
<td>B</td>
<td>70 – 84%</td>
</tr>
<tr>
<td>C</td>
<td>55 – 69%</td>
</tr>
<tr>
<td>D</td>
<td>40 – 54%</td>
</tr>
<tr>
<td>F</td>
<td>&lt;40%</td>
</tr>
</tbody>
</table>

These grade ranges may be adjusted over the course of the semester.

Academic Dishonesty: Students are required to know, understand, and comply with the CU Denver Academic Dishonesty Policy as detailed in the Catalog and on the CLAS website. Academic dishonesty consists of plagiarism, cheating, fabrication and falsification, multiple submission of the same work, misuse of academic materials, and complicity in academic dishonesty. If you are not familiar with the definitions of these offenses, go to http://www.ucdenver.edu/academics/colleges/CLAS/faculty-staff/policies/Pages/DefinitionofAcademicDishonesty.aspx. This course assumes your knowledge of these policies and definitions.

Failure to adhere to them can result in possible penalties ranging from lowering a grade on an assignment to dismissal from the University; so, be informed and be careful. If this is unclear to you, ask me.

The College of Liberal Arts and Sciences (CLAS) Ethics Bylaws allow the instructor to decide how to respond to an ethics violation, whether by lowering the assignment grade, lowering the course grade, and/or filing charges against the student with the Academic Ethics Committee.

Students who have complaints about the course or instructor should: 1) meet with the instructor face-to-face; 2) if not satisfied, meet with the
Associate Chair of the math department/unit, Prof. Steve Billups or the Chair, Prof. Jan Mandel; 3) if not satisfied, appeal to the Associate Dean. No step in this process may be skipped. See "Procedures for Student Grievances about Courses or Faculty, CLAS."

- **Missing an Exam:** If circumstances arise that prevent you from attending an exam, please contact me **ahead of time** as I will be much more lenient. Unexplained absences may require hard evidence such as a death certificate, hospital paperwork, etc.

**Midterm Exam:**  **Tuesday, October 14, 2014  12:00pm – 1:50pm**

**Final Exam:**  **TBD during finals week**

**Attendance at all exams is mandatory.**

**Drops and incompletes:** You have until October 28th to drop the course with only the instructor's (but not a Dean's) signature.

The incomplete policy of the department and college is strictly enforced. Incompletes are given only in situations in which a student has: (1) Successfully completed 75 percent of the course (i.e. is passing the course) (2) Special circumstances (verification may be required) that preclude the student from attending class and completing graded assignments, and (3) Made arrangements to complete missing assignments with the original instructor. A CLAS Course Completion agreement is strongly suggested. Incompletes are not granted for low academic performance.

**Tentative Course Schedule**

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>SECTIONS</th>
<th>LECTURE DATES</th>
<th>QUIZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1-1.6</td>
<td>8/19 - 8/28</td>
<td>8/28, 9/4</td>
</tr>
<tr>
<td>2</td>
<td>2.1-2.3</td>
<td>9/2 - 9/4</td>
<td>9/11</td>
</tr>
<tr>
<td>3</td>
<td>3.1-3.6</td>
<td>9/9 - 9/18</td>
<td>9/18, 9/25</td>
</tr>
<tr>
<td>4</td>
<td>4.2-4.6</td>
<td>9/23 - 10/7</td>
<td>10/2</td>
</tr>
<tr>
<td>5</td>
<td>5.1-5.6</td>
<td>10/9, 10/16 - 10/23</td>
<td>10/23, 10/30</td>
</tr>
<tr>
<td>6</td>
<td>6.1-6.3</td>
<td>10/28 - 10/30</td>
<td>11/6</td>
</tr>
<tr>
<td>7</td>
<td>7.1-7.5</td>
<td>11/4 - 11/13</td>
<td>11/13, 11/20</td>
</tr>
<tr>
<td>10</td>
<td>10.1-10.3</td>
<td>11/18 - 11/29</td>
<td>12/2</td>
</tr>
<tr>
<td>Catch up/Review</td>
<td>As needed</td>
<td>12/2 - 12/4</td>
<td>None</td>
</tr>
</tbody>
</table>

**Technology and Media:**

- **Email:** This will be the primary means of communication for this class. Please try to check your email regularly, and please try to contact me through email.
- **Canvas:** I will be using Canvas to organize the content for this class. Make sure you log in at least once a week to see what material has been added. You will be able to check your grades through Canvas.
**Other resources for this course**

**The Learning Resources Center**

- The Learning Resource Center is where students go to get help or insight with class assignments, course-loads, and study skills. The Center also helps with arranging tutoring sessions, which take place in the days or evenings.

  North Classroom Building (NC) Room 2006  
  Phone # 303-556-2802  
  Monday - Thursday 9am-7pm  
  Friday 9am-5pm

  [http://www.ucdenver.edu/life/services/LRC/Pages/default.aspx](http://www.ucdenver.edu/life/services/LRC/Pages/default.aspx)

**Program Access for Persons with Disabilities**

- The University of Colorado Denver is committed to providing reasonable accommodations and access to programs and services to persons with disabilities. Students should contact the Disabilities Resources Offices.

  North Classroom Building (NC) Room 2514;  
  Phone # 303-556-3450, TTY 303-556-4766.  
  Monday – Friday 8am – 5pm

  [http://www.ucdenver.edu/academics/colleges/CLAS/faculty-staff/faculty-resources/teaching/supporting-students/Pages/students-disabilities.aspx](http://www.ucdenver.edu/academics/colleges/CLAS/faculty-staff/faculty-resources/teaching/supporting-students/Pages/students-disabilities.aspx)

**Academic Success and Advising Center**

- This office serves as the first point of contact for students who are pre-business, pre-engineering, or who have not declared a major in CLAS or CAM. In addition, the center provides general information and resource referral to all students.

  North Classroom Building (NC) Room 2024  
  Phone # 303-352-3520

**Career Center**

- The Career Center offers a full array of services that prepare students for career success, such as resume help, internship and career counseling and they have a large career library.

  Tivoli Student Union Room 267  
  Phone # 303-556-2250

The University of Colorado Denver, provides many other services and resources. See [http://www.ucdenver.edu/life/services/Pages/index.aspx](http://www.ucdenver.edu/life/services/Pages/index.aspx)
The following policies, procedures and deadlines pertain to all degree-seeking students in the College of Liberal Arts and Sciences (CLAS). Please also consult the Official University Academic Calendar and see your advisor if you have questions or concerns.

- **Schedule verification:** It is each student’s responsibility to verify online that his/her official registration and schedule of classes is correct before classes begin and prior to the drop/add deadline. Failure to verify schedule accuracy is not sufficient reason to justify a late adds or drops.

- **E-mail:** Students must activate and regularly check their official CU Denver e-mail account for university related messages. Those who forward email should check CU Denver e-mail regularly for messages not automatically forwarded.

- **Waitlists:**
  - Students are automatically notified if they are enrolled in a class from a waitlist via their official CU Denver email account.
  - Students are not automatically dropped from a class if they never attended, stopped attending, or do not make tuition payments, though instructors may request administrative drops.
  - Waitlists are purged after the 1st week of classes. To add a course from August 26-September 3, it is the student's responsibility to get a CLAS Instructor Permission to Enroll in a Course form at [http://www.ucdenver.edu/academics/colleges/CLAS/clas-advising/Pages/CLASAdvising.aspx](http://www.ucdenver.edu/academics/colleges/CLAS/clas-advising/Pages/CLASAdvising.aspx) or [http://www.ucdenver.edu/academics/colleges/Graduate-School/Pages/default.aspx](http://www.ucdenver.edu/academics/colleges/Graduate-School/Pages/default.aspx), have it signed electronically or in person and submit it according to the instructions on the form. Students and faculty will receive emails with directions for completing registration via official university email and students must complete registration and verify their schedules before census, September 3rd, by 5p.m. **After Sept 3:** students should meet with their CLAS advisor to learn more about how to petition to add a course late.

- **Late adds** (after September 3, 2014) will be approved only when circumstances surrounding the late add are beyond the student’s control. This will require a written petition and verifiable documentation. Petition forms are available in the CLAS advising office, NC 4002, or the Graduate School, LSC 1251. The signature of a faculty member on a Schedule Adjustment Form does not guarantee that a late add petition will be approved.

- **Late drops** (after November 10, 2014) will be approved only when circumstances surrounding the late drop are beyond the student’s control. This will require a written petition and verifiable documentation. Petition forms are available in the CLAS advising office NC 4002 or the graduate school, LSC 1251. The signature of a faculty member on a Schedule Adjustment Form does not guarantee that a late drop petition will be approved.

- **Tuition:** Students are responsible for completing arrangements with financial aid, family, scholarships, etc. (depending on tuition plan selected) to pay their tuition prior to Census Date, September 3, 2014. Students who drop after that date are (1) financially responsible for tuition and fees, (2) academically responsible and will receive a "W" grade, and (3) are ineligible for a refund of COF hours or tuition.

- **Graduation:**
  - Undergraduate students wishing to graduate in Fall 2014 should (1) first meet with their CLAS advisor; (2) meet with their major and minor advisor(s), who will complete the electronic form required to verify eligibility to graduate; and (3) apply for graduation online through UCDAccess. These steps must be completed by no later
than 5PM on September 3rd, which is an absolute deadline without exception.

- Graduate students wishing to graduate in Fall 2014 must apply for graduation online through UCDAccess and have a Request for Admissions to Candidacy on file with the CU Denver Graduate School (LSC 1251) no later than 5 PM, September 3, 2014, which is an absolute deadline without exception.

**Important Dates and Deadlines**

*All dates and deadlines are in Mountain Standard Time (MST).*

- **August 18, 2014:** First day of classes.
- **August 24, 2014:** Last day to add or waitlist a class using the UCDAccess student portal. Last day to drop a class without a $100 drop charge--this includes section changes.
- **September 1, 2014:** Labor Day--no classes, campus closed.
- **September 3, 2014:** Census date.
  - **9/3/14, 5 PM:** Last day to add structured courses without a written petition for a late add. This is an absolute deadline and is treated as such. This deadline does not apply to independent studies, internships, project hours, thesis hours, dissertation hours, and late-starting modular courses.
  - **9/3/14, 5 PM:** Last day to drop a Fall 2014 course or completely withdraw from all courses using a UCD Access Portal and still receive a tuition refund, minus the drop fee(s). After this date, tuition is forfeited and a "W" will appear on the transcript. This includes section changes. This is an absolute deadline.
- **9/3/14, 5 PM:** Last day to apply for Fall 2014 graduation.
- **9/3/14, 5 PM:** Last day to request pass/fail or non-credit option for a course.
- **9/3/14, 5 PM:** Last day to petition for a reduction in Ph.D. dissertation hours.
- **September 15-24, 5 PM:** Early Alert open to faculty
- **October 27, 2014, 5 PM:** Last day for non-CLAS majors to drop individual courses instructor permission only. After this date, a dean’s signature is required on a Schedule Adjustment Form. **Note:** Withdrawal from all classes does not require individual instructor signatures. Students must obtain a dean’s signature to withdraw from all classes.
- **November 10, 2014, 5 PM:** Last day for CLAS majors to drop individual courses or withdraw from all classes without a petition and dean’s approval. After this date, a petition is required in order to obtain dean’s signature approval on a Schedule Adjustment Form. Petition forms are available in NC 4002 for undergraduates and LSC 1251 for graduates.
- **November 24-30:** Fall break, no classes but campus open.
- **November 27:** Thanksgiving Day--no classes, campus closed
- **December 6, 2014:** Last day of classes
- **December 8-13:** Final Exam week
- **December 13:** Fall 2014 commencement
- **December 22, 2014:** Final grades available on UCDAccess and transcripts (tentative).

**Definition of Academic Dishonesty**

Students are expected to know, understand, and comply with the ethical standards of the University. In addition, students have an obligation to inform the appropriate official of any acts of academic dishonesty by other students of the University. Academic dishonesty is defined as a student's use of unauthorized assistance with intent to deceive an instructor or other such
person who may be assigned to evaluate the student’s work in meeting course and degree requirements. Examples of academic dishonesty include, but are not limited to, the following:

**Plagiarism:** Plagiarism is the use of another person’s distinctive ideas or words without acknowledgment. The incorporation of another person’s work into one’s own requires appropriate identification and acknowledgment, regardless of the means of appropriation. The following are considered to be forms of plagiarism when the source is not noted:
1. Word-for-word copying of another person’s ideas or words.
2. The mosaic (the interspersing of one’s own words here and there while, in essence, copying another's work).
3. The paraphrase (the rewriting of another's work, yet still using their fundamental idea or theory).
4. Fabrication of references (inventing or counterfeiting sources).
5. Submission of another’s work as one's own.
6. Neglecting quotation marks on material that is otherwise acknowledged.
Acknowledgment is not necessary when the material used is common knowledge.

**Cheating:** Cheating involves the possession, communication, or use of information, materials, notes, study aids or other devices not authorized by the instructor in an academic exercise, or communication with another person during such an exercise. Examples of cheating are:
1. Copying from another’s paper or receiving unauthorized assistance from another during an academic exercise or in the submission of academic material.
2. Using a calculator when its use has been disallowed.
3. Collaborating with another student or students during an academic exercise without the consent of the instructor.

**Fabrication and Falsification:** Fabrication involves inventing or counterfeiting information, i.e., creating results not obtained in a study or laboratory experiment. Falsification, on the other hand, involves deliberately alternating or changing results to suit one’s needs in an experiment or other academic exercise.

**Multiple Submissions:** This is the submission of academic work for which academic credit has already been earned, when such submission is made without instructor authorization.

**Misuse of Academic Materials:** The misuse of academic materials includes, but is not limited to, the following:
1. Stealing or destroying library or reference materials or computer programs.
2. Stealing or destroying another student’s notes or materials, or having such materials in one’s possession without the owner’s permission.
3. Receiving assistance in locating or using sources of information in an assignment when such assistance has been forbidden by the instructor.
4. Illegitimate possession, disposition, or use of examinations or answer keys to examinations.
5. Unauthorized alteration, forgery, or falsification.
6. Unauthorized sale or purchase of examinations, papers, or assignments.

**Complicity in Academic Dishonesty:** Complicity involves knowingly contributing to another’s acts of academic dishonesty.