**Course Description:** Students learn and refine both problem solving techniques and computer programming skills. Examples, exercises, and projects are taken from a wide range of mathematical topics including algebra, calculus, linear algebra and probability.

**Prerequisites:** Math 2411 is required; as a corequisite, either Math 3191 or Math 3195.

**Eligibility:** This course will not count toward a graduate degree in applied math.

**Who should take this class (Rationale):** This class is designed for students who are interested in studying applied mathematics or numerical analysis, as well as any student who want to understand how problems can be solved in the computer. Introductory coding practices are taught and then used to run simulations in Matlab.

**Who should not take this class:** Those who are not ready to put in the time and work required (probably 6+ hours per week) should reconsider this class.


**Note:** This book is available through SIAM eBooks if you are on campus: [http://epubs.siam.org/doi/book/10.1137/1.9780898717648](http://epubs.siam.org/doi/book/10.1137/1.9780898717648)

**Overall learning objectives:** The course has two major learning objectives:

- To learn the basics of computer programming and good coding practices;
- To study mathematical problems and real world scenarios computationally, especially those which do not have an analytic solution.
Addressed learning outcomes:

- **Core skills:** Students will be able to use computer technology for quantitative analysis and mathematical modeling.
- **Essential learning outcomes:** By developing the topic of randomness from basic probability to random variables to statistical tests, students will develop their **problem solving, creative thinking, written communication** and **quantitative literacy** skills from this class. The short projects will require students to abstract a problem into its components and devise creative computational solutions. After implementing these methods, the results will be written in a professional format to train for effective communication.

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm Exams</td>
<td>50%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
</tbody>
</table>

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

- **A** 85 – 100%
- **B** 70 – 84%
- **C** 55 – 69%
- **D** 40 – 54%
- **F** <40%

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](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 1:** Thursday, February 27, 2014 3:30pm – 4:45pm  
**Midterm Exam 2:** Tuesday, April 8, 2014 3:30pm – 4:45pm  
**Final Exam:** TBD during finals week

Attendance at all exams is mandatory.

**Drops and incompletes:** You have until February 5th 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>PROJECT DUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1-1.2</td>
<td>1/21 - 1/28</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>2.1-2.2</td>
<td>1/30 - 2/6</td>
<td>2/20</td>
</tr>
<tr>
<td>3</td>
<td>3.1-3.2</td>
<td>2/11 - 2/20</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>4.1, 4.3</td>
<td>2/25, 3/4 - 3/6</td>
<td>3/20</td>
</tr>
<tr>
<td>5</td>
<td>5.1-5.3</td>
<td>3/11 - 3/20, 4/1</td>
<td>4/15</td>
</tr>
<tr>
<td>7</td>
<td>7.1-7.3</td>
<td>4/3, 4/10 - 4/15</td>
<td>4/24</td>
</tr>
<tr>
<td>6</td>
<td>6.1-6.2</td>
<td>4/17 - 4/22</td>
<td>5/1</td>
</tr>
<tr>
<td>8</td>
<td>8.1-8.2</td>
<td>4/24 - 4/29</td>
<td>None</td>
</tr>
<tr>
<td>9</td>
<td>9.1</td>
<td>5/1</td>
<td>None</td>
</tr>
<tr>
<td>12</td>
<td>12.1</td>
<td>5/6 - 5/8</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 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
  (303) 556-2802
  Monday - Thursday 9am-7pm
  Friday 9am-5pm

  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 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

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
Spring 2014 CLAS Academic Policies

The following policies pertain to all degree-seeking students in the College of Liberal Arts and Sciences.

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

- **E-mail**: Students must activate and regularly check their official student e-mail account for CU Denver business: [http://www.ucdenver.edu/student-services/Pages/WebMail.aspx](http://www.ucdenver.edu/student-services/Pages/WebMail.aspx). Those who forward email must check CU Denver e-mail regularly for messages not automatically forwarded.

- **Waitlists**:
  - Students are not automatically notified if they are added to a class from a waitlist.
  - Students are not automatically dropped from a class if they never attended, stopped attending, or do not make tuition payments.
  - Waitlists are purged after the 1st week of classes, after which a paper Schedule Adjustment Form (SAF or drop/add form) is required. It is the student's responsibility to get the form (online or at the Advising Office, NC 4002), have it signed, deliver it to the Registrar (Annex 100) or the Student Services Center (NC 1003), and verify her/his schedule online.

- **Late adds** (after 5 February) 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 NC 4002. The signature of a faculty member on a SAF does not guarantee that a late add petition will be approved.

- **Late drops/withdrawals** (after 7 April) will be approved only when circumstances surrounding the late drop have arisen after the published drop deadline and are beyond the student’s control. This will require a written petition and verifiable documentation. The signature of a faculty member does not guarantee that a late drop/withdrawal petition will be approved.

- **Tuition**: Students are responsible for completing arrangements with financial aid, family, scholarships, etc. to pay their tuition prior to Census Date (5 February). 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 Spring 2014 must complete the online Graduation Application form, in the UCD Access Portal, and meet with their academic advisor to obtain a graduation application. This application must be submitted by Census Date (5 February). You can obtain an application only after meeting with your advisor. There are no exceptions to this policy.
  - Graduate students wishing to graduate in Spring semester 2014 must complete the online Graduation Application form, in the UCD Access Portal, and have a Request for Admissions to Candidacy on file with the CU Denver Graduate School (LSC 1251) no later than 5 PM, February 5, 1014.
Important Dates and Deadlines

- **January 20, 2014**: Martin Luther King Holiday. Last day to withdraw from all classes via UCDAccess and receive a refund of the $200 advance payment and all tuition.
- **January 21, 2014**: First day of classes.
- **January 26, 2014**: Last day to add or waitlist classes using UCDAccess. After this date, a Schedule Adjustment Form (SAF) is required to change, add, or drop.
- **January 27, 2014**: Last day to drop without a $100 drop charge. No adds permitted on this day.
- **January 28 – February 5, 2014**: 
  - UCDAccess registration is closed; registration now requires a SAF with faculty signature.
  - Verify your registration via UCDAccess. You are not registered for a course unless your name appears on the official roster; conversely, your name may have been added automatically from the waitlist without notification, which means that you will be held responsible.
- **February 5, 2014**: Census date.
  - 2/5/14, 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 does not apply to independent studies, internships, project hours, thesis hours, dissertation hours, and modular courses.
  - 2/5/14, 5 PM: Last day to drop a course or completely withdraw from Spring 2014 using a SAF and still receive tuition refund, minus the drop fee. After this date, tuition is forfeited and a "W" will appear on the transcript. This includes section changes. This is an absolute deadline.
  - 2/5/14, 5 PM: Last day to request Pass/Fail or No-Credit option for a course.
  - 2/5/14, 5 PM: Last day for a graduate student to register for a Candidate for Degree and last day for a Ph.D. student to petition for a reduction in hours.
  - 2/5/14, 5 PM: Last day to apply for Spring 2014 graduation. If an undergraduate, you must make an appointment and see your academic advisor to apply. If a graduate student, you must complete the Intent to Graduate and Candidate for Degree forms.
- **February 17-26, 2014**: Faculty can use the Early Alert system.
- **March 24-30, 2014**: Spring Break-(no classes; campus open).
- **April 7, 2014, 5 PM**: Last day for non-CLAS students to drop or withdraw without a petition and special approval from the academic dean. After this date, a dean’s signature is required.
- **April 22, 2014, 5 PM**: Last day for CLAS students to drop or withdraw with signatures from the faculty and dean but without a full petition. After this date, all schedule changes require a full petition. Petitions are available in NC 4002 for undergraduates and in the CU Denver Graduate School offices for graduate students.
- **May 12-17, 2014**: Finals Week. No schedule changes will be granted once finals week has started—there are no exceptions to this policy. Commencement is May 17.
- **May 22, 2014**: Due date for faculty submission of grades (tentative).
- **May 26, 2014**: Spring final grades available on UCD Access (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.