Course Description
Machine learning (ML) is a field of inquiry devoted to understanding and building methods that 'learn', that is, methods that leverage data to improve performance on some set of tasks. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so.

Learning Objectives and Outcomes
By the end of this course, students should be able to:
- Explain how data is converted to knowledge and insights
- Demonstrate good understanding of various statistical techniques applied to data
- Understand various analytics models
- Understand design challenges in incorporating analytics in information/decision systems

Prerequisite(s): none
Co-Requisite(s): none
Concurrent Enrollment: none
Recommended Preparation: none

Course Notes
Since the class is online, all lectures will be recorded and posted via Blackboard. All lecture slides will be separately posted to Blackboard.

Technological Proficiency and Hardware/Software Required

<table>
<thead>
<tr>
<th></th>
<th>Apple</th>
<th>Windows PC</th>
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<tbody>
<tr>
<td><strong>Laptop</strong></td>
<td>2.6 GHz dual-core Intel Core i5 or 2.0 GHz quad-core Intel Core i7</td>
<td>Intel Core i5 or Intel Core i7</td>
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<tr>
<td>(Minimum standards)</td>
<td>Minimum 13” display</td>
<td>Minimum 14” display</td>
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<tr>
<td></td>
<td>250 GB SSD or larger</td>
<td>250 GB SSD or larger</td>
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<tr>
<td></td>
<td>16 GB memory</td>
<td>16 GB memory</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>Manufacturer warranty or extended warranty coverage (Apple Care)</td>
<td>Manufacturer warranty or extended warranty coverage</td>
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</tbody>
</table>
Operating System
- Mac OS X 10.13 or higher
- Windows 7, 10 operating system or higher

Peripherals
- HD webcam, speakers and microphone (Most newer laptops have built-in webcam, speakers and microphone)
- Headset
- Digital camera (Cameras on newer smartphones are acceptable)
- External drive for cloud account for backup and storage

Software
- Adobe Creative Cloud (Photoshop, Illustrator, and InDesign)
- Adobe Acrobat Reader
- Microsoft Office Suite
- Sophos Endpoint Security (antivirus)
- Browser: Most recent version of Firefox, Chrome, Safari, or Internet Explorer

Network
- Cable modem, DSL, T1/T3 or higher

Required Reading:

Optional Reading:
Storytelling with Data: A Data Visualization Guide for Business Professionals, by Cole Nussbaumer Knaflic

Grading Breakdown

<table>
<thead>
<tr>
<th>Assignment</th>
<th>% of Grade</th>
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</thead>
<tbody>
<tr>
<td>Labs</td>
<td>30%</td>
</tr>
<tr>
<td>Assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Final Project</td>
<td>40%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Grading Scale
Course final grades will be determined using the following scale:
- A 95-100
- A- 90-94
- B+ 87-89
- B 83-86
- B- 80-82
- C+ 77-79
- C 73-76
- C- 70-72
- D+ 67-69
- D 63-66
- D- 60-62
- F 59 and below

Assignment Submission Policy
All labs, assignments, and final project are to be submitted via Blackboard.
**Late Submissions**
Assignments will be accepted after the deadline with the following grade penalties. Do not ask for extensions.

- Submission in the 24 hours after the deadline: 25% deduction
- Submission between 24 and 48 hours after the deadline: 50% deduction
- Submission more than 2 days after the deadline: 100% deduction

_Keep copies of all your files and emails until the end of the semester._

**Correcting a Grading Error or Disputing a Grade**
If you don’t inform the instructor of missing or incorrect grades within two weeks of those grades being posted, the grades will be assumed correct. Do not wait until the semester’s end to check or appeal any grades. If you feel a grade merits re-evaluation, you are encouraged, within one week of the instructor providing a grade and initial feedback, to send the instructor a memo in which you request reconsideration. The memo should include a thoughtful and professional explanation of your concerns. Be aware that the re-evaluation process can result in three types of grade adjustments: positive, none, or negative. (Note: Complaints on the date of a graded assignment’s return to you will not be addressed; it is essential to wait one full day prior to raising a concern.)

**Academy Attendance Policy**
The Academy maintains rigorous academic standards for its students and on-time attendance at all class meetings is expected. Each student will be allowed two excused absences over the course of the semester for which no explanation is required. Students are admonished to not waste excused absences on non-critical issues, and to use them carefully for illness or other issues that may arise unexpectedly. Except in the case of prolonged illness or other serious issue (see below), no additional absences will be excused. Each unexcused absence will result in the lowering of the final grade by ⅓ of a grade (e.g., an A will be lowered to A-, and A- will be lowered to a B+, etc.). In addition, being tardy to class will count as one-third of an absence. Three tardies will equal a full course absence.

Students remain responsible for any missed work from excused or unexcused absences. Immediately following an absence, students should contact the instructor to obtain missed assignments or lecture notes and to confirm new deadlines or due dates. Extensions or other accommodations are at the discretion of the instructor.

Automatically excused absences normally may not be used for quiz, exam or presentation days. Using an excused absence for a quiz, exam or presentation, such as in the case of sudden illness or other emergency, is at the discretion of the instructor.

In the case of prolonged illness, family emergencies, or other unforeseen serious issues, the student should contact the instructor to arrange for accommodation. Accommodation may also be made for essential professional or career-related events or opportunities. All accommodations remain at the discretion of the instructor, and appropriate documentation may be required.

**Class notes policy:** Notes or recordings made by students based on a university class or lecture may only be made for purposes of individual or group study, or for other non-commercial purposes that reasonably arise from the student’s membership in the class or attendance at the university. This restriction also applies to any information distributed, disseminated, or in any way displayed for use in relationship to the class, whether obtained in class, via e-mail or otherwise on the Internet, or via any other medium. Actions in violation of this policy constitute a violation of the Student Conduct Code, and may subject an individual or
entity to university discipline and/or legal proceedings. Again, it is a violation of USC’s Academic Integrity Policies to share course materials with others without permission from the instructor.

**No recording and copyright notice:** No student may record any lecture, class discussion or meeting with the instructor without his/her prior express written permission. The word “record” or the act of recording includes, but is not limited to, any and all means by which sound or visual images can be stored, duplicated, or retransmitted whether by an electro-mechanical, analog, digital, wire, electronic or other device or any other means of signal encoding. The instructor reserves all rights, including copyright, to his/her lectures, course syllabi and related materials, including summaries, slides (e.g., Keynote, PowerPoint), prior exams, answer keys, and all supplementary course materials available to the students enrolled in the class whether posted to the LMS or otherwise. They may not be reproduced, distributed, copied, or disseminated in any media or in any form, including but not limited to all course note-sharing websites. Exceptions are made for students who have made prior arrangements with The USC Office of Disability Services and Programs and the instructor.

**Participation:** Students are expected to actively participate in this course. In an online forum, participation includes:

- Careful reading and viewing of assigned materials by the date due
- Regular, substantive contributions to discussions
- Active engagement with online content
- On-time attendance and full attention in synchronous sessions
- Significant collaboration with classmates and teammates
## Course Schedule: A Weekly Breakdown

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics/Daily Activities</th>
<th>Readings and Homework</th>
<th>Deliverable/ Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Analytics Methods and Models; Introduction to RapidMiner</td>
<td>Camm et al., Chapter 1</td>
<td>Lab 1</td>
</tr>
<tr>
<td>2</td>
<td>Descriptive Statistics</td>
<td>Camm et al., Chapter 2</td>
<td>Lab 2; Assignment 1</td>
</tr>
<tr>
<td>3</td>
<td>Data Visualization I</td>
<td>Knaflc, Chapters 1 - 2</td>
<td>Lab 3</td>
</tr>
<tr>
<td>4</td>
<td>Linear Regression</td>
<td>Camm et al., Chapter 4</td>
<td>Lab 4; Assignment 2</td>
</tr>
<tr>
<td>5</td>
<td>Time Series Analysis and Forecasting</td>
<td>Camm et al., Chapter 5</td>
<td>Lab 5</td>
</tr>
<tr>
<td>6</td>
<td>Data Mining</td>
<td>Camm et al., Chapter 6</td>
<td>Lab 6; Assignment 3</td>
</tr>
<tr>
<td>7</td>
<td>Linear Optimization Models</td>
<td>Camm et al., Chapter 8</td>
<td>Lab 7</td>
</tr>
<tr>
<td>8</td>
<td>Integer Linear Optimization Models</td>
<td>Camm et al., Chapter 9</td>
<td>Lab 8; Assignment 4</td>
</tr>
<tr>
<td>9</td>
<td>Nonlinear Optimization Models</td>
<td>Camm et al., Chapter 10</td>
<td>Final Project Part1</td>
</tr>
<tr>
<td>10</td>
<td>Monte Carlo Simulation</td>
<td>Camm et al., Chapter 11</td>
<td>Final Project Part2</td>
</tr>
<tr>
<td>11</td>
<td>Decision Analysis</td>
<td>Camm et al., Chapter 12</td>
<td>Final Project Part2</td>
</tr>
<tr>
<td>12</td>
<td>Data Visualization II</td>
<td>Knaflc, Chapters 3 - 4</td>
<td>Final Project Part 3</td>
</tr>
<tr>
<td>13</td>
<td>Data Visualization III</td>
<td>Knaflc, Chapters 5 - 6</td>
<td>Final Project Part 3</td>
</tr>
<tr>
<td>14</td>
<td>Data Visualization IV</td>
<td>Knaflc, Chapters 7 - 9</td>
<td>Final Project Part 3</td>
</tr>
<tr>
<td>15</td>
<td>Final Project Presentations</td>
<td></td>
<td>Final Project Presentations</td>
</tr>
</tbody>
</table>
Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call engemannshc.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP)
-213-740-9355 (WELL)
https://studenthealth.usc.edu/sexual-assault/
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Relationship and Sexual Violence Prevention and Services provides immediate therapy services for situations related to gender- and power-based harm (e.g., sexual assault, domestic violence, stalking). (wording from the site)

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

USC Policy Reporting to Title IX (213) 740-5086
https://policy.usc.edu/reporting-to-title-ix-student-misconduct/
The university encourages individuals to report prohibited conduct to the Title IX Office. Individuals can report to the university Title IX Coordinator in the Office of Equity and Diversity.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.
The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost’s Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.