BMIS 326: Introduction to Data Analytics  
Fall Semester 2014

This course introduces the terminology and application of big data and data analytics. Students will complete cases in a variety of disciplines as they become acquainted with some of the software, tools, and techniques of data analytics, including introductions to Python, R, MapReduce, Hadoop, Big Insights, Cognos, and Tableau. Prerequisite: Students must have successfully completed a college-level statistics course prior to taking this class.

Professor: Belva Jones  
E-mail: belva.jones@umontana.edu  
Office: GBB 307  
Office Phone: 243-5155  
Office Hours: 9:30—11:00 MW or by appointment (Please e-mail times you are available.)


Learning Goals:
1. Understand the terminology used in the Big Data field of study.
2. Explore the applications of Big Data in a variety of disciplines.
3. Use, at an introductory level, data analytics tools.
4. Explain the story told by the output of the data analyses.
5. Discuss the issues of privacy and ethics raised by the use of Big Data tools.

Learning Outcomes:
1. Students will be able to answer multiple choice and essay questions about Big Data terminology, Big Data Applications, and privacy/ethics issues of Big Data.
2. Students will complete an on-line tutorial in Python.
3. Students will complete apply tools such as Python, R, Hadoop, MapReduce, Big Insights, Cognos, and Tableau at an introductory level.
4. Targeting audiences in the areas of application, students will write explanations of the findings of the analyses. They will tell the story of their conclusions.

Grading:
Exams (3 @ 100 points each) 300 points
Homework 200 points

If you must miss an exam because of illness, be prepared to document your absence with a doctor's note in order to take a makeup exam. Any other reason for missing the exam must be cleared with the professor well in advance of the test. Any cheating on a test (e.g., opening any file or application other than your own test file, looking at someone else's monitor, etc.) may result in a failing grade for the course and further disciplinary action by the university.

E-mail:
Please use your university account when sending me official e-mails. Be sure to use a professional writing style, checking for misspellings, grammatical errors, and appropriate tone.
Professionalism in the classroom:
Out of consideration for your classmates, please arrive on time and turn off your cell phone. If you must leave early, please let me know at the beginning of class, and sit near the door. Please do not bring beverages into the classroom because of the risk of spilling liquids on or around the computers. Please do not surf the Internet, read e-mails, or play computer games during class, as these activities distract the people around you.

Tentative Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Chapter/Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Big Data</td>
</tr>
<tr>
<td>2</td>
<td>Python</td>
</tr>
<tr>
<td>3</td>
<td>Applications of Big Data Techniques</td>
</tr>
<tr>
<td>4</td>
<td>Exploratory Data Analysis</td>
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<tr>
<td>5</td>
<td>Predictive Analytics with SPSS</td>
</tr>
<tr>
<td>6</td>
<td>Visualization with Tableau or Cognos</td>
</tr>
<tr>
<td>7</td>
<td>Continue with Tableau / Cognos</td>
</tr>
<tr>
<td>8</td>
<td>Introduction to R</td>
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<tr>
<td>9</td>
<td>Continue with R</td>
</tr>
<tr>
<td>10</td>
<td>Big Data Computing Platforms</td>
</tr>
<tr>
<td>11</td>
<td>The Role of Map Reduce</td>
</tr>
<tr>
<td>12</td>
<td>Introduction to Hadoop / Big Insights</td>
</tr>
<tr>
<td>13</td>
<td>Continue Hadoop</td>
</tr>
<tr>
<td>14</td>
<td>The People Part of Big Data</td>
</tr>
<tr>
<td>15</td>
<td>Privacy and Ethics</td>
</tr>
</tbody>
</table>

SoBA Mission Statement:
The University of Montana’s School of Business Administration is a collegial learning community dedicated to the teaching, exploration, and application of the knowledge and skills necessary to succeed in a competitive marketplace.

Disability Accommodations:
The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide an appropriate accommodation.

Academic Honesty and Integrity (UM official statement):
All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the university. All students must be familiar with the Student Conduct Code. The code is available for review online at http://www.umt.edu/SA/VPISA/index.cfm/page/1321
BMIS 482: Big Data Project  
Spring Semester 2015

Students will work in cross-disciplinary teams to complete big data projects from several different disciplines. Lectures will provide background on appropriate methods where needed. In addition to big data topics, students will explore the topic of agile project management.

Prerequisites: BMIS 326 and two of the following: CSCI 444, CSCI 447, CSCI 448, MIS 465 or M 491 (Introduction to Real-Time Data Analytics), M 491 (Big Data Analytics and Near Real-Time Computation Algorithms), and BMKT 491 (Marketing Analytics).

Professor: Team taught by professors defining the projects, a computer science professor, a statistics professor, and a business professor.

Learning Goals:
1. Work in teams to solve actual big data projects.
2. Achieve depth in appropriate data analysis techniques.
3. Develop experience in using visualization tools.
4. Explore and use agile project management tools.

Learning Outcomes:
1. Students will be graded on the quality of the deliverables created as part of project management.
2. Students will complete a working project, answering the relevant questions posed at the beginning of the project.
3. Students will effectively explain the results and conclusions of the project in the context of the project’s discipline.

Grading:
- Deliverables: 40%
- Project: 50%
- Presentation: 10%

Graduate Increment: A 10-12 page term paper addressing a current big data issue is required. The paper will be of publishable quality, including an introduction, literature review, presentation of the issue, discussion of the significance of the analysis to the relevant discipline, a conclusion, and references to literature cited.

E-mail:
Please use your university account when sending me official e-mails. Be sure to use a professional writing style, checking for misspellings, grammatical errors, and appropriate tone.

Professionalism in the classroom:
Out of consideration for your classmates, please arrive on time and turn off your cell phone. If you must leave early, please let me know at the beginning of class, and sit near the door. Please do not bring beverages into the classroom because of the risk of spilling liquids on or around the computers. Please do not surf the Internet, read e-mails, or play computer games during class, as these activities distract the people around you.
**Disability Accommodations:**
The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide an appropriate accommodation.

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CSCI 444, Data Visualization

Meeting time: MWF 15:10-16:00
Location: Gallagher Business Building L04
Final Exam: 13:10-15:10 Monday, December 9

Prerequisites

- Ability to competently program in a language of your choice as demonstrated by successful completion of CS Structures
- Evidence of mathematical maturity as shown by successful completion of Calculus and/or Statistics
- Maturity enough to show up for class, consistently
- Maturity enough to respect and offer constructive criticism to your peers.

Course Objectives

This course emphasizes the practice of data visualization, compelling students to identify and become proficient tools allowing them to visualize a range of data types. Hence, a majority of the time is spent in the creation of new visuals. To guide the process, we will consider a set of visualizations that represent best practices, as well as those that represent worst practices. Moreover, students should acquire a sophisticated framework for assessing the quality of visualizations, the technical skills required to produce visualizations, and an understanding of the mathematical challenges that underlie many data visualization activities.
of visualizations, the technical skills required to produce visualizations, and an understanding of the mathematic challenges that underly many data visualization activities.

After taking this course, students will be able to:

- quickly adapt to any quantitative visualization environment,
- write short, modular programs of moderate complexity to visualize quantitative data,
- apply numerical methods to make data more accessible,
- critique visualization using a set of standards focus on the accurate display of quantitative information.

Course Logistics

The course is project driven. All projects share the same approach, but differ in data sets and types of data used. The approach is as follows:

1. Form a hypothesis from the data. State the hypothesis as clearly as possible.
2. Identify two visuals on the Internet, in books, magazines, or other media. One should be a good example of a hypothesis can be supported with similar data (e.g. a time series plot that is conclusive, and especially well-drawn). The other visual should be a uniquely bad visual that uses similar data, but is difficult or impossible to draw conclusions from. In a sentence: one visual for how to do it, and one for how not to do it. Obtain electronic copies of the visuals and submit them with the assignment.
3. Write one half to one page about the visuals you found, where you found them, and why you believe they are consistent with lecture material and appropriate to your objectives.
4. Produce three visuals of your own, from the data, that support your hypothesis.
5. Write one half to one page detailing how your visuals are consistent with the examples, support the hypothesis, and are consistent with the material covered in lecture.
6. Produce one visual that refutes your hypothesis and provide a paragraph explaining why. Summarize your findings in a few overhead slides and be prepared to defend them to the class.

Given the larger enrollment this semester, we will have to come up with a randomized method of determining...
6. Present your data and refute your hypotheses and provide a paragraph explaining why. Summarize your findings in a few overhead slides and be prepared to defend them to the class.

Given the larger enrollment this semester, we will have to come up with a randomized method of determining which presents each project, otherwise too much time would be spent in presentations. Everyone will be prepared to present but only some of you will.

To help differentiate between good and bad visuals, we will be studying the opinions of Edward Tufte. His books are very accessible to all, and feature a large number of engaging graphics. Those graphics will be displayed on the projector, and we will discuss them in class.

I place no restrictions on the languages/tools used for visualization of data. You may use whatever gets the job done. However, I personally use Python, and might offer you more insightful advice should you need it, if you use Python. Some of the assignments require the use of Python, at least in the sense that you have to interface your visualization tools to a Python package.

Course Topics

Week 1: 26-29 August
- Introduction to class
- Graphical Excellence
- Bivariate plots

Tufte: Chapter One Lectures, Part I 36.3 MB

Project 1: Bureau of Labor Statistics

Week 2: 4-6 September
- Graphical Excellence
- Bivariate plots
Week 2: 4-6 September

- Graphical Excellence
- Plotting bivariate data
- Fitting data

Tufte: Chapter One Lecture, Part II 2.5MB

Week 3: 9-13 September

- Present project 1
- Raster data

I'll be speaking at this conference, and not teaching. A substitute will be arranged.

Project 2: Raster Data

Week 4: 16-20 September

- Contouring of data

Week 5: 23-27 September

- Sources of Graphical Integrity and Sophistication

Tufte: Chapter 2 Lecture 2.7MB
Week 5: 23-27 September
- Sources of Graphical Integrity and Sophistication
- Data-Ink and Graphical Redesign
- Geographical coordinate systems
- Project 2 presentations

Week 6: 30 September - 4 October
- Chartjunk: Vibrations, Grids, and Ducks
  Tufte, Chapter 3 Lecture633.5KB
- Project 3: Geographical Coordinate Systems

Week 7: 7-11 October
- Chartjunk: Vibrations, Grids, and Ducks
- Data-Ink Maximization and Graphical Designs

Week 8: 14-18 October
- Multifunctioning Graphical Elements
- Fast Fourier Transform
- Project 3 presentations
- Final Project: Identification of data sets

Project 4: Fast Fourier Transform of Music
Project 4: Fast Fourier Transform of Music

Week 9: 21-25 October
- Data Density and Small Multiples
- Project 4 presentations

Week 10: 28 October - 1 November
- Aesthetics and Technique in Data Graphical Design
- log-log plots
- Project 4 presentations

Project 5: Networks

Week 11: November 4-10
Buffer week to catch up on lecture topics and student presentations.

Week 12: 11-15 November
- Project 5 Presentations
- Open GL

Project 6: Simulation output and Open GL

Week 13: 18-22 November
Week 13: 18-22 November
- The Cognitive Style of Power Point

8/23/13

CSCM44.01-74887-Fall2013: Syllabus

- Unstructured meshes and some examples of visualization in my work.

Week 14: 25 November

- Project 6 Presentations
  - Thanksgiving Break

Week 15: 2-6 December

- Highlights from Beautiful Evidence
- Final Project Presentations

Finals Week: 9-13 December

Finals week. Final exam meeting time Monday, December 9 13:10-15:10. I will be gone, so this will be the due of the final project.

Course Materials

We will use the following text:
Course Materials

We will use the following text:

- Hardcover: 200 pages
- Publisher: Graphics Pr; 2nd edition (May 2001)
- Language: English
- ISBN-10: 0961392142
- **Publisher:** Graphics Pr; 2nd edition (May 2001)
- **Language:** English
- **ISBN-10:** 0961392142
- **ISBN-13:** 978-0961392147
- **Product Dimensions:** 9 x 11 inches

At $26, this might be the best book you purchase for college.

**Grading**

**Grading Breakdown**

Grades of A-F will be assigned based on a percentage of the total possible points earned. The break points are as follows.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>94-100</td>
</tr>
<tr>
<td>A-</td>
<td>90-93</td>
</tr>
<tr>
<td>B+</td>
<td>87-89</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
</tr>
<tr>
<td>C+</td>
<td>77-79</td>
</tr>
<tr>
<td>C</td>
<td>73-76</td>
</tr>
<tr>
<td>C-</td>
<td>70-82</td>
</tr>
</tbody>
</table>
I reserve the right to make changes to the grade breakdown that will be favorable to students grades.

Assessment

Grades will be based on the following forms of evaluation.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description of Component</th>
<th>Per of (</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects</td>
<td>I will try to prepare six of these. If we run short of time, maybe five. Each one will feature a new data set. The requirements for each are described above, under 'course logistics'. The data sets will steadily increase in complexity, dimension, and interrelationships.</td>
<td>60%</td>
</tr>
<tr>
<td>Final</td>
<td>This is a visualization of your own choosing. You will find your own data and visualize it in whatever manner you like. The evaluation technique is the same.</td>
<td>30%</td>
</tr>
</tbody>
</table>

Engagement  
This is a combination of attendance and contribution to classroom sessions. Come to class prepared to discuss the Tufted, or the projects. Be alert, and an active participant in the classes activities. Listen attentively and ask a lot of questions.  

8/23/13
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Pass Fail

Students taking the course pass/no pass are required to earn a grade of D or better in order to pass.

Attendance Policy

The learner centered design of the course will make attendance neccessary. If you know in advance that you will miss class, I encourage you to come speak to me. Acknowledging that everyone misses class occasionally, the in class assignments and two attendance grades will be discarded before grades are computed.

Late Assignments

Other than in in exceptional circumstances, such as family emergencies, late work will not be accepted. If you can emergency that causes you to miss an important classroom activity, please let me know in advance and I will very accomodating.

Academic Integrity

As a student of the University of Montana, you are responsible for upholding all rules in the student conduct code. There are aspects of that code that are of particular importance in Computer Science courses. The electronic nature of many assignments facilitates their dissemination. To be clear, from the student conduct code:

1. Plagiarism: Representing another person's words, ideas, data, or materials as one's own.

6. Submitting work previously presented in another course: Knowingly making such submission in violation of course requirements.

Of course, all other aspects of the student conduct code will be enforced as well. These are just the two that are commonly violated.
I will interpret these guidelines to the letter. Students found in violation will be penalized with the maximum punishment permitted in the student conduct code. That is to say, the matter will be handed over to the Academic Dean and academic misconduct proceedings will take place.

In order to reconcile encouraged interaction between students and the academic misconduct policies, you must other students in your work. If, for example, you worked with others to develop some algorithm, or solve some homework problem, specifically mention those that you have worked with in the assignment that is handed in. Similarly, you must properly document and credit any online resources that you use.

If you collaborate with others, the instructor has the right to question you about the material turned in. If it is evident that your understanding of what you turn in is weak, your grade will be lowered.

Students are to uphold a level of conduct becoming of adults. The use of abusive or demeaning speech is not permitted under the student conduct code, and will not be tolerated in this course.

Disabilities
Students with disabilities are encouraged to meet with me to discuss any accommodations they require.

Other Issues
Turn off your cellphone, or set it to vibrate in class. Take the call outside the classroom.

Do not talk in the classroom during lecture. Take it outside.
You are logged in as Jesse Johnson (Logout)
Course: Machine Learning

**Course Title:** Machine Learning: CSC 447

**Time:** 2:40 to 5:55 Tuesday and Thursday

**Room:** 55-302

**Instructor:** Dr. Douglas L. Ratcliff

**Office:** Social Sciences 221

**Phone:** 406-244-4600

**E-mail:** Dlratcliff@dce.net

**Office Hours:** 2:00 to 4:00 Tuesday and Thursday

**Instructor's Website:** http://www.cs.uc.edu/~dlratcliff

**Course Website:** https://www.cs.uc.edu/~dlratcliff/nonforms/832/833/834/835/836/837

**Textbook:**

**ISBN:** 020148987

**Publisher:** McGraw-Hill

**Language:** English

**Edition:** 1988-1989

**Price:** $25.00

**Grading:**

- Projects: 20%
- Quizzes: 30%
- Final Exam: 50%

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**Grading:**

Chiefs in academic activities are important at the University of Montana. It is our goal to graduate students who are responsible, hardworking, dependable, and who exhibit integrity and independence of thought.

The assignments and exams given in this course are designed to reinforce your understanding of the topics covered in class. As such, the work you turn in should be your own, and no one's else.

A variety of teaching methods will be considered to be the result of copying. If you collaborate with another person for a grade assignment or quiz, you are responsible for the material you submit. If you are not familiar with the material, ask for help in class or visit the Learning Center.

The fundamental policies of the University of Montana will apply to this course. The university is committed to providing a quality education for all students. It is the responsibility of students with disabilities to contact the Disability Services Program for Students (DPS) to make accommodations. Please contact Jim Marko in the Department of Disability Services. For more information, visit the Disability Services Program for Students (DPS) website.

**Academic Dishonesty and the Honor Code:**

The Department of Computer Science is committed to ensuring opportunities in education for all students. It is the responsibility of students to submit their own work on tests and assignments. University policy states that students who submit work that is not their own will receive a failing grade in the course. Students who violate the honor code will be referred to the Dean of Students for further action.

**Accommodations:**

The Department of Computer Science is committed to providing equal opportunities in education for all students. It is the responsibility of students with disabilities to contact the Disability Services Program for Students (DPS) to make accommodations. Please contact Jim Marko in the Department of Disability Services. For more information, visit the Disability Services Program for Students (DPS) website.

**Religious Observance:**

Pregnancy or parental leave situations may be accommodated on a case-by-case basis. If a student is unable to attend class due to illness, the instructor should be notified as soon as possible. In cases of illness, students are encouraged to contact the instructor to make arrangements to catch up on missed work. The instructor will work with each student to ensure that all deadlines are met.

**Pacemaker Assistance for Students with Disabilities:**

Students participating in an off-campus educational experience are encouraged to notify their instructors of any medical conditions or disabilities that may affect their ability to make up course assignments, as they may affect the student's performance. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other graded assignment to make up the work.
Course: Machine Learning CSCI 448

Spring 2013

Pattern Recognition

Dr. Douglas M. Weld
Office: Social Science 412
Phone: 434-295-9015
Email: weld@virginia.edu

Textbook:

Publisher: Academic Press, 9th edition (March 10, 2005)
Language: English

Syllabus for Pattern Recognition

Objectives

1. Introduction to pattern recognition
2. Overview of supervised vs. unsupervised learning techniques
3. Discriminant analysis (Bayes, maximum likelihood, etc.)
4. Nonparametric methods (nearest neighbor, k-nearest neighbor)
5. Neural networks (perceptrons, backpropagation)
6. Support vector machines (SVMs)
7. Clustering algorithms (K-means, hierarchical, etc.)
8. Markov models (HMMs, hidden Markov models)
9. Bayesian networks (Bayesian inference, decision trees)
10. Decision trees (ID3, C4.5, etc.)

Prerequisites

Laser or senior status

Grading

Exam 1: 15% of final grade
Exam 2: 15% of final grade
Midterm: 15% of final grade
Final Exam: 20% of final grade
Project: 20% of final grade

Textbook:

Publisher: Academic Press, 9th edition (March 10, 2005)
Language: English

Policies

Late assignments will receive a penalty of 50% per day late.

The following are the policies for this course:

- Late assignments will receive a penalty of 50% per day late.
- Collaboration on homework assignments is encouraged, but all work must be done individually.
- Cheating or plagiarism will result in a failing grade.
- There will be a final exam at the end of the semester.

Academic Dishonesty

Plagiarism is a serious violation of the Student Conduct Code. Any student caught plagiarizing will receive a failing grade.

Religious Observations

Students are encouraged to observe their religious beliefs and traditions, including days of observance, religious holidays, and other important religious activities.

Academic Dishonesty and the Honor Code

Cheating, plagiarism, and other forms of academic dishonesty are strictly prohibited. Any violation of these rules will result in disciplinary action.
Course Information

Course Title: Introduction to Real-Time Data Analytics
Level: 1
Credit: 3

Common Course Numbering Review

Does an equivalent course exist elsewhere in the MUS.CSR Course Data? Check all relevant boxes if course is equivalent. Yes No

Co-registered courses

Is this a common core course? Yes No

Course Fees

Endorsements/Approvals

Department: Finance

First Name: John
Last Name: Jones
Assessor: Beta Jones
Approve Date: 01/01/2023 2:17:06 PM

College: Business

Chair: Tom Hanson
E-mail: thanson@bemontana.edu by fax, Campus on 01/01/2023
Current: 2/10/2023 5:00 AM
E-mail notification to Terri lehman@bemontana.edu by fax, Campus on 01/01/2023

Other affected programs

Does this project affect other department/programs because of:

- related course inclusion in pre-requisites or co-requisites?
- sequential overlap in current sequence?
- non-redundant course offering?

Program office training major or minor (check Professional Education Required)

Fax, e-mail, and enter all required departmental signatures in the next section.

Department: Finance

First Name: John
Last Name: Jones
Approve Date: 01/01/2023 2:17:06 PM

College: Business

Chair: Tom Hanson
E-mail: thanson@bemontana.edu by fax, Campus on 01/01/2023
Current: 2/10/2023 5:00 AM
E-mail notification to Terri lehman@bemontana.edu by fax, Campus on 01/01/2023

Subcommittee(s)

E-mail: thanson@bemontana.edu

First Name: John
Last Name: Jones
Approve Date: 01/01/2023 2:17:06 PM

ABECE

E-mail: thanson@bemontana.edu

First Name: John
Last Name: Jones
Approve Date: 01/01/2023 2:17:06 PM

Grad Council

E-mail: thanson@bemontana.edu

First Name: John
Last Name: Jones
Approve Date: 01/01/2023 2:17:06 PM
School of Business Administration

BMIS/M 491-01
Real-Time Data Analytics
Fall 2013

Course Information

Time: Th 2:10 – 5pm
Venue: Gallagher Business Building 205/206 (lab)

Professor Information

Professor: Eric Tangedahl
E-Mail: eric.tangedahl@business.umt.edu
Phone: (406) 243-6620
Office: GBB370
Office Hours: Wednesday 2-4pm or by Appt.

Professor: Brian Steele
E-Mail: brian.steele@umontana.edu
Phone: (406) 243-5396
Office: Math 314
Office Hours: MWF 1:30-3pm or by Appt.

School of Business Administration Mission Statement

The University of Montana’s School of Business Administration is a collegial learning community dedicated to the teaching, exploration, and application of the knowledge and skills necessary to succeed in a competitive marketplace.

School of Business Administration Assessment and Assurance of Learning

As part of our assessment process and assurance-of-learning standards, the School of Business Administration (SoBA) has adopted five learning goals for our undergraduate students:

- **Learning Goal 1** SoBA graduates will possess fundamental business knowledge.
- **Learning Goal 2** SoBA graduates will be able to integrate business knowledge.
- **Learning Goal 3** SoBA graduates will be effective communicators.
- **Learning Goal 4** SoBA graduates will possess problem solving skills.
- **Learning Goal 5** SoBA graduates will have an ethical awareness.
- **Learning Goal 6** SoBA graduates will be proficient users of technological skills.
- **Learning Goal 7** SoBA graduates will understand the global business environment in which they operate.
Course Learning Outcomes

- Students will exhibit their ability to code in Infosphere streams and show their understanding of statistical techniques by turning in weekly homework assignments.
- Fundamental knowledge of Infosphere Streams operators and functionality as well as statistical methods will be assessed using two mid-term exams.
- Final projects will bring the knowledge of real-time analytics, statistics and Infosphere streams together to show how decisions can be made with the large datasets to derive relevant information and put that in the hands of managers. Projects will include a written paper along with an oral presentation.

Prerequisites

BMIS 365 – Business Application Development or equivalent.
STAT216 – Introduction to Statistics
BMIS370 – Managing Information and Data

Course Description

Real-Time Data Analytics looks at a portion of Big Data that deals with streaming data. Basic concepts of Big Data, statistics, streams programming, cloud computing and parallel computing will be introduced. In this course we will look at applications of streaming data as they relate to such topics as cyber security, finance, social media and others. You will be working with IBM Infosphere Streams to analyze data and understand the process of working with Big Data to obtain relevant informative information. This class is multi-disciplinary and designed to have skillsets from Management Information Systems, Computer Science and Math. The intention is to allow students to work with these disciplines to simulate the problem solving environment one would see in the work place. The course is co-taught by a Math and MIS professor and you are expected to have aptitude in computer programming, statistics and database management systems to be successful in the course. This class will look at exciting and complex problems that have only recently had solutions due to computing advances and data analytics techniques.

Required Materials

Class Materials
No textbook is required for this course. Lectures and lab exercise materials will be in the form of PDF on Moodle.

**Moodle**

The professor will make extensive use of the Moodle system, which can be located at https://moodle.unr.edu/. Course materials (announcements, course schedule, handouts, assignments, grades, etc.) will be posted on Moodle.

**Computing Resources**

Students must have access to the following computing resource:

- We will be in the GBB206 computer lab. The Linux image for this class is currently only available on your assigned hard drive for this class. Use class time wisely as this is your best opportunity to have access to this computer lab.

**Course Grading**

Student performance will be measured along three (3) distinct achievement criteria, broken down as follows:

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Midterm Exams</td>
<td>200</td>
</tr>
<tr>
<td>Final Project</td>
<td>100</td>
</tr>
<tr>
<td>Homework and Tutorials</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>400</strong></td>
</tr>
</tbody>
</table>

*Subject to change, current document will be posted on Moodle.*

**Class Attendance**

Class attendance is extremely important to succeed in this course. With only one class per week, we have a total of only 15 classes for you to attend. Access to this specific lab image will be more difficult outside classroom hours. While attendance every class period is not mandatory, it will be critical to your success in working with a new technology and new programming language. If you are going to miss an exam you will need to notify me at least one week prior. If missing the exam was due to an emergency please provide documentation which verifies this emergency. (E.g. a doctor’s note)

**Seating**

The computer you are sitting at the first day of class will be your location for the semester. You will be responsible for the hard drive, which is to be removed after each class and placed in the cabinet in the back of the room. Maintain a clean workspace as this is a shared lab.
Use of Personal Electronic Devices

The use of personal electronic devices such as cell phones, tablets (Kindles, iPads, etc.) and iPods is prohibited during class. **Turn off all personal electronic devices prior to entering the classroom.** Use of a personal electronic device during an exam or quiz will result in immediate removal from the course.

Electronic Mail Policy

Faculty may only communicate with students regarding academic issues via official UM electronic mail (e-mail) accounts. Accordingly, students must correspond with their professors using authorized UM accounts (e.g., umontana.edu, umconnect.edu). E-mail received from non-UM accounts may be flagged as spam and deleted without further response. Due to security issues, confidential information (including grades and course performance) will not be discussed via e-mail.

The professor will try to be extraordinarily timely when responding to e-mail messages. If you send an e-mail during the week, you will almost always receive a response within one business day. However, your messages should be well written and grammatically correct. Furthermore, your messages should begin with a proper salutation and end with a thank you. Be sure to include your full name and section number when communicating with the professor via e-mail.

Written communication skills are extremely important to succeed in business. Therefore, students should be aware that the professors will reject e-mails that do not comply with the above specifications. In particular, the professors will not respond to your inquiry directly, but rather advise you to reformat and resubmit the correspondence. As a result, sending unacceptable e-mails will impair your ability to receive a timely response.

NetID Password

All students must change their NetID passwords at least once every 365 days. Otherwise, passwords expire for security purposes. If your password expires, you will be unable to access the course materials posted on Moodle. Therefore, students are encouraged to change their passwords at the beginning of the semester to avoid any potential logon issues. Students can change their passwords online at [http://onestop.umt.edu](http://onestop.umt.edu). To maximize security, students are encouraged to create complex passwords including a combination of alpha, numeric, and symbolic characters (minimum of six characters).

Students with Disabilities

Students with disabilities may request reasonable modifications by contacting the professor. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). “Reasonable” means the University permits no fundamental alterations of academic standards or retroactive modifications. For other options, please refer to [http://www.umt.edu/disability](http://www.umt.edu/disability).

University Student Conduct Code

The professor, school, and University rely upon and cherish a community of trust. The professors firmly endorse, uphold, and embrace the University’s Students Conduct Code. Even one misconduct infraction can destroy an exemplary reputation that has taken years to build. Acting in a manner consistent with the
University's policies will benefit every member of the community, not only while attending the University, but also in your future business endeavors.

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the professors and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://life.unt.edu/VPSA/name/StudentConductCode.

Course Schedule

Due to the nature of this course and this being the first time it is offered the schedule will change often. Any updates to the schedule will be provided on Moodle.
Course Format: One meeting per week: 2:10-3:30 PM.

Course Objectives: Learn practical methods for the analysis of big data. Gain experience in applying these methods.

Course Content: The content consists of data analysis and computer programming methods for analyzing massive data sets, using methods for the analysis of streaming data, an introduction to predictive analytics, and an introduction to data visualization methods.

Principal Topics:
1. Reduction of massive data sets using Python.
2. Visual and quantitative analysis of reduced sets using R.
3. Analysis of streaming data using Python.
4. Introduction to Hadoop map/reduce.
5. Introduction to predictive analytics.

Learning Outcomes: Upon completion of this course, the student will be able to:
1. apply the statistical and computational principles supporting big data analytics,
2. write computer programs for the reduction of massive data sets,
3. conduct visual and quantitative analysis of data sets obtained by reducing massive data sets,
4. analyze streaming data in real time,
5. understand predictive analytics and be able to apply predictive analytics to real-world problems.

Prerequisites:
1. Two mathematics classes at the 200 level or above.
2. A course in probability or statistics at the 300 level or above.
M 462: Theoretical Basics of Big Data Analytics and
Real Time Computation Algorithms

Syllabus

Course Format: 3 lectures; one meeting per week; 2:10 PM-5:00 PM.

Course Objectives: The main goal of this course is to provide students with a unique opportunity to acquire conceptual knowledge and theoretical background behind mathematical tools applicable to Big Data Analytics and Real Time Computations.

Course Content: The course will review specific challenges of Big Data Analytics, such as problems of extracting, unifying, updating, and merging information, and specific needs in processing data, which could be highly parallel and distributed. A number of mathematical tools for Big Data analytics, such as regression analysis, linear estimation, calibration problems, real time processing of incoming (potentially infinite) data, will be studied in more detail. It will be shown how these approaches can be transformed to conform to the Big Data demands. It will be discussed why most of the widely used algorithmic languages are not quite appropriate for solving Big Data problems and alternative approaches will be outlined.

Practical Topics:
1. The notion of canonical information: basic properties, extraction of canonical information from raw data and manipulations with canonical information.
2. Linear experiment and optimal estimation problem; canonical information for linear experiments; optimal estimation with prior information.
3. Manipulating information in different forms: raw vs. explicit vs. canonical; transforming one form into another.
5. Calibration problem; canonical calibration information.
6. Real-time signal processing with finite and infinite field of view.
7. Time-series processing; balancing estimation accuracy, delay and computational demands.
8. Image processing with infinite field of view, parallel processing of signals and images.

Learning Outcomes: Upon completion of this course the students will be able to:
- understand theoretical concepts lying at the core of Big Data Analytics algorithms;
- apply theoretical concepts they learned in class to solving practical Big Data problems;
- use elementary programming tools for practical implementations of theoretical ideas related to solving solutions of Big Data problems.

Prerequisites: M221 Introduction to Linear Algebra and two other MATH/STAT classes at 200-level or above, or consent of instructor.
Marketing Analytics 491  
MW 12:40-2pm  
GBB 11  
Instructor: Mario Schulzke

Twitter: @themarioblog  
Email: mario.schulzke@umontana.edu  
Office Hours: By appointment, email me  
Office: 327 Brantly Hall

Learning Outcomes  
• Understand the importance of adding value and measuring data in marketing  
• Be able to use research and data to create compelling content  
• Can work in a non-structured professional environment  
• Learn and be able to use Google Analytics, social analytics and heat mapping tools  
• Become a better writer, marketer and bring an actual idea to life

Reading  
The Lean Startup by Eric Ries. You can get it on Amazon.

Grade Composition  
- 45% blog posts (15% per post)  
- 30% class and online participation  
- 25% book report

Extra credit available, through April 31. Pitch the class of what you’d contribute to get extra credit.

Structure  
• I will mostly lecture in the first month. During that time you will also read the book.  
• I will post weekly reading assignments in our online group. You need to discuss and participate before the next class period, as well as in class. Come prepared.  
• You will write a 2,000-word book report on how you think the Lean Startup philosophy might apply to marketing today. Also, share what you learned in your reading and whether you think it’s a worthwhile read. Don’t make stupid spelling or grammar mistakes. It will hurt your grade.  
• Next, we will create a blog together as a class. Throughout the course of the semester, you will be asked to write three compelling blog posts. We will create a content calendar together at which point you will be assigned three dates. Your blog posts will be graded based on the quality of your posts, the research that went into them and (mostly) the traffic/shares they receive. In addition to writing the blog entries, you will also be asked to propose your grade for them - using actual analytics.  
• To see examples of high-traffic blog posts, check out buzzfeed.com and businessinsider.com

Important Dates  
February 19 - Book Report Due at midnight