Course Description

Examines the process of decision making in large organizations and the technologies that can be used to enhance data-driven decision making. The course focuses on the underlying framework of good decision making featuring operational decisions as reusable assets that can be automated through the creation of business rules. Students explore how data can add analytic insight to improve decisions. Best practices for long-term success of an analytics project in terms of project management and communications are also covered with an emphasis on the Cross-Industry Standard Process for Data Mining (CRISP-DM) methodology.

Course Introduction

This fast-paced course focuses on the process of decision making in large organizations and the technologies that can be used to enhance a data-driven approach.

This course includes three meta-themes: 1) framing the decision; 2) performing the analytical analysis; 3) operationalizing the results from the analysis:

1. Framing the Decision: a complete thorough outline of the decision to be analyzed is the first step. In the decision framing process, among other things, the decision to be analyzed is stated, the necessary inputs designated, the data sources identified, and the responsible parties tasked. Using the DecisionsFirst software, you will be performing this “framing” exercise in weeks 2-3.

2. Performing the analysis: once the decision is fully framed, data exploration, preparation and analysis can be conducted. In this step (weeks 4-9) analytical approaches and techniques are identified and applied to data sets, using analytical software packages (e.g., Watson Analytics) included in this course. Part of the analysis includes the appropriate amount of sensitivity analysis and assumption testing.

3. Operationalizing the results: once the analysis is complete, the results of the analysis need to be transformed into an operational procedure (weeks 10-12). This portion of the course will include a team assignment to conduct and explain a complete analysis (i.e., “tell a story”).

The last day to withdraw from this course can be found at: http://www.umuc.edu/withdrawals.

Course Outcomes

At the end of this course, students should be able to:

1. Understand common decision biases and traps and how evidence-based decision making can help overcome these limitations in a data rich environment.
2. Analyze the potential for analytical models to assist in decision making.
3. Use, evaluate and critique the utility of several end user analytical tools for analytical data analysis.
4. Develop an analytical model framework to assist in addressing a real world problem, opportunity, or challenge.

## Course Materials

[Click to access your course materials information](http://webapps.umuc.edu/grcmBook/BPage.cfm?C=DATA%20610&S=9042&Sem=2172)

## Grading Information

### Grading Criteria

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Individual or Team Assignment</th>
<th>Frequency of Assignment</th>
<th>Percentage for each Assignment</th>
<th>Percentage of Total Grade</th>
<th>Outcome(s) Addressed by Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem framing exercise</td>
<td>Individual</td>
<td>1</td>
<td>100%</td>
<td>20%</td>
<td>1, 2</td>
</tr>
<tr>
<td>Data exploration and refinement</td>
<td>Individual</td>
<td>1</td>
<td>100%</td>
<td>20%</td>
<td>1, 3</td>
</tr>
<tr>
<td>Predictive model development</td>
<td>Individual</td>
<td>1</td>
<td>100%</td>
<td>20%</td>
<td>1, 3</td>
</tr>
<tr>
<td>Dashboard development</td>
<td>Individual</td>
<td>1</td>
<td>100%</td>
<td>20%</td>
<td>1, 3</td>
</tr>
<tr>
<td>Team analytical decision model</td>
<td>Team</td>
<td>1</td>
<td>100%</td>
<td>15%</td>
<td>1, 2, 4</td>
</tr>
<tr>
<td>Discussion Participation</td>
<td>Individual</td>
<td>1</td>
<td>100%</td>
<td>5%</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** During the weeks between assignments, there will be activities designed to provide key resources and information relevant to the assignments.

### Course Specific Grading Policies

For team assignments: Each person on a team will typically receive the same grade for an assignment. The highest possible grade on the team project will be based on what is submitted as the team end-product. However, a team member’s grade may be adjusted **downward** for a specific assignment if the faculty member determines the quality of that person’s participation to be substandard. To allow your faculty member to review team member contributions to all team assignments, each team member is required to post all contributions in the team’s study group conference.

Review any posted assignment rubrics carefully. They will help you understand the faculty’s expectations regarding assignment grading. If you have any questions about a grade you received, contact your faculty member. Your faculty member is here to help you understand the material, your grade, and how you may improve your performance in this course.

### Due Date Extension/Late Penalty Policy
Timely completion of all assignments is critical to student success in a graduate program. Each assignment in this program has a submission due date. Students should take these due dates seriously. It is highly recommended that each student review both the syllabus and the course content areas thoroughly at the beginning of each course, in order to understand the nature and magnitude of the work required—then plan in advance to allocate sufficient time to complete each assignment on or before the required due date.

For assignments a faculty member may, at his or her discretion, elect to grant an extension when a student is unable to meet a due date because of an unexpected business, health, or personal emergency beyond the student's control. For such an extension to be considered, a student must make an extension request before the assignment due date (unless this is physically impossible). The student must support this request with a compelling rationale, indicating why such an extension is justified. If a faculty member grants an extension, he or she will set a new due date for submission of the assignment. There will be no extensions of the new due date.

For late assignment submissions that have not been approved by the faculty member, and for assessments submitted after an extension due date, the penalty will be a five-point reduction in grade for each day that the assignment is late. Faculty will not accept assignments that are twenty or more days late; such assignments will be assigned a grade of zero.

Note that there will be no extensions for the assignments due the last week of class.

Extra Credit and "Redoing" Assignments

This is a very fast-paced course, and assignments are due at planned times in the course schedule. The syllabus is designed to build upon each week, and the assignments are chosen carefully to develop skills and build knowledge. It is important that you do a good job on all of the assignments and that you hand them in on time. There is no "extra credit" granted to individuals in this course, and students will not be able to redo assignments.

Original Work

Re-submission of the coursework from previous classes (whether or not taken at UMUC), partially or in its entirety is unacceptable, unless prior approval is obtained from the instructor for the specific assignment. Using coursework, partially or in its entirety, from a previous course without explicit prior approval of your section professor will result in a grade of zero for the assignment.

Assignment Descriptions

All of the reading and writing assignments are contained in the Course Schedule Assignments section of this syllabus. Detailed guidance for each assignment will be included in the classroom. All assignments are due no later than midnight Eastern U.S. time Sunday unless otherwise indicated. All individual and team assignments must be submitted in pdf, rtf, or Word format, as the instructor requires.

Individual Assignments

There are three individual assignments in the course, which you post in your Assignment folder. Detailed guidance on each of these assignments will be provided in the course classroom.

Team Assignments

There is one team assignment. Detailed guidance on this assignment will be provided in the course classroom guidance.

NOTE: You should prepare and save all your assignments on your computer before you post them to the classroom. You should never type your assignment directly into the classroom. If your computer crashes or if you are disconnected from the Internet before you finish posting your work, you will lose everything you have not saved. In addition, shortly after the course is over you will no longer have access to any of the materials you posted in the classroom.

Discussion and Activities

Discussion Topics:

To complement each lesson, there are discussion topics available to allow for additional comments, insights, information, questions, etc. Students are encouraged to contribute to these discussions.

Activities
Further, there are periodic activities to be accomplished during the course. Again, these activities are not graded (only the assignments are graded), but are intended to provide needed resources and accomplishments to insure success on the assignments. Completing the activities in a timely manner will greatly increase your chances of successfully accomplishing the graded assignments. The activities build toward the assignments, so completion of the activities in a timely manner is essential.

Project Descriptions

**Assignment 1:** Each student fully frames a decision using the DecisionsFirst software.

For this assignment complete fully the four steps below using the DecisionsFirst software:

- Step 1: **Identify decisions.** Identify the decisions that will be impacted by the analytic project
- Step 2: **Specify decision requirements.** Specify the information and knowledge required to make the decisions and combine into a Decision Requirements Diagram.
- Step 3: **Complete the model.** Refine it until enough is included that the analytic project can be successful.
- Step 4: **Generate an Analytics Requirement Document (ARD).** Package this information as an Analytics Requirements Document.
  - **NOTE:** additional details on this assignment are available in the Assignments section of the course.

**Assignment 2:** Each student fully explores and prepares a dataset using Watson Analytics software.

For this assignment, using a robust dataset, explore, refine and prepare the dataset. Include in your written submission, as a minimum, the following items:

- Item 1: **Data set description.** Fully describe the selected data set to include number of cases (instances), variable descriptions, etc.
- Item 2: **Examine the dataset and explain any key insights.** Develop key questions that could be answered from the dataset.
- Item 3: **Cleanse the dataset.** Perform any necessary data cleaning and preparation.
- Item 4: **Relate to a business decision.** Describe how this approach could be used in a business situation to assist in decision making.
  - **NOTE:** additional details on this assignment are available in the Assignments section of the course.

**Assignment 3:** Each student develops and explains predictive analytics models using Watson Analytics software.

For this assignment, using a robust dataset, develop predictive analytics models. Include in your written submission, as a minimum, the following items:

- Item 1: **Data set description.** Fully describe the selected data sets to include number of cases (instances), variable descriptions, etc.
- Item 2: **Develop model.** Develop at least two models (one using a continuous target variable; one using a categorical target variable) from data sets.
- Item 3: **Evaluate the accuracy of the models:** Using the appropriate accuracy measures, present and discuss how accurate the models are. Compare the accuracy measures for the models.
- Item 4: **Relate to a business decision.** Describe how this approach could be used in a business situation to assist in decision making.
  - **NOTE:** additional details on this assignment are available in the Assignments section of the course.

**Assignment 4:** Each student assembles a dashboard presentation using using Watson Analytics software.

For this assignment, using a robust dataset, students will develop a dashboard presentation and a Storyboard presentation with Watson Analytics software

- Item 1: **Retrieve and outline the dataset to be used.** **NOTE:** This could be a data set already used in previous assignments.
- Item 2: **Develop several displays and dashboards.** Utilize at least one Storybook aspect in the analysis. Include twitter insights gained from including appropriate twitter information in the analysis.
- Item 3: **Discuss key aspects of the dashboard and storybook presentations.**
  - **NOTE:** additional details on this assignment are available in the Assignments section of the course.
**Assignment 5:** Each student team completes a full analytical analysis (i.e., data cleansing, data preparation, data exploration, model development, sensitivity analysis).

For this assignment, **complete the steps** below using [Watson Analytics](https://www.ibm.com/analytics/watson-analytics) software:

- **Step 1:** *Identify and refine a robust data set.* Choose a robust data set (e.g., lots of cases and many potential input variables) for the assignment. Explore, refine and prepare the data set as necessary.
- **Step 2:** *Describe decisions.* Describe the key decisions related to the data set and discuss how improving these decisions will impact the business objectives and metrics of the business.
- **Step 3:** *Develop key performance indicators (KPI's).* Specify quantifiable and measurable KPI's for the analysis.
- **Step 4:** *Develop the predictive model(s).* Develop and explain fully at least two models, refine them and perform the appropriate sensitivity analysis.
- **Step 5:** *Develop several appropriate dashboards.* Include appropriate Storybook and twitter aspects.
- **Step 6:** *Assemble a presentation.* Package the entire model into a completed presentation using the [Watson Analytics](https://www.ibm.com/analytics/watson-analytics) assembly mode.

**NOTE:** additional details on this assignment are available in the Assignments section of the course.

**Assignment 6:** Throughout the course, each student contributes significantly to the class Discussion items, adding insights, revelations, etc. At least one significant insightful comment per week is the expected norm.

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### Academic Policies

#### Academic Policies and Guidelines

**ACADEMIC INTEGRITY**

As a member of the University of Maryland University College (UMUC) academic community that honors integrity and respect for others you are expected to maintain a high level of personal integrity in your academic work at all times. Your work should be original and must not be reused in other courses.

**CLASSROOM CIVILITY**

Students are expected to work together cooperatively, and treat fellow students and faculty with respect, showing professionalism and courtesy in all interactions. Please review the Code of Civility for more guidance on interacting in UMUC classrooms: [https://www.umuc.edu/students/support/studentlife/conduct/code.cfm](https://www.umuc.edu/students/support/studentlife/conduct/code.cfm).

**POLICIES AND PROCEDURES**

UMUC is committed to ensuring that all individuals are treated equally according to Policy 040.30 [Affirmative Action, Equal Opportunity, and Sexual Harassment](https://www.umuc.edu/policies/adminpolicies/admin04030.cfm).

Students with disabilities who need accommodations in a course are encouraged to contact the Office of Accessibility Services (OAS) at accessibilityservices@umuc.edu, or call 800-888-UMUC (8682) or 240-684-2287.

The following academic policies and procedures apply to this course and your studies at UMUC.
Academic Dishonesty and Plagiarism[1] – UMUC defines academic dishonesty as the failure to maintain academic integrity. All charges of academic dishonesty will be brought in accordance with this Policy.

Note: Your instructor may use Turnitin.com, an educational tool that helps identify and prevent plagiarism from Internet resources, by requiring you to submit assignments electronically. To learn more about the tool and options regarding the storage of your assignment in the Turnitin database go to: [https://www.umuc.edu/library/libresources/turnitin.cfm](https://www.umuc.edu/library/libresources/turnitin.cfm).

Code of Student Conduct[2]

The following policies describe the requirements for the award of each degree:

Degree Completion Requirements for the Graduate School[3]
Degree Completion Requirements for a Bachelor’s Degree[4]
Degree Completion Requirements for an Associate’s Degree[5]

Policy on Grade of Incomplete[6] - The grade of I is exceptional and only considered for students who have completed 60% of their coursework with a grade of B or better for graduate courses or C or better for undergraduate courses and request an I before the end of the term.


Procedures for Review of Alleged Arbitrary and Capricious Grading[8] – appeals may be made on final course grades as described herein.

Calculation Of Grade-Point Average (GPA) for Inclusion on Transcripts and Transcript Requests[9] – Note: Undergraduate and Graduate Schools have different Grading Policies (i.e. The Graduate School does not award the grade of D). See Course Syllabus for Grading Policies.

GRADING

According to UMUC's grading policy, the following marks are used:

<table>
<thead>
<tr>
<th></th>
<th>Undergraduate</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100</td>
<td>90-100</td>
</tr>
<tr>
<td>B</td>
<td>80-89</td>
<td>80-89</td>
</tr>
<tr>
<td>C</td>
<td>70-79</td>
<td>70-79*</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
<td>N/A**</td>
</tr>
<tr>
<td>F</td>
<td>59 or below</td>
<td>69 or below</td>
</tr>
<tr>
<td>FN</td>
<td>Failure-Non attendance</td>
<td>Failure-Non attendance</td>
</tr>
<tr>
<td>G</td>
<td>Grade Pending</td>
<td>Grade Pending</td>
</tr>
<tr>
<td>P</td>
<td>Passing</td>
<td>Passing</td>
</tr>
<tr>
<td>S</td>
<td>Satisfactory</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>
* The grade of "B" represents the benchmark for The Graduate School. Students must maintain a Grade Point Average (GPA) of 3.0 or higher. Classes where final grade of C or F places a student on Academic Probation must be repeated.  
** The Graduate School does not award the grade of D.

COURSE EVALUATION SURVEY

UMUC values its students' feedback. You will be asked to complete an online evaluation toward the end of the term. The primary purpose of this evaluation process is to assess the effectiveness of classroom instruction in order to provide the best learning experience possible and make continuous improvements to every class. Responses are kept confidential. Please take full advantage of this opportunity to provide your feedback.

LIBRARY SUPPORT

Extensive library resources and services are available online, 24 hours a day, seven days a week at [https://www.umuc.edu/library/index.cfm](https://www.umuc.edu/library/index.cfm) to support you in your studies. The UMUC Library provides research assistance in creating search strategies, selecting relevant databases, and evaluating and citing resources in a variety of formats via its Ask a Librarian service at [https://www.umuc.edu/library/libask/index.cfm](https://www.umuc.edu/library/libask/index.cfm).

LEARNING MANAGEMENT SYSTEM SUPPORT

To successfully navigate the online classroom new students are encouraged to view the Classroom Walkthrough under Help in the upper right menu of the LEO classroom. Those requiring technical assistance can access Help@UMUC Support directly in LEO under the Help menu. Additional technical support is available 24 hours a day, seven days a week via self-help and live chat at [https://www.umuc.edu/help](https://www.umuc.edu/help) or by phone toll-free at 888-360-UMUC (8682).

SYLLABUS CHANGES

All items on this syllabus are subject to change at the discretion of the Instructor and the Office of Academic Affairs.

Class & Assignment Schedule

<table>
<thead>
<tr>
<th>Session</th>
<th>Module/Topics</th>
<th>Readings/Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. **Overview of Data Analytics:**
   - Decision making biases and traps
   - Making better decisions with analytics


   **Activity for the session:**
   Complete the decision making checklist. This simple tool provides a good, quick assessment of your decision making approach and also outlines tools and strategies you can use for each stage of the problem-solving process.

2. **Framing the Problem:**
   - DecisionFirst software introduction and walkthrough.
   A demonstration of the DecisionFirst software will be included.

   **Required Reading:**

   **Multimedia:**

   **ACTIVITY for the session:**
   Each student accesses the website for DecisionFirst Modeler and watches the tutorial videos for the software. Details contained in the classroom lesson guidance.

   **UPCOMING ASSIGNMENT REMINDER:** Your first course assignment will be due at the end of week 3. See the detailed guidance in the assignment area of LEO.

3. **Framing the Problem:**
   - Comparing and contrasting analytical methodologies
   - Assessing the organization's analytic maturity

   **Required Reading:**

   **Multimedia:**

   **ACTIVITY for the session:**
   Each student completes the Analytic Quotient (AQ) quiz.

   **ASSIGNMENT DUE (20%):**
   By the end of week 3, each student posts his/her framed model developed with DecisionFirst software. Details contained in the classroom assignment guidance.
### Getting Started with Watson Analytics:

- **Introduction to Watson Analytics software**
- **Data series and data refinement with Watson Analytics**

**Required Reading:**


**Multimedia:**


**Activity for the session:**

Each student accesses [Watson Analytics](http://www.watsonanalytics.com) and insures that their account access works.

**UPCOMING ASSIGNMENT REMINDER:** Your second course assignment will be due at the end of week 5. See the detailed guidance in the assignment area of LEO.

### Exploring and preparing data:

- **Statistics review**
- **Exploring Data with Watson Analytics**
- **Data preparation, data cleansing with Watson Analytics**

**Required Reading:**


**Multimedia:**

- Kane, D. (Performer) (Jan 23rd, 2015). *EDA and Model Selection* [Web]. Retrieved from [https://www.youtube.com/watch?v=OByOgGXq76A](https://www.youtube.com/watch?v=OByOgGXq76A)

**ASSIGNMENT DUE (20%):**

By the end of week 5 each student posts his/her assignment, developed with Watson Analytics, to include description and analysis. Details contained in the classroom assignment guidance.

### Predictive models overview

- **Overview of the types of predictive models**
- **Assessing the accuracy of predictive models**

**Required Reading:**


**Multimedia:**

- Kane, D. (Performer) (Jan 23rd, 2015). *Data Science Part IV: Decision Trees and Random Forests* [Web]. Retrieved from [https://www.youtube.com/watch?v=OByOgGXq76A](https://www.youtube.com/watch?v=OByOgGXq76A)

**Activity for the session:**

Each student begins developing predictive models using Watson Analytics.

**UPCOMING ASSIGNMENT REMINDER:** Your third course assignment will be due at the end of week 7. See the detailed guidance in the assignment area of LEO.
<table>
<thead>
<tr>
<th>7</th>
<th>Developing and interpreting Watson Analytics predictive models:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Creating and interpreting predictive models with Watson Analytics</td>
<td></td>
</tr>
<tr>
<td>- Interpreting models and utilizing sensitivity analysis</td>
<td></td>
</tr>
</tbody>
</table>

**Multimedia:**

- Watson Analytics: How to navigate the spiral - some insights on the specifics from the spiral diagram created with a Watson Analytics predictive model
- Analyzing customer service rep performance with Watson Analytics - an excellent complete case example of how Watson Analytics can provide insights from a data set. (NOTE: starting at about the 3 minute mark, the video shows how to develop and explain a presentation which is not part of this assignment, but will be part of assignment 4 for the course.)

**ASSIGNMENT DUE (20%):**

By the end of week 7 each student posts his/her analytical model developed with Watson Analytics to include description and analysis. Details contained in the classroom assignment guidance.

<table>
<thead>
<tr>
<th>8</th>
<th>Assembling and interpreting dashboards with Watson Analytics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Creating a dynamic presentation with Watson Analytics</td>
<td></td>
</tr>
</tbody>
</table>

**Required Reading:**


**Multimedia:**


**Activity for the session:**

Each student begins developing dashboard and Storybook presentations using Watson Analytics.

**UPCOMING ASSIGNMENT REMINDER:** Your fourth course assignment will be due at the end of week 9. See the detailed guidance in the assignment area of LEO.
### Presenting and explaining the dashboard results:

- Creating a dynamic presentation with Watson Analytics

### Required Reading:


### Multimedia:


- Using a Watson Analytics Expert Storybook: Part 2 of the Storybook Series. Retrieved from [https://www.youtube.com/watch?v=mAPci1Z76vc](https://www.youtube.com/watch?v=mAPci1Z76vc)

### Assignment Due (20%):

By the end of week 9, each student posts his/her assembled dashboard and storyboard developed with Watson Analytics to include description and analysis. Details contained in the classroom assignment guidance.

### Decision Management

### Required Reading:


### Multimedia:


### Activity for the session:

Each student posts in the appropriate discussion area comments and insights relevant to his/her organization from reading the *Use cases for decision management*. Retrieved from [http://www.information-management.com/news/use-cases-for-decision-management-10024064-1.html](http://www.information-management.com/news/use-cases-for-decision-management-10024064-1.html)
<table>
<thead>
<tr>
<th>Week</th>
<th>Application of Watson Analytics concepts:</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td><strong>Team Project (part 1):</strong> Student teams will start to develop the final assignment project.</td>
</tr>
<tr>
<td></td>
<td><strong>Required Reading:</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Activity for the session:</strong> Each student team begins by choosing a representative data set and beginning the refining and data exploration process for the assignment due at the end of week 12. Details contained in the classroom lesson guidance.</td>
</tr>
<tr>
<td></td>
<td><strong>UPCOMING ASSIGNMENT REMINDER</strong> Your fifth course assignment will be due at the end of week 12. See the detailed guidance in the assignment area of LEO.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week</th>
<th>Application of Watson Analytics concepts:</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td><strong>Team Project (part 2):</strong> Student teams will complete and submit the final assignment project which includes a completed analysis, using <em>Watson Analytics.</em></td>
</tr>
<tr>
<td></td>
<td><strong>ASSIGNMENT DUE (15%)</strong> By the end of week 12, each student team submits their completed analytical model and presentation, developed with <em>Watson Analytics.</em> Details contained in the classroom lesson guidance.</td>
</tr>
</tbody>
</table>