Course Syllabus

USF Sarasota-Manatee College of Hospitality and Technology Leadership

MAD 2104 – 3 Credit Hours

Discrete Math

Spring 2014 Syllabus

Instructor: Bill Murphy
E-Mail: wmurphy@usf.edu
Telephone: 941-350-3085
Office: Virtual
Office Hours: By appointment
Classroom: Canvas
Time: Asynchronous

Communication:
The instructor can be contacted through the conversations portal of canvas. Please include course name and number in communications.
You can call the instructor at 941-350-3085.
You can also email the instructor at wmurphy@usf.edu.
Responses will generally be sent within 1 business day.

Prerequisites:
None. However, understanding of high school algebra and basic math will go a long way in this class...

Course Description:
This course introduces you to Discrete Math concepts from an applied IT perspective, with the specific goal to prepare students for later courses or duties related to Data Mining.

Course Topics:
- Seeing relationships in data and predicting based on them
- Probability
- Bayes Rule
- Correlation vs. Causation
- Maximum Likelihood Estimation
- Mean, Mean, Mode
- Standard Deviation
- Variance
- Outliers, Quartiles
- Binomial Distribution
- Central Limit Theorem
- Manipulating Normal Distribution
- Confidence intervals
- Hypothesis Testing
- Linear regression
- Logic, Sets, and Graphs
- Bayes networks
- Machine Learning

Course Objective:
This course is intended to acquaint students with Discrete Math from an applied IT perspective, to real IT problems.
The ultimate goal is to present the discrete math topics most likely to be useful to prepare students for later Data Mining courses or duties.
Artificial Intelligence is an IT domain used in business, healthcare, etc that relies heavily on the use of discrete math techniques, and will be our example domain throughout the course.

**BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY MISSION STATEMENT:** The mission of the Information Technology Program is to provide high quality educational opportunities for students interested in pursuing careers in the broad range of fields that support our computer/information-based society and economy. Additionally, the goal is to utilize the resources of the program to provide service to society; and to emphasize to students the need for lifelong learning, to have ethical conduct, and an understanding of the diverse social context in which Information Technology is practiced.

**BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY PROGRAM LEARNING OUTCOMES (PLOs):**

1. Demonstrate technical knowledge and skill sets (computational and analytic) needed for success in careers related to Information Technology.
2. Demonstrate an understanding of professional ethics in the development and application of Information Technology.
3. Design and develop computer processes and systems of advanced complexity.
4. Assess the potential value of new technologies and see possibly beneficial applications.
5. Conduct computer research, organize a structured presentation, and deliver it in a way that communicates to novice users as well as computer experts.

**COURSE STUDENT LEARNING OUTCOMES:**

Upon completion of this course, students will be able to:

1. Understand Elementary Statistical data grouping techniques
2. Apply basic probability concepts to real problems
3. Recognize Logic, Sets, and Graphs
4. Understand how Discrete Math is applied to real world domains, in particular artificial intelligence applications.

**Required Textbooks:**

To save the students money, there are no required textbooks for this class.

**Performance Evaluation and Grading:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>1st Udacity Course – Introduction to Statistics</td>
<td>35</td>
</tr>
<tr>
<td>2nd Udacity Course – Introduction to Artificial Intelligence</td>
<td>35</td>
</tr>
<tr>
<td>Discussion posts</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100</td>
</tr>
</tbody>
</table>

A grade will be determined based on the total of possible points earned, as follows: A 90-100; B 80-89; C 70-79; D 60-69; F 0-59.

**1st Udacity Course – Introduction to Statistics**

Instead of using textbooks and course notes, students will complete Udacity courses from [www.udacity.com](http://www.udacity.com).

You have to go to [www.udacity.com](http://www.udacity.com) and sign-up for their courseware.

For the first half of the semester everyone will work towards completing the Udacity course entitled Introduction to Statistics ST101 with Sebastian Thrun & Adam Sherwin.

After each lesson students will submit a screen shot of their progress to the instructor as a file upload via the Canvas Assignments interface.

There are 7 lessons in this tutorial. Each lesson has approximately 5 subsections and is worth 5 points for a total of 35 points.

**2nd Udacity Course – Introduction to Artificial Intelligence**

For the second half of the semester everyone will work towards completing the first 6 Problem Set sections plus the Midterm section of the Udacity course entitled Introduction to Artificial Intelligence with Peter Norvig and Sebastian Thrun.

You have to go to [www.udacity.com](http://www.udacity.com) and sign-up for their courseware.

After each lesson students will submit a screen shot of their progress to the instructor as a file upload via the Canvas Assignments interface.

Each of the first 7 sections you complete has approximately 3 subsections and is worth 5 points for a total of 35 points.

**Discussion Posts:**

A heavy part of your grade will be based on whether or not you are posting questions and solutions to the in class discussion forums for the Udacity courses you take.

If you fail to be an active participant on our in-class boards for the Udacity courses you take, (posting real questions and real solutions, not just "I agree" nor "complaint" nor off-topic posts) then you can expect your grade to drop by letter grades.

ONLY TECHNICAL POSTS SHOULD BE MADE ON THE TECHNICAL DISCUSSION BOARDS (you can post non-technical related posts ONLY to the Community...
Extra Credit

The class is encouraged to form a student led weekly Skype session with Audio (and possibly video) to solve problems according to the Problem Based Learning paradigm. The students need to take the initiative as a class to decide what days and times those Skype sessions will be. The Skype sessions should be student led and self-directed as per the PBL paradigm. Every week, one (1) student at the Skype session can organize the meeting and post the notes (tech problems and tech answers) the students discuss and discover at that weekly Skype session to gain from 1 to 5 points of final grade extra credit depending on the quality of that week's student led discovery (as evidenced by the posted notes) and the quality of the notes posted. Each student may only get a maximum of 5 extra credit points per semester for being a Skype meeting organizer and note poster. Extra Credit will only be given if the meeting organizer got students to RSVP ahead of time about their attendance and only if 3 or more students attended for at least 20 minutes. Skype sessions where audio is not used will not count for extra credit opportunities.

The students (and not the instructor) will determine which student each week will get this opportunity/privilege for extra credit, and what the times and day of the Skype Session that week will be

Note to Students

In addition to the discussion forums, all students are strongly encouraged to not isolate behind a computer screen. If you can't make in person visits with your peers, consider Skyping or telephoning your peers. If you don't want to give out your real phone number, consider getting the free Google number service. If you are concerned about getting calls at unwanted times, post the times you should not be called. One of the prime reasons IT personnel get fired in the real world is because they fail to establish personal contact with their peers. The biggest problem with online programs is that they reinforce the habit of electronic only communication, which is a negative habit when it comes to advancing your career or transforming contacts into business relationships.

Problem Based Learning (PBL):

Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject through the experience of problem solving. The goals of PBL are to help the students develop flexible knowledge, effective problem solving skills, self-directed learning, effective collaboration skills and intrinsic motivation. Problem-based learning is a style of active learning. Often working in groups, students identify what they already know, what they need to know, and how and where to access new information that may lead to resolution of the problem.

The role of the instructor is to facilitate learning by supporting, guiding, and monitoring the learning process, not by lecturing, nor by providing direct answers. PBL is now used at many medical schools, business schools, and engineering schools. (Drawn largely from Wikipedia). What this means is you have to learn to interact with your peers to work together to solve problems. The answers will not be handed to you by the instructor.

Late Work

Your instructor will not accept late work unless you have obtained prior permission. Be mindful of due dates, and turn in assignments accordingly.

Cheating/collaboration

Unlike other development courses you have been in, collaboration and even code sharing is entirely encouraged. However, don't rip off other people's code unless you give them credit for the code they wrote, and you use their code legally. Cheating is still not acceptable. If cheating has been discovered, at best a grade of zero will be earned for the assignment. You must also follow the Udacity honor code as stated on the Udacity course website for each course.

Incomplete Grade

An Incomplete grade is reserved for those with good reason for having missed a small amount of work, and must be agreed by the student and instructor during the course as circumstances require. Otherwise, exams not taken or assignments not turned in will receive a zero grade and will be counted in the final grade accordingly. Please note that it is the student's responsibility to ensure that work is completed before the end of the following semester and the Incomplete changed to a regular grade. If this is not done before the end of the following semester, the Incomplete automatically becomes an F.

The last day to drop a course with a grade of "W" is November 2. There will be no refund and no academic penalty.

USFSM Policies

A. Academic Dishonesty: The University considers any form of plagiarism or cheating on exams, projects, or papers to be unacceptable behavior. Please be sure to review the university's policy in the catalog, USFSM Undergraduate Catalog (http://www.sarasota.usf.edu/Academics/Catalogs/) or USFSM Graduate Catalog (http://www.sarasota.usf.edu/Academics/Catalogs/), the USF System Academic Integrity of Students, and the USF System Student Code of Conduct (http://www.sa.usf.edu/srr/page.asp?id=88).

B. Academic Disruption: The University does not tolerate behavior that disrupts the learning process. The policy for addressing academic disruption is included
with Academic Dishonesty in the catalog: [USFSM Undergraduate Catalog](http://www.sarasota.usf.edu/Academics/Catalogs/) or [USFSM Graduate Catalog](http://www.sarasota.usf.edu/Academics/Catalogs/), USF System Academic Integrity of Students, and the [USF System Student Code of Conduct](http://www.sa.usf.edu/srr/page.asp?id=88).

### C. Contingency Plans:
In the event of an emergency, it may be necessary for USFSM to suspend normal operations. During this time, USFSM may opt to continue delivery of instruction through methods that include but are not limited to: CANVAS, Elluminate, Skype, and email messaging and/or an alternate schedule. It's the responsibility of the student to monitor CANVAS site for each class for course specific communication, and the main USFSM and College websites, emails, and [MoBull](http://www.mobull.usf.edu) messages for important general information. The USF hotline at 1 (800) 992-4231 is updated with pre-recorded information during an emergency. See the [Safety Preparedness Website](http://www.sarasota.usf.edu/facilities/SafetyPreparedness.php) for further information.

### D. Disabilities Accommodation:
Students are responsible for registering with the Office of Students with Disabilities Services (SDS) in order to receive academic accommodations. Reasonable notice must be given to the SDS office (typically 5 working days) for accommodations to be arranged. It is the responsibility of the student to provide each instructor with a copy of the official Memo of Accommodation. Contact Information: Disability Coordinator, 941-359-4714, disabilityservices@sar.usf.edu; http://www.usfsm.edu/students/disability.

### E. Fire Alarm Instructions:
At the beginning of each semester please note the emergency exit maps posted in each classroom. These signs are marked with the primary evacuation route (red) and secondary evacuation route (orange) in case the building needs to be evacuated. See [Emergency Evacuation Procedures](http://www.sarasota.usf.edu/Facilities/documents/EAP_FAQ.pdf).

### F. Religious Observances:
USFSM recognizes the right of students and faculty to observe major religious holidays. Students who anticipate the necessity of being absent from class for a major religious observance must provide notice of the date(s) to the instructor, in writing, by the second week of classes. Instructors canceling class for a religious observance should have this stated in the syllabus with an appropriate alternative assignment.

### G. Web Portal Information:
Every newly enrolled USF student receives an official USF e-mail account. Students receive official USF correspondence and CANVAS course information via that address.

*Syllabus is subject to change with prior notice*

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Details</th>
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<tbody>
<tr>
<td>Jan 10</td>
<td>Fri</td>
<td><a href="https://usflearn.instructure.com/courses/1002048/assignments/3025353">Disc. Visualizing relationships in data</a></td>
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<td>Fri</td>
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<td>2: <a href="https://usflearn.instructure.com/courses/1002048/assignments/3025368">Probability</a></td>
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<td><a href="https://usflearn.instructure.com/courses/1002048/assignments/3025354">Disc. Probability</a></td>
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<td>Jan 24</td>
<td>Fri</td>
<td><a href="https://usflearn.instructure.com/courses/1002048/assignments/3025369">3: Estimation</a></td>
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<td><a href="https://usflearn.instructure.com/courses/1002048/assignments/3025357">Disc. Outliers and Normal Distribution</a></td>
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<td>Feb 7</td>
<td>Fri</td>
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<td><a href="https://usflearn.instructure.com/courses/1002048/assignments/3025366">Disc. Inference</a></td>
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<td>Assignment 1</td>
<td>Assignment 2</td>
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<td>Mar 7</td>
<td>Fri</td>
<td>AI Problem Set 2</td>
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<td>Mar 14</td>
<td>Fri</td>
<td>AI Problem Set 3</td>
<td>Disc. AI Problem Set 3</td>
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<tr>
<td>Mar 21</td>
<td>Fri</td>
<td>AI Problem Set 4</td>
<td>Disc. AI Problem Set 4</td>
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<td>Mar 28</td>
<td>Fri</td>
<td>AI Problem Set 5</td>
<td>Disc. AI Problem Set 5</td>
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<td>Apr 4</td>
<td>Fri</td>
<td>AI Midterm</td>
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<td>Apr 18</td>
<td>Fri</td>
<td>AI Problem Set 6</td>
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<tr>
<td>Other</td>
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