Course Syllabus

MAD 2104 - Discrete Math

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, Applying Algorithms, Cryptography etc.

Instructor: Bill Murphy

Communication:
The instructor can be contacted through the conversations portal of canvas. Please include course name and number in communications. Responses will generally be sent within 1 business day.

You can also email the instructor at wmurphy@usf.edu.

You can also call the instructor at 941-350-3085.

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

Prerequisites / Co-requisites:
Whether or not you have a prior Python programming background will help determine whether within this course you choose to substitute the Python module for the Advanced topics modules or vice-versa.

Course Goals:
This course is intended to acquaint students with Discrete Math from an applied IT perspective, using tools such as Python to apply these concepts 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, Applying Algorithms, Cryptography and other applied IT work.

Probability And Statistics Topics:
Seeing relationships in data and predicting based on them; Simpson's paradox
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; correlation

**Algorithmic Topics (For students with a solid background in Python):**

Algorithm analysis fundamentals

Using mathematical tools to analyze how things are connected

Basic Graph Algorithms

Keeping track of social network relationships using heaps

Using social networks to examine edge weights.

Exploring what it means for a problem to be harder than other problems.

**Students without a background in Python will complete a Python module instead of the Algorithms Module:**

Implementing Logic Using Python

Using Python to perform counting functions on the web

Procedures, decisions (if), loops; finding all of the links on a page

Universal techniques for solving programming problems

Lists; crawling the web, using Python to pull useful data from the web

Complex data structures; Implementing Search, networks

Reasoning about cost; hash tables (Dictionary), Recursive definitions; ranking results

**Materials**

Instead of using textbooks and course notes, the students will go through assigned free materials from the web.
Discussion Forums:

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.

If you fail to be an active participant on our in-class discussion boards, (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 up to a letter grade and half.

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 meaningful contact with their peers. The biggest problem with online programs is that they reinforce the habit of electronic only communication, which can be a very negative habit when it comes to advancing your career or transforming contacts into business relationships.

Performance Evaluation and Grading:

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.

75% Sending Proof of Completing the Assigned Materials and Quizzes

10% Turning Completed and Correct Work in by the Deadlines

15% Helping your peers and participating on the discussion boards

Late Work

You may resubmit work all through the semester to maximize the 75% for completing the quiz work.

However, you are assessed a separate 10% for showing proof of completing the materials by the posted deadlines without the need to resubmit after the posted deadlines.

Any work turned in after July 19th will note be accepted without prior written permission from the instructor.

Our In-class Discussion Forums
即可只发技术内容，非技术内容发布到社区论坛。

Don't force folks who need a solution to read through" I agree" or "I am really frustrated" or "my dog did something cute today" posts.

Save those posts for the Community Forum Discussion board; that is the “water cooler” meeting place for the class.

**Weekly Skype Session and An Extra Credit Opportunity**

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.

**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.

This means the answers will not be handed to you by the instructor.

**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 website for any Udacity materials we use.

*Syllabus is subject to change with prior notice*