Discrete Mathematics

CSC/MTH 447 – Fall 2012

Introduction

This course is an introduction to the mathematical study of discrete objects. In it, you will learn how to construct proofs, as well as read and write formal mathematics. You will also become familiar with a range of standard mathematics concepts commonly used in computer science and particular areas of mathematics.

Discrete mathematics is the part of mathematics devoted to the study of discrete (as opposed to continuous) objects:

- Examples of discrete objects: integers, steps taken by a computer program, distinct paths to travel from point A to point B on a map along a road network, ways to pick a winning set of numbers in a lottery.
- On the other hand, calculus deals with continuous objects and is not part of discrete mathematics.

The kinds of problems that can be solved using discrete mathematics include:

- How many ways can a password be chosen following specific rules?
- How many valid Internet addresses are there?
- What is the probability of winning a particular lottery?
- Is there a link between two computers in a network?
- How can I identify spam email messages?
- How can I encrypt a message so that no unintended recipient can read it?
- What is the shortest path between two cities using a transportation system?
- And many others…

The goals of the course are:

- Mathematical Reasoning: Ability to read, understand, and construct mathematical arguments and proofs.
- Combinatorial Analysis: Techniques for counting objects of different kinds.
- Discrete Structures: Abstract mathematical structures that represent objects and the relationships between them. Examples are sets, permutations, relations, graphs, trees, and finite state machines.

Required Text

Discrete Mathematics and Its Applications, Kenneth Rosen, 7th edition, McGraw-Hill, 2012.

Instructor

Dr. Lutz Hamel
email: hamel@cs.uri.edu
office: Tyler Hall, Rm 251

hours: TBA

Schedule

MW 4:30pm – 5:45pm, Tyler Hall Room 109
Webpage: http://homepage.cs.uri.edu/faculty/hamel/courses/2012/fall2012/csc447

Grading:

Homework   50%
Midterm 1   15%
Midterm 2   15%
Final   20%

Policies:

- Check the website (often)! I will try to keep the website as up-to-date as possible.
- Class attendance, promptness, participation, and adequate preparation for each class are expected. If you are absent, it is your responsibility to find out what you missed (e.g. handouts, announcements, assignments, new material, etc.)
- **Late assignments:** Late assignments will **not** be accepted.
- Make-up quizzes and exams will **not** be given without a valid excuse, such as illness. If you are unable to attend a scheduled examination due to valid reasons, please inform myself, or the department office in Tyler Hall, prior to the exam time. Under such circumstances, you are not to discuss the exam with any other class member until after a make-up exam has been completed.
- All work is to be the result of your own individual efforts unless explicitly stated otherwise. Plagiarism, unauthorized cooperation or any form of cheating will be brought to the attention of the Dean for disciplinary action. See the appropriate sections (8.27) of the University Manual.
- Software piracy will be dealt with exactly like stealing of university or departmental property. Any abuse of computer or software equipment will be subject to disciplinary action.

Tentative Course Outline:

The Foundations: Logic and Proofs
Basic Structures: Sets, Functions, Sequences, and Sums
Induction and Recursion
Counting
Relations
Graphs and Trees