Class Syllabus

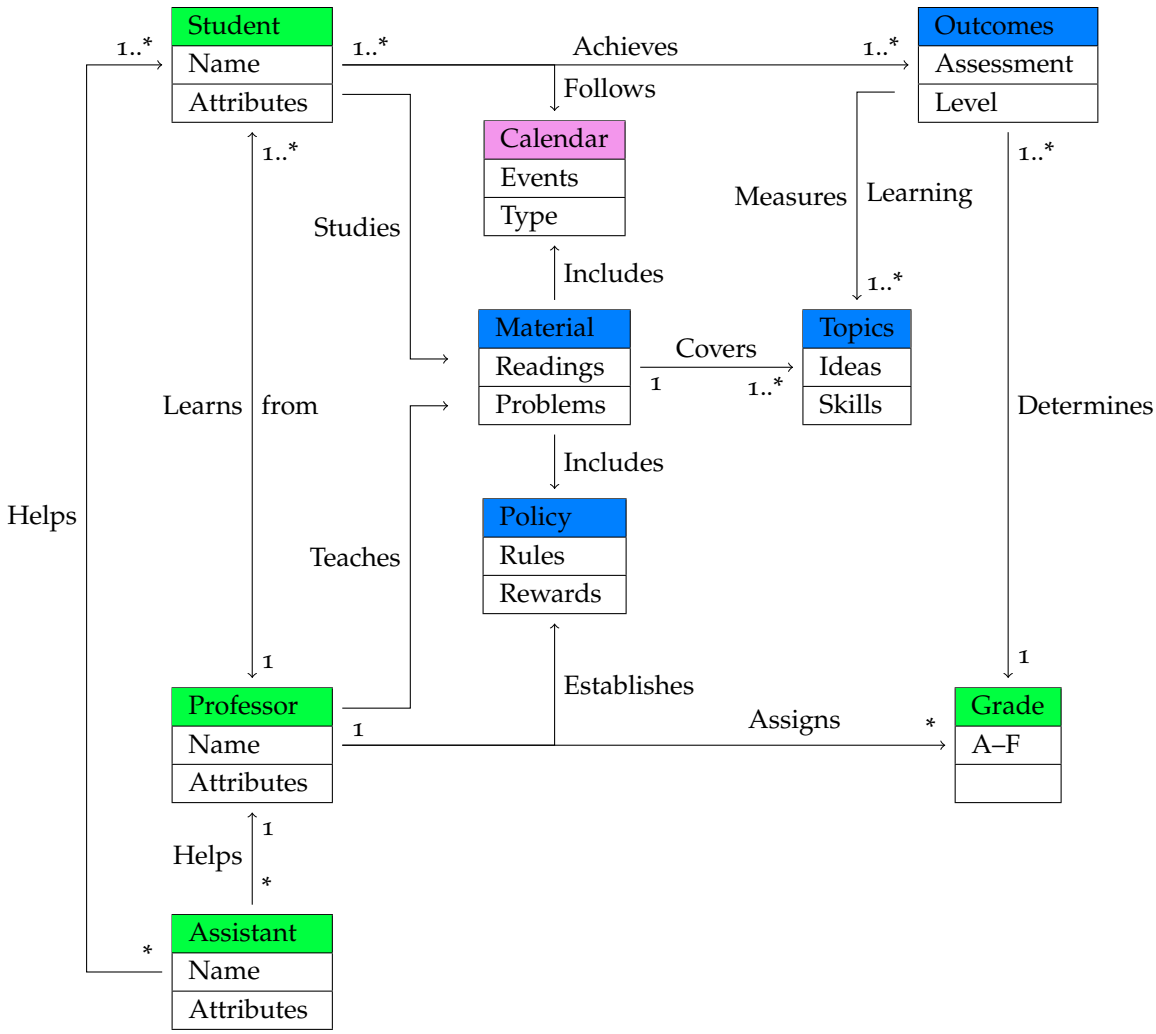
CSE 1400 Applied Discrete Mathematics

& MTH 2051 Discrete Mathematics

Instructor: William Shoaff

Fall 2018 (August 27, 2018)

The Structure of a Class



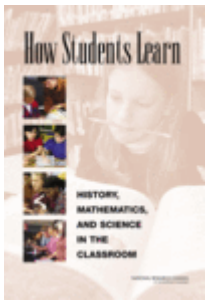
Course Description

CSE 1400 Applied Discrete Mathematics cross-listed with **MTH 2051 Discrete Mathematics** (3 credits). Topics include: positional and modular number systems, relations and their graphs, discrete functions, set theory, propositional and predicate logic, sequences, summations, mathematical induction and proofs by contradiction. (Requirement: Passing score on the Calculus Readiness Test, or pre-requisite course.) Prerequisites: MTH 1000 Precalculus.

Prerequisites

Students must have mastered certain mathematical knowledge to be successful. In particular, students must be able to perform arithmetic on natural numbers, integers, and rational numbers, and they must be able to use concepts from "College Algebra" and "Precalculus." In brief, students should have satisfied the requirements necessary to be prepared to study calculus. Students should be aware of the strong correlation between class attendance and grades. In brief, students must be engaged in learning and fully participate in all activities. If you have already mastered all of the material in this course, speak with your professor about an equivalency exam.

Modern learning theory (Fuson et al., 2005) suggests that students learn when they have (1) an ability to link conceptual understanding with procedural fluency; (2) meta-cognition (learning they how learn and think; and (3) problem solving abilities.



Students, Professor & Assistants

Students

Get to know your fellow classmates. Help each other.

Class Hours: Monday, Wednesday, and Friday from 11:00 to 11:50 in P–133

Office Hours: Monday, Wednesday, and Friday at 9:30 to 10:45& 1:00 to 1:45

The Professor

William David Shoaff

wds@cs.fit.edu

(321) 674-8066

Room 324, Harris Cen,ter for Science and Engineering

MWF 9:30 – 10:45 & 1:00 to 1:45 or by appointment, walk-ins welcome

Assistants

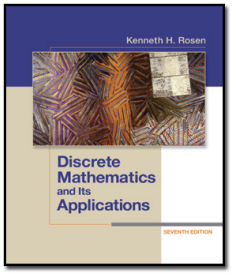
hchang2014@my.fit.ed

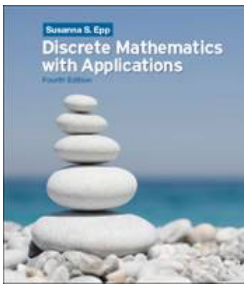
Office Hours: T 11:00 – 1:00 Harris Center 211; Help Desk: TR 11:00 – 100 Crawford 500; Recitation: Monday & Wed

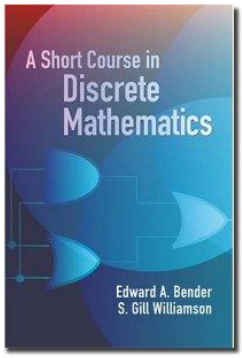
Calendar

This is the tentative schedule of exams. Attend class to be informed of changes.

- Quiz 1 Friday September 7
- Quiz 2 Friday September 28
- Midterm Exam Friday October 5
- Quiz 3 Friday October 26
- Quiz 4 Friday Novemeber 16
- Final Exam, Friday, December 14, 1–3







Material

There is material on the course management system. The main use of the CMS is for communicating, posting grades, collecting basic items, and linking back to the class URL.0 The class URL is

http://cs.fit.edu/~wds/classes/adm

There you will find, perhaps too much, material such as:

1. This syllabus
2. Previous quizzes with keys
3. A textbook
4. Summary slides
5. Recorded lectures
6. A great cheat sheet

There are other excellent sources that you can use to learn the topics of discrete mathematics, for example, (Rosen, 2011), (Epp, 2010), (Stanoyevitch, 2011), (Bender and Williamson, 2005), and (Belcastro, Sarah-Marie, 2012)

Wikipedia Discrete Math Portal
Mathigon World of Mathematics

Policy

Attendance

The class meets on Monday, Wednesday and Friday at 11:00 AM for a 50 minute session. The location is P–133. Attendance is required. If, for some reason [1], you cannot attend class inform your professor as soon as possible. Written documentation is necessary for an absence to be excused.

A recitation session, lead by Haoran Chang, is scheduled on Monday & Wednesday 5:00 PM– 7:00 in Life Sciences 129

[1] Religious holiday, atheletic event, illness or accident, family emergency, ...

Rules for quizzes and exams

1. No notes, books, conversations, peeking at a neighbor's answers, note-passing, sign language, mechanical/electrical devices: abacus, camera, telephone, calculator, etc.
2. First violators of rule 1 will receive a 0 for the test. Second violators of rule 1 will receive an F for the course.

Rules for homework

1. You are encouraged to work with other students in the class or with others from whom you can learn.
2. The Academic Support Center may be able to schedueg group study sessions
3. Do not turn in homework when you do not understand the answers. Ask for guidance instead.

Academic integrity

The department enforces an honor code. This honor code establishes a recommended penalty and reporting structure for academic dishonesty.

Offense	Recommended Penalty	Report to
First	Zero on work	Dean of Students
Second	F in course	Dean of Students
Third	Expulsion from Program	UDC

Florida Tech provides guidelines to help students understand plagiarism, its consequences, and how to recognize and avoid academic dishonesty. Lipson describes three principles for academic integrity (Lipson, 2004).

1. "When you said you did it, you actually did."
2. "When you use someone else's work you cite it, When you use their word, you quote it openly and accurately."
3. "When you present research materials, you present them fairly and truthfully. That's true whether the research involves data, documents, or the writing of other scholars."

Issues and Concerns

1. If you have a disability, inform your teacher. Accommodations can be provided.
2. If you have an academic problem, your teacher can link you to support services.

The Patsy Mink Equal Opportunity in Education Act, aka Title IX:

What is Title IX?

Title IX of the Educational Amendments Act of 1972 is the federal law prohibiting discrimination based on sex under any education program and/or activity operated by an institution receiving and/or benefiting from federal financial assistance.

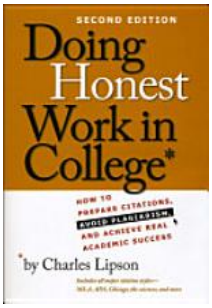
Behaviors that can be considered "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. You are encouraged to report these behaviors.

Reporting

Florida Tech can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one complainant reports having been assaulted or harassed by the same individual.

Florida Tech is committed to providing a safe and positive learning experience. To report a violation of sexual misconduct or gender discrimination, please contact Security at 321-674-8111. *** Please note that as your professor, I am required to report any incidences to Security or to the Title IX Coordinator (321-674-8700).** *For confidential reporting, please contact CAPS at 321-674-8050.*

Suggested Syllabus Language
J. Oglesby: 02/06/2015



Don't fail in silence!

Richard Ford's advice to new students, The Florida Tech Crimson, Fall 2011, Issue 2

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3. If you have a personal issue, without revealing private information, your teacher can link you to support services.

Where to Get Help

1. Your professors (For this class: MWF 9:30 – 10:45 or by appointment)
2. Recitation sessions lead by Haoran Chang Monday & Wesnesday, 5:00 PM to 7:00 in Life Sciences 129
3. Your academic advisor
4. Your first-year advisorno
5. The Computer Sciences Help Desk
6. The Academic Support Center
7. Counseling and Psychological Services

Topics

The course prepares students to solve problems in computing with applications in business, engineering, mathematics, the social and physical sciences and many other fields. Students study discrete, finite and countably infinite structures: logic and proofs, sets, naming systems, in particular, number systems, relations, functions, sequences, graphs, and combinatorics. These topics are commonly used when reasoning about problems and developing correct algorithmic solutions for them.

Outcomes

By the end of the course, each student will be able to:

1. Analyze a complex computing problem and apply principles of discrete mathematics to identify solutions.

Grades

Your final grade will be based on your performance on quizzes, examinations, and discussions of your homework during student-teacher meetings.

Grades and their relation to performance

Grade	A	B	C	D	F
Performance	Excellent	Good	Average	Poor	Failure

Example of course skills:

1. The decimal number 15 can be written as
$$\begin{aligned}(15)_{10} &= (1111)_2 \\ &= (01111)_{2c} \\ &= (F)_{16}\end{aligned}$$
2. $x \in \emptyset \implies x \in \mathbb{X}$.
3. For all natural numbers n
$$\sum_{0 \le k < n} 2^k = 2^n - 1$$
4. For all sets $\mathbb{X}$ and $\mathbb{Y}$,
$$\neg(\neg\mathbb{X} \cup \mathbb{Y}) = \mathbb{X} \cap \neg\mathbb{Y}.$$
5. If $\mathrm{P} = \texttt{False}$, $\mathrm{Q} = \texttt{False}$, and $\mathrm{R} = \texttt{True}$, then
$$(\mathrm{P} \to \mathrm{Q}) \wedge (\neg\mathrm{P} \to \mathrm{R}) = \texttt{True}.$$
6. You can fool some of the people all of the time, and all of the people some of the time, but you cannot fool all of the people all of the time.
$$\begin{aligned}&(\exists p)(\forall t)(\textsc{canfool}(p, t)) \\ &\quad \wedge (\forall p)(\exists t)(\textsc{canfool}(p, t)) \\ &\quad \wedge (\exists p)(\exists t)(\neg\textsc{canfool}(p, t)).\end{aligned}$$
7. Partial orders and equivalences:
$$\subseteq \text{ is a partial order on } 2^{\mathbb{X}}.$$
$$\equiv \bmod m \text{ is an equivalence on } \mathbb{Z}.$$
8. Using an $O(n \lg n)$ sorting algorithm. a million things can be ordered in about 20 million steps.
9. There are $\binom{n}{k}$ k-elements subsets of an n-element set.
10. Basic number theoretic concepts
$$\mathbb{P} = \{2, 3, 5, 7, 11, \ldots\}$$
$$\gcd(51, 24) = 1$$
$$3x = 4 \bmod 5 \implies x = 3$$

The emphasis is on algorithmic problem-solving. Algorithmic efficiency, elegance, and generality are quality characteristics.

See the course management systemfor your current grades.

The percentage of letter grades, averaged over the last 10 offerings of the class, are

A	B	C	D	F
29%	27%	20%	14%	11%

Student performance is measured in the following ways.

1. Four quizzes (60% of grade)
2. A comprehensive midterm examination (20% of grade)
3. A comprehensive final examination (20% of grade)
4. Participation in recitation session subjective fuzzing.

The points you earned are computed by the formula Your score S will be a rational number between 0 and 100 computed by the formula

$$S = \frac{15}{100}\left(\sum_{k=0}^{3} q_k\right) + \frac{20}{100}(\text{midterm+final})$$

where $0 \leq q_k \leq 100$, $k = 0, 1, 2, 3$ are your quiz scores. Extra credit will not be given. Final letter grades will be assigned based on the range in which your score S falls:

$$(90 \leq S \leq 100) \Rightarrow \texttt{A}, \quad (80 \leq S \leq 89) \Rightarrow \texttt{B}, \quad (70 \leq S \leq 79) \Rightarrow \texttt{C}, \quad (60 \leq S \leq 69) \Rightarrow \texttt{D}, \quad (0 \leq S \leq 59) \Rightarrow \texttt{F}$$

The last day to withdraw for the class with a final grade of `W` is Friday, October 17.

Checking Grades

Check you grades on the course management system. Contact your professor when you find an error in your recorded grades. Be able to document the error.

Measure of Success

The target achievement level is that 70% of students will score at or above average (70%) on the final comprehensive examination. The questions on the final measure attainment of course outcomes.

References

Belcastro, Sarah-Marie (2012). Discrete Mathematics with Ducks. Taylor & Francis. [page 3]

Bender, E. A. and Williamson, S. G. (2005). A Short Course in Discrete Mathematics. Dover. [page 3]

Epp, S. (2010). Discrete Mathematics with Applications. Brooks/Cole Publishing Company, 4th edition. [page 3]

Table 1: Achievement Level

	Student's Score on Final	
	Below 70%	70% or Above
Fall 2017	40%	60%
Spring 2017	7%	93%
Fall 2016	26%	74%
Fall 2015	15%	85%
Spring 2015	25%	75%
Fall 2014	55%	45%
Spring 2014	32%	68%
Fall 2013	32%	68%
Spring 2013	48%	52%
Fall 2012	38%	62%
Spring 2012	52%	48%
Fall 2011	34%	66%
Spring 2011	43%	57%
Fall 2010	45%	55%
Spring 2010	42%	58%

Fuson, K. C., Kalchman, M., and Bransford, J. D. (2005). Mathematics understanding: An introduction. In Donovan, M. S. and Bransford, J. D., editors, How Students Learn: History, Mathematics, and Science in the Classroom, pages 217–256. National Academies Press, Washington, D. C. [page 2]

Graham, R. L., Knuth, D. E., and Patashnik, O. (1989). Concrete Mathematics. Addison-Wesley.

Lipson, C. (2004). Doing Honest Work in College: How to Prepare Citations, Avoid Plagiarism, and Achieve Real Academic Success. University of Chicago Press, Chicago. [page 4]

Rosen, K. H. (2011). Discrete Mathematics and Its Application. McGraw-Hill, seventh edition. ISBN 9780073383095. [page 3]

Stanoyevitch, A. (2011). Discrete Structures With Contemporary Applications. A Chapman & Hall book. Chapman and Hall/CRC. [page 3]