

CS 237 Syllabus and Portfolio Winter 2020

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What's It All About?

This course is about **mathematics for computer science**.

It introduces the mathematical topics needed to provide a solid theoretical foundation for your career and continued learning in computer science.

The following topics will be covered:

- Sets and Logic
- Functions and Relations
- Combinatorics and Probability
- Number Theory and Practice
- Trees and Graphs
- Languages and Grammars

Outcomes

- Master the basic terminology and operations of sets and logic, functions and relations, combinatorics and probability, number theory and practice, trees and graphs, and languages and grammars.
- Demonstrate logical reasoning as you solve interesting problems.
- Interpret the meaning of mathematical statements in the context of applications in computer science.
- Think like a mathematician by making good connections.
- Learn basic functional programming through using, reading, and writing elisp code.

Prerequisites

- You must have successfully completed CS 165, Object-Oriented Software Development.
- You must also have developed an awareness of what logical thinking entails.

Requirements

You are required to:

- attend class each class period (but then again, why wouldn't you?);
- read assigned portions of the course materials *before* the class meeting when they will be discussed;
- complete weekly preparation assessments; and
- do weekly homework assignments to deepen your understanding of selected topics.

Required Text

- Metaphors Be With You

Required Software

To install these tools, see the instructions here (and go to the *Tools* section).

- git
- Emacs/Spacemacs

Required Accounts

You are required to have an account using your real name and school email address with (at least) these three platforms:

- <https://github.com> (free)
- <https://kritik.io> (requires paying a \$15 fee)
- <https://quizlet.com> (free)

Required Behaviors

You are required to:

- attend class, as assessments will happen in class each day that are not reproducible outside of class;
- read assigned portions of the course materials *before* class each Tuesday;
- complete all team and personal assessments to deepen your understanding of selected topics; and
- maintain a portfolio of your completed work (see below).

Course Periodicity

This course has a weekly period, i.e., you can count on knowing ahead of time what you will be doing each day of each week. Each class meeting consists of two types of activity:

Tuesdays

Presentation — A time where I will add depth information to the preparation material you finished reading **before class**.

Class Directed Learning — You will participate in a class-wide activity that reinforces what you've read and what I've shown you.

Thursdays

Readiness Assessment — A short in-class quiz on the reading and topics for the week.

Answer Questions — I will answer questions that have surfaced through various means, including the quiz you will have just taken.

Questions

- Some of the questions answered on Thursdays are verbatim or generalized from those you create via the Kritik platform.

- Creating and evaluating questions help you develop higher order thinking skills.
- You will have plenty of questions. Engage with them! Choose knowledge over ignorance.

Work

Exercises

Exercises are smaller experiences that are designed to float uncertainties and questions you have to the surface of your mind. They are designed to be smaller so you can find out what you don't know and then take the steps necessary to know.

Problems

Problems are weightier experiences that invite you to explore topics in discrete mathematics, as well as increase your logical thinking and problem solving prowess. All involve writing mathematically.

Puzzles

Puzzles are like problems, only with another added measure of difficulty that will require even more ingenuity, deep thought and persistent effort to solve. (Think "Escape Room" — where you must solve a series of puzzles in order to escape from a room.) But the hints are more obscure, and in fact the statement of the problem may be obscure, indirect or encoded somehow. Solving these, or even attempting to do so, is one kind of "above and beyond" behavior (see below). Each has four subsections, as shown:

Rephrase

A textual description showing you understand the "heart of the problem".

Approach

A textual description of how you approached solving the problem.

Solution

The solution itself. (Most beneficial if it works, or the correct answer is reached.)

Proof

A textual description of how you know the solution is correct. The more robust the argument, the better.

Assessment

About every four weeks you will meet with me in my office. The purpose of this meeting is for you to present your portfolio of work to me, make a grade-to-date claim, and provide evidence justifying that claim.

Your portfolio **MUST** be a modified version of this file. All entries must follow the example format you will find at the end of this document (when it is updated). Also, your evidences must be complete and internally consistent. You are required to produce your portfolio using Spacemacs, and you **MUST** be able to successfully export it as an HTML file (see above).

Grades

In each of our three personal meetings, you will present your portfolio and a letter-based grade-to-date claim. Afterwards I will give you my thoughts on the strength of your claim. The last claim that you make (**not an average** of the three), taking into account any feedback from me, will be your final grade for the course. All of your claims must be evidence-based. That means you **MUST** bring the evidence with you, in your portfolio, that supports your claim.

Letter-Based

When making your claim, you are required to use the BYU-Idaho standard letter-based definition of grades, reproduced below. **Note with one exception that there are no plusses or minuses!**

- “A” represents outstanding understanding, application, and integration of subject material and extensive evidence of original thinking,

skillful use of concepts, and ability to analyze and solve complex problems. Demonstrates diligent application of Learning Model principles, including initiative in serving other students.

- “B” represents considerable/significant understanding, application, and incorporation of the material that would prepare a student to be successful in next level courses, graduate school, or employment. The student participates in the Learning Model as applied in the course.
- “C” represents sufficient understanding of subject matter. The student demonstrates minimal initiative to be prepared for class. Sequenced courses could be attempted, but mastering new materials might prove challenging. The student participates only marginally in the Learning Model.
- “D” represents poor performance and initiative to learn and understand and apply course materials. Retaking a course or remediation may be necessary to prepare for additional instruction in this subject matter.
- “D-” represents failure in the course. Why not F?

Note that the above description of an “A” implies that you have gone **above and beyond**. To claim this grade you **must** have done and recorded evidence in your portfolio of doing **some** of the behaviors listed below, **each week** throughout each 4-week period.

1. teaching and/or helping others in the class but not in your group
2. teaching a Non-CS, Non-CE, Non-EE, Non-SE major about the material in this class to help them with a class they are taking
3. applying what you’ve learned in this class in another class you are currently taking
4. solving problems marked as optional
5. solving puzzles
6. doing other work not assigned, exploring other topics in mathematics, writing code implementing what you are learning that has not been assigned, etc.

How many is **some**? It is doing at least two of the first three (1, 2, 3), **and** at least two of the last three (4, 5, 6).

Regarding the first two about teaching others, quoting Truman Madsen (quoting the Prophet Joseph Smith): Now one of the strongest and wisest statements I have ever heard on egoism. The question was put to him, “Joseph, is the principle of self-aggrandizement wrong? Should we seek our own good?” Listen to his answer. “It is a correct principle and may be indulged upon only one rule or plan — and that is to elevate, benefit, and bless others first. If you will elevate others, the very work itself will exalt you. Upon no other plan can a man justly and permanently aggrandize himself.”

Moral/Legal

Honor Code

- Academic Honesty
- Dress and Grooming

Links to Official Policies and Channels

- Academic Student Grievance
- Student Support
- Sexual Harassment
- Students with Disabilities

Readings

These readings are to be completed **prior to** each listed week’s Tuesday class. The listed Exercises/Problems/Puzzles (EPPs) for each week are to be completed **prior to** midnight each Saturday. (More details about these EPPs will be available in each week’s course files. Again, the Puzzles are optional, as are some of the Problems.)

Week	Reading	Exercises/Problems/Puzzles (EPPs)
01	<ABC	CRC DGZ CHJ DOK CJF DZB
02	ABC	OQP USV UCA ODS UGX OGR UWM OPZ UOX OTX UOT OIM UIN OJL UCG OIO UIJ OQT UTQ OYU UOH OZD UZM OOO UFZ OKJ UVH OJM ULQ OTD UJU OLH UWY OBW USL OYP UBV OKQ UKF OKL UEZ OYW UEF OUB UQY
03	DEF	TDR WDT TEH WFC TEJ WFK TER WGP TEU WJS TGE WKC THP WKM TIW WNW TKG WOV TME WQW TMZ WRA TNL WRD TNQ WRP TOJ WRU TOL WZO TOU TLI WPI TTV WUZ TUK WVQ TUQ WVU TUW TVL WWS TXG TKH WUE
04	GHI	EBQ MGX ECI MHB ECT MKJ EFE MKL EFS MLB EJE MLU EJK MMC EJU MNE EKQ MON
05	JKL	QAM REX QCV RFC QCZ RFF QDM RGL QEB RGM QFK RHB QGK RVB QGT RJV QIQ RLH QKA RNC QKT RNM QOS ROP QRQ ROX
06	MNO	FAB ISM FBH ITT FDK IVO FDZ IWC FJH IWK FJY IXT FMD IYJ FOJ IZL FOY VAO FQI VAR FQL VAY FQW VCR FRM VEM FUA VFJ FVF VGU FVH VGX FXI VIB FYR VIW
07	PQR	GMQ JPZ GMY JQA GRZ JYA GXF XAJ GYI XFO
08		GYN XGG
09	STU	LDA SQI LJP SUF LNR YGT LDO YCF LUM YZU
10		LTI YDQ LND YTR LGO YIV
11	VWX	HST KDB HTC KPS ABR KWD HRR KEO HMO HIJ
12		KLE HAB KOV HBT AGA KNF HJS HAX KHQ HKE KBB HRL AGD HSG KHO ANA HLX KSI HTR KSQ HBE KSC
13	YZ@	BAO NCO PDQ NTC PTW NTM PMV NES BRZ BRE NGP BRQ PIQ PRK NIO PFA BGT NGI NLR BSP NBO PBI BJO NKY BMI

Portfolio

Your portfolio consists of your Course Tracker together with Grade Claims and Evidences (to be detailed later).

Other

This document may be modified by the instructor at any time without notification.