CSE371, MAT371
LOGIC

Professor Anita Wasilewska
Web page: www3.cs.stonybrook.edu/~ cse371
Spring 2020

SPRING 2020 SYLLABUS UPDATES

Hello, all my students,

I am writing to you now to assure you that I understand you and your difficulties and that I am with YOU and for YOU in our so stressful and fast changing times. Take care of your health and safety- this is the most important. Here is what I decided to make your learning less stressful while keeping learning standards unchanged.

TESTING

Due to the stress and difficulties of everybody's life conditions I decided to give all remaining tests, including Final as take home test. I will design them is a way the most profitable for your new way of learning. For the same reason I also added more extra credit points.

We will still have **Q2, Practice Final** and **Final**

All test are Take Home Test

Practice Final is now an **extra credit** test

TESTS SCHEDULE

Q2 will be posted on Blackboard and course webpage on Wednesday, **April 15** and is and **due** Thursday, **April 16**

Practice Final will be posted on Blackboard and on course webpage on Tuesday, **May 5** and is **due** Thursday, **May 7**

Final will be posted on Blackboard and course webpage on **May 12** and **due** any day before or on a day of **scheduled** Final date

Changes, if any will be published on the Blackboard and course webpage

GRADING

Here are scores for ALL tests.

Q1 and **MIDTERM** scores are **unchanged**

Q1 25

Midterm 75 + 15extra

Q2 25 + 5extra

Practice Final 10extra

Final 75 + 15extra

TOTAL Points is now 300 and you can earn 45 extra credit points.

The %grade = #of earned points / 2

The **Letter Grade** evaluation reminds the same

UNIVERSITY GRADES POLICY

All classes that began the semester with a grading scale of A F or S/U will continue with it.

Students will have the chance to designate if they want a grade or Pass/No Credit. This designation must be made no later than the last day of the classes, Saturday May 9, 2020.

All grades of C or better will be considered a Pass.

MIDTERM RETURN

There will be another announcement on midterm return later. Please read carefully Midterm SOLUTIONS.

LECTURES

I have been recording Video Lectures for you for 10 days already, and I am still doing it.

The plan is to have Lectures for all chapters recorded so you could review them, if needed.

I plan to cover all, or parts of CHAPTERS 4, 5, 6, 7

Video Lectures and corresponding Lectures Slides will be posted on course webpage.

I will post there weekly what you have to prepare for a given week and guide you through the process, in detail.

I will also post what you need to prepare for Q2 and other TESTS

Chapter 4 LECTURE VIDEO is already posted together with corresponding **Chapter 4** Lecture slides

Chapter 5 LECTURE VIDEO will be posted before first day of NEW CLASSES, on Tuesday, March31

The other Chapters LECTURE VIDEOS will follow.

OFFICE HOURS

Following the guidelines from the university, the **Professor** and **TAs** office hours after the spring break will be also moved to **online via email** We will try to respond promptly, but please understand that it may sometimes take one or two days before we get back to you.

TAs emails

Xuan Xu: xuaxu@cs.stonybrook.edu

Debapriya Mukherjee: dmukherjee@cs.stonybrook.edu

PROFESSOR email

Anita Wasilewska: anita@cs.stonybrook.edu

Also, let us know if you'd like to **talk** with any of us over the phone or video chat. It could be arranged when necessary.

Lecture TUESDAY, THURSDAY 1:00pm - 2:20 pm

Location FRAY HALL 105

Professor Anita Wasilewska, e-mail: anita@cs.stonybrook.edu
Please e-mail the professor with serious concerns only

Phone number 632 8458

Office Hours Tuesday, Thursday 5:30 pm - 7:30 pm and by appointment.

Place New Computer Science Building, Room 208, telephone: 2-8458

TA TBA

TA Office Hours TBA

Textbook

Textbook

Anita Wasilewska

LOGICS FOR COMPUTER SCIENCE: Classical and Non - Classical

Springer Nature Switzerland AG 2018 2018

ISBN 978-3-319-92590-5 ISBN 978-3-319-92591-2 (e-book)

Library or Congress Control Number 8948163201

https://www.springer.com/us/book/9783319925905
https://news.stonybrook.edu/facultystaff/sbu-professors-new-logics-book-written-for-computer-scientists/

You can get the book in Hard cover, or in Electronic form.

Springer also has an option of providing you with chapters of your choice.

COURSE Lectures Slides

The course webpage also contains current LECTURES Slides with material we cover during the semester.

Course Goal

The goal of the course is to make student understand the need of, and to learn the formality of logic. The book, and the course is developed to teach not only intuitive understanding of different logics, but (and mainly) to teach formal logic as scientific subject, with its language, definitions and problems.

Course Structure

I will progress relatively slowly, making sure that the pace is appropriate for the students in class. But it doesn't mean that you can just come to class and listen without doing work at home. You have to go over the text in proper chapters; in fact to go over and over again. The book is written with students on my mind so that they can read and learn by themselves, even before coming to class. For sure, it is also essential to study after the class.

Important

There is no recitations, but I will cover some solutions to the course book homeworks assignments and held questions/answers sessions in class.
Students are also responsible to study chapters examples that are not included in Lectures. I may include them in Quizes and Tests.

Workload There will be 2 quizzes, Midterm, and Final examination

The consistency of your efforts and work is the most important for this course.

None of the grades will be curved.

Quizzes: total 50 pts There will be 2 quizzes (35 minutes), 25 points each.

No make-up for quizzes except of important, well proven reasons

I might give some **additional quizzes** for extra credit

Quizzes will be given on **Thursdays** at the end of the class.

Each quiz will consist of **2 -4 questions**

Quizzes and Tests problems will be taken mainly from examples, exercises and problems solved in the Textbook and from Homework Assignments located at the end of the chapters of the book, or will be similar to problems from previous Quizzes and Tests as published on the course Webpage.

Quizzes and Tests are **closed book** (and cell phones) examinations.

Midterm (75pts) Midterm will covers material from Q1 and material covered after Q1 in class before Midterm

Final (75pts) Final will cover mainly material covered after Midterm including material from Q2 and covered after Q2.

Extra Credit I will give some extra credit problems on Tests and Quizzes.

Previous TESTS and Quizzes

I posted a collection of past Quizzes and Tests on the course Webpage. They are designed to help you to learn what you have learned and what you still may not understand.

Final grade computation

You can earn up to 200 points + x extra credit points = (200 + x) points during the semester.

Extra points are BENEFICIAL for students as they add to the TOTAL number of points!!

None of the grades will be curved

The grade will be determined in the following way:

# of earned points divided by 2 = % grade.

The % grade is translated into a letter grade in a standard way i.e.

$100 - 95$ % is A, $94 - 90$ is $A-$,
$89 - 86$% is $B+$, $85 - 83$ % is B, $82 - 80$ % is $B-$,
$79 - 76$ % is $C+$, $75 - 73$ % is C, $72 - 70$ % is $C-$,
$69 - 60$ % is D range and F is below 60%.

Tentative Quizzes and Tests schedule
Changes (if any) will be advertised on the course webpage

Q1 Thursday, Febuary 2015 -22

MIDTERM Thursday, March 12 in class

Spring Break March 15 - 22

Q2 Thursday, April 16

Last Class (Review for Final) Thursday, May 7

FINAL time and place as scheduled by University during the FINALS TIME: May 12 - 20

Course Content

The course will cover a **selection** of the following subjects.

1. Paradoxes and Puzzles (Chapter 1)

2. Introduction to classical Logic (Chapter 2).
Propositional and predicate languages. AI languages. Basic propositional and predicate tautologies. Equational Laws for quantifiers.

3. Propositional Semantics: Classical and Many Valued (Chapter 3).
Formal propositional languages. Classical semantic: formal definitions of model, counter model, tautology. Equivalence of propositional languages, Some many valued semantics.

4. General Proof Systems: Syntax and Semantics (Chapter 4).
General definition and examples. Definition of a formal proof. Relationship between proof systems and their semantics. Definition of notions of *soundness* and *completeness* of a given proof systems relatively to given semantics. Definition of a logic as a complete proof system.

5. Hilbert Proof Systems: Completeness of Classical Propositional Logic (Chapter 5).
Hilbert style proof systems for classical propositional logic. Proofs of the Deduction theorem, and two different proofs of the Completeness theorem.

6. Automated Proof Systems:Completeness of Classical Propositional Logic (Chapter 6).
Automated Gentzen type proof systems: RS, RS1, RS2 for Classical logic. Examples of the automatic proof-search. Constructive proof of the Completeness Theorem. Original Sequent Gentzen proof systems GL, G, LK or Classical logic.. Completeness and Hauptxatz Theorems.

7. Introduction to Intuitionistic and Modal logic (Chapter 7).
Hilbert and Gentzen style proof systems for Intuitionistic logic. Heuristic decision procedures. Relationship between Intuitionistic and Classical logics. Hilbert style proof systems for Modal logics S4 and S5. Relationships with Intuitionistic logic.

8. Classical Predicate Semantics and Proof Systems (Chapter 8).
Formal Predicate Languages. Classical semantics. Predicate Tautologies, Hilbert proof systems. Completeness theorem.

9. Hilbert Proof Systems: Completeness of Classical Predicate Logic (Chapter 9).
Reduction of Predicate logic to Propositional logic. Proof of the Completeness Theorem.

10. Predicate Automated Proof Systems: Completeness of Classical Predicate Logic (Chapter 10). Automated Gentzen type proof system QRS. Constructive proof of the Completeness Theorem.

11. Formal Theories and Gödel Theorems (Chapter 11).
Definition and examples of formal theories. Formal theory of Natural numbers PA (Peano Arithmetic). Consistency and Completeness of formal theories. Gödel Incompleteness Theorems.

ACADEMIC INTEGRITY STATEMENT (Adopted by the Undergraduate Council September 12, 2006)

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Stony Brook University Syllabus Statement If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services at (631) 632-6748 or http://studentaffairs.stonybrook.edu/dss/. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: http://www.sunysb.edu/ehs/fire/disabilities.shtml