Catalog Description
Basic set theory and symbolic logic. Methods of proof, including mathematical induction. Relations, partitions, partial orders, functions, and graphs. Modular arithmetic. Credit cannot be given for both MAT 375 and CIS 375.

Instructor Information
Prof. Susan Older (sueo@ecs.syr.edu)
Office: CST 4-181, x4679 (email’s much better than phone)
Office hours: Mondays (3-5pm), Fridays (1:30-3pm), or by appointment.
You can also catch me after class!

TA Information
Christopher Sanford (crlenfor@syr.edu) and Zhiruo Zhao (zzhao11@syr.edu)
Office & office hours: to be announced

Recitation sections for lecture section M001 (TuTh 2-3:20pm):
   Wed  10:35-11:30am  Shaffer Art Building 221D
   Thurs 11:00-11:55am  CST 3-216
Recitation sections for lecture section M004 (TuTh 11-12:20pm):
   Wed  2:15-3:10pm  CST 3-212
   Wed  3:45-4:40pm  Heroy Geology Building 013

Course Web Address
http://www.cis.syr.edu/~sueo/cis375

Textbook

A copy of this textbook has been placed on 2-hour course reserve at SU’s Bird Library.

Course Objectives
There are two primary goals of this course. The first goal is to introduce you to the fundamental mathematical structures used throughout computer science and computer engineering, such as sets, functions, relations, and graphs. These structures arise again and again in different settings, including algorithms, artificial intelligence, databases, digital design, operating systems, security, and software and hardware verification. The second goal is to help you develop the reasoning skills necessary for learning—and evaluating claims about—new computing concepts. Given the dynamic nature of the computing field, such skills are essential for success.

Prerequisites
In the pre-requisite course PHI 251 (Logic), you worked with both propositional and predicate logic, studying notions of validity, logical consequence, and formal proof. This course builds on those
foundations to provide precise definitions of discrete structures used in computing and to support rigorous (but not always formal) proof and analysis of the structures’ properties.

**Course Outcomes**

After successfully completing this course, you should be able to do the following:

- Translate between informal (but precise) English and the language of set theory.
- Specify and manipulate basic mathematical objects, including sets, functions, and relations.
- Construct and verify mathematical proofs.
- Use mathematical and structural induction to prove simple mathematical properties of a variety of discrete structures.
- When given a property about sets, functions, or relations, determine its validity and provide either a rigorous proof or a counter-example.
- When given a set, determine whether it is countable and provide convincing support for that answer.

**Outcome Measurement**

Your final grade will be based on a variety of activities:

- **Homework assignments (25% of final grade)**
  Homeworks are intended to give you practice with course material, as well as feedback on your efforts: be sure to *pick up and look at* your graded assignments. There will be a homework assignment approximately every week: all homeworks are equally weighted, and I will drop the lowest homework grade at the end of the semester. Occasionally, students may be asked to explain their homework to me or to the TA: in such cases, the homework grade will be based on the results of this explanation.

  Homeworks assignments should be turned in at class or placed in the marked bin in the hallway near CST 4-226; you will need to complete, sign, and attach a disclosure cover sheet with each assignment. Assignments are due by the date and time specified on them: *No late assignments will be accepted*.

- **Pop Quizzes and Participation (10% of final grade)**
  On occasion I may give an unannounced, brief quiz. These quizzes will be graded on the following scale:

<table>
<thead>
<tr>
<th>Points</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>3</td>
<td>Substantially correct</td>
</tr>
<tr>
<td>2</td>
<td>Partially correct</td>
</tr>
<tr>
<td>1</td>
<td>Primarily incorrect or no answer</td>
</tr>
<tr>
<td>0</td>
<td>No quiz submitted (i.e., absence)</td>
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</tbody>
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  Pop quizzes are intended to provide both you and me with more timely feedback on the class’s understanding of key concepts.

  I may sometimes introduce an in-class activity and also treat this participation as a pop quiz gradewise.

- **Exams (65% of final grade)**
  Exams allow you to demonstrate your understanding and mastery of the course concepts. There will be three in-class exams during the semester. There will also be a two-hour *optional* final
exam: the exam portion of your final grade will be the greater of (1) your cumulative average of the in-class exams, and (2) your score on the final exam.

All grades are recorded in the Blackboard system. I encourage you to check them frequently, and let me know if you find any discrepancies. The scale for converting your numeric overall grade (calculated as stated above) to a course letter grade will be no more restrictive than the following:

<table>
<thead>
<tr>
<th>A numeric score of at least</th>
<th>results in a course grade of at least</th>
</tr>
</thead>
<tbody>
<tr>
<td>93.0</td>
<td>A</td>
</tr>
<tr>
<td>88.0</td>
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<tr>
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<td>B+</td>
</tr>
<tr>
<td>76.0</td>
<td>B</td>
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<tr>
<td>70.0</td>
<td>B-</td>
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<tr>
<td>65.0</td>
<td>C+</td>
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<tr>
<td>60.0</td>
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<tr>
<td>50.0</td>
<td>D</td>
</tr>
<tr>
<td>0.0</td>
<td>F</td>
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Course Topics

Other Information
Academic Integrity
Syracuse University's academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The pilot policy in effect at the College of Engineering and Computer Science defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The pilot policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The pilot policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the pilot policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered. SU students are required to read an online summary of the university's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. For more information and the pilot policy, see: http://academicintegrity.syr.edu

My expectations for this course are the same as those enumerated in the pilot policy: you should (1) credit your sources, (2) do your own work, (3) communicate honestly, and (4) support academic integrity. Every student must read and sign a copy of the course Honor Policy, which
elaborates on how academity integrity applies to this course. Students will receive zeroes on all coursework until this sheet is turned in.

The pilot policy Violation and Sanction Classification Rubric establishes recommended guidelines for the determination of grade penalties by faculty and instructors, while also giving them discretion to select the grade penalty they believe most suitable, including course failure, regardless of violation level. Any established violation of the pilot policy in this course will result in a failing grade for the course.

Accommodations

Our community values diversity and seeks to promote meaningful access to educational opportunities for all students. Syracuse University and I are committed to your success and to supporting Section 504 of the Rehabilitation Act of 1973 as amended and the Americans with Disabilities Act (1990). This means that in general no individual who is otherwise qualified shall be excluded from participation in, be denied benefits of, or be subjected to discrimination under any program or activity, solely by reason of having a disability.

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), http://disabilityservices.syr.edu, located at 804 University Avenue, Room 309, or call 315-443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented disabilities “Accommodation Authorization Letters,” as appropriate. Because accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

Religious Observances  SUs religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.

Attendance

If you are unable to attend a lecture for some reason, then please send me email before that lecture begins: I will generally excuse a missed quiz or participation grade if I receive prior notice of your absence.

Accreditation

As part of the regular ABET accreditation process for the undergraduate program in computer engineering, we may be collecting samples of students’ work in this class. As a result, some of your homeworks/exams may be photocopied and saved to present to the ABET evaluators who visit next fall.