KENNESAW STATE UNIVERSITY

SYLLABUS

COLLEGE OF COMPUING AND SOFTWARE ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE

CS5070 MATHEMATICAL STRUCTURES FOR COMPUTER SCIENCE

SECTION W01 – Summer 2025

Course Information

Class meeting time: Online
Modality and Location: Online
Course schedule posted in D2L

Instructor Information

Instructor: Umama Tasnim
Email: utasnim@kennesaw.edu
Office Location: J-353C
Office Hours (Online): By appointment only Preferred method of communication: e-mail.

Course Description

Pre-requisites: Appropriate undergraduate degree.
CS 5070: Mathematical Structures for Computer Science
3 Class Hours 0 Laboratory Hours 3 Credit Hours

This course covers discrete mathematics topics, including elementary set theory, relations, functions, principles of counting, graphs, formal logic, recursion, and mathematical proof methods. This course includes introduction to formal languages such as regular and context-free languages. Emphasis is given to how mathematics relates to computer science.

Course Materials

Required Texts:
Discrete Mathematics: An Open Introduction. Oscar Levin. 3rd Edition. 2019 Creative Commons. ISBN: 978-1792901690. Available online.

Additional Recommended/reference Texts:

Discrete Mathematical Structures, by Kolman, Busby, Ross, Edition: 6/E, 2009, Pearson, ISBN: 978-0-13-229751-6 / 0-13-229751-5

Additional notes provided on D2L.
Note that D2L Learning modules each have an expiration date.

Minimum Technology Requirements

Access to D2L access requires computer resources. Generally, basic standards include a computer (either a PC or a Mac) that is less than five years old, equipped with at least Microsoft Office (including Word, PowerPoint, and Excel) and recent versions of free media players (e.g. RealPlayer, Windows Media Player, QuickTime).

Your internet connection will also be important to your ability to access information on D2L. Faculty often use audio and video files that would take a very long time to download over slow internet connections. We highly recommend a high-speed internet connection for taking online courses.

Minimum Technical Knowledge and Skills

Software tools required:

For all **email communication**, you must use the following:

1. E-mail messages must include appropriate indication in the Subject area. These are the course type (prefix) and number, section number, and phrase or label that indicates the purpose of the message.
2. All attached files must use an appropriate file name that include the course type (prefix), course number, section number, your name (initial and last name separated by underscore), and content name. All these items must appear in the indicated order and be separated with underscores.

This course requires participants to have average computer literacy. Students should be proficient with the basic functions of standard software packages (e.g., MS Word, MS Excel, MS PowerPoint, and Adobe Reader) and standard players (e.g., QuickTime, Windows Media Player). These programs will need to be accessible to students through home use or other computer access. A list of primers on many of these technologies is available at https://apps.kennesaw.edu/portal/prod/app_uni_cdoc_publ/documents/

A working knowledge of the D2L learning management system is required for participation in online courses. All submitted work will be graded according to the rubrics described in the document 'Rubrics_grading.docx'.

Learning Course Outcomes

Upon the completion of the course, students should be able to

1. Demonstrate understanding of applying elementary formal logic and proof methods, e.g., proof by counterexample, proof by contradiction, mathematical induction, to prove mathematical statements and theorems.
2. Demonstrate the familiarity with the concept of recursion and solving recurrence relations.
3. Demonstrate understanding of performing various operations and properties on sets, relations, and functions, and of their applicability to computer science,
4. Demonstrate the familiarity with the basic formal languages such as regular and context-free languages, and
5. Demonstrate understanding of representing and performing operations on trees and graphs.

Course Requirements and Assignments

The required coursework consists of: four quizzes, one test (midterm), seven assignments and one course project. The online sections include Discussion questions to be answered for all eight course modules. All assignments (and the course project report) must be submitted in a report format, see 'submission_report.pdf'. A submission might also require attached source files, input data and output data files. All files in a submission must be archived (in a single ZIP file). Files submitted must have an appropriate file name (see above). See rubrics. Assignments and quizzes will be graded over 10 points. Late assignments will have a reduced grade (1 or 2 points for every day).

Note that all modules have a start date/time, and expiration date/time. You must read frequently the course calendar on D2L. You must exercise very good time management.

Students are expected to participate in D2L discussions, reason about problems, and exercise initiative, creative and critical thinking in their work. In addition to learning the principles and concepts in the course content, students are expected to learn and use the appropriate terminology and to exercise good writing knowledge and skills. Assignments and the course project must be formatted in a report form. See 'Submission_report.pdf'. See rubrics described in the document 'Rubrics_grading.docx'.

The KSU Writing Center helps students in all majors improve their writing. Experienced, friendly writing assistants help with topic development, revision, research, documentation, grammar, and more. For more information or to make an appointment, visit writingcenter.kennesaw.edu or stop by English Building, Room 242 (Kennesaw campus) or Building A, Room 184 (Marietta campus).

Student-centered Learning
Variety of online student-centered learning tools will complement individual student learning styles and help students becomes more versatile learners.

Collaborative Learning
Online group work allows students to become more active participants in the learning process. Contributing input requires that students comprehend what is being discussed, organize their thinking coherently, and express that thinking with carefully constructed language.

Course Delivery

If you are feeling ill, please stay home and contact your health professional. In addition, please email your instructor to say you are missing class due to illness. Signs of COVID-19 illness include, but are not limited to, the following:

- Cough
- Fever of 100.4 or higher
- Runny nose or new sinus congestion
- Shortness of breath or difficulty breathing
- Chills
- Sore Throat
- New loss of taste and/or smell

COVID-19 vaccines are a critical tool in "Protecting the Nest." If you have not already, you are strongly encouraged to get vaccinated immediately to advance the health and safety of our campus community. As an enrolled KSU student, you are eligible to receive the vaccine on campus. Please call (470) 578- 6644 to schedule your vaccination appointment or you may walk into one of our student health clinics.
For more information regarding COVID-19 (including testing, vaccines, extended illness procedures and accommodations), see KSU's official Covid-19 website.

Face Coverings

Based on guidance from the University System of Georgia (USG), all vaccinated and unvaccinated individuals are encouraged to wear a face covering while inside campus facilities. Unvaccinated individuals are also strongly encouraged to continue to socially distance while inside campus facilities, when possible.

Evaluation and Grading Policies

Grading Distribution

Midtrem	20%
Assignments	20%
Quiz	10%
Final exam	25%
Project	25%

GRADING SCALE:
90% - 100 % A
80% - 89% B
70% - 79% C 60% - 69% D
0% - 59% E

Course Policies

Late work (assignments) will be graded with 15 % lower grade for each day of lateness, missed quizzes and exams will default to no grade (zero).

Institutional Policies

Federal, BOR, & KSU Course Syllabus Policies:
http://curriculum.kennesaw.edu/resources/federal_bor_ksu_student_policies.php

Student Resources:
http://curriculum.kennesaw.edu/resources/ksu_student_resources_for_course_syllabus.php

Academic Integrity Statement:
http://scai.kennesaw.edu/codes.php

KSU Student Resources

This link contains information on help and resources available to students:
https://curriculum.kennesaw.edu/resources/ksu_student_resources_for_course_syllabus.php

Course Content

Course Topics and Outline: Students are expected to review the chapters of the required textbooks that are covered in classes. It is highly recommended that students preview relevant chapters before the classes.

Table of Contents:

Modules	Topics	Chapters
M1	Foundations. Intro to Discrete Mathematics; Logic	0
M2	Sets; Relations, and Functions	0.3
M3	Counting	1
M4	Sequences	2
M5	Symbolic Logic and Proofs	3
M6	Graphs	4
M7	Generating Functions and Number Theory	5
M8	Int. to Formal Languages	Additional materials

GENERAL EXPECTATIONS FOR COURSEWORK IN GRADUATE PROGRAMS

Graduate study is markedly different from undergraduate study. This graduate course syllabus serves as a general description of goals and expectations in the course, as well as providing logistical and organizational information. It has been approved by the Faculty of your Academic Department to meet objectives in your discipline, as well as the University's Graduate Faculty standards for graduate study. It contains a number of resources for and expectations of you as a student. Instructionally, it is a general "plan" for the course and not a contract - please know that the course instructor is permitted some departures from it. If you have questions regarding this, please contact the Chair of your Academic Department.

1. **Roles and Responsibilities.** A graduate student should always remember that he or she is taking a particular graduate course to learn advanced content in an academic discipline. While graduate students are expected to think critically and ultimately be able to demonstrate mastery of advanced disciplinary knowledge, his or her instructor has already earned at least one – if not multiple – advanced degrees in the discipline, and spent (in some cases) decades studying it. A Graduate Faculty member may be regarded as a state or national authority in some aspect of the discipline being studied. Moreover, the instructor has an equal instructional obligation to all graduate students engaged in a particular learning activity. Consequently, the graduate instructor exercises discretion in framing

instructional interactions about the discipline with graduate students, which may include decisions to terminate discussions or move the discussion to another topic.

2. **Responsibility for Demonstrating Mastery of Advanced Content.** Admission to a graduate program is both elective and selective. In graduate study, a graduate student bears primary responsibility for acquiring knowledge about the discipline he or she is studying. The primary role of a graduate instructor is to assist the student in appropriately applying that knowledge at an advanced level in the discipline. Ultimately, a graduate course provides a graduate student with the opportunity to demonstrate that she or he can master and apply advanced knowledge in an academic discipline. The burden of demonstrating this mastery and application to the satisfaction of the Graduate Faculty lies solely with the graduate student.

3. Availability of Graduate Faculty Members. Members of the Graduate Faculty are expected to be authorities in their academic disciplines. In addition to teaching, graduate faculty members serve in significant research, professional, and academic roles. Graduate students should be aware that, in any given semester, these other responsibilities may constitute between forty (40) and eighty (80) percent of a professor's workload. Consequently, graduate students are advised to schedule meetings with their instructors well in advance, knowing that a Graduate Faculty member's research and service obligations may result in him or her not being able to respond to the student for up to two (2) days during the academic week (M-F).

4. **Interactions with Graduate Faculty Members.** A graduate student should ensure that his or her interactions with her or his instructors are professional and appropriate. It is a relationship that is far more analogous to an employment relationship than a social friendship.

Within the Classroom (or Analogous) Environment. While graduate student thinking and discussion is expected to be far deeper, more challenging, and more critical about the advanced topic being studied than in undergraduate coursework, the context in which these discussions are framed should remain academically detached and appropriate. An element of graduate education – and particularly the application of advanced content – may require a graduate student to demonstrate the ability to think and analyze advanced knowledge in the discipline in a detached and clinical fashion.

This can be challenging when the topic under discussion relates to assumptions the student has never challenged previously. Neither graduate students nor members of the Graduate Faculty should "personalize" these discussions. A graduate student does not have the right to disrupt instruction in a learning activity. If a graduate student believes he or she cannot continue to engage in the discussion with appropriate academic detachment, she or he should disengage from the activity until the time that he or she believes he or she can appropriately resume. Simply put, in graduate study, thinking should be disruptive – conduct should never be.

Outside the Traditional Classroom Environment. While graduate students and their faculty members may have richer and less formal interactions outside of the classroom environment than those in undergraduate programming (for example, having coffee together to discuss a particular aspect of a study the student wishes to conduct or jointly working on research), it is important for both the faculty member and graduate student to remember that the "formal" instructor/student relationship that undergirds these interactions, and act consistently with that. If a graduate student believes that the faculty member's interactions with him or her are inappropriate, the graduate student should contact the Department Chair of her or his academic department, or the appropriate University official.

5. **Intellectual Property Issues.** More than any other part of the University enterprise, graduate study may result in the creation of ideas and thinking that are legally recognized and protected as intellectual property. Consequently, graduate students should carefully monitor their conduct to ensure that they do not inadvertently misappropriate the intellectual property of a member of the Graduate Faculty or another graduate student. The Graduate College has prepared an overview of intellectual property issues

6. **Electronic Recording.** While graduate students may wish to electronically record a class session as a study aid, in graduate school, this requires a careful balancing of the interests of the student, her or his fellow students, and the graduate instructor. Consequently, a graduate student may not disseminate any electronically recorded class discussion unless given explicit permission by the graduate instructor in writing. Irrespective of whether the student disseminates it, a graduate student should ask permission of his or her graduate instructor before electronically recording the instructor's lectures.

A University generates ideas, and ideas can become intellectual property irrespective of whether they are written in a book or paper. As a recognized authority in her or his academic discipline who has spent years studying, synthesizing, and expanding advanced knowledge in the academic discipline to which he or she has devoted his or her life's work, a graduate instructor has a legally-recognized property interest in her or his thinking about that work, which may include the graduate instructor's lectures. Kennesaw State University prohibits the misappropriation of intellectual property (which is a form of theft), which can result in discipline for a graduate student, up to and including dismissal from the University. If the graduate student is also a member of a profession with an applied code of ethics, it may additionally result in professional discipline, as well as subjecting the student to any civil legal remedies protecting intellectual property. Graduate students should recognize the rights of their fellow graduate students to engage in free exchange of ideas in their graduate coursework, asking questions or making observations that they might not make if they believed those observations could be publicly disseminated without their knowledge or permission.

If a student needs to electronically record a course as a result of a recognized disability or other exceptionality, the student should contact the University's Disabled Student Support Services to develop an appropriate reasonable accommodation.