KENNESAW STATE UNIVERSITY
COLLEGE OF COMPUTING AND SOFTWARE ENGINEERING
Department of Computer Science

CS 4504 – Parallel and Distributed Computing
Summer 2021

SYLLABUS

FACULTY AND COURSE INFORMATION

Kun Suo
Assistant Professor
Email: ksuo@kennesaw.edu (D2L email system)
Home page: https://kevinsuo.github.io
Office: J-318
Office Hours: Email, Microsoft Teams or by appointment

Class Location and Meeting Times:

Time: D2L
Location: D2L

Course Communication and Office Hours- Students can ask questions by sending messages to the instructor via the course management system (i.e., D2L). Students can also meet with the instructor during the office hours or at a scheduled date and time.

Electronic Communications - The University provides all KSU students with an 'official' email account with the address 'students.kennesaw.edu.' As a result of federal laws protecting educational information and other data, **this is the sole email account you should use to communicate with your instructor or other University officials.**"

Required Texts or Other Resources –

An Introduction to Parallel Programming. Peter S. Pacheco, ISBN: 978-0-12-374260-5

[Recommended/Other Textbooks]

Distributed Systems 3rd edition. M. van Steen and A.S. Tanenbaum ISBN-13: 978-1543057386

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.

COURSE DESCRIPTION, CREDIT HOURS, AND PREREQUISITES

CS 4504: Parallel and Distributed Computing
3 Class Hours 0 Laboratory Hours 3 Credit Hours
This course covers various aspects of parallel and distributed processing and algorithm design with an emphasis on programming. Topics include: Taxonomy of parallel architectures; Shared-memory vs. message-passing architectures; Computation models and Performance metrics; Parallel/distributed algorithm design - basic techniques; Parallel/distributed programming techniques and issues: partitioning, load balancing, synchronization, task scheduling, message overheads, etc.; Parallel/distributed algorithms for sorting, matrices, etc.; Debugging, Profiling, and Performance enhancements of parallel and distributed programs.

COURSE LEARNING OUTCOMES

At the end of the course students will be able to:

1. Apply problem solving (analysis, design, and development) skills to distributed and parallel computing applications
2. Identify and decompose complex systems into its components parts
3. Integrate OS and programming language concepts to solve/implement the (distributed) components of the systems
4. Develop suites of networking protocols for implementing the communicating components
5. Evaluate or validate their implementations via simulations and/or realistic projects using PDC platforms or IDEs such as MPI and RMI (with UDP/TCP) or PThreads.

NOTE: The listed course learning objectives above are "officially" approved ones (i.e., KSU Curriculog), during the consolidation of university. It is likely that these objectives will be reviewed in future.

TEACHING PHILOSOPHY AND INSTRUCTION METHODS

As computer science and technology are becoming the backbone of today's world and developing so rapidly, a successful education comes from not only providing students with solid knowledge and existing skills, but also teaching them the thinking of solving new problems and passion to explore the unknown. First, interest is the best teacher for everyone, and I will seek to make the courses interesting and motivate the students engaging in learning. Second, I will not only teach the fundamental concepts and basic knowledge, but also work with my students on the cutting-edge problems and explore the connections between these issues with what we learnt. Last and most importantly, my goal is to guide students to help them develop the ability to find problems, conduct research, design solutions and collaborate with others.

COURSE CONTENT AND REQUIREMENTS/GRADING SCALE

Course Topics and Outline

- Distributed hardware and software
- Pthread, OpenMP and MPI
- Distributed resource management and scheduling
- Distributed data storage and file system

Final Exam: TBD

Week	Topic	Reading	Assignment Due
1	Overview, Overview of Parallel and Distributed Programming	Ch 1 & 2	
2	Process, Thread		
3	MPI	Ch 3	Pthread Project
4	Midterm Exam		
5	Pthreads	Ch 4	Pthread Project
6	OpenMP	Ch 5	OpenMP Project
7	Distributed scheduling and storage		
8	Final exam		

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may

need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

Grading Scale and Course Policies

Homework, quizzes, project, and exams will be given numerical scores. These scores will be averaged at the end of the semester using the following weighting:

Item	Points, percentage or measurement
Homework/Project	45%
Mid Exam	25%
Final Exam	30%

Homework Submission: Copying or paraphrasing codes from other sources or other students will be considered a violation of the Student Code of Conduct. Due dates for homework assignments will be specified on the homework themselves. No late submission is accepted.

Letter grades will be determined by ranking the numerical averages of all students in the class. Cut-off points for grades will depend on the performance of the class as a whole; however, they will be no higher than 90 (A), 80 (B), 70 (C), and 60 (D).

Your final weight average will be used to determine your final letter grade using the table below:

Grade	Points, percentage or measurement
A	90-100
B	80-89
C	70-79
D	60-69
F	0-60

Course Policies:

Attendance Policy: Regular attendance is expected; please notify me in advance if you will be unable to attend because of business travel or other valid reason. If a student misses 2 or more than 2 classes, the student's final grade may be decreased.

Quiz/Exam Policy: Quiz/Exam Policy: Three exams will be given throughout the semester. Students who are late to class on a day when an exam is administered will not be given extra time to complete the exam. Makeup exams **WILL NOT** be given. For online students, please read http://www.kennesaw.edu/dlc/virtualexam/ .

Electronic Devices and Classroom Behavior Policy: In order to minimize the level of distraction, all beepers and cellular phones must be on quiet mode during class meeting times. Students who wish to use a computer/PDA for note taking need prior approval of the instructor since key clicks and other noises can distract other students. Recording of lectures by any method requires prior approval of the instructor. Students using a laptop in class should not check their email, browse the web, or in other way detract from the focus of the class.

Students are reminded to conduct themselves in accordance with the Student Code of Conduct (KSU Student Code of Conduct, Section III), as published in the Undergraduate and Graduate Catalogs. Every KSU student is responsible for upholding the provision. Students who are in violation of KSU policy will be asked to leave the classroom and may be subject to disciplinary action by the University.

Tutoring: The College of Computing and Software Engineering offers some tutoring services for certain courses.

If this applies to your course, you may want to include this resource for your students. Tutoring info can be found here: http://ccse.kennesaw.edu/ccselabs/ccse-tutoring.php

COURSE WITHDRAWAL

See below for commentary on withdrawals from the 2020-2021 Graduate Catalog:

Students may withdraw from one or more courses up to one week prior to the last day of class. To completely or partially withdraw from classes at KSU, a student must withdraw online at www.kennesaw.edu, under Owl Express, Registration and Student Records. Students who officially withdraw from courses before mid-semester will receive a "W" in those courses and receive no credit. They will not, however, suffer any academic penalty. Students who officially withdraw after mid-semester one week prior to the last day of class will receive a "WF," which will be counted as an "F" in the calculation of their grade point average. Exact withdrawal dates will be published in the official academic calendar and are subject to approval by the Board of Regents.

For attendance verification, faculty may assign "non-attendance" or submit a grade of W or WF for students who stop attending class and do not officially withdraw along with the last day of known attendance.

The only exceptions to these withdrawal regulations will be for instances involving unusual circumstances that are fully documented.

Students will receive refunds only when they withdraw from all their classes and only by the schedule outlined in the University System refund policy.

GRADE APPEALS AND STUDENT COMPLAINTS

See below for commentary on withdrawals from the 2019-2020 Graduate Catalog:

Grade appeal will follow the level of the course. Students' rights to grade appeals are defined in the university catalog. A key element in the grade appeal procedure is the faculty member's responsibility to publish a specific grading policy for each of his/her classes. Specifically, the grade appeal procedure states: "Each faculty member must specify his/her grading policy, at the first of the semester. He/she may change his/her grading policy for cause after that time, but he/she must do so uniformly, with ample notification to students, if at all possible."

Note that failure to publish the grading policy would mean that a faculty member would have great difficulty in sustaining his/her assigned grade if a student appealed with anything but a frivolous or irresponsible basis for his/her charge. The grading policy should be quite specific and should be distributed to each class in written form. Some departments may also require faculty members to file grading policy statements in the departmental office. Because the student can submit a grade appeal to the Department Chair within 20 business days after the first day of classes of the next academic term after the academic term in which the final grade was awarded to the student (see Grade Appeals Procedure, section B), it is strongly recommended that instructors retain any student papers, tests, projects, or other materials not returned to the student for 70 days after the end of a semester or if an appeal is filed until the appeal is resolved. Refer to the following section for specific grade appeal procedures.

Students can find more details regarding the appeal process here:
http://catalog.kennesaw.edu/

ACADEMIC INTEGRITY

Every KSU student is responsible for upholding all provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. The Code of Conduct includes the following:

- Section II of the Student Code of Conduct addresses the University's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.
- Students involved in off-campus activities shall not act in a disorderly or disruptive fashion, nor shall they conduct any dangerous activity.
- Students involved in off-campus activities shall not take, damage or destroy or attempt to take, damage or destroy property of another.

Frequently students will be provided with "take-home" exams or exercises. It is the student's responsibility to ensure they fully understand to what extent they may collaborate or discuss content with other students. No exam work may be performed with the assistance of others or outside material unless specifically instructed as permissible. If an exam or assignment is designated "no outside assistance" this includes, but is not limited to, peers, books, publications, the Internet and the WWW. If a student is instructed to provide citations for sources, proper use of citation support is expected. Additional information can be found at the following locations:

- http://www.apa.org/journals/webref.html
- http://bailiwick.lib.uiowa.edu/journalism/cite.html
- http://www.indiana.edu/~wts/wts/plagiarism.html
- http://www.virtualsalt.com/antiplag.htm

CAMPUS POLICIES

Confidentiality and Privacy Statement (FERPA):
Kennesaw State University adheres to the Family Educational Rights & Privacy Act of 1974 - FERPA. See the following link for more information:
http://usg.edu/information_technology_handbook/section9/tech/9.5_privacy_and_security

University - Student Rights & Responsibilities:
Students of Kennesaw State University are entitled to an environment that is conducive to learning and individual growth. To this end, students enrolling at Kennesaw State University assume a responsibility to abide by the policies and regulations expressed in this section. By doing so, students may fulfill their responsibilities and enjoy the exercise of their own rights while also respecting the rights of others.
http://catalog.kennesaw.edu/content.php?catoid=27&navoid=2263

Ethics Statement:
All students are responsible for knowing the information, policies and procedures outlined in the Kennesaw State
University Codes of Conduct. The KSU Codes of Conduct include: the general Student Code of Conduct, the Residential
Code of Conduct, and the Code of Academic Integrity. Kennesaw State University reserves the right to make changes to this code as necessary and once those changes are posted online, they are in effect. Students are encouraged to check online for the updated versions of all policies.
http://scai.kennesaw.edu/codes.php

Sexual Misconduct Policy:

Kennesaw State University is committed to providing programs, activities, and educational environment free from all forms of sex discrimination. For more information click here. KSU issues this statement of policy to inform the community of the University's comprehensive plan addressing sexual misconduct, educational programs, and procedures that address sexual assault, domestic violence, dating violence, and stalking, whether the incident occurs on or off campus. This policy generally covers faculty, students, and staff of the University, as well as third parties. Third parties include but are not limited to guests, vendors, contractors, retirees, and alumni.
http://scai.kennesaw.edu/procedures/sexual-misconduct.php

Course Accessibility Statement (ADA Statement):
http://catalog.kennesaw.edu/content.php?catoid=27&navoid=2263&hl=FERPA&returnto=search#ADA

ADDITIONAL STUDENT RESOURCES

For CCSE Student resources:
http://ccse.kennesaw.edu/student-resources.php

KSU Service Desk:
The KSU Service Desk is your portal to getting assistance or access to University IT Services. Students call: 470-578-3555 or email studenthelpdesk@kennesaw.edu

For Academic Advising information and to schedule appointments:
http://ccse.kennesaw.edu/advising/index.php

Links to frequently used and helpful services:
http://www.kennesaw.edu/myksu/

Department of Career Planning & Development
https://careers.kennesaw.edu

Counseling and Psychological Services
https://counseling.kennesaw.edu

Center for Health Promotion and Wellness
https://wellness.kennesaw.edu

Student Health Services
https://studenthealth.kennesaw.edu