



Class Information

Course Title: High Performance Computing

Course Number and Section: CPS 5965 01

Campus Location: KEAN UNION

Semester: 2025FA

Class Meeting Days and Times: W From 16:30 To 19:15

Instructor Information

Instructor Name: David Joiner

Office Location: STEM 513D

Office Hours: W 3-4 STME 5-13D

Office Phone: x77221

Email: djoiner@kean.edu

***I am available to meet with you via Teams, phone or in person. To make an appointment, please download the Navigate360 app and use the Appointment option. Step-by-step instructions are available [here](#).**

Course Description from Catalog

Fundamental concepts of high performance computing; hardware architecture; software libraries; design, analysis, implementation and performance evaluation of parallel and distributed algorithms.

CPS*5100 or CPS*5440

Course Level Student Learning Outcomes

Upon successful completion of this course, the student will be able to:

- Demonstrate an understanding of the fundamental factors affecting the performance of sequential programs.
- Transform programs to enhance data locality.
- Demonstrate an understanding and apply the prevalent parallel and distributed programming models.
- Design, implement and analyze parallel and distributed programs.

Instructional Technique(s)

The course will be taught with a combination of lecture and problem based learning. Students are expected to have a laptop available to work on programming based problems in class.

Required Texts and Materials



Parallel and High Performance Computing

9781617296468

Robert Robey, Yuliana Zamora

Simon and Schuster

2021-06-22

Your [campus bookstore](#) offers a Price Match guarantee. If you find your class texts cheaper at Barnes & Noble.com or Amazon.com, the campus bookstore will match the price at the time of purchase or up to 7 days after purchase. The book has to be sold and shipped from [Barnes & Noble.com](#) or Amazon.com and not a 3rd party seller or marketplace. It also has to be in stock at the bookstore and on either platform. Search for your course materials by the ISBN provided in this syllabus to ensure that your price match is acceptable. We also offer RENTALS on New & Used textbooks which saves up to 80% over purchasing. At the end of the semester during finals

week until the last day of finals, there's Buyback where you can sell your textbooks back for up to 50% of what the bookstore sold it for provided it will be used for the following semester.

Topics and Assignments

Week/Unit	Topics
1	Introduction to HPC Problems, overview of programming languages and performance
2	Profiling non-parallel applications, solving the wave equation in your language
3	C/C++, solving the wave equation in C
4	Loop Optimization
5	Using GPUs in GPU-enabled programs,
6	Compiling CUDA, simple kernels
7	Solving the Mandelbrot set in CUDA, Amdahl's Law
8	Midterm Exam
9	OpenACC and OpenMP, compiling OpenMP programs
10	Memory locality and threaded programming, race conditions and false sharing, the reduction clause
11	Solving the wave equation in OpenMP
12	Solving the Mandelbrot set in OpenMP, Load Balancing
13	Embarrassingly parallel MPI
14	Domain decomposition for gridded problems
15	Solving the gravitational N-Body program in MPI
16	Final Exam

Important Dates

For important dates, please consult the Academic Calendar via the following link:

<https://www.kean.edu/offices/registrars-office/academic-calendar>

Technology Requirements

Canvas

You will use Canvas as your Learning Management System (LMS) in this class. Announcements, assignments, and often other course materials are available on the course Canvas site. You will be able to access your grades at all times in the course Canvas Grade Center. If you need any Canvas support, you will find resources in this [Student Guide to Canvas](#), and you can access [Canvas help 24 hours a day, 7 days a week via Live Chat](#).

Hardware and Software Support

Find all of the technology platforms you have access to as a Kean student at the [myApps Launchpad](#).

If you need help with any technology questions, you can find answers at the [Kean Help Desk](#).

Email

All students must have a valid Kean email account. Please only communicate with me using your Kean email address.

Laptops

If you need a short-term loaner laptop, please visit the [Learning Commons Technology & Equipment page](#). These devices are located at the front desk of the Learning Commons.

Assessment

Weekly programming assignments will be given in class, uncompleted assignments will be assigned for homework.

A midterm and and final exam will be given, weighted equally.

Final grade will be 50% programming assignments, and 50% exams.

Course Section Level AI Expectations

All exams will be written exams, in class, closed book, closed note, with no internet access.

In class assignments and homework is open book, open note, with full internet access including both AI and reference sites such as Stack Overflow allowed, however the student is responsible at all times for the correctness and appropriateness of their submitted work. In class work and homework will be problem/project based.

Academic Alerts

Academic Alerts and Campus Referrals

Academic Alerts provide you with ongoing feedback on how you are performing in your classes. Your professor may contact other offices on campus via an Alert to provide you additional support. These alerts, sent via Navigate360, are not a grade and not reported in your permanent academic record. If you get an alert, it will give you instructions about what to do next.

For more information, please see the Undergraduate or Graduate Catalog.

Course Policies

Provide Course Policies, if necessary, such as participation, etc. in addition to the following:

Class Recordings (Live Sessions/Collaborate)- if applicable

In this class software may be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. All recordings will become unavailable to students in the class when the course is closed.

Students are not permitted to record (or download) the course experience. If a recording of the course is required for accommodation purposes students must make those arrangements with the Office of Accessibility Services. Students found to have recorded (or downloaded) course experiences without authorization are subject to review by the Office of Student Conduct and Community Standards.

Privacy Statement

Assuring privacy among faculty and students engaged in online instructional activities helps promote open and robust conversations and mitigates concerns that comments made within the context of the class will be shared beyond the classroom. As such, recordings of instructional activities occurring in online classes may be used solely for internal class purposes by the faculty member and students registered for the course, and only during the period in which the course is offered.

Department Examination Conduct Policy

The Department of Computer Science and Technology provides classroom examinations in the following modalities, as specified by the instructor: paper examinations, oral examinations, and online LMS exams, which may use the Lockdown Browser in a timed environment.

Students are NOT permitted to use headphones, mobile phones, or any other electronic devices during the examination unless explicitly permitted by the faculty member.

Once the exam period begins, students cannot leave the room and later return to their exam. Departure from the exam room signals the conclusion of the exam for that student and the exam paper must be turned in for paper exams; the Canvas session concludes for electronic exams.

Kean University's academic integrity policy can be found [here](#).

Nancy Thompson Learning Commons

Location: *Nancy Thompson Library building*

Email: learningcommons@kean.edu

Learning Commons Website: learningcommons.kean.edu

Learning Support Services Appointments: tutoring.kean.edu

The Nancy Thompson Learning Commons is your gateway to academic success, offering research support, personalized tutoring, writing support, extensive library collections, and expert guidance to empower your learning.

Library Resources

Access a wide range of digital and print materials, including Open Educational Resources (OERs), tailored to support your academic journey.

Research Support

Librarians are available to help you build research and information literacy skills. Schedule a consultation via the Research Support page or tutoring.kean.edu.

Workshops

Learn essential academic skills—from time management and citations to exam prep and critical thinking. View upcoming sessions on the [Learning Commons Workshops and Events page](#).

Learning Support Services

Receive comprehensive academic support, including subject tutoring, academic

coaching, public speaking practice, Supplemental Instruction (SI), embedded tutoring in GE courses, and writing guidance through the Writing Center—all designed to help you succeed and grow as a learner. Book services at tutoring.kean.edu.

Academic Policies

Photo ID

All Kean students are expected to have and carry a Kean photo ID. If you need to obtain an ID card, more information can be found [here](#).

Attendance

Attendance is expected in all courses. Students are responsible for informing the instructor in advance or in a timely manner of the reasons for their absence. Typically, excused absences include illness, bereavement or religious observances. Serious tardiness may be dealt with at the discretion of the instructor. For further information regarding withdrawal and health and wellness absences (including student bereavement leave), please see the Office of the Registrar's website.

Video Recording of Class Sessions

In this course, class sessions may be recorded to comply with the Americans with Disabilities Act (ADA) and to support the learning process. Software may be used to record live class discussions and/or remote sessions. As a student in this class, your participation in these sessions may be recorded. Recordings will be accessible only to students enrolled in the class for the duration of the course and will be deleted or made unavailable when the course concludes. Students are not permitted to create video or audio recordings of the course—including AI-generated transcripts—without permission from the instructor and other students. If you require course recording as an accommodation, contact Kean's Office of Accessibility Services. Recording may be used solely for internal class purposes and may not be posted or shared outside of the class.

Student Code of Conduct

Students should review the Student Code of Conduct, as it discusses expectations of appropriate conduct in the classroom. Contact the Office of Accountability, Standards and Education by phone at (908) 737-5240 or by email at conduct@kean.edu.

Emergency Notifications

Students are automatically registered for the University's emergency notification system (<http://www.kean.edu/campusalert>) through the contact information included in [KeanWISE](#). This system enables university community members to be informed of campus emergencies, weather notices, and other announcements. Kean Ocean

students would sign up via the following link: <https://ocean.sendwordnow.com/LicensePage.aspx>

Academic Integrity and Expectations for Generative AI

Academic Integrity

Students are responsible for reviewing and understanding the University Academic Integrity Policy available via the following link: <https://www.kean.edu/academic-integrity>. Students are expected to submit their original work. Any use of generative AI - is subject to the same citation rules as any ideas, text, speech, or imagery derived from human authors as outlined in the [Academic Integrity Policy](#). Instructors must indicate on the syllabus and/or individual assignment if the use of Kean University Learning Support Services (*Tutoring and/or Writing Center*) is permitted for take-home assignments/exams.

Expectations for AI Use

Students are required to abide by the expectations for AI use outlined in Kean's Academic Integrity Policy. In summary, all courses follow the below expectations:

- **Originality:** Content created by AI cannot be presented as original student work.
- **Citation and Attribution:** In courses where AI use is permitted, any content generated by AI must be cited. Guidelines for citations can be found [here](#).
- **Integrity:** Students are accountable for the accuracy and appropriateness of any content they create or publish, including AI-generated material.
- **Consequences:** Use contrary to the course policy and/or without proper acknowledgement is subject to the same rules and consequences outlined for integrity violations. Faculty may use various tools to check for AI, including: comparisons with other work, AI detection tools, verbal demonstration of mastery of content, and other relevant forms of evidence.

NOTE: If your instructor has additional (course specific) expectations related to AI use, they will be outlined in the next section of this syllabus.

Student Support Services

Kean University offers several support services for students. Please visit Kean University Student Support Services for more information in any of the areas listed below. You can also *Submit a Hand Raise* via Navigate360, connecting you with support services and campus resources. Check out THIS video tutorial for instructions.

Diversity & Non-Discrimination Statement

Kean University is dedicated to fostering excellence through access. Our campus-wide commitment empowers every individual to thrive in diverse classrooms and succeed in a global workforce. We promote empathy and respect across all levels of our community, including students, faculty, staff, administrators, and the broader public. For further information on Kean's initiatives, policies, and procedures, including support for protected communities, please visit the webpages of the Office of Affirmative Action Programs and Human Resources.

Faith and Spirituality Statement

In alignment with our commitment to fostering a respectful and welcoming environment, Kean University supports students' rights to be excused from classes due to reasons of faith and spirituality, without academic penalty. Students are encouraged to proactively communicate with instructors to make alternative arrangements for coursework that conflicts with religious observances.

During business hours students, faculty, and staff who wish to engage in prayer or meditation are invited to use:

Religious Plural Prayer and Meditation Room in Townsend 116E

Muslim Prayer Room in Center for Academic Success (CAS) 442

Americans with Disabilities Act Statement

Once students are registered with the Office of Accessibility Services and approved for accommodations, they must present their Letter of Accommodation to their instructors via email or in person at the beginning of each semester. Please note, accommodations become active when the Letter of Accommodation is presented to the faculty member. Accommodations are not retroactive, so it is important that you submit your letter as early as possible. Students are encouraged to contact their instructors to schedule a confidential meeting to discuss how accommodations can support them in understanding the course learning objectives and fulfilling the course requirements.

Office of Accessibility Services

The Office of Accessibility Services is committed to ensuring equal access by fostering an accessible learning environment. Our office provides assistance and accommodations for all students with documented temporary and permanent physical, medical, learning, emotional, and/or physical disabilities. You can contact the office to schedule an initial appointment in person at the Kean Wellness Center, Downs Hall 122,

by phone at (908) 737-4910 or by email at accessibilityservices@kean.edu. Please visit the [Office of Accessibility Services website](#) for additional information.

Accommodation Renewals

Students are required to work with the Office of Accessibility Services to renew their accommodations at the start of a new semester. Renewals are processed in the student [portal](#).

Title IX Statement

Title IX of the Education Amendments of 1972 (Title IX) prohibits discrimination on the basis of sex in education programs or activities. Sex discrimination, which includes discrimination based on sex stereotypes, sex characteristics, pregnancy or related conditions, sexual orientation, gender identity and sex-based harassment, will not be tolerated at Kean University. Incidents of sexual discrimination should be reported to the Title IX Coordinator immediately.

Kean University is committed to providing a fair and impartial process for all parties involved. This includes supportive measures, a thorough investigation, and equitable resolutions.

For more information about the University's Title IX Policy and the rights and resources available to you, please visit Sexual Discrimination Policies and Procedures. For more information on Title IX, please see this [link](#).

In the event that you choose to write or speak about having experienced sexual misconduct, including sexual assault, dating violence, domestic violence, stalking, sexual exploitation or any other form of sexual and/or gender-based harassment, as a mandated reporter, I must notify the Title IX Office. They will contact you to let you know about accommodations and support services at Kean and reporting options both on and off campus. You have no obligation to respond to the Title IX Office or to meet with them to discuss support services and reporting options.

Canvas Digital Gradebook

The Canvas grade book is being used this term, for prompt feedback on your work. As soon as grades are posted, you will be notified immediately so that you can log in and see your feedback.