Course Information

- **ECE 608:** Computational Models and Methods
- **CRN:** 23496
- **Meeting time:** TuTh 1:30-2:45 (MSEE B012)
- **Instructional Modality:** Face-to-Face
- **Course credit hours:** 3
- **Prerequisites:** This course is designed for students who have an undergraduate degree in Electrical and Computer Engineering or Computer Science or a related discipline.

Instructor(s) Contact Information

Xiaokang Qiu (Instructor)

- **BHEE 329 (Zoom link: https://purdue-edu.zoom.us/my/xkqiu)**
- **765-494-9987**
- **xkqiu@purdue.edu**
- **Office hours:** M 10:30-12 (in-person and online)

Fouad Afiouni (Teaching Assistant)

- **BHEE 209 (Zoom link: https://purdue-edu.zoom.us/j/6072339087)**
- **fafiouni@purdue.edu**
- **Office hours:** M 4-5:30 Tu 4-5:30 (in-person and online)

Pai-Chuan Chang (Teaching Assistant)

- **BHEE 209 (Zoom link: https://purdue-edu.zoom.us/j/6252890859)**
- **chang895@purdue.edu**
- **Office hours:** Th 9:30-11, F 1:30-3 (in-person and online)

Course Description

Computation models and techniques for the analysis of algorithm complexity. The design and complexity analysis of recursive and non-recursive algorithms for searching, sorting, set operations, graph algorithms, matrix multiplication, polynomial evaluation and FFT calculations. NP-complete problems.

Learning Resources, Technology & Texts

Course Websites

- **Brightspace** (lecture videos and notes, weekly practice problems, weekly quizzes, grades): https://purdue.brightspace.com/d2l/home/1361072
- **Gradescope** (quiz submission and feedback): https://www.gradescope.com/courses/1065987
- **Piazza:** https://piazza.com/purdue/fall2025/ece608

Required Textbook

- Introduction to Algorithms, 4th (or earlier) Edition, T. Cormen, C. Leiserson, R. Rivest and C. Stein, MIT Press, 2022, ISBN No. 9780262046305

Learning Outcomes

A student who successfully fulfills the course requirements will have demonstrated an ability to:

- Analyze the computational complexity of algorithms for combinatorial problems.
- Design polynomial time algorithms for combinatorial problems when they exist.
- Identify NP-Hard combinatorial problems.
- Provide efficient non-optimal solutions to HP-Hard combinatorial problems.

Assignments and Exams

Exams

We will not have exams.

Quizzes

There will be (almost weekly) quizzes. Each quiz will be held in class (typically the last thirty minutes of Thursday's class). The quizzes are open notes and close book (though you can print relevant chapters of a book as your notes). Electronic devices are *not* allowed. Each quiz will be graded out of 10 points.

Practice Problems

There will be (almost weekly) exercises for your practice and quiz preparation. The exercises will not be collected or graded. Solutions to each exercise will be posted a few days before the quiz covering the same topics.

Grading Scale

Grades will be assigned as follows:

100% — Quizzes (evenly distributed among all quizzes; the lowest scored quiz will be exempted)
1% — Bonus for submitting course evaluation

There may be a constant curve (i.e., all grades will be increased by a fixed amount) for individual exams at the instructor's discretion. Your course grade will be determined using an absolute scale: 97–100: A+; 91–97: A; 88–91: A-; and continuing down.

Attendance Policy

This course follows the University Academic Regulations regarding class attendance, which state that students are expected to be present for every meeting of the classes in which they are enrolled. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, you should inform me of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to is not possible, contact me as soon as possible by email or phone. For absences that do not fall under excused absence regulations (see below), this course follows the following procedures:

1. Do not come to class if you are feeling ill, but DO email me with the subject line: xxx ECE 608 absence. I do not need details about your symptoms. Just let me know you are feeling ill and cannot come to class. If it is an emergency situation, please follow the University regulations on emergent medical care (see below).

2. Unless it falls under the University excused absence regulations (see below), any work due should be submitted on time via our course Brightspace.

3. If that day's class involves a quiz, you cannot make up the quiz unless it falls under excused absences under academic regulations. You will get zero ono the quiz but exempted as the lowest scored quiz. In any case, email me immediately when you know that you will miss class.

4. The most important consideration in any absence is how it will affect your achievement of the assignment objectives and the course learning outcomes.

For cases that fall under excused absence regulations, you or your representative should contact or go to the Office of the Dean of Students (ODOS) website to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent medical care. The processes are detailed, so plan ahead.

Course Schedule (tentative)

Week	Topic
1	*Turing machines; program semantics, propositional logic, and first-order logic*
2	*Asymptotic notations*
3	*Recurrences*
4	*Heapsort and quicksort*
5	*Linear-time sorting algorithms*
6	*Complexity; N and NP problems*
7	*First-order logic; descriptive complexity*
8	*Slack (fall break)*
9	*Elementary data structures; hash tables*
10	*Elementary graph algorithms*
11	*Minimum spanning trees; greedy algorithms*
12	*Shortest path and dynamic programming*
13	*Maximum flow*
14	*Slack (thanksgiving break)*
15	*Approximation algorithms*
16	*Algorithm synthesis; reactive synthesis*

* Schedule and assignments subject to change. Lecture slides will be posted on the course website.

Academic Integrity

We hope (and assume) that you are all honest and have no intentions of cheating. Cheating ruins the experience for everyone and we will pursue appropriate penalties if we catch someone cheating. Please don't -- it's not worth it, both for you and for us. You can find Purdue's student guide for academic integrity at https://www.purdue.edu/odos/academic-integrity/ .

The use of generative artificial intelligence (AI) tools (e.g., ChatGPT, Gemini) on any assessed work (e.g., quizzes) is strictly prohibited. Using an AI tool will be treated as an instance of academic dishonesty.

If we do catch someone cheating for the first time, the following penalties will be applied: zero on the quiz, and we will

subtract 10% from your final average in the course, or reduce your letter grade by one category (e.g., B to B-), whichever results in the lower grade.

For second cheating offense of any kind, you will fail this course.

Nondiscrimination Statement

A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in the Academic Resources table on your Brightspace homepage.

Accessibility

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are encouraged to contact the Disability Resource Center at: **drc@purdue.edu** or by phone: 765-494-1247, as soon as possible.
If the Disability Resource Center (DRC) has determined reasonable accommodations that you would like to utilize in my class, you must release your Course Accommodation Letter to me. Instructions on sharing your Course Accommodation Letter can be found by visiting: **https://www.purdue.edu/drc/students/course-accommodation-letter.php** Additionally, you are strongly encouraged to contact me as soon as possible to discuss implementation of your accommodations.

Mental Health/Wellness Statement

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try Therapy Assistance Online (TAO), a web and app-based mental health resource available courtesy of Purdue Counseling and Psychological Services (CAPS)**.** TAO is available to all students at any time by creating an account on the TAO Connect website, or downloading the app from the App Store or Google Play. It offers free, confidential well-being resources through a self-guided program informed by psychotherapy research and strategies that may aid in overcoming anxiety, depression and other concerns. It provides accessible and effective resources including short videos, brief exercises, and self-reflection tools.

If you need support and information about options and resources, please contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 a.m.- 5 p.m.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions in West Lafayette with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect. Students in Indianapolis will find support services curated on the Vice Provost for Student Life website.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS offices in West Lafayette or Indianapolis.

Emergency Preparation

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.