

Syllabus of Optimization Methods (AMA4850)

2024/25 Semester 2

January 2025

You can find the **Subject Description Form** for this course at <https://www.polyu.edu.hk/ama/information/undergraduate/AMA4850.pdf>. Please read it and the syllabus carefully at the beginning of the semester.

Instructor Details

- Name: ZHANG, Shijun
- Email: shijun.zhang@polyu.edu.hk
- Office: TU815
- Office Hours: Thursday 14:00 – 17:00

If you have any questions, please visit my office during office hours as your first option. If that doesn't work, you can send me an email instead.

Class Schedule and Location

- Tutorial: Monday **15:30 – 16:20** in **N002**.
- Lecture: Thursday **9:30 – 11:20** in **Z207**.

Assessment and Grade Thresholds

Grades in this course will be based on the following components:

- **Assignments (10%)**: There will be **two assignments** in total, with the first tentatively due in **mid-March** and the second in **mid-April**. Specific arrangements will be shared with you in advance.
- **Midterm Test (30%)**: The Midterm Test is provisionally planned for **late March**. The specific details will be communicated to you in advance.
- **Final Exam (60%)**: The final exam could include all the material we've covered and is scheduled to take place during the "Examination Period" from April 25 to May 13.

The grade thresholds are provided in the table below:

Grade	A-, A, A+	B-, B, B+	C-, C, C+	D, D+	F
Mark	85–100	65–84	50–64	40–49	0–39

Tentative Course Schedule

- * **Week 1:** Overview/Preliminaries
- * **Week 2:** Convex Sets and Functions
- * **Week 3:** Linear Programming
- * **Week 4:** Semidefinite Programming I: Formulation and Duality
- * **Week 5:** Semidefinite Programming II: Reformulation
- * **Week 6:** Semidefinite Programming III: Applications
- * **Week 7:** Unconstrained Optimization I: Optimality Conditions and Gradient Descent
- * **Week 8:** Unconstrained Optimization II: Descent Direction and Armijo Rule
- * **Week 9:** Midterm
- * **Week 10:** Unconstrained Optimization III: Quasi-Newton Methods
- * **Week 11:** Constrained Optimization I: KKT Conditions
- * **Week 12:** Constrained Optimization II: Penalty and Barrier Methods
- * **Week 13:** Depending — leftover content, new material, or review.

The PolyU Academic Calendar can be accessed at <https://www.polyu.edu.hk/ar/docdrive/polyu-students/AC.pdf>.

Reference Books

- *Convex Optimization*, by S. Boyd and L. Vandenberghe.
Available at <https://web.stanford.edu/~boyd/cvxbook/>.
- *Introduction to Nonlinear Optimization: Theory, Algorithms, and Applications with Python and MATLAB (Second Edition)*, by Amir Beck.
Available at <https://archive.siam.org/books/mo19/>.
- *Nonlinear Programming (Third Edition)*, by D. P. Bertsekas, 2016.
- *Numerical Optimization (Second Edition)*, by J. Nocedal and S. J. Wright, 2006.
- *Introductory Lectures on Convex Optimization: A Basic Course*, by Y. Nesterov, 2024