



# Optimization Theory and Algorithm II

## Lecture 1: Introduction

Xiangyu Chang(常象宇)

Email: [xiangyuchang@xjtu.edu.cn](mailto:xiangyuchang@xjtu.edu.cn)

Center for Intelligent Decision-Making and Machine Learning

School of Management

Xi'an Jiaotong University

# Introduction



## Professor

Center for Intelligent Decision-Making  
and Machine Learning

Department of Information Systems  
and Intelligence Business

School of Management

## Address

Room #750, Main Building of

Management School

Xi'an Jiaotong University (XJTU)

China

## Email

xiangyuchang AT xjtu DOT edu DOT cn

## Employment Experience

- 2018.12-2019.12, Visiting Associate Professor  
Department of Industrial & Systems Engineering, University of Washington, Seattle.
- 2016.01-2016.02, Research Associate  
Department of Mathematics, City University of Hong Kong
- 2015.04-2016.04, Visiting Assistant Professor  
Department of Business Statistics and Econometrics, Guanghua School of Management, Peking University

## Education

- 2013-2014, Ph.D., Applied Math, XJTU, China
- 2010-2012, Visiting Ph.D. Student, Statistics, UC Berkeley, U.S.
- 2009-2010, Ph.D. Candidate, Applied Math, XJTU, China
- 2008-2009, M.S., Applied Math, XJTU, China
- 2003-2007, B.S., Applied Math, XJTU, China

## Research Interests

- Statistics & Machine Learning
- Business Data Science

<http://xiangyuchang.github.io/>



SOM-XJTU

# Optimization Theory and Algorithm II

Fall 2022



HOME



SCHEDULE



LECTURES



ASSIGNMENTS



PROJECT



MATERIALS

## Optimization Theory and Algorithm II / Fall 2022

### Updates

- New course in Fall 2022 is coming soon.
- New Lecture is up: Lecture 1 Introduction and Review I [[slides](#)] [[notes](#)]

### Course Description

This course is to present the basic theories and algorithms in optimization fields for undergraduate students at School of Management, Xi'an Jiaotong University. The aim is to give students a thorough understanding of how to construct algorithms for solving optimization problems, and how to develop theories to analyze optimization problems and corresponding algorithms.

<https://som-course.github.io/opt-fall-2022/>

Optimization is a special field that is built on three intertwined pillars:

- **Models** give rise to optimization problems.
- **Algorithms** solve optimization problems.
- **Theoretical foundations** support algorithms and models.

**Optimization = Modeling + Algorithm + Theory**

**Location:** B103 Main Building (主楼B103)

**Date:** 1st&2nd class, Mondays and 9&10th class, Thursdays, 09/05 - 10/24, 2022.

## Instructors



Xiangyu  
Chang



Yao Wang

## Teaching Assistants



Hao Di

# Outline

32hrs, 1-8 week

## Part I: Constrained Optimization

- Review
- Linear Programming
- Simplex Method
- Interior Point Method
- Projected Gradient Descent
- Mirror Descent

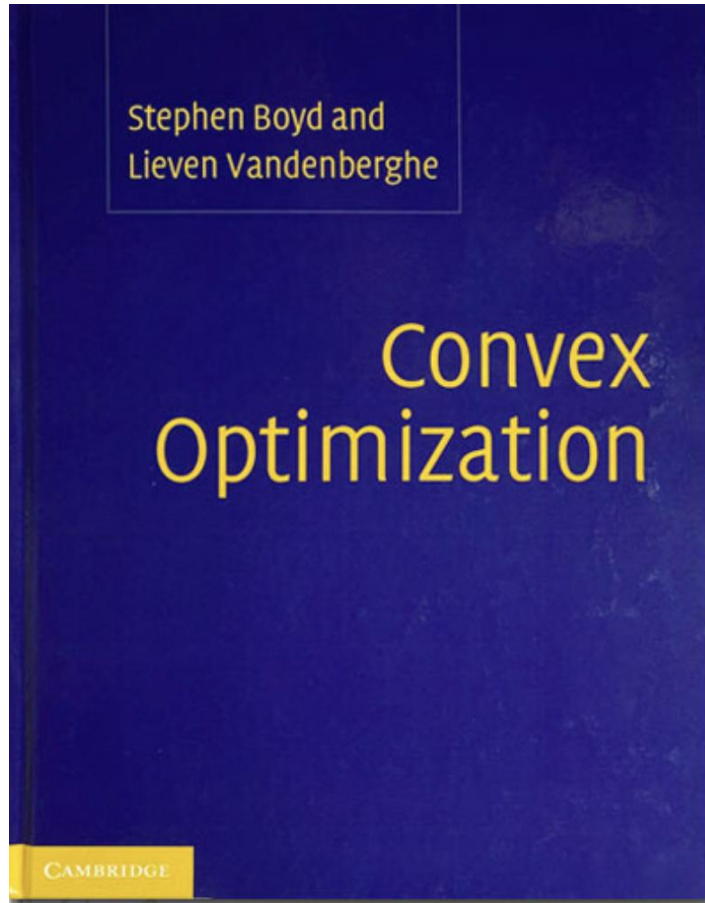
## Part II: Advanced Topics

- Stochastic Gradient Descent
- SVRG
- Local SGD
- BCD
- ADMM

# Evaluation

- 50%HW + 50%Final Exam = 100%
- Edit your homeworks by LaTeX!
- To practice Python or R for handling optimization problems

# Text Book





## Materials

### Suggested Text Book

- Convex Optimization by Stephen Boyd and Lieven Vandenberghe: a very famous book.
- 最优化：建模、算法与理论 by 刘浩洋、户将、李勇锋、文再文编著.

### R

- R
- RStudio: Suggested IDE
- R Cheatsheet
- An introduction course of R by Xiangyu Chang: Lecture 1, Lecture 2, Lecture 3, Lecture 4, Lecture 5, Lecture 6

### Python

- Python for Beginners
- Python Cheatsheet
- Python 数据科学实践 by 常象宇, 曾智亿, 李春艳, 程茜著
- SciPy Tutorial
- NumPy Quickstart Tutorial

### LaTeX

- MacTeX
- CTeX
- Learn LaTeX in 30 minutes
- Use Overleaf
- TeXStudio: Suggested IDE





SOM-XJTU

# Optimization Theory and Algorithm II

Fall 2022

 HOME

 SCHEDULE

 LECTURES

 ASSIGNMENTS

 PROJECT

 MATERIALS

## Lectures

You can download the lectures here. We will try to upload lectures prior to their corresponding classes.



### Lecture 1 Introduction and Review I

**tl;dr:** introduction lecture  
[\[slides\]](#) [\[notes\]](#)

#### Suggested Readings:

- Lecture Notes



课后复习用，每次课结束后公布



课前预习用，每次课之前公布



SOM-XJTU

# Optimization Theory and Algorithm II

Fall 2022



HOME



SCHEDULE



LECTURES



ASSIGNMENTS



PROJECT



MATERIALS

## Assignments

You can download the assignments here. Also check out each assignment page for any additional info.

School of Management  
Xi'an Jiaotong University

 [som.xjtu.edu.cn](http://som.xjtu.edu.cn)



SOM-XJTU

# Optimization Theory and Algorithm II

Fall 2022

 HOME

 SCHEDULE

 LECTURES

 ASSIGNMENTS

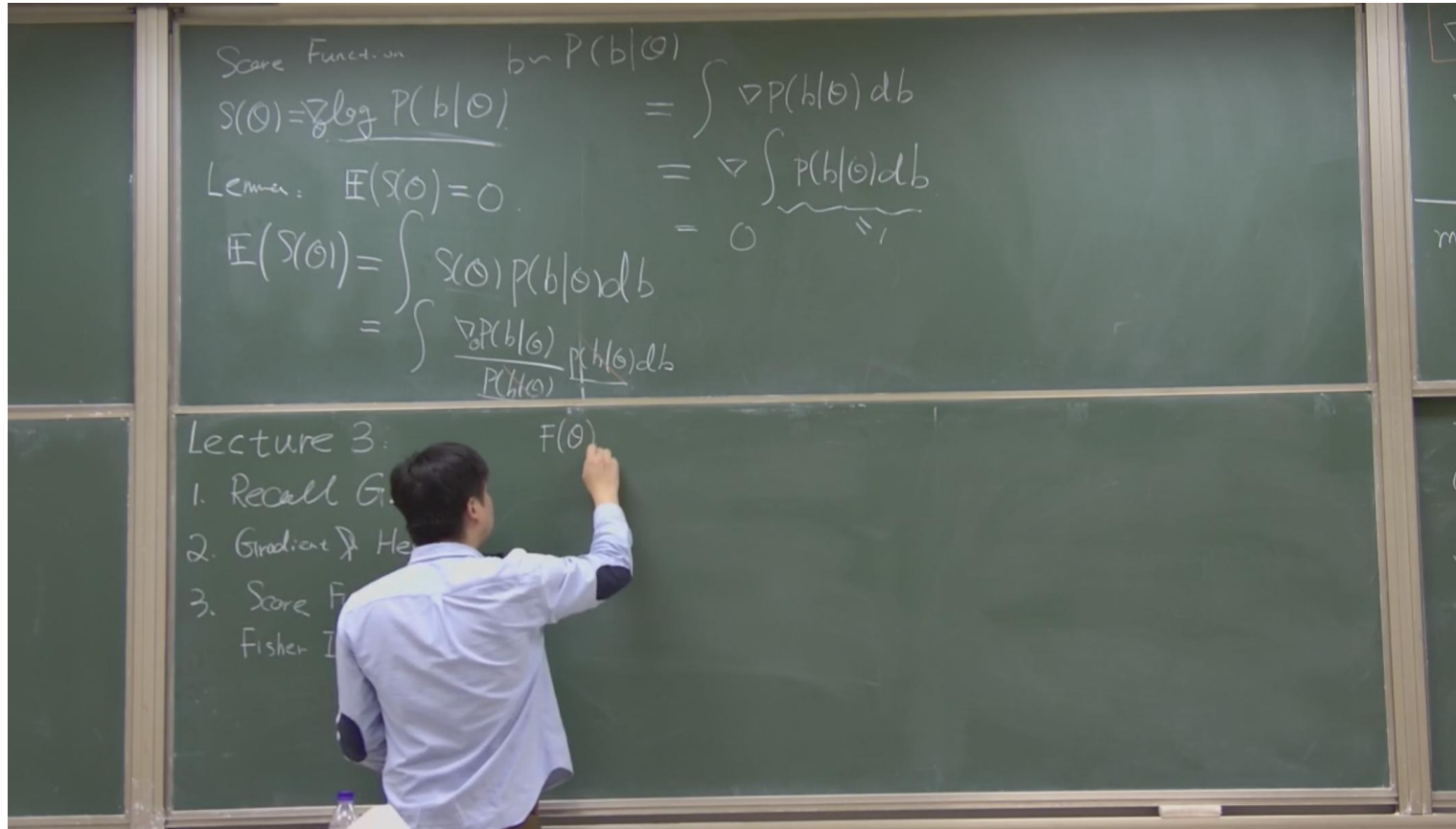
 PROJECT

 MATERIALS

## Schedule

EVENT	DATE	DESCRIPTION	COURSE MATERIAL
Lecture	09/04/2022 Sunday	Lecture 1 Introduction and Review I <a href="#">[slides]</a> <a href="#">[notes]</a>	<b>Suggested Readings:</b> <ul style="list-style-type: none"><li>◦ Lecture Notes</li></ul>

# Teaching Style



- Writing on the blackboard in English for main lectures, Speaking in Chinese
- Demostrating codes or visual examples by slides

# Why?



观点 > 人民网评

人民网评：一流大学建设要坚持社会主义办学方向

2021-04-22 08:07 人民网-观点频道 作者：岚山



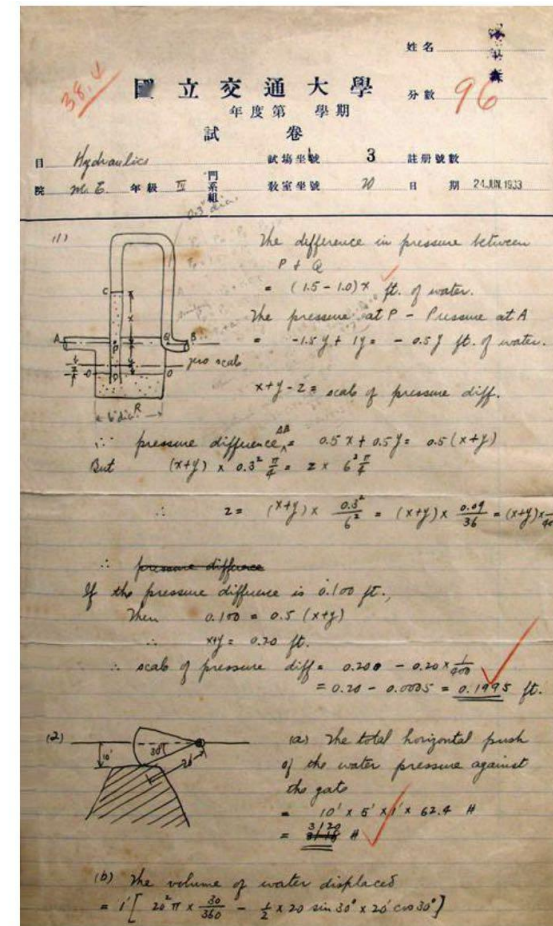
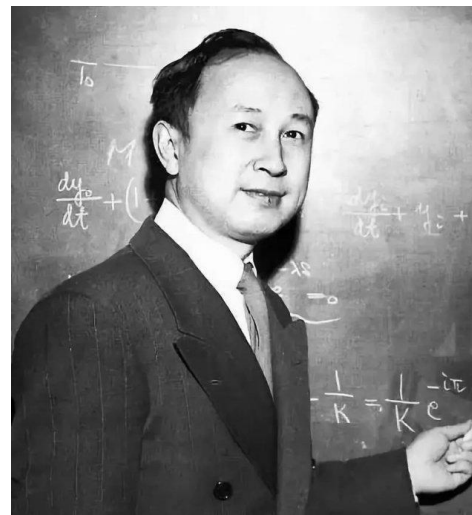
文章指出，教育兴则国家兴，教育强则国家强。在国家发展进程中办好高等教育，办出世界一流大学，首先要在体现中国特色上下功夫。



交通大学上海徐家汇校区老校门（1920年代）



1956年交通大学主体西迁西安庆典





**Questions**



Спасибо

RUSSIAN



Gracias

SPANISH



Merci

FRENCH



CẢM ƠN

VIETNAMESE



谢谢

CHINESE



Thank  
You!

ENGLISH



Ευχαριστώ

GREEK



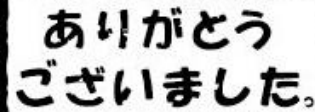
شكراً

ARABIC



고맙습니다

KOREAN



ありがとう  
ございました。

JAPANESE