课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**储能原理与技术 Principle and technology of energy storage**
2.	**课程性质** **Compulsory/Elective**	专业选修课 Major Elective Courses
3.	**课程学分/学时** **Course Credit/Hours**	3/48
4.	**授课语言** **Teaching Language**	中英双语 English & Chinese
5.	**授课教师** **Instructor(s)**	曾林，副教授，机械与能源工程系 Email：zengl3@sustech.edu.cn Lin Zeng, Associate Professor, Department of Mechanical and Energy Engineering, Email：zengl3@sustech.edu.cn
6.	**是否面向本科生开放** **Open to undergraduates or not**	是 Yes
7.	**先修要求** **Pre-requisites**	（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.） ME304 能源工程技术（非必须） ME304 Fundamentals of Energy Engineering (Optional)
8.	**教学目标** **Course Objectives**	

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

1）研究生教学目标：本课程旨在介绍能源存储的基本原理以及各种储能技术的最新发展情况。通过课程学习，掌握能源转换过程和储存过程中的基本原理和评价手段，熟悉各种储能系统中的能源的转化过程以及关键技术，了解各种储能系统的最新的研究进展以及规模化应用情况。进一步，了解各类储能系统的集成技术，管理和应用，以及能源互联网的概念。通过课程项目，培养学生对能源存储和转换过程的辩证分析能力。

The objectives of this course: This course introduces students to the fundamentals of energy storage and provides a broad understanding and appreciation of various energy storage systems (ESSs). Through the course study, the students master the basic scientific principles that underpin the operation of different ESSs and the evaluation methods, gain knowledge regarding the basic energy conversion/storage process and critical technologies in different ESSs, and understand the latest research development and industrial application of different ESSs. In addition, the students need to understand the integration technology, management and application of different ESSs. The future development and concept of energy Internet will be finally introduced. Through the course study, the students are trained to have the capability of critically thinking and analyzing different ESSs.

2）本科生教学目标：通过该课程的教学使学生了解储能的基本原理以及储能技术的最新发展状况，对能源存储和转换的科学原理和应用有更广泛的理解和认识。提高学生在能源存储系统方向理论知识积累，培养学生的工程分析及设计能力。通过该课程的教学使研究生掌握能源存储的关键技术，为后续科研工作中专业能力的提升及发展奠定一定的基础。

Course objectives for undergraduates: To enable students to understand the basic principles of energy storage and the latest development of energy storage technology, and to have a broader understanding

of the scientific principles and applications of energy storage and conversion. Through the teaching of this course, undergraduate students can master the basic principles and the key technologies for energy storage systems, lay a certain foundation for the promotion and development of professional ability in the follow-up scientific research work.

9. 教学方法
Teaching Methods

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

教室讲授（多媒体授课+案例解析），以及课程项目设计（课程展示+报告）
Classroom lecture (multimedia teaching + case analysis), and course project (oral presentation + report)

对本科生和研究生使用相同方法，不同评估标准（课后作业和课程项目难度不同）
Use the same teaching method for both undergraduate and graduate students, but with different assessment criteria (different difficulty levels in homework and course projects).

10. 教学内容
Course Contents
（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

Section 1	能源现状以及储能基本原理 Global energy status and basic principles of energy storage
Section 2	机械储能 Mechanical Energy Storage
Section 3	化学储能 Chemical Energy Storage
Section 4	电能储能 Electrical Energy Storage
Section 5	电化学储能 Electrochemical Energy Storage
Section 6	热能储能 Thermal Energy Storage
Section 7	储能系统集成、管理和应用 Energy Storage Integration, management and application
Section 8	储能系统比较和成本分析 Comparison and cost analysis of different energy storage systems
Section 9	储能技术未来发展方向和能源互联网 Future development of energy storage technology and energy Internet
Section 10	课程项目汇报 Course project report
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11. 课程考核
Course Assessment

（①考核形式 Form of examination；②.分数构成 grading policy；③如面向本科生开放，请注明区分内容。

If the course is open to undergraduates, please indicate the difference.）

①考核形式 Form of examination：Assessment

②分数构成 grading policy：a.出勤 Attendance 10%; b. 课程项目 Projects 30%; c.期末考试 Final exam 40%; d. 期末报告 Final Presentation 20%

③如面向本科生开放，请注明区分内容。If the course is open to undergraduates, please indicate the difference.）

本科生考核分数构成如下 Grading policy for ：

a.出勤 Attendance 10%; b. 课程项目 Projects 30%; c.期末考试 Final exam 30%; d. 期末报告 Final Presentation 30%

12. 教材及其它参考资料
Textbook and Supplementary Readings

1. Michael Sterner, Ingo Stadler, Handbook of Energy Storage: Demand, Technologies, Integration, Springer, 2019, ISBN: 978-3-662-55503-3
2. Robert A. Huggins, Energy Storage Fundamentals, Materials and Applications, 2nd edition, Springer, 2015, ISBN: 978-3-319-21238-8