**上海交通大学硕士研究生课程教学大纲**

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| 课程基本信息（Course Information） |
| 课程代码（Course Code） | EU26001 | \*学时（Credit Hours） | 32 | \*学分（Credits） |  3 |
| \*课程名称（Course Name） | （中文）碳资源循环学 |
| （英文）Carbon Resources Circular Technology |
| 课程性质(Course Type) | 专业前沿课 Discipline Frontier Courses |
| 授课语言(Language of Instruction) | 英文/English |
| \*开课院系（School） | China-UK Low Carbon College中英低碳学院 |
| 先修课程（Prerequisite） | 无/None |
| 授课教师（Teacher） | 林千果/ Lin Qianguo | 课程网址(Course Webpage) |  |
| \*课程简介（Description） | 本课程旨在全面介绍碳捕集、利用与封存技术(CCUS)。通过课程学习，学生将了解来自于电力生产和工业制造的CO2排放特征。课程将帮助学生理解多种主要的碳捕集技术，包括吸收法、吸附法、膜分离法、低温深冷以及循环回收技术。通过案例学习，学生将能够针对具体的电力生产或制造过程的某一排放源选择合适的捕集技术。二氧化碳利用主要涉及二氧化碳的提高石油采收率实现封存的利用，封存主要介绍二氧化碳的地下深部咸水层的封存。另外，CO2的压缩和运输的知识将单独介绍以帮助理解全流程CCUS技术的整体性。压缩和运输涉及的技术问题和管道运输涉及的安全风险问题也会介绍。最后，中国CCUS发展路线图以及将CCUS纳入中国碳交易市场的技术问题也将被讨论。 |
| \*课程简介（Description） | The course aims at providing a comprehensive overview of carbon capture, utilization and storage (CCUS) technology. It will acquaint students with characteristics of CO2 emissions sourced from power generation and major industries. The course will help students understanding a variety of capture technologies including absorption, adsorption, membrane, cryogenic and looping cycles. Through case study, students will be able to select suitable capture technologies for a given CO2 emission source associated with a specific power-generation or manufacturing process. Utilization and storage of CO2 will be lectured thereafter. The utilization topic will mainly touch CO2 enhanced-oil-recovery (EOR), while storage will focus on CO2 storage in deep saline aquifer. In addition, knowledge of compression and transportation will be introduced to better understand the integration of a full-chain CCUS technology. The technical issues related to compression and transport and the safety risks associated with pipeline transport will be introduced as well. Finally, the roadmap for China CCUS development and technical issues of inclusion of CCUS projects into China national ETS will be also covered.  |
| 课程教学大纲（course syllabus） |
| \*学习目标(Learning Outcomes) | Understanding of concept, principle and theory of CCUS technology. Be able to propose suitable capture technology for a given gas steam.Capable of conducting analysis on transport mode and the associated risks.Knowledge of CO2 enhanced oil recovery utilization and deep saline aquifer storage. Understanding of China CCUS roadmap and challenges and opportunities of inclusion CCUS into China national ETS. |
| \*教学内容、进度安排及要求(Class Schedule& Requirements) |

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| Class Schedule | Topic |
| Week 1 (3hrs) | GHG emissions; GHG emission reduction measures; general concept, principle and theory of CCUS |
| Week 2(3hrs) | Properties of CO2 and characteristics of major CO2 emission sources from industry |
| Week 3 (3hrs) | Carbon capture technology – absorption  |
| Week 4 (3hrs) | Carbon capture technology – adsorption |
| Week 5 (3hrs) | Carbon capture technology – membrane and others |
| Week 6 (4hrs) | CO2 utilization and storage |
| Week 7 (3hrs) | CO2 conditioning |
| Week 8 (3hrs) | CO2 transport  |
| Week 9 (4hrs) | China CCUS roadmap and inclusion of CCUS into national ETS |

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| \*考核方式(Grading) | Attendance:5%, Midterm coursework:35%, Final coursework, 60%.  |
| \*教材或参考资料(Textbooks & Other Materials) | Smit, B., Reimer, J.A., Oldenburg, C.M. and Bourg, L.C., 2014, Introduction to Carbon Capture and Sequestration, Imperial College Press, LondonHoward J. Herzog, A concise overview of carbon dioxide capture and storage (CCS), a promising but overlooked climate change mitigation pathway. The MIT press, Cambridge, Massachusetts, U.S. |
| 其它（More） |  |
| 备注（Notes） |  |

备注说明：

1.课程大纲一般为教师网上填写，填写要求会自动提示；对于新开课程，需要填着纸质大纲，并经院系教学委员会或专业委员会通过。

2．带\*内容为必填项。

3．课程简介字数为300-500字；课程大纲以表述清楚教学安排为宜，字数不限。