课程大纲 COURSE SYLLABUS		
1.	**课程代码/名称** **Course Code/Title**	**遥感水文学 Remote Sensing in Hydrology**
2.	**课程性质** **Compulsory/Elective**	专业选修课 Major Elective Courses
3.	**开课单位** **Offering Dept.**	环境科学与工程学院 School of Environmental Science and Engineering
4.	**课程学分/学时** **Course Credit/Hours**	3/48
5.	**授课语言** **Teaching Language**	中英文 Chinese-English
6.	**授课教师** **Instructor(s)**	姜丽光
7.	**开课学期** **Semester**	春季 Spring
8.	**是否面向本科生开放** **Open to undergraduates or not**	否 No
9.	**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.） Pre-requisites: Hydrology: Principles and Applications (ESE307)
10.	**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.） By the conclusion of this course, students will: • Be familiar with mostly used satellite products to investigate hydrological issues, especially for the purpose of surface water monitoring and modelling, • Understand the how to use remote sensing products to force lumped and distributed models of surface water hydrology, • Be familiar with model calibration using multiple remote sensing variables, • Be able to download, process satellite products for the purpose of hydrological modeling, • Choose modelling approaches appropriate to the region being investigated, for supporting specific model goals, including water resource management decisions or scientific hypotheses, • Be able to intelligently apply concepts from the course to inform, build, and interpret hydrological models of watersheds of interest. • Be able to use software tools to manipulate and analyze hydrological remote sensing data, calibrate and validate models, and assess model uncertainty 完成课程目标的学生能够： • 熟悉主要的遥感技术手段、遥感水文数据集 • 理解遥感产品驱动概念性/物理模型和集总式/分布式水文模型 • 理解如何处理水文模型需要的流域遥感数据集 • 正确设置集总式水文模型遥感驱动数据 • 熟练模型操作、优化和可视化工具 • 配置、校正和验证一个基于遥感产品的实际流域降雨径流模型 • 分析和解译模型结果	

- 了解当前的遥感水文模拟前沿

11. 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.）
讲授 Lectures：46
习题/讨论 Tutorials：2

12. 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.）

遥感水文学绪论 （2 课时） Introduction to the course, overview of remote sensing in hydrology (2 hrs)	首先介绍课程内容和考核要求，明确课程教学目标。介绍水文学研究的主要内容，遥感技术的特点及在水文学研究中的应用，遥感水文学的研究进展等。 First an overview of this course as well as the grading will be given. Then we will introduce the subject of hydrology and remote sensing, individually. Subsequently, introduce how do remote sensing techniques are used to study hydrology and water resources.
遥感水文数据集简介（4 课时） Remote sensing data sets for hydrology	介绍主要的水文要素遥感监测和反演数据产品，不同数据产品的应用，主流数据集和数据库，如何获取这些产品等。 In this session, we will introduce the major hydrological elements that can be monitoring via remote sensing. How are these data sets used and what can be achieved by exploring such data sets. In the later part, we will give an overview of major products and agencies providing such products. Also, students have the opportunity to go through all these products by themselves.
遥感降水、蒸散发、土壤水分、陆地总储水量等估算 (8 课时) Estimation of Precipitation, Evapotranspiration, Soil moisture	介绍降水、蒸散发、土壤水分、陆地总储水量等在水循环中的意义，如何用遥感估算降水、蒸散发、土壤水分、陆地总储水量等，主流算法有哪些等。 In this session, we will go through the major hydrological components, such as precipitation, evapotranspiration, soil moisture, total water storage, etc. How could we estimate these components via remote sensing techniques? What are the current algorithms?
内陆水体测高技术及河道水流演进模拟（6 课时） Inland water altimetry and hydrodynamic modeling	介绍测高技术及水体水位数据获取流程，如何应用水位数据在流域水文水动力模拟的应用。 Introduction of the inland water altimetry, retrieval of water level of major water bodies, as well as the application of altimetry data in hydrodynamic modeling.
内陆水体储量动态和洪涝干旱监测（6 课时） Storage dynamics of Inland water, flood and drought monitoring	利用主要遥感产品，监测和评估陆地总储水量变化，洪涝和干旱灾害监测与评估 Monitoring and assessment of total water storage variations, floods and droughts.
期中评估（2 课时） Midterm evaluation	
水文模型（10 课时） Hydrological models	介绍水文循环过程模型，包括不同尺度的模型。流域模型主要围绕集总式水文模型和分布式水文模型展开。不同模型的主要特点和应用范畴，如何应用遥感产品设置一个具体的水文模型等 We will introduce the major tools to simulate hydrological cycles. Both regional and global hydrological models will be introduced as well as catchment hydrological models including both lumped and distributed models. Later, examples will be

		given to illustrate how do deal with hydrological data.
	模型校正和优化，结果分析与可视化（8 课时） Model calibration, optimization, Analysis and interpretation of model results, visualization	围绕模型的优化，包括单一目标和多目标优化问题进行讲解遥感产品在水文模拟方面的价值；如何分析获得的水文模拟结果，进行模拟结果分析、解译与可视化 Remote sensing products are widely used to force, calibrate, and validate hydrological models. In this session, we will study how to use different products to calibrate model parameters. Evaluate the value of satellite products for better constraining models. In the later part, we will go through analyses of simulation results and visualization.
	课程项目集中汇报（2 课时） Final evaluation	课程总结和结课成果展示 Summary and presentation of the term project

13. 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.）
出勤 Attendance：10%
课程项目 Projects：50%；
平时作业 Assignments：20%
期末报告 Final Presentation：20%

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

1. Textbooks
- Handbook of Applied Hydrology, 2nd Edition by Vijay P. Singh
- 水文遥感，刘元波、吴桂平、柯长青等著

2. Reading materials
- Measurements and Observations in the XXI century (MOXXI): innovation and multi-disciplinarity to sense the hydrological cycle. Tauro et al. 2018, Hydrological Sciences Journal
- The Added Value of Different Data Types for Calibrating and Testing a Hydrologic Model in a Small Catchment. Széles et al. 2020, Water Resources Research
- The future of Earth observation in hydrology. McCabe et al. 2017, Hydrology and Earth System Sciences
- Observational breakthroughs lead the way to improved hydrological predictions. Lettenmaier 2017, Water Resources Research