# Advanced GIS Technologies and Applications 3 Credits

Time: 3.10 to 6 pm on Thursday from week 1 to week 16

Room: College of Urban and Environmental Sciences Building R108

Instructor: Xie HU (hu.xie@pku.edu.cn; Office R464)

Office hour: Schedule as needed

TA: Yiling Lin (yllin@stu.pku.edu.cn; Office R403)

Please bring your laptops ■ Power strip will be provided ©

The first 2 hours will be for lecture and the remaining time will be allocated for computer lab exercise. Your answers shall be uploaded in Canvas before 2 pm on the next Thursday.

#### **Objectives**

- o Hands-on experience
- Motivation
- Innovation

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Software   tools	Proficient	Preliminary	OS	Instructions on installation	
ArcGIS	✓		WIN	https://zhuanlan.zhihu.com/p/473689369	
QGIS		<b>√</b>	WIN   MacOS   LINUX	https://www.qgis.org/en/site/forusers/download.h tml	
ENVI		<b>√</b>	WIN	https://blog.csdn.net/m0_56729804/article/details/130149401 https://www.cnblogs.com/enviidl/p/16334286.html	
SNAP		<b>√</b>	WIN	https://step.esa.int/main/download/snap-download/	
Google Earth Engine		<b>√</b>	\	https://code.earthengine.google.com	
Adobe Illustrator		<b>√</b>	WIN	http://software.pku.edu.cn/	
Matlab	?	?	WIN   MacOS   LINUX	http://software.pku.edu.cn/ Please select the following toolboxes during installation (minimum)  ☑ Aerospace Toolbox ☑ Curve Fitting Toolbox ☑ Image Acquisition Toolbox ☑ Image Processing Toolbox ☑ Mapping Toolbox ☑ Text Analytics Toolbox Please take 20~30 mins to go through Matlab 101	

## Schedule

Week	Dates	Themes	Software   tools	Due on 2 pm
01	9/14	Epidemic	ArcGIS   QGIS   Excel	9/21
02	9/21	Nightlight time remote sensing	ArcGIS   Matlab	9/28
03	9/28	Topography	ArcGIS   Matlab	10/12
04	10/5	Break (National holiday 🏂 🦫)		
05	10/12	Route design	ArcGIS	10/19
06	10/19	Flood and inundation	ArcGIS   SNAP   Google Earth Engine	10/26
07	10/26	Vegetation indices	ENVI	11/2
08	11/2	Urban construction	Matlab	11/9
09	11/9	Glacier	Matlab	11/16
10	11/16	Tectonics	Excel   Google Earth   Matlab	11/23
11	11/23	Landslides	QGIS   Matlab   Google Earth	11/30
12	11/30	Proposal		
13	12/7	Temporal analysis in general	Matlab	12/14
14	12/14	Spatial analysis in general	Google Earth Engine   ArcGIS   Matlab	12/21
15	12/21	Graphic design	Adobe Illustrator   PPT	
16	12/28	Final Project 🖰 🖑		1/22

### Grades

Form	Grades (%)	Notes
Lab	70	Twelve labs in total. The students can exclude any two and submit ten in total. Ten highest scores will be considered in the final grade if one completed more than ten labs. Deduction of 7 points for each missing turns in if one completed less than ten labs.
Proposal	10	Every student is encouraged to select your their area of interest and concerned phenomenon, to search for and download relevant remote sensing and environmental datasets, and to make a proposal on how to better understand the phenomenon.  PPT presentation accounts for 5%. Every student is asked to make comments/suggestions on others' work. This will be counted for 5% for class participation. Anonymous reviews will be sent to the presenter after the class.
Final project	Every student is encouraged to use GIS tools and coding for span and temporal analyses, and to finalize a report and an enlightening figure.  PPT presentation 5%   Q&A 5%   Difficulty 5%   Report and enlighten figure 5%	

## **▲** ATTENTION PLEASE **▲**

- Please read *Before the Class* and complete the tasks (software installation, testing, account registration, data download, literature reading, etc.) prior to the class
- o HARD DUE for lab turns in
- o Please ask for leave when you have to BEFORE the class
- o PKU Policy

Thank you for your cooperation 🔋 🖫



# GIS 高级技术与应用

# Advanced GIS Technologies and Applications 3 Credits

Time: 1~16 周, 周四 7~9节 (3.10~6 pm)

Room: 城环院楼 108

Instructor: 胡燮 研究员 (<u>hu.xie@pku.edu.cn</u>; 城环院楼 464)

北京大学城市与环境学院自然地理与自然资源系

Office hour: Schedule as needed

TA: 林祎凌 (yllin@stu.pku.edu.cn; 城环院楼 403)

请带上笔记本■,插排管够 ☺

每次课 1~2 课时 Lecture + 剩余时间 Lab (Due 下一个周四 2 pm)

### 课程目标

Objectives

- 干货输入
- 启发探索
- 思维创新

专业软件	熟 练	掌 握	OS	安装说明	
ArcGIS	✓		WIN <a href="https://zhuanlan.zhihu.com/p/473689369">https://zhuanlan.zhihu.com/p/473689369</a>		
QGIS		✓	WIN   MacOS   LINUX	https://www.qgis.org/en/site/forusers/download.html	
ENVI		✓	WIN	https://blog.csdn.net/m0_56729804/article/details/130149 401 https://www.cnblogs.com/enviidl/p/16334286.html	
SNAP		✓	WIN	WIN https://step.esa.int/main/download/snap-download/	
Google Earth Engine		✓	\	https://code.earthengine.google.com	
Adobe Illustrator		✓	WIN <a href="http://software.pku.edu.cn/">http://software.pku.edu.cn/</a>		
Matlab	?	?	WIN   MacOS   LINUX	http://software.pku.edu.cn/  安装过程中请手动☑如下工具包(如硬盘空间大可全选)     ○ Aerospace Toolbox     ○ Curve Fitting Toolbox     ○ Image Processing Toolbox	

### 课程安排

Schedule

Scheau	ie			
周	日期	主题	使用软件   工具	Due on 2 pm
01	9/14	流行病空间与统计分析	ArcGIS   QGIS   Excel	9/21
02	9/21	夜光遥感分析	ArcGIS   Matlab	9/28
03	9/28	地形分析	ArcGIS   Matlab	10/12
04	10/5	国庆 🏂 🤔		
05	10/12	路径分析	ArcGIS	10/19
06	10/19	洪范提取	ArcGIS   SNAP   Google Earth	10/26
			Engine	
07	10/26	植被指数分析	ENVI	11/2
08	11/2	城市建设	Matlab	11/9
09	11/9	冰川监测	Matlab	11/16
10	11/16	地质构造	Excel   Google Earth   Matlab	11/23
11	11/23	滑坡时空分析	QGIS   Matlab   Google Earth	11/30
12	11/30	Proposal		
13	12/7	通用时间分析	Matlab	12/14
14	12/14	通用影像处理	Google Earth Engine   ArcGIS	12/21
			Matlab	
15	12/21	图表设计	Adobe Illustrator   PPT	
16	12/28	Final Project 🖰 💍		1/22

### 成绩评定

Grades

类型	占比%	说明
Lab	70	共计 12 次,可以根据自身情况选择 2 次不提交,共计提交 10 次 提交超过 10 次按最优 10 次计算;提交不足 10 次按缺次×7 扣分
Proposal	10	每位 同学将根据感兴趣的研究区和地学现象设计科学或工程应用问题,选择、查询并下载适宜的遥感和环境数据集,提出解决方案 PPT 展示 5%,学生需为他人 PPT 展示提意见和建议,将作为课程参与度评分 5%
Final project	20	每位同学将使用 GIS 思路、方法和编程语言 开展地理信息或遥感影像时空分析,撰写项目报告并提交作品图一幅 PPT 展示 5%   Q&A 5%   难度 5%   书面报告和作品图 5%

# **▲** ATTENTION PLEASE **▲**

- 请提前完成课前任务(安装软件、调试软件、注册账号、下载数据、阅读文献…)
- o Hard due for lab turns in, 正常情况下 due 后一周内收到 lab 成绩和评定细节
- 如遇不可抗拒的特殊情况无法到堂,请提前请假
- 北京大学规教务部章制度

感谢理解与配合♥♥