Advanced GIS Technologies and Applications

3 Credits

Time: 3.10 to 6 pm every 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: Yuanzhuo Zhou (20211002044@cug.edu.cn; primary on lab exercise)
Yiling Lin (yllin@stu.pku.edu.cn; primary on course materials; Office R403)

Please bring in your laptops 💻 to the class. 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

- Hands-on experience
- Motivation
- Critical thinking

Software | tools	Proficient	Preliminary	OS	Instructions on installation
ArcGIS	✓		WIN	
ENVI		✓	WIN	
Google Earth Engine		✓	\	https://code.earthengine.google.com
Adobe Illustrator		✓	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
*Python	?	?	WIN | MacOS | LINUX	https://www.anaconda.com/download PyCharm 2021; Anoconda
* Pick up either one for the programming tasks.				

Schedule

Week	Dates	Themes	Software | tools	Due on 2 pm
01	9/12	Pandemic	ArcGIS	9/19
02	9/19	Nightlight time remote sensing	ArcGIS | Matlab/Python	9/26
03	9/26	Topography	ArcGIS | Matlab/Python	10/10
04	10/3	Break (National holiday 🎉🎉)		
05	10/10	Urban planning	ArcGIS | Matlab/Python	10/17
06	10/17	Floods	ArcGIS | Google Earth Engine | Matlab/Python	10/24
07	10/24	Vegetation	ENVI	10/31
08	10/31	Urban construction	Matlab/Python	11/7
09	11/7	Glaciers	Matlab/Python	11/14
10	11/14	Tectonics	Google Earth | Matlab/Python	11/21
11	11/21	Landslides	Google Earth | Matlab/Python	11/28
12	11/28	Temporal analysis in general	Google Earth	12/5
13	12/5	Image processing in general	ArcGIS | Google Earth Engine | Google Earth	12/12
14	12/12	Proposal		
15	12/19	Graphic design	Adobe Illustrator | PPT	
16	12/26	Final Project✌✌		1/20

Grades

Form	Grades (%)	Notes
Lab	70	Twelve labs in total. The students can exclude any two and submit ten. Ten highest scores will be considered in the final grade if one completed more than ten labs.
Proposal	10	**Every student** is encouraged to select an area of interest to research on natural phenomena, to search for and download relevant remote sensing and environmental datasets, and to make a proposal on how to better understand the natural process. *PPT presentation accounts for 5%. Every student is asked to make comments/suggestions on others' work. This will be counted for 5% in terms of class participation. Anonymous reviews will be sent to the presenter after the class.*
Final project	20	**Every student** is encouraged to use **GIS tools and coding** for spatial and temporal analyses, and to finalize a report and an enlightening figure. *PPT presentation 5% | Q&A 5% | Difficulty 5% | Report and enlightening 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
- HARD DUE for lab turns in
- Please ask for leave when you have to BEFORE the class
- 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 (hu.xie@pku.edu.cn；城环院楼 464)
北京大学城市与环境学院
Office hour: Schedule as needed
TA: 周远卓 (20211002044@cug.edu.cn; Lab 内容)
林祎凌 (yllin@stu.pku.edu.cn；课程内容等；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	
ENVI		✓	WIN	
Google Earth Engine		✓	\	https://code.earthengine.google.com
Adobe Illustrator		✓	WIN	http://software.pku.edu.cn/
*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 Acquisition Toolbox ○ Image Processing Toolbox ○ Mapping Toolbox ○ Text Analytics Toolbox 无编程基础的同学建议跟练 Matlab 101 (20~30 mins)
*Python	?	?	WIN | MacOS | LINUX	https://www.anaconda.com/download PyCharm 2021; Anoconda
* 任选其一完成编程任务。				

课程安排

Schedule

周	日期	主题	使用软件 | 工具	Due on 2 pm
01	9/12	流行病传播	ArcGIS	9/19
02	9/19	夜光遥感	ArcGIS | Matlab/Python	9/26
03	9/26	地形地势	ArcGIS | Matlab/Python	10/10
04	10/3	国庆🥕🥕		
05	10/10	城市规划	ArcGIS | Matlab/Python	10/17
06	10/17	洪涝灾害	ArcGIS | Google Earth Engine | Matlab/Python	10/24
07	10/24	植被指数	ENVI	10/31
08	10/31	城市建设	Matlab/Python	11/7
09	11/7	冰川运动	Matlab/Python	11/14
10	11/14	地质构造	Google Earth | Matlab/Python	11/21
11	11/21	山体滑坡	Google Earth | Matlab/Python	11/28
12	11/28	通用时间分析	Google Earth	12/5
13	12/5	通用影像处理	ArcGIS | Google Earth Engine | Google Earth	12/12
14	12/12	Proposal		
15	12/19	图表设计	Adobe Illustrator | PPT	
16	12/26	Final Project✌✌		1/20

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…)
- 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🌹🌹