# Advanced GISc (Fall 2017)

http://grel.ist.edu.pk/lms/course/view.php?id=78

| Instructors | | | |
|---|---|---|---|
| **Teacher** | **Rizwan Bulbul, PhD**<br>Assistant Professor<br>Geospatial Research and Education Lab (GREL)<br>Department of Space Science<br>Institute of Space Technology | **Assistant** | |
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| Course Outline | | | |
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| **Department** | Department of Space Science | **Program** | MS in RS and GISc |
| **Type** | Core | **Credit Hrs** | 3 |
| **Pre-Req** | Introduction to GIS | **Level** | Graduate |
| **Description** | Geographic information systems (GIS) by definition are specialized information systems providing special functionality for efficiently capturing, storing, accessing and analyzing spatial data. Understanding the core and fundamental theoretical concepts is of utmost importance for comprehending advanced GIS concepts.<br><br>The course builds on the basic GIS knowledge and aims at providing an in-depth understanding of the advanced topics in GIS. Theoretical knowledge will be supplemented with practical training through lab sessions. Both open source and propriety software will be used for demonstration purposes.<br><br>In addition to the reference books, the students will read research papers both classic and state of the art for respective topics as the course moves on. | | |

## Course Outcome

By the end of this course students should be able to achieve and demonstrate the ability to;

- Understand the fundamental concepts
- Understand spatial data representation and storage models.
- Have knowledge of advanced spatial data analysis techniques
- Find research problems for MS thesis.

## Teacher Expectations

The students enrolled for the course are expected to;

1. have basic GIS concepts (as is the prerequisite),
2. contribute actively in the class by constructive discussions,
3. frequent quizzes and assignments almost everyday,
4. perform well in quizzes and submit assignments on time,
5. do labs properly and as instructed, and
6. find an idea for final thesis.

**Warning:** **Plagiarism in deliverables is highly discouraged and will be dealt strictly.**

## Course Outline

The major topics to be covered in the course are;

1. Introduction to the course
2. Introduction to GIS
3. Spatial data modeling
4. Spatial data analysis
5. Algorithms and data structures
6. Data exploration and spatial statistics
7. Network and location analysis
8. Spatial reasoning and uncertainty
9. Time series
10. Research trends

## Weekly Course Distribution*

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|---|---|
| 1. Introduction to the course | Week-1 |
| 2. Introduction to GIS | Weeks 2 |
| 3. Spatial data modeling | Week 3-5 |
| 4. Spatial data analysis | Weeks 6-8 |
| 5. Algorithms and data structures | Weeks 9-11 |
| 6. Data exploration and spatial statistics | Weeks 12-13 |
| 7. Network and location analysis | Weeks 14 |
| 8. Spatial reasoning and uncertainty | Weeks 15 |
| 9. Time | Weeks 16 |
| 10. Research trends | Week 17 |
| 11. Project Presentations | Week 18 |

## Lab Outline

The lab exercises will cover following topics;

1. Fundamental concepts
2. Analyzing vector data
3. Analyzing raster data
4. Terrain mapping and analysis
5. Viewshed and watersheds
6. Spatial statistics
7. Spatial databases
8. Handling time series data
9. Big data analysis

## Assessment*

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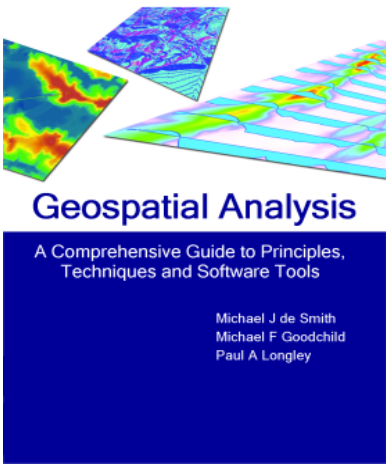
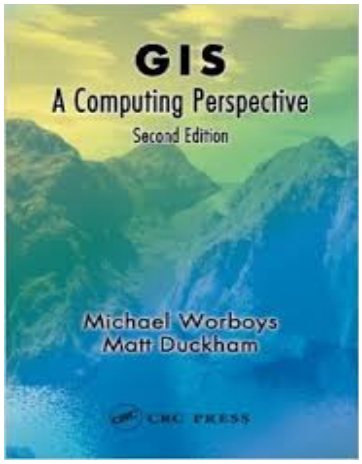
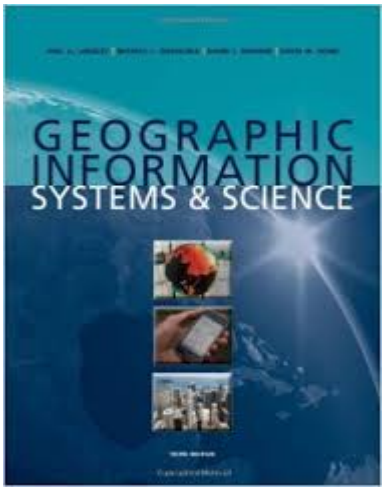
| Quizzes | 10% |
| Assignments | 15% |
| OHTs/Midterm | 15% |
| Project | 30% |
| Final Exam | 30% |

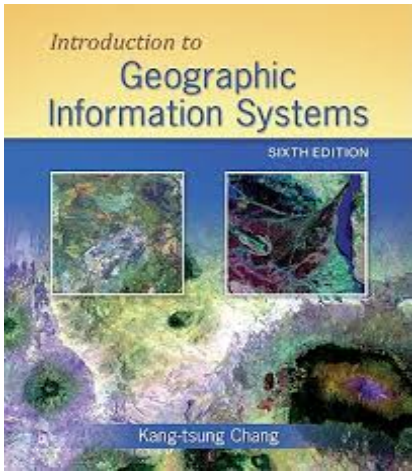
*tentative and may subject to change

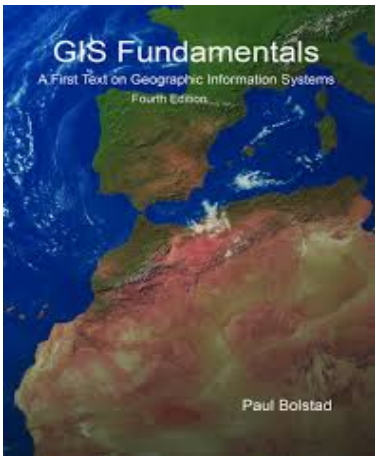
## Books

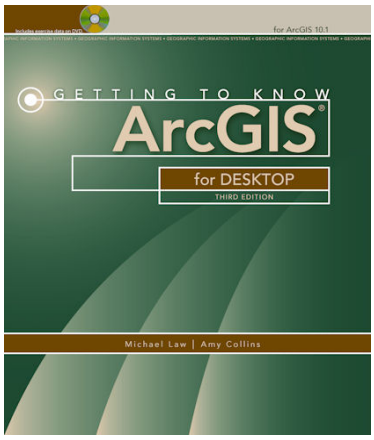


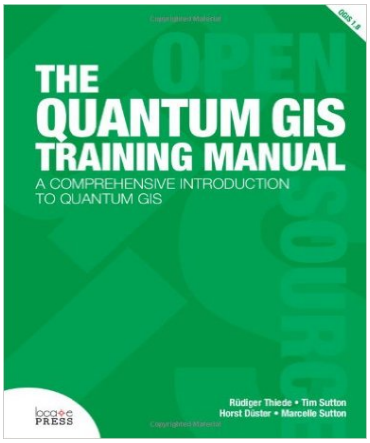



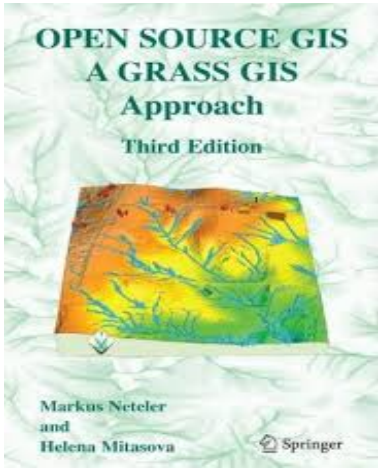



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| **Document Code** | | **Written By** | **Name** | **Dr. Rizwan Bulbul** |
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| **Course Title** | **Advanced GIS** | **Approved By** | **Name** | |
| | | | **Date** | |