

Semester II

Paper 204: Programming With Python

Unit 1: Functions, Modules and Files

15 Lectures

- 1.1. Function: introduction, function definition, parameters, function call, recursions.
- 1.2. Working with Libraries: import statement. Visualizing data with Matplotlib: Introduction to Matplotlib, Plotting vector data, Plotting raster data, Plotting 3D data.
- 1.3. FileHandling:Readingandwritinginfiles.
- 1.4. IntroductiontoPYQGIS: Pythonconsole in QGIS,Using PyQGISinscripts.

Unit 2: Object Oriented programming

15 Lectures

- 2.1 Introduction to Object Oriented Programming
- 2.2 ClassesandObjects:Objects
- 2.3 Classes,Operators overloading
- 2.4 Polymorphism, Inheritance.

Unit 3:Vector data Processing with Python

15 Lectures

- 3.1 Reading and writing vector data with OGR: Introduction to OGR, Reading vectordata: accessing specific features, and displaying data, writing vector data: Creatingnewdata sources and new fields,Updating existing data.
- 3.2 FilteringdatawithOGR:Attributefilters,Spatialfilters,UsingSQLtocreatetemporary layers.
- 3.3 ManipulatinggeometrieswithOGR:Workingwithpoints,lines,andpolygons.
- 3.4 Usingspatialreferencesystems:OSRandpyproj.

Unit 4: Raster Data Processing with Python

15 Lectures

- 4.1 Introduction to GDAL, Reading writing and resampling raster data with GDAL.
- 4.2 Working with raster data: Ground control points, Converting pixel coordinates
- 4.3 Histograms, Attribute tables, Virtual raster format.
- 4.4 Map algebra with NumPy and SciPy

References:

1. Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 2/E 2014
2. Michael Dawson, Python Programming for the Absolute Beginner, Paperback, Second Edition, Published November 8th, 2005 by Course Technology PTR
3. James Payne, Beginning Python: Using Python 2.6 and Python 3, Wiley India, 2010
4. AllenDowney.Thinkpython.<http://greenteapress.com/thinkpython/thinkpython.pdf>,2012.
5. ChrisGarrard.GeoprocessingwithPython."ManningPublications",2016.
6. FabrizioRoman. LearningPython ,2015PacktPublishing,Birmingham-Mumbai
7. QGIS Community. Pyqgisdevelopercookbook.<http://docs.qgis.org/2.14/pdf/en/QGIS-2.14-PyQGISDeveloperCookbook-en.pdf>, accessed25-Feb-2017.
8. ShellScottM.Anintroductiontonumpyandscipy.<https://engineering.ucsb.edu/~shell/che210d/numpy.pdf>, accessed25-Feb-2017.
9. John VGuttag. Introduction to Computationand Programming Using Python,PrenticeHallofIndia
10. SinanKalkan. IntroductiontoProgrammingConceptswithCaseStudiesinPython ,