# Deep Dive in Python (IP/IS, 4 credits, Monsoon 2022)

Instructor/Guide: Pankaj Jalote

This is IP/IS to study advanced aspects of the Python language as well as the rich Python ecosystem. In this “course” we will collectively learn advanced and important aspects of Python (i.e. beyond regular programming). Students can enroll in this in groups of 2. Each student group will have to take up at least one topic (some examples given below), gain expertise in it and then give lecture cum tutorial on it, as well as give some problem/assignment for others so others can gain familiarity and a degree of understanding. So, at the end of this course, each student-group will gain expertise in one topic, and good familiarity in other topics.

The whole “class” will meet once a week in evenings, perhaps in hybrid mode (i.e. some can come to class and others can join online), for 2+ hours. As it is a 4 credit IP/IS, each student is expected to put a total of about 8-10 hours per week.

**Prerequisite**: Students should be proficient in Python and should have good experience in developing largish software / projects. Enrollment will be limited to a few (˜5) student-groups. Preference will be given to final year students (BTech/MTech).

Some of the topics the IS/IP may cover (this list can be expanded, and a subset of topics will be selected):

* Python runtime system – details of the runtime system and compilation. We can use Cpython for this.
* Parallel and distributed computing in Python – how is this supported.
* Functional programming using Python – for this topic, first we will study the FP paradigm using some standard functional programming language, and then explore what aspects are supported in Python (e.g. lambda functions, map, reduce, closures, etc)
* Performance engineering of python code – including profiling, monitoring, incorporating efficient code written in other languages in python
* Packages and frameworks and the Python ecosystem. How this open system of packages and frameworks works, important packages and frameworks available with their scope, … some important and widely used packages for data structures
* Advanced Python programming. E.g. Python philosophy and the pythonic way, everything is an object, API based program development (producing and consuming APIs), decorators, generators, closures, etc, understanding subtle concepts, ..
* Machine Learning with Python – as ML is now prevalent and is becoming a commonly used technology
* NLP in Python – some common NLP problems and Python’s support for it
* Extensions proposed for Python – e.g. adding types etc.

Students can enroll in groups of 2. Those who want to enroll in this IP/IS, should send an email to Sanjana (Sanjana Soni [sanjanas@iiitd.ac.in](mailto:sanjanas@iiitd.ac.in)) with cc to Prof. Jalote with the subject “IP/IS in Python Ecosystem”. Pls send the email by May 12th. The mail should contain the names/rollno of the students, along with this information for each of the member:

1. Largest three software projects worked on (size in LOC, language, tech stack)
2. Grades in programming oriented courses (IP, AP, DSA, DB, …)
3. A brief statement on why you want to do this IP/IS.