

Object Oriented Programming (Using Python)

AICTE Model Curriculum -2021 for UG Degree Courses in

- COMPUTER SCIENCE & ENGINEERING (CSE)
- COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)
- ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
- ARTIFICIAL INTELLIGENCE AND DATA SCIENCE (AI&DS)
- COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)
- COMPUTER SCIENCE AND ENGINEERING (IOT)
- COMPUTER SCIENCE & ENGINEERING (CYBER SECURITY)
- CSE (IoT & CYBER SECURITY INCLUDING BLOCK CHAIN TECHNOLOGY)
- INFORMATION TECHNOLOGY

Object Oriented Programming (Using Python)

II Semester, Program Core Course, 3 Credits

- Top Programming Languages - 2024
- Objectives
- Outcomes
- Syllabus
- Text and Reference Books
- e-Resources
- Introduction to Python

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Top Programming Languages: TIOBE Index for May 2024

TIOBE Index for May 2024









<https://www.tiobe.com/tiobe-index/>



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May 2024	May 2023	Change	Programming Language	Ratings	Change
1	1		 Python	16.33%	+2.88%
2	2		 C	9.98%	-3.37%
3	4	▲	 C++	9.53%	-2.43%
4	3	▼	 Java	8.69%	-3.53%
5	5		 C#	6.49%	-0.94%
6	7	▲	 JavaScript	3.01%	+0.57%
7	6	▼	 Visual Basic	2.01%	-1.83%

TIOBE Index for May 2024

8	12	⬆️		Go	1.60%	+0.61%
9	9			SQL	1.44%	-0.03%
10	19	⬆️		Fortran	1.24%	+0.46%
11	11			Delphi/Object Pascal	1.24%	+0.23%
12	10	⬇️		Assembly language	1.07%	-0.13%
13	18	⬆️		Ruby	1.06%	+0.26%
14	15	⬆️		MATLAB	1.06%	+0.18%
15	14	⬇️		Swift	1.01%	+0.09%

TIOBE Index for May 2024

16	8	↘	 PHP	0.97%	-0.62%
17	13	↘	 Scratch	0.93%	-0.02%
18	17	↘	 Rust	0.93%	+0.11%
19	33	↗	 Kotlin	0.89%	+0.52%
20	26	↗	 COBOL	0.85%	+0.29%

Object Oriented Programming (Using Python)

COURSE OBJECTIVES:

1. Explore the concepts object-oriented programming like classes, constructors, Polymorphism, Inheritance, and File handling.
2. Prepare student for solving real-world problems using OOPs concepts.

Object Oriented Programming (Using Python)

COURSE OUTCOMES:

1. Understand the concepts of Object-Oriented features.
2. Apply OOPs concepts and different libraries to solve programming problems.
3. Understand the advanced concepts of Python.
4. Develop programs to access databases and web data.
5. Understand APIs and third-party libraries to be used with Python.

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SYLLABUS:

UNIT I

Introduction to Object Oriented Programming Paradigms:

Programming paradigms, advantages of OOP, comparison of OOP with Procedural Paradigms.

Classes and Objects: Prototyping, referencing the variables in functions, inline, static and friend functions. Memory allocation for classes and objects, arrays of objects, constructors.

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SYLLABUS:

UNIT II

Polymorphism and Inheritance: Overriding methods, type conversions, base classes and derived classes, types of inheritance, various types of classes, invocation of constructors and destructors inheritance, aggregation, composition, classification hierarchies, metaclass/ abstract classes, unit testing and exceptions.

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SYLLABUS:

UNIT III

Python Libraries: Basics of Open Source libraries for data pre-processing, modeling and visualization.

UNIT IV

Python to access Web Data: Regular Expressions, extracting data, sockets, using the Developer Console to Explore HTTP, Retrieving Web Page, and Passing Web Pages.

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SYLLABUS:

UNIT V

Using Databases with Python: Using Databases, Single Table CRUD, Designing and representing a data model, reconstructing data with JOIN, many-to-many relationships.

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SYLLABUS:

Text Books and References:

1. Allen Downey, Jeff Elkner, Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python", SoHo Books, 2009.
2. R.S. Salaria , "Mastering Object-Oriented Programming", Khanna Book Publishing Co., Delhi
3. Jeeva Jose, "Introduction to Computing & Problem Solving with Python", Khanna Book Publishing, 2019.
4. <https://www.coursera.org/specializations/python-3-programming#courses>
5. Paul Barry , "Head First Python", O'Reilly, 2010

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SYLLABUS:

NPTEL/SWAYAM Course:

1. Python for Data Science, Prof. Raghunathan Rengasamy, IIT Madras
2. The Joy of Computing using Python Prof. Sudarshan, Prof. Yayati Guptaingar, IIT Ropar, IIIT Dharwad.

Object Oriented Programming Lab

Course Objectives:

1. Master the concepts of Object Oriented Programming.
2. Explore the OOPs features of Python and build applications.

Course Outcomes:

1. Demonstrate the features of Object-Oriented Programming.
2. Understand APIs and third-party libraries to be used with Python.
3. Use Python libraries to solve real-world problems.
4. Write scripts to solve data science/machine learning problems using NumPy and Pandas.
5. Develop applications by accessing web data and databases.

Object Oriented Programming Lab

List of experiments/programs:

1. Write a NumPy program to compute the cross product of two given vectors.
2. Write NumPy program to calculate the QR decomposition of a given matrix.
3. Write a Pandas program to convert a Panda Module Series to Python list and its type.
4. Write a Pandas program to convert a NumPy array to a Pandas series.
5. Create a Python project to get the citation from Google scholar using title and year of publication and volume and pages of journal.
6. Create a Python project to get total COVI-19 cases, total deaths due to Covid-19, total Covid-19 patients recovered in the world.

Object Oriented Programming Lab

Text Book:

1. Reema Thareja, "Python Programming", Oxford Press, 2017.

Online Resources:

1. <https://vknight.org/cfm/labsheets/04-object-oriented-programming/>
2. <http://learning-python.com/class/Workbook/x-exercises.htm>
3. <https://inst.eecs.berkeley.edu/~cs61a/fa14/lab/lab06/#inheritance>
4. https://anandology.com/python-practice-book/object_oriented_programming.html
5. <http://stanfordpython.com/>
6. <https://docs.python.org/3/>

Introduction to Python

OUTLINE:

- What is Python?
- History and versions of Python
- Features of Python
- Applications for Python
- Who uses Python Today

What is Python?

- **Guido van Rossum** created **Python** in the late **1980s** at the National Research Institute for Mathematics and Computer Science in the **Netherlands**.
- **Python** first version was released in **1991**.
- **Python** began as a competitor to **Java** in the industry, but it quickly grew in popularity.
- **Python** is currently quite popular among both **researchers** and **developers**.
- Today **python** interpreters are available for many operating systems including **Windows, Linux/UNIX, macOS, Other**.

What is Python?

- **Python** is a **programming language** that lets you work **more quickly** and **integrate** your systems **more effectively**.
- You can learn to use **Python** and see almost **immediate gains** in **productivity** and **lower maintenance costs**.
- **Python** is powerful... and fast;
 plays well with others;
 runs everywhere;
 is friendly & easy to learn;
 is Open.

What is Python?

- **Python** is a **high-level, interpreted, interactive** and **object-oriented** scripting language.
- **Python** is designed to be **highly readable**. It uses **English keywords** frequently whereas the other languages use **punctuations**.

What is Python?

- **Python is Interpreted:** Python is processed at **runtime** by the **interpreter**. You do not need to compile your program before executing it. This is similar to **PERL** and **PHP**.
- **Python is Interactive:** You can actually sit at a **Python** prompt and interact with the **interpreter** directly to write your programs.
- **Python is Object-Oriented:** Python supports **Object-Oriented** style or technique of programming that **encapsulates** code within objects.
- **Python is a Beginner's Language:** Python is a great language for the beginnerlevel programmers and supports the development of a wide range of applications from simple **text processing** to **WWW** browsers to **games**.

History and versions of Python:

- **Python** is derived from many other languages, including **ABC**, **Modula-3**, **C**, **C++**, **Algol-68**, **SmallTalk**, and **Unix shell** and other **scripting** languages.
- **Python** is **copyrighted**. Like **Perl**, **Python** source code is now available under the **GNU General Public License (GPL)**.
- **Python** is now maintained by a **core development team** at the **institute**, although **Guido van Rossum** still holds a vital role in directing its progress.

History and versions of Python:

- **Python 1.0** was released in **November 1991**. **Python 1.5.2** in **April 1999** & **Python 1.6.1** in **September 2000**.
- **Python 2.0.1** was released in **June 2001**. **Python 2.7.18** is the latest edition of **Python 2** was released on **April 20, 2020**.
- **Python 3.0.0** was released on **Dec. 3, 2008**.
- **Python 3.12.3** is the latest edition of **Python 3** was released on **April 9th, 2024**.

Features of Python:

- Automatic garbage collection
- Automatic memory management
- Beginners programming language
- Built-in tool set
- Component integration/embedded
- Developer activity
- Dynamically typed
- Ease of use
- Extensible
- Free and open source
- GUI Programming
- High level language
- Interactive
- Interpreted
- Large and comprehensive standard library
- Multi-paradigm
- Object oriented
- Platform independent
- Powerful
- Procedure oriented
- Program portability
- Programming becomes pleasure than work
- Ready-made stuff
- Scalable
- Simple and easy to learn
- Software quality
- Support libraries

Applications for Python:

Python is used in many application domains. Here's a sampling.

- Web and Internet Development
- Scientific and Numeric
- Database Access
- Desktop GUIs
- Software & Game Development
- Network Programming
- Education
- Business Applications

For more details visit: <https://www.python.org/about/apps/>

Who uses Python Today?

Many organizations use **Python** for various purposes. These include:

- **Google:** In web search systems
- **YouTube:** Video sharing service
- **Bit-torrent:** Peer to peer file sharing system
- **Intel, HP, Seagate, IBM, Qualcomm:** Hardware sharing
- **Pixar, Industrial Light and Magic:** Movie animation
- **JP Morgan chase, USB:** Financial market forecasting
- **NASA, FermiLab:** Scientific programming
- **iRobot:** Commercial robot vacuum cleaners
- **NSA:** Cryptographic and intelligence analysis
- **IronPort:** Email servers
- **Drop Box, RaspBerry PI, NETFLIX, Yahoo, Honeywell, Philips, United Space Alliance** etc.,

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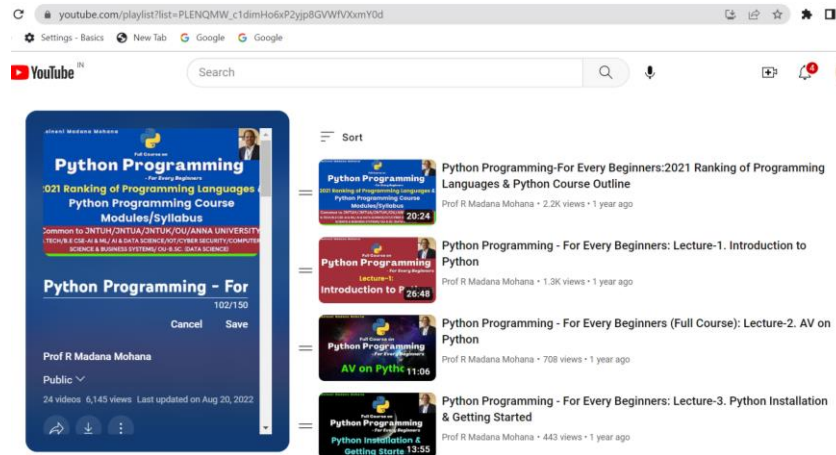
<https://www.linkedin.com/in/dr-rasineni-madana-mohana/>

YouTube Channel Subscription:

<https://www.youtube.com/c/RASINENIMADANAMOHANA>

Python Programming - For Every Beginners (Full Course):

https://www.youtube.com/playlist?list=PLENQMW_c1dimHo6xP2yjp8GVWfVXxmY0d



The screenshot shows a YouTube channel page for Prof R Madana Mohana. On the left, there is a video player for a video titled "Python Programming - For Every Beginners (Full Course): Lecture-2. AV on Python". The video player shows a thumbnail with the text "Python Programming For Every Beginners 2021 Ranking of Programming Languages & Python Course Outline Python Programming Course Modules/Syllabus" and "Sometime to JNTU/JNTUA/JNTUK/OU/ANNA UNIVERSITY TRENKLE CSE & AI & ML & AI & DATA SCIENCE/OT Cyber Security/Computer Science & Business Systems/OU & IIC & Data Science". The video player shows a progress bar at 102/150 and buttons for "Cancel" and "Save". Below the video player, it says "Prof R Madana Mohana", "Public", and "24 videos, 6,145 views, Last updated on Aug 20, 2022".

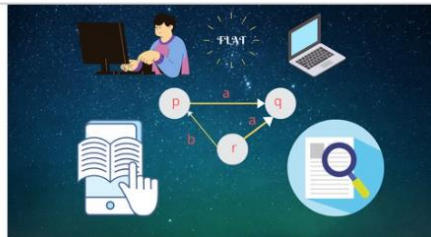
On the right, there is a list of videos:

- Python Programming - For Every Beginners: 2021 Ranking of Programming Languages & Python Course Outline (20:24) - Prof R Madana Mohana • 2.2K views • 1 year ago
- Python Programming - For Every Beginners: Lecture-1. Introduction to Python (26:48) - Prof R Madana Mohana • 1.3K views • 1 year ago
- Python Programming - For Every Beginners (Full Course): Lecture-2. AV on Python (1:06) - Prof R Madana Mohana • 708 views • 1 year ago
- Python Programming - For Every Beginners: Lecture-3. Python Installation & Getting Started (13:55) - Prof R Madana Mohana • 443 views • 1 year ago

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Basics of R Software for Data Science

Prof. R. Madana Mohana

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Python Programming - For Every Beginners

Prof. R. Madana Mohana

4.3 ★★★★★ (306)



Introduction to R Programming

Prof. R. Madana Mohana

4.4 ★★★★★ (198)

16.5 total hours · 30 lectures · All Levels

<https://www.udemy.com/user/dr-r-madana-mohana/>

1. Python Programming - For Every Beginners

<https://www.udemy.com/course/python-programming-for-every-beginners/>

2. Introduction to R Programming

<https://www.udemy.com/course/introduction-to-r-programming-w/>

3. Basics of R Software for Data Science

<https://www.udemy.com/course/basics-of-r-software-for-data-science/>

4. Formal Languages and Automata Theory

<https://www.udemy.com/course/formal-languages-and-automata-theory-e/>

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