

Subject: Programming and Data Science

CHE-226	Programming and data sciences	CH (3)	
		Theory (2+1)	
Pre- req.	Nil	Category	Foundation Course

Course Contents as per PEC Guidelines 2023-2024

- Introduction to Computers and Python: Overview of hardware and software, Operating systems, Python and other programming languages, Internet and world wide web. Software Technologies
- Variables and Assignment Statements, Arithmetic operators, Function print and an intro to strings, getting input from user
- Programming Logic: flow charts. program structure, logic building, algorithms
- Conditional Statements: Boolean operators and, or and not. The if statement and Comparison Operators. Algorithms Pseudocode. Control Statements. If statement. If else. else statements
- Repetition Structures: Sequence- Controlled Repetition, Sentinel- Controlled Repetition, Nested Control Statements, break and continue statements
- Functions: Defining functions, functions with multiple parameters, Random Number generation, case
- study: A game of chance, python standard library, math module functions. Default parameters values, Keyword Arguments, scope rules. import: A deeper look, function Call stack
- Sequences: Lists and Tuples: Lists. Tuples. Unpacking Sequences. Sequences Slicing. del statement, Passing lists to functions. Sorting lists, searching sequences. simulating stacks with lists, Two Dimensional lists, Dictionary Comparisons, Comparing sets. Mathematical set operations
- Array oriented programming with NumPy: Creating arrays from existing data. array Attributes, Filling arrays with specific values, creating arrays from Ranges, List vs array performance. NumPy calculation Methods, Indexing and slicing, views, Reshaping and transposing
- Manipulating Strings: formatting strings, concatenating and repeating strings. stripping whitespace from strings, other string manipulation functions
- Files and Exceptions: Files, Text file processing, updating text files
- How Big is Big Data?
- Introduction to Python Programming
- Case. study: Processing sample dataset in python
- Mutable set operators and Methods, Set Comprehensions
- Serialization with JASON.
- Focus on security. pickle serialization and deserialization, Handling expressions

Weekly plan/ Reference Books	
1	Introduction to Computers and Python • Overview of hardware and software • Operating systems • Python and other programming languages • Internet and the World Wide Web • Software Technologies
2-3	Variables and Assignment Statements • Variables, Assignment Statements, Arithmetic Operators • Function print and intro to strings • Getting input from the user
4	Programming Logic • Flowcharts, Program Structure • Logic building • Algorithms
5	Conditional Statements • Boolean operators (and, or, not) • if statement and comparison operators • Algorithms Pseudocode • Control Statements (if, else, elif)
6	Repetition Structures • Sequence-Controlled Repetition • Sentinel-Controlled Repetition • Nested Control Statements, break and continue
7-8	Functions • Defining functions, functions with multiple parameters • Random number generation • Python Standard Library and math module • Default parameters, keyword arguments, scope rules
9-10	Mid-Term Exam
11-12	Two-Dimensional Lists and Dictionary Comparisons • Two-dimensional lists, Dictionary Comparisons • Comparing sets, Mathematical set operations
13	Sequences: Lists and Tuples • Lists and Tuples, Sequence Slicing, del statement • Passing lists to functions • Sorting and searching sequences • Simulating stacks with lists
14	Array-Oriented Programming with NumPy (Part 1)

	• Creating arrays from existing data • Array attributes, filling arrays with specific values Creating arrays from ranges, List vs Array performance
15-16	Array-Oriented Programming with NumPy (Part 2) • NumPy calculation methods • Indexing and slicing, views Reshaping and transposing Manipulating Strings • Formatting strings, concatenating, and repeating Stripping whitespace, other string manipulation functions
17	Files and Exceptions • Files and Text file processing Updating text files
18	Final Exam
TEXT AND REFERENCE BOOKS: • Paul Deitel. Harvey Deitel "Intro 10 Python for Computer Science and Data Science: Learning to Program with AI. Big Dam and The Cloud" 1st Edition. Pearson Education. 2021 • Wes McKinney, "Python for Data Analysis", O'Reilly Media. Inc, 2018Chopy & Hicks, "Handbook of Chemical Engineering Calculations", 2nd Ed. 1994 McGraw-Hill Professional Publishing.	

