

## DETAILED SYLLABUS

<b>COMPUTER SYSTEM SECURITY</b>		
<b>Course Outcome ( CO)</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>At the end of course , the student will be able to understand</b>		
<b>CO 1</b>	To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats	<b>K<sub>1</sub>, K<sub>2</sub></b>
<b>CO 2</b>	To discover cyber attack scenarios to web browsers and web servers and to explain how to mitigate such threats	<b>K<sub>2</sub></b>
<b>CO 3</b>	To discover and explain mobile software bugs posing cyber security threats, explain and recreate exploits, and to explain mitigation techniques.	<b>K<sub>3</sub></b>
<b>CO 4</b>	To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios	<b>K<sub>4</sub></b>
<b>CO 5</b>	To articulate the well known cyber attack incidents, explain the attack scenarios, and explain mitigation techniques.	<b>K<sub>5</sub>, K<sub>6</sub></b>
<b>DETAILED SYLLABUS</b>		<b>3-1-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Computer System Security Introduction:</b> Introduction, What is computer security and what to learn? , Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1 chase. <b>Hijacking &amp; Defense:</b> Control Hijacking ,More Control Hijacking attacks integer overflow ,More Control Hijacking attacks format string vulnerabilities, Defense against Control Hijacking - Platform Defenses, Defense against Control Hijacking - Run-time Defenses, Advanced Control Hijacking attacks.	08
<b>II</b>	<b>Confidentiality Policies:</b> Confinement Principle ,Detour Unix user IDs process IDs and privileges , More on confinement techniques ,System call interposition ,Error 404 digital Hacking in India part 2 chase , VM based isolation ,Confinement principle ,Software fault isolation , Rootkits ,Intrusion Detection Systems	08
<b>III</b>	<b>Secure architecture principles isolation and leas:</b> Access Control Concepts , Unix and windows access control summary ,Other issues in access control ,Introduction to browser isolation . <b>Web security landscape :</b> Web security definitions goals and threat models , HTTP content rendering .Browser isolation .Security interface , Cookies frames and frame busting, Major web server threats ,Cross site request forgery ,Cross site scripting ,Defenses and protections against XSS , Finding vulnerabilities ,Secure development.	08
<b>IV</b>	<b>Basic cryptography:</b> Public key cryptography ,RSA public key crypto ,Digital signature Hash functions ,Public key distribution ,Real world protocols ,Basic terminologies ,Email security certificates ,Transport Layer security TLS ,IP security , DNS security.	08
<b>V</b>	<b>Internet Infrastructure:</b> Basic security problems , Routing security ,DNS revisited ,Summary of weaknesses of internet security ,.Link layer connectivity and TCP IP connectivity , Packet filtering firewall ,Intrusion detection.	08

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<b>Text books:</b>		
1. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.		
2. Michael T. Goodrich and Roberto Tamassia, Introduction to Computer Security, Addison Wesley, 2011.		
3. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.		
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRC Press, 2001.		
<b>Mapped With :</b> <a href="https://ict.iitk.ac.in/product/computer-system-security/">https://ict.iitk.ac.in/product/computer-system-security/</a>		

<b>PYTHON PROGRAMMING</b>		
<b>Course Outcome ( CO)</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>At the end of course , the student will be able to understand</b>		
CO 1	To read and write simple Python programs.	K <sub>1</sub> , K <sub>2</sub>
CO 2	To develop Python programs with conditionals and loops.	K <sub>2</sub> , K <sub>4</sub>
CO 3	To define Python functions and to use Python data structures -- lists, tuples, dictionaries	K <sub>3</sub>
CO 4	To do input/output with files in Python	K <sub>2</sub>
CO 5	To do searching ,sorting and merging in Python	K <sub>2</sub> , K <sub>4</sub>
<b>DETAILED SYLLABUS</b>		<b>3-1-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction:</b> The Programming Cycle for Python , Python IDE, Interacting with Python Programs , Elements of Python, Type Conversion. <b>Basics:</b> Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression.	<b>08</b>
<b>II</b>	<b>Conditionals:</b> Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation. <b>Loops:</b> Purpose and working of loops , While loop including its working, For Loop , Nested Loops , Break and Continue.	<b>08</b>
<b>III</b>	<b>Function:</b> Parts of A Function , Execution of A Function , Keyword and Default Arguments ,Scope Rules. <b>Strings :</b> Length of the string and perform Concatenation and Repeat operations in it. Indexing and Slicing of Strings. <b>Python Data Structure :</b> Tuples , Unpacking Sequences , Lists , Mutable Sequences , List Comprehension , Sets , Dictionaries <b>Higher Order Functions:</b> Treat functions as first class Objects , Lambda Expressions	<b>08</b>

IV	<p><b>Sieve of Eratosthenes:</b> generate prime numbers with the help of an algorithm given by the Greek Mathematician named Eratosthenes, whose algorithm is known as Sieve of Eratosthenes.</p> <p><b>File I/O :</b> File input and output operations in Python Programming</p> <p><b>Exceptions and Assertions</b></p> <p><b>Modules :</b> Introduction , Importing Modules ,</p> <p><b>Abstract Data Types :</b> Abstract data types and ADT interface in Python Programming.</p> <p><b>Classes :</b> Class definition and other operations in the classes , Special Methods ( such as <code>_init_</code>, <code>_str_</code>, comparison methods and Arithmetic methods etc.) , Class Example , Inheritance , Inheritance and OOP.</p>	08
V	<p><b>Iterators &amp; Recursion:</b> Recursive Fibonacci , Tower Of Hanoi</p> <p><b>Search :</b> Simple Search and Estimating Search Time , Binary Search and Estimating Binary Search Time</p> <p><b>Sorting &amp; Merging:</b> Selection Sort , Merge List , Merge Sort , Higher Order Sort</p>	08

**Text books:**

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist``, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/thinkpython/>)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, —Introduction to Computation and Programming Using Python``, Revised and expanded Edition, MIT Press , 2013
4. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
5. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015.
6. Kenneth A. Lambert, —Fundamentals of Python: First Programs, CENGAGE Learning, 2012.
7. Charles Dierbach, —Introduction to Computer Science using Python: A Computational ProblemSolving Focus, Wiley India Edition, 2013.
8. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3, Second edition, Pragmatic Programmers, LLC, 2013.

**Mapped With :** <https://ict.iitk.ac.in/product/python-programming-a-practical-approach/>