[Credits: 2, Lab: 30]

Software Lab Based on Python: Students are advised to do laboratory/practical practice.

Reference Books:

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India

2. R. Nageswara Rao, "Core Python Programming", dreamtech

3. Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall

4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Pyhon", Wiley

5. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication

6. Luke Sneeringer, "Professional Python", Wrox

7. "Hacking Secret Ciphers with Python", AI Sweigart, URL- https://inventwithpython.com/hacking/chapters

Course Outcome:

After learning the course, the student will be able:
1. To develop proficiency in creating based applications using the Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using PyLab.
5. To be able to do text filtering with regular expressions in Python
6. To be able to create socket applications in Python
7. To be able to create GUI applications in Python

CC -6: Operating Systems   [Credit: 4, Lecture Hours: 60]
Course Objective:
To study the basic concepts and functions of operating systems and learn the basics Unix Commands

Unit 1: Introduction   (06Lectures)
Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems, batch systems , time sharing systems; operating systems for personal computers & workstations, process control & real time systems. Multiuser, multitasking, multiprocessing and real time operating systems,

Unit 2: Operating System Organization   (6 Lectures)

Processor and user modes, kernels, system calls and system programs, Various components of operating system with reference to DOS. BIOS, BIOS and DOS interrupt, Single user operating system. Task loader, Memory management.

Unit 3: Process Management (10 Lectures)

System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-preemptive and preemptive scheduling algorithms; concurrent and processes, critical section, semaphores, methods for inter-process communication; deadlocks. Device management. Control of various devices. Device drivers. Interrupt driven and poll driven data transfers. Need of software and hardware protocols.

Unit 4: Memory Management (08 Lectures)

Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory

Unit 5: File and I/O Management (08 Lectures)

Directory structure, file operations, file allocation methods, device management, File systems. File management. Process management and scheduling Special requirements and facilities for multiprocessing environment

Unit 6: Protection and Security (4 Lectures)

Policy mechanism, Authentication, Internal access Authorization.

Unit 7: Introduction to Unix (08 Lectures)

Brief history of UNIX, Features of UNIX, Structure of the UNIX system, functions of shell & kernel.
UNIX File System (etc,bin,dev,usr,lib,tmp).
Types of files (ordinary, special & directory files),
Pathname - absolute & relative, block and character device,
Internal structure of File System (boot block, super block,
inode block, data block).
Files opened by UNIX - stdin(0), stdout(1), stderr(2)
Shell variables - HOME, PATH, TERM, LOGNAME, PS1, PS2, MAIL.

Unit 8: Unix Commands (10 Lectures)

ls [options- A,d,F,i,l,r,R,t,u,x] [files..] wild card characters *, ?, [a..z], cat , rm [options -i,r][files..], cal, date [m,h,a,D,x,V], banner, passwd, pwd, echo, who[options- H,u], who am i, logname, clear, tty, tput clear, mkdir, cd, rmdir, comm, diff, cmp, chmod, chgrp, chown, Redirection & pipes { <, >, >>, |} cp [options -i,r][files..], tee, ln, mv, wc [options-l,w,c] [files..], grep[options-c,i,l,n,v], pr [(+n)d(on)(1n)] [files.], passwd, pg, more, sleep, write, mesg, wall, lp [cm(n number)], ps [options-a, e, u], kill [-9] <pid>. Vi modes of vi - command mode & edit mode. vi +n file, vi /pattern file exiting - ZZ, :wq, :q!, :qi, :x , window movement- ^d, ^u, ^f, ^b, z, z., z-, text entry - a, i, o, A, O, I, cursor movement - l , k,j, h,^, $,[n]w, [n]b, [n]e,), (,return,H, M, L deletion of text-[n]x, [n]X,[n]r,R, [n]s,d$,d^ undo- u & U, redraw screen-^, pattern searching -/pattern, ?pattern rearranging textJ, P, p operators- [n]dd, [n]yy, cc, vi options - :set,:set allnu, showmode last line commands contd ..... :w!, :w <name>, :w! <name>, :w, :r <name>

PROGRAMMING THE BOURNE SHELL

echo, \c, \t, \n, \v, \\
executing a shell script
test <expression>

```
files        :r, w,x,f,d,e,s
string       :z,n,s1=s2,s1!=s2
numerics :- n1 [opt] n2

             opt - gt, lt, eq, ne, ge, le
```
read <variable>, if ... then..elif..else ... fi,
case ... esac, while, until, for.

Operating Systems Lab[Credit: 2, Lab : 30]

Students are advised to do laboratory/practical practice.
Course Outcome:
After learning the course the students should be able to:
Understand various generations of Operating System and functions of Operating System
Write shell scripts in Linux/UNIX environment.

Reference books :

1. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
2. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
3. W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice Hall of India. 2008.
4. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.
5. Operating Systems, A K Sharma, University Press
6. Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
7. Operating System Concepts (4th Ed.) by Abraham Silberschatz & Peter B. Galvin
8. A User Guide to UNIX System by Dr. Rebecca Thomas and Jean Yates
9. Concepts & Application by Sumitabha Das
10. Peter Norton's guide to Unix