## DEPARTMENT OF INFORMATION TECHNOLOGY, NITK SURATHKAL

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| Course Code | IT253 | Course Name | PARADIGMS OF PROGRAMMING - II |
| Core/Elective/MLC: | Elective | L-T-P | (3-0-0)3 |
| Pre-requisites: | - | Contact Hours: | 9am to 5pm |
| Type of course: (Lecture/Tutorial /Seminar/Project) | Lecture | Course Assessment Methods: (both continuous and semester end assessment) | 1. Mid Term: 30M<br>2. End Term: 50M<br>3. Mini Project: 20M |
| Course Educational Objectives: | | | |

1 : To develop a greater understanding of the issues involved in programming language design and implementation.

2 : To describe and understand basics of compilers, Lexical/Syntactical analysis, programming constructs, subroutines, looping.

3 : To develop an in-depth understanding of functional, logic and object-oriented programming paradigms.

4 : To perform different Case studies on Paradigms of Programming Languages using various aspects of Runtime environments.

5 : To apply the concepts of Virtual Machines for Java application development.

6 : To develop an application using Android System.

# DEPARTMENT OF INFORMATION TECHNOLOGY, NITK, SURATHKAL

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| **Course Code:** | IT250 | **Course Name:** | Operating Systems |
| **Core/Elective/MLC:** | Core | **L-T-P:** | (3-0-2):4 |
| **Pre-requisites** | IT200 | **Contact Hours** | 3 |
| **Type of Course: (Lecture/Tutorial/Seminar/Project )** | Lecture | **Course Assessment Methods(both continuous and semester-end assessment)** | Mid Sem Exam=25%<br>End Sem Exam=40%<br>Laboratory Exercises =15%<br>Minor Project =20% (Design Methodology incl. P O C-10% Implementation/ Results Analysis -10% ) |

**Course Description:** Operating Systems are solely responsible for making the communication possible between a common user and the hardware of any design. Similarly, a course on operating systems is an essential part of any computer science education. This field is undergoing rapid change, as computers are now prevalent in virtually every arena of day-to-day life, from embedded devices in automobiles through the most sophisticated planning tools for governments and multinational firms. By the end of course students will be able to understand and describe the basic principles of operating systems.

**Course Objectives:**

This course demonstrates a deeper understanding of Operating Systems and its various functionalities in our day-to-day routine. By the end of this course, students will be able to

- Understand the overall design and architecture of an Operating System.
- Understand the importance of kernel and programming a kernel module with implementation of virtual machine and system calls.
- Analyse a process with some important techniques involved in synchronizing, scheduling these processes.
- Illustrate some real-time problems in process execution using deadlocks and various strategies involved in solving them.
- Identify various memory and storage management techniques in an Operating System with protection and security criteria to be followed.

Course Plan:

| <u>Topics Covered:</u> | |
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| Weeks | Topics |
| Week 1-3 | **Overview:** Introduction to operating systems, Computer system organization and Architecture, Operating-System Operations, Kernels and Microkernels, Caching and Interrupts, System Calls, Virtual Machines, Computing Environments. |

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| Week 4-6 | **Process Management:** Process-Concepts, Process scheduling terminologies, Operation on Process, Interprocess Communication, Remote Procedure Calls and Remote Method Invocation, Threads, Multi-thread Programming, Process Scheduling: Detailed concepts and Scheduling Algorithms. |
| Week 7-9 | **Process Synchronization:** Critical Section Problem and Solutions, Semaphores, Classical Problems of Synchronization, Monitors, Deadlocks, Necessary Condition for deadlock, Deadlock Prevention, Deadlock Avoidance, Recovery from deadlock. |
| Week 10-12 | **Memory Management:** Logical v/s Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, and Virtual Memory: Demand Paging, Page replacement algorithms, Allocation of frames, Thrashing. |
| Week 14-16 | **Storage Management:** File Concepts, Access methods, File Sharing, Protection, Secondary Storage structure, Disk scheduling, Disk Management, RAID<br>**Protection and Security with Case study:** System Protection, System Security, Case Study: Windows OS, Unix and Linux Systems. |

**Course Outcomes (CO's) :** On completion of this course, students should be able to:

**CO1:** Explain and describe the role of an operating system, its organization from hardware perspective with various architectural views. Various operations and the role of kernels and microkernels with System calls and Virtual Machines.
**CO2:** Apply the main principles and techniques used to implement processes and threads and implementation of Interprocess Communication, Remote Procedure Call and Remote Method Invocation and process scheduling algorithms.
**CO3:** Illustrate the main problems related to concurrency and the different synchronization mechanisms with occurrence, prevention and avoidance of Deadlock and Study of various memory management techniques including virtual memory.
**CO4:** Describe various disk organization techniques and management of the file system structure with classification on various levels of RAID.
**CO5:** Understand the importance of security and implement various system protection strategies with some real-time case studies of the Operating system.

**Reference Books:**

1) Silberschartz and Galvin, Operating System Concepts, Adison Wesley. 9th Edition, 2012.
2) Melin Milenkovic, Operating Systems – Concepts and Design, McGraw Hill, New York, 2nd Edition, 2009.
3) Andrew S Tennebaum, Operating Systems Design Implementation, 3rd Edition, Pearson Publication, 2015
4) Achyut S Godbole, Operating Systems, Tata McGraw-Hill Education, 3rd Edition, 2010

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| Course Instructor (s): | Course Mentor: |
| Dr. Nagamma Patil & Savitha S | Dr. Nagamma Patil |

## NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

### COURSE PLAN AND EVALUATION PLAN
### Jan - May 2019

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| Class | : B.Tech. CS (VI Sem) & IT (IV Sem) |
| Course Code | : MA204 |
| Course Title | : Linear Algebra and Matrices |
| L-T-P | : 3-0-0 |
| Credits | : 3 |
| Pre-requisite | : Basics of Matrix Theory |
| Course Instructor | : Dr. A. Senthil Thilak |
| Teaching Department | : Mathematical and Computational Sciences (MACS) |
| Objectives of the course | : To provide an insight into the theory and exposure to applications of Linear Algebra to Computer Science and its allied areas |
| Skill development of the student | : Expected to have a brief outline on the Linear Algebraic techniques used in Matrix Theory and their applications to Computer Science and its allied areas. |

**SYLLABUS:** ***(3-0-0) 3***

*Vector spaces:* Vector spaces and subspaces - Fundamental results, linear dependence, Basis and Dimension.
*Matrices:* Determinants - Expansion by Co-factors; Inverse by Partitioning. Linear Transformations, Rank and echelon matrices. Homogeneous linear equations: Basic solutions. similarity, symmetric matrices. Diagonalization. Quadratic forms. Rotation of Co-ordinates. Orthogonal transformations, Singular Value Decomposition.

**References:**

1. G. Strang, Linear Algebra and its Applications, Fourth Edition, Thomson Learning, 2003.
2. W. Cheney and D. Kincaid, Linear Algebra: Theory and Applications, Jones & Bartlett Student Edition, 2010.
3. S. Kumaresan, Linear Algebra: A Geometric Approach, PHI, 2008.
4. G. Hadley, Linear Algebra, Narosa 2000.
5. K. Hoffman and R. Kunze, Linear Algebra, PHI, 2003
6. I. N. Herstein, Topics in Algebra, Vikas Publications, 1972.

Course Coverage : 40hrs of Lecture schedule

# DEPARTMENT OF INFORMATION TECHNOLOGY

# NITK, SURATHKAL

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| **Course Code:** | IT-254 | **Course Name:** | Computer Graphics |
| **Core/Elective/MLC:** | Elective | **L-T-P:** | 3-0-2 |
| **Pre-requisites:** | - | **Contact Hours:** | 8 am to 5 pm |
| **Type of course: (Lecture/Tutorial/Seminar /Project)** | Lecture | **Course Assessment Methods:** | 1.Mid Sem Exam = 20%<br>2.End Sem Exam = 40%<br>3.Lab + Mini-Project = 15% + 25% |

**Course Objectives:** The objective of this course is to

- Familiarize the students with fundamental algorithms and programming that are applied and used in interactive graphics systems
- Train the students with the principles and practice of computer graphics including concepts of mathematical foundations for application to the modern domains of scientific visualisation, virtual reality, computer games and film animation.
- Equip the students with practical experience of graphical software environments such as OpenGL.

**Course Outcomes:** After the completion of this course, the student will be able to:

**CO1:** Understand various theoretical concepts in graphics and their uses.
**CO2:** Gain knowledge of all stages of graphics pipeline and its functioning.
**CO3:** Learn how to design and implement using OpenGL and glut functions.
**CO4:** Create 2D/3D Graphic Packages.
**CO5:** Analyse different algorithms covered.
**CO6:** Evaluate past and current research in the field of Computer Graphics.

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**Topics covered:**

| **Weeks** | **Topics** |
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| Week 1 &2: | Introduction to Computer Graphics, History, Computer Graphics Hardware, Graphics Pipeline. |
| Week 3 &4: | Scan line conversion of line, Circle, Ellipse. |
| Week 5 &6: | Filling and Clipping algorithms, Transformation. |
| Week 7 &8: | Implementation of 2D/3D packages, Animation. |
| Week 9 &10: | 3D Modeling, Viewing, Projections. |
| Week 11 &12: | Visible Surface detection, Lighting, Shadow, Reflections, Shading Models. |

**References Books:**

1. Donald Hearn , M Pauline Baker,: Computer Graphics: Principles and Practice" 4th Edition.

2. Van Dam, Foley, Feimer, Hugher, "Computer Graphics: Principles and Practice in C" Addison Wesley.

3. Edward S Angel, Dave Shreiner," Interactive Computer Graphics using OpenGL: A top-down Approach", Pearson Higher Education.

**Course Instructor:**

Miss. Sangeetha S Harikantra

**Signature:**

**Course Mentor:**

Prof. Ananthanarayana V. S

**Signature:**