College of Engineering, Pune www.coep.org.in

Department of Computer Engineering and Information Technology

Course Plan

Course Code: PPS **Course: Programming for Problem Solving**

Teaching Scheme:
Lectures : 3 Hrs/week
Laboratory: 2 Hrs/week

Examination Scheme:
Lab Assignments: 20 Marks
Practical Exam :20 marks
Quiz T1/T2 : 20 Marks
End Sem Exam:40 marks

Academic Year: 2019-20 **Class: FY Btech** **Semester: II**

1. **Teaching Learning Interaction**: (Class, Tutorials, Assignments, presentations, home works)

Unit	Topic	Lecture(s)	Total
I	**Unit I: Fundamental Operations of a Modern Computer**		4
	Von Neumann Architecture, Design of a computer, Basic hardware components (RAM, disk, processor, keyboard, mouse).	1	
	Basic Software components (applications, operating system, system software, compiler, etc.).	2	
	Basics of I/O and data transfer between I/O devices and RAM/variables.	1	
II	**Unit II: Basic programming constructs**		4
	Basic Data types (Numerical, String), Variables, Expressions, statements	1	
	I/O statements for keyboard handling, Editing, compiling/interpreting/running programs.	1	
	Syntax errors and runtime errors. Comparison of language model with von Neumann architecture.	1	
	Applications of the above constructs to solve some problems.	1	
III	**Unit III: Introduction to problem solving using computers**		7
	Manual solutions to real life problems, Algorithmic representation of the solutions	1	
	Basic Problems, Variables, Expressions, Conditional statements.	1	
	Multiplication, Exchange values of two variables, Finding maximum of three numbers.	2	
	What is problem? Identifying problem, Understanding a problem: Framing a problem in simple terms – mathematical, graphical, other abstractions.	1	
	Files: Files as an alternative I/O medium, I/O functions to transfer data from file to variables	1	
	Comparison of keyboard and file I/O functions, operations to read, write, close, open files.	1	

IV	**Unit IV: Iterative problems**		**7**
	Introduction to iterative constructions in language, Find Sum, average of a given set of numbers.	**1**	
	Loop design techniques: While loop - *body*, *iterative step*, *loop condition.* Emphasis on while loop against for loop: Factorial, Sine function computation, Fibonacci sequence generation, Some problems to read data from files.	**2**	
	Arrays as homogenous collection of elements, Array properties, Reversing elements of an array, Finding maximum, Finding second maximum, Algorithms for substring search	**3**	
	Search problems: linear search, linear search in sorted array i.e., binary search	**1**	
V	**Unit V: Modular solutions**		**7**
	Introduction to functions, Importance of design of functions, Rewriting earlier solutions using functions	**1**	
	Taking care of all possible values of arguments, Parameters, return values, signature, local and global scope, Modular code,	**1**	
	Basic rules of recursion: recursive formulation, terminating case, handle all cases, recursion leading to terminating case.	**2**	
	Factorial: iterative vs recursive, Fibonacci series	**1**	
	Recursive formulation for: multiplication, gcd, tower of hanoi, binary search	**1**	
	Recursion vs iteration in general, when to use recursion	**1**	
VI	**Unit VI: Advanced Problems**		**7**
	Convert a number into one with digits reversed	**1**	
	Convert decimal to binary and vive versa	**1**	
	Generating prime numbers. Generating random numbers	**1**	
	Computing x power y. Partitioning an array. Finding the kth smallest element of an array	**2**	
	Selection sort. Insertion sort. bubble sort	**2**	
		Total	**36**

2. Text Book:

1. R. G. Dromey, "How to solve it by Computer", Pearson Education, ISBN 0-13-433995-9.
2. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press; First edition, 978-0199480173.

3. Reference Books:

1. The 'C' programming language by Kernighan and Ritchie, Prentice Hall.
2. Stephen G. Krantz, "Problem Solving Techniques" , Universities Pres
3. Programming and Problem Solving by M. Sprankle, Pearson Education
4. Introduction to Computing & Problem Solving using Python by Jeeva Jose, Khanna Publication.
5. Introduction to Computing & Problem Solving with Python by E Balgurusamy, McGraw Hill.

4. On-line Course Resources:

1. **https://www.w3schools.in/python/**
2. **https://www.tutorialspoint.com/computer_programming/python**
3. **https://www.linkedin.com/.../solving...problems/introducing-the-five-step-problem-sol...**

5. Learning Outcomes of the Course:

1. **CO 1**: Makes student gain a broad perspective about the uses of computers in engineering industry.
2. **CO 2**: Develops basic understanding of computers, the concept of algorithm and analyze a problem in the form of graphical notation.
3. **CO 3**: Introduces basic concepts of programming to solve problem using Python.
4. **CO 4**: Develops the use of the programming language to represent real life data using data types and variables.
5. **CO 5**: Introduces the advance features of Python language.

6. Questions (Not full question – just type/ theme/topic / abstract):

Test- 1 examination:

1. **Question 1**: Basic Concepts of Computer
2. **Question 2**: Basic Algorithmic Thinking.
3. **Question 3**: Basic architecture model of computer

Test- 2 examination:

1. **Question 4**: Python Programming Syntax
2. **Question 5:** Programming using loops

End Semester examination:

1. **Question 6** : Problems Solving using mathematical approach
2. **Question 7**: Problems using advanced concepts of python
3. **Question 8**: Problems solving using functions and files

7. Program Outcomes relevant to the Outcomes:

1. **PO1:** Graduates will demonstrate basic knowledge in fundamentals of programming, algorithms and programming technologies and fundamentals of Computer Science.
2. **PO2:** Graduate will demonstrate knowledge of fundamentals of hardware technology relevant to understanding Computer Science basics.
3. **PO4:** Graduates will be able to demonstrate the ability to design creative solutions to real life problems faced by the industry.
4. **PO6:** Graduates will be able to communicate technical topics in written and verbal forms.
5. **PO11:** Graduates will be able to develop the capability for self-learning.

8. Mapping of Questions to CO's: (Sequence of Questions as per item 6)

Questions	CO's
1	1, 2
2	1,2
3	1,2
4	3,4
5	3,4
6	1, 2
7	3, 5
8	4, 5

9. Mapping of CO's to PO's:

CO's	PO's
1	4
2	1, 2
3	4, 6, 11
4	1, 11
5	1, 11

10. Evaluation Scheme:

Examination	Marks	Date
Quiz I	20	As per academic schedule
Quiz II	20	As per academic schedule
End Sem Exam	60	As per academic schedule

(Jagruti R. Waykole)
Course in charge

College of Engineering, Pune www.coep.org.in
Department of Computer Engineering and Information Technology

Course Plan

Course Code: CT(DE)-18033 **Course:Multicore Technology**

Teaching Scheme: **Lectures- 3**hours/week Examination Scheme: **Tests/ Quizzes- 40 Marks**
ESE- 60 Marks

Academic Year: 2019-20 **Class: BTech** **Semester: VIII**

1. **Teaching Learning Interaction**: (Class, Tutorials, Assignments, presentations, home works)

SN	Unit	Topic	Lecture(s)	Total
01	I	Introduction to Multicore Systems: Fundamentals, The Era of Multicore Machines,	**1**	5
		Unicore vs Multicore, Understanding Performance, Shared Memory Multicore Systems,	**1**	
		Distributed Memory Multicore Systems, Hybrid Systems, Symmetric and Asymmetric MulticoreSystems,	1	
		Overview of Multithreading, Multithreading in different forms,	**1**	
		Homogeneous and Heterogeneous Multicore systems, Examples of different Multicore Systems.	**1**	
02	II	Cache Memory: Large Cache Design: Shared vs. Private Caches, Centralized vs.Distributed	**1**	7
		Shared Caches, Coherence: Snoopy cache coherence protocol,	**2**	
		Directory cache coherence protocol, Uniform Cache Access,	**1**	
		Non-Uniform Cache Access, S-NUCA, D-NUCA,	**1**	
		Inclusion, Exclusion, Examples of different Cache Organization,	**1**	
		Consistency Models, Case Study.	**1**	
03	III	Performance and Optimizations for Multicore Systems: Select the right core, Improve serial performance	**1**	5
		Achieve proper load balancing, Improve data locality, Reduce or eliminate false sharing	**1**	
		Use of affinity scheduling, Lock granularity and frequency,	**1**	
		Remove synchronization barriers, Minimize communication latencies,	**1**	
		Use of thread pools, Managing thread count, Use of parallel libraries.	**1**	
04	IV	Programming Multicore Systems: Programming models for Multicore Systems,	**1**	9
		SharedMemory Programming using pthreads,	**1**	
		Shared Memory Programming using OpenMP	**1**	
		Use of OpenMP compiler directives, #pragma with different clauses	**1**	
		Understanding parallelized loops, Synchronization Constructs towards dependencies,	**2**	
		Function parallel program, OpenMP Library Functions,	**1**	
		OpenMP Environment Variables, Compilation, Debugging, Performance	**2**	
05	V	Special Case – Graphics Processing Unit: CPU architecture, GPU hardware	2	9
		Design Goals of CPU and GPU, Compute levels	1	
		Case Study of Nvidia GPU, GPGPU, Compute Unified Device Architecture (CUDA)	2	
		Programming model, Applications of CUDA, Threads, Blocks, Grids,	2	
		Memory management, Examples, Alternatives to CUDA.	2	
			Total	

06	**VI**	Domain Specific-Architectures: Guidelines for domain specific architectures,	2	5
		Example Domain: Deep Neural Networks, Deep Learning Architecture,	1	
		Google's Tensor Processing Unit (TPU) for Deep Neural Networks (DNNs)	1	
		Pixel Visual Core, a Personal Mobile Device ImageProcessing Unit	1	
			Total	**40**

2. Text Books:

1. Gerassimos Barlas, "Multicore and GPU Programming: An Integrated Approach", Morgan Kaufmann, 2015, ISBN: 978-0-12-417137-4.

2. Rob Oshana, "Multicore Application Development Techniques: Applications, Tips and Tricks", Elsevier, 2016, ISBN: 978-0-12-800958-1.

3. John L Hennessy, David A Patterson, "Computer Architecture: A Quantitative Approach", Sixth Edition, Morgan Kaufmann, 2018, ISBN: 978-0-12-811905-1.

3. Reference Books:

1. Rajeev Balasubramonian, Norman P. Jouppi, and Naveen Muralimanohar, "Multi-Core Cache Hierarchies", Morgan & Claypool Publishers, 2011,ISBN: 9781598297546

2. Daniel J. Sorin, Mark D. Hill, David A. Wood "A Primer on Memory Consistency and Cache Coherence", Morgan & Claypool Publishers, 2011, ISBN: 9781608455652.

3. Shane Cook, "CUDA Programming: A Developer's Guide to Parallel Computing with GPUs", Morgan Kaufmann, 2013, ISBN: 978-0-12-415933-4.

6. Learning Outcomes of the Course:

Students will be able to:

- **CO 1**: Understand the working principles of multicore architectures.
- **CO 2** : Optimize performance of multicore systems.
- **CO 3**: Specify the necessity of GPU.
- **CO 4**: Comprehend and differentiate between CPU and GPU.
- **CO 5**: Identify and demonstrate the need of domain specific architectures.

7. Questions (Not full question – just type/ theme/topic / abstract):

Test- 1 examination:

- **Question 1**: Unit-1
- **Question 2**: **Unit-2**

Test- 2 examination:

- **Question 3**: **Unit-3**
- **Question 4**: Unit-4
- …

End Semester examination:

- **Question 5**: Unit-1
- **Question 6**: Unit-2
- **Question 7**: Unit-3
- **Question 8**: Unit-4
- **Question 9**: Unit-5
- **Question 10**: Unit-6

8. Program Outcomes relevant to the Outcomes:
Full listing on URL http://www.coep.org.in/index.php?pid=824

9. Mapping of Questions to CO's: (Sequence of Questions as per item 7)

Questions	CO's
Q5	1
Q6	1, 2
Q7	1, 2
Q8	1, 2
Q9	3, 4
Q10	5

10. Mapping of CO's to PO's:

CO's	PO's
1	1,2,6,8
2	2,5,6
3	4,5.6
4	5,7
5	4,6,8

11. Evaluation Scheme:

Examination	Marks	Date
Quiz I	20	As per academic schedule
Quiz II	20	As per academic schedule
End Sem Exam	60	As per academic schedule

( )
Course in charge

College of Engineering, Pune - 05

Department of Computer Engineering and Information Technology

DE : MOBILE AND AD-HOC NETWORKS

Teaching Scheme: Lectures- 3 Hrs/Week **Examination Scheme: 100 marks:**

Continuous evaluation-

Assignment/Quizzes – 40 marks

End Sem Exam - 60 marks

Teaching plan

No.	Unit	Topic	Count	Total
1	I	Fundamentals of Wireless Communication Technology	1	6
		Characteristics of the Wireless Channel, Multiple Access Techniques	1	
		IEEE 802 Networking Standard	1	
		Wireless LANs and PANs	1	
		IEEE 802.11 Standard, IEEE 802.16 Standard	1	
		Bluetooth, HomeRF	1	
2	II	Cellular Wireless Networks and Wireless Internet:- The Cellular Concept	1	6
		Cellular Architecture, First-Generation Cellular Systems	1	
		Second-Generation Cellular Systems, Third-Generation Cellular Systems	1	
		Wireless in Local Loop, Wireless ATM,Wireless Internet	1	
		What is Wireless Internet, Mobile IP	1	
		TCP in Wireless Domain, WAP, Optimizing Web Over Wireless	1	
3	III	Introduction to Ad-Hoc Networks:- characteristics, applications	1	6
		Medium Access Protocols: design issues, goals and classification	1	
		Contention based protocols- with reservation	1	
		Scheduling algorithms, protocols using directional antennas	1	
		Standards: 802.11a, 802.11b, 802.11g	1	
		Standards: 802.15. HIPERLAN	1	
4	IV	Routing Protocols for Ad-Hoc Networks: Design issues	1	6
		Goals and classification, Proactive Vs reactive routing	1	
		Unicast routing algorithms	1	
		Multicast routing algorithms	1	
		Hybrid routing algorithm, Energy aware routing algorithm	1	
		Hierarchical Routing, QoS aware routing	1	
5	V	Issues in designing Transport layer Ad-Hoc Networks, TCP over Wireless Ad-Hoc Networks	2	6
		Security issues in Ad-hoc networks, secure routing protocols, Energy Management in Ad-Hoc Networks	2	
		Battery Management, Transmission Power Management, System Power Management	2	
6	VI	Wireless Sensor Networks: Sensor Network Architecture	1	6
		Data Dissemination, Data Gathering	1	
		MAC Protocols for Sensor Networks	1	
		Location Discovery	1	
		Quality of a Sensor Network	2	

Text Books

- C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007

Reference Books

- F.Zhao, L. Guibas, Wireless Sensor Networks: An Information Processing Approach. Morgan Kaufmann, 2004
- Stefano Basagni, Marco Conti, Silvia Giordano and Ivan sSojmenovic, Mobile Ad-hoc Networking, Wiley-IEEE Press, 2004.
- Mohammad Ilyas, The Handbook of Ad-hoc Wireless Networks, CRC press, 2002.

Useful URLs: http://courses.missouristate.edu/huiliu/csc690/
http://www2.ece.rochester.edu/courses/ECE586/lectures.htm
https://www.csd.uoc.gr/~hy439/schedule.html
http://www.cs.mun.ca/~yzchen/teaching/cs6777/

Course outcomes

1. Have an understanding of the principles of mobile ad hoc networks and what distinguishes them from infrastructure-based networks.
2. Have an understanding of the principles and characteristics of wireless sensor networks
3. Be able to understand how routing protocols function and their implications on data transmission delay and bandwidth consumption
4. Be familiar with the mechanisms for implementing security, transport layer and energy efficiency in MANETs

List of Assignments/ home works /problems:

1. Set up an infrastructure wireless network consisting of multiple nodes and an access point. observing IEEE 802.11 traffic
2. Configure an ad hoc network, measure the throughput
3. Measuring delay, throughput, connectivity, and overhead in MANET routing protocols using a network simulator
4. Configure Bluetooth piconets and analyse the interference with 802.11
5. Configure the Mobile IP

Questions:

Test 1

Q1 – Basics of Wireless Communication, Multiple Access Techniques.
Q2 - Wireless LANs and PANs, Bluetooth
Q3 – The Cellular Concept and Cellular Architecture

Test 2

Q4 – Cellular System Generations, Wireless Internet
Q5 – WAP, Optimizing Web Over Wireless
Q6 – Introduction to Ad-Hoc Networks and Medium Access Protocols

End Semester Exam

Q7 – On Unit one and two
Q8 – On Unit two and three
Q9 – Scheduling algorithms and Routing Protocols for Ad-Hoc Networks

Q10 - Routing algorithms and Security issues in Ad-hoc networks
Q11 - Energy Management in Ad-Hoc Networks and Wireless Sensor Networks

Program Outcomes relevant to the Outcomes:

(1) Graduates will demonstrate basic knowledge in fundamentals of programming, algorithms and programming technologies and fundamentals of Computer Science.
(2) Graduates will have knowledge of the best practices in software development in industry.
(3) Graduates will be able to demonstrate the ability to design creative solutions to real life problems faced by the industry.
(4) Graduates will be able to communicate technical topics in written and verbal forms.
(5) Graduates will demonstrate an understanding of the problems most relevant in time to Computer Engineering and IT industry.

Mapping of Questions to CO's:

Questions	CO's
1	1
2	1
3	1,2
4	2
5	2
6	2,3
7	1,2,3
8	1,2,3
9	3
10	3,4
11	3,4

Mapping of CO's to PO's:

CO's	PO's
1	1
2	3,4
3	6
4	6,7

Evaluation Procedure

Examination	Marks	**Dates** (As per Academic Calendar)
Quiz I	20	February 08-10, 2020
Quiz II	20	March 20-22, 2020
End Sem Exam	60	27 April-12 May, 2020

(S.K.Gaikwad)
Subject In charge

Head
Dept. of Computer Engg. and IT

College of Engineering, Pune www.coep.org.in

Department of Computer Engineering and Information Technology

Course Plan

Course Code: CT(MI) - 17002 **Course: Object Oriented Programming and Design**

Teaching Scheme: **Lectures- 3** hours/week Examination Scheme: **Tests/ Quizzes- 40 Marks**

ESE- 60 Marks

Academic Year: 2019 - 2020 **Class: TY (Minor)** **Semester: VI**

1. **Teaching Learning Interaction**: (Class, Tutorials, Assignments, presentations, home works)

SN	Unit	Topic	Lecture(s)	Total
01	I	Various programming paradigms: Procedural, object-oriented,	2	8
		Classes, Objects, Methods	2	
		Encapsulation	1	
		Input/Output mechanisms; Private, public, protected members	1	
		Abstract Data Types	2	
02	II	Encapsulation;;;	1	6
		Constructors, Destructors	2	
		Polymorphism	2	
		Access specification	1	
03	III	Inheritance	2	8
		Multiple Inheritance	2	
		Class hierarchies	2	
		Virtual Functions	2	
04	IV	Generic Programming;	1	8
		Packages	2	
		Interfaces.	2	
		Iterators; Containers	3	
05	V	Exception handling, Exception types	3	6
		file I/O.	3	
06	VI	Basic Concepts of Concurrent Programming, Threads.	3	6
		Design: Unified Modelling language; use case diagrams; Class Diagrams;	3	
			Total	**42**

2. Text Book:

1. Cay S Horstmann and Gary Cornell, Core Java Vol-1 and Vol-2, 9th Edition, Pearson Education India, ISBN-10: 9332518904 and 9332518890
2. Bjarne Stroustrup, The C++ Programming Language, 3th Edition, Pearson Education, ISBN-10: 8131705218
3. E. Balagurusamy, Object Oriented Programming with C++, 6th Edition, McGraw Hill, ISBN10: 125902993X

3. Reference Books:

1. Herbert Schilt, "JAVA Complete Reference", 7th Edition, Tata McGraw Hill, ISBN: 9780070636774
2. Sharon Zakhour, Scott Hommel, Jacob Royal, Isaac Rabinovitch, Tom Risser, Mark Hoeber, "The Java Tutorial,"Addison Wesley Professional, 2006, Print ISBN-10: 0-32133420-5
3. M. Ben Ari, "Principles of Concurrent Programming, 1989
4. Eckel B., "Thinking in Java", 3rd Edition, Pearson Education, 2012

4. On-line Course Resources:

1. **https://www.coursera.org/learn/c-plus-plus-a**
2. **https://nptel.ac.in/courses/106/101/106101208/**

5. List of Assignments/ home works /problems:

Homework practical assignments will be given as and when a topic is completed.

6. Learning Outcomes of the Course:

- **CO 1**: Design a class hierarchy using object-oriented thinking for a given problem
- **CO 2:** Write object oriented application code for a given problem
- **CO 3**: Write small pieces of code demonstrating various object-oriented programming concepts
- **CO 4**: Describe, annotate, compare, and comment on various object-oriented programming concepts

7. Questions (Not full question – just type/ theme/topic / abstract):

Test- 1 examination:

- **Question 1**: MCQs
- **Question 2**: Programming questions using OOP concepts

Test- 2 examination:

- **Question 3**: MCQs
- **Question 4**: Programming questions using OOP concepts

- **End Semester examination:**

- **Question 5**: Short Questions
- **Question 6**: Programming Questions

8. Program Outcomes relevant to the Outcomes:

a) Graduates will demonstrate knowledge in fundamentals of theory of computation, programming, algorithms, hardware technology, systems software and networking.
b) Graduates will be aware of professional ethics, environmental and sustainability issues.
c) Graduates will be able to demonstrate the ability to design creative solutions to real life and most relevant problems faced by the industry and society at large.
g) Graduates will demonstrate good performance in the competitive examinations for higher education

9. Mapping of Questions to CO's: (Sequence of Questions as per item 7)

Questions	CO's

10. Mapping of CO's to PO's:

CO's	PO's
Design a class hierarchy using object oriented thinking for a given problem	a, c ,g
Write object oriented application code for a given problem	a, c ,g
Write small pieces of code demonstrating various object oriented programming concepts	d ,g
Describe, annotate, compare, and comment on various object oriented programming concepts	d, g

11. Evaluation Scheme:

Examination	Marks	Date
Quiz I	20	As per academic schedule
Quiz II	20	As per academic schedule
End Sem Exam	60	As per academic schedule

Ashwini Matange
Course in charge

College of Engineering, Pune www.coep.org.in
Department of Computer Engineering and Information Technology
Course Plan
Course Code: **Course:** Cryptography and Network Security

Teaching Scheme: **Lectures- 2** hours/week Examination Scheme: **Tests/ Quizzes-** 40 Marks
Tutorial- 1 hour/week **ESE**-60 Marks
Academic Year: 2019-20 **Class:** Final Year B Tech **Semester:** VII

1. **Teaching Learning Interaction**: (Class, Tutorials, Assignments, presentations, home works)

SN	Unit	Topic	Lecture(s)	Total
01	I	**Introduction:** Cryptography and modern cryptography, Need of security	1	04
		Security services, Basic network security terminology	1	
		Security attacks, Classical cryptosystems and their cryptanalysis	1	
		Operational model of network security	1	
02	II	**Mathematical Foundations:** Prime Number, relatively prime numbers, Modular Arithmetic	1	04
		Fermat's and Euler's Theorem	1	
		The Euclidean and Extended Euclidean Algorithms	1	
		The Chinese Remainder Theorem, Discrete logarithms	1	
03	III	**Symmetric Key Ciphers**: Symmetric Key Ciphers, Feistel Networks	1	06
		Modern Block Ciphers	3	
		Modes of Operation	1	
		Cryptanalysis of Symmetric Key Ciphers: Linear Cryptanalysis, Differential Cryptanalysis	1	
04	IV	**Asymmetric Cryptography**: RSA	1	06
		Key Distribution and Management	1	
		Diffie-Hellman Key Exchange	1	
		Elliptic Curve Cryptography, hash functions: The Merkle Damgard Construction	1	
		Message Digest algorithms: MD5, Secure Hash algorithm (SHA)	1	
		Message Authentication Codes	1	
05	V	**Authentication and Web Security**: Digital Signatures	1	04
		Authentication Protocols, Kerberos, X.509 Digital Certificate Standard	1	
		Pretty Good Privacy, Secure Socket Layer	1	
		Secure Electronic Transaction. Zero knowledge proof	1	
06	VI	**Network Security**: Intruders, Intrusion Detection	1	04
		Password Management, Worms, viruses, Trojans, Virus Countermeasures	1	
		Vulnerabilities in TCP/IP model	1	
		Firewalls, Firewall Design Principles	1	
		Total		**28**

2. Text Book:

- V. K. Pachghare, "Cryptography and Information Security", 2nd edition, PHI Learning, ISBN: 978-81-203-5082-3.
- Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: Private Communication in a Public World, Prentice Hall, ISBN 0-13-046019-2.

3. Reference Books:

- William Stallings, "Cryptography and Network Security, Principles and Practices", Pearson Education, Fifth Edition, ISBN: 0-13-60970-9.
- Christopher M. King, "Security architecture, design deployment and operations", Curtis Patton and RSA Press, ISBN: 0072133856.
- Stephen Northcatt, LenyZeltser, "INSIDE Network Perimeter Security", Pearson Education Asia, Second Edition, ISBN: 978-0735712324.
- Robert Bragge, Mark Rhodes, HeithStraggberg, "Network Security the Complete Reference", Tata McGraw Hill Publication, ISBN: 9780072226973.

4. On-line Course Resources:

1. MIT Course http://ocw.mit.edu/courses/electrical-engineering-and-computer-science

2. http://cseweb.ucsd.edu/~mihir/papers/gb.pdf
3. http://www.emc.com/emc-plus/rsa-labs/index.htm

5. List of Assignments/ home works /problems:

1. Design and Implement your own encryption/ decryption algorithm.

2. Install any Proxy Server and configure an application gateway

6. Learning Outcomes of the Course:

This course aims at

Students will be able to:

(1) Explain the concepts related to applied cryptography, including plaintext, ciphertext, symmetric cryptography, asymmetric cryptography, and digital signatures
(2) Apply concepts of finite mathematics and number theory.
(3) Demonstrate the understanding of common network vulnerabilities and attacks, defence mechanisms against network attacks, and cryptographic protection mechanisms.
(4) Detect possible threats to different defence mechanisms and different ways to protect against these threats.

7. Questions :

.

Test- 1 examination:

- **Question 1**: Understanding, describe and interpret concepts of cryptography and security
- **Question 2**: Understanding, problem solving
- **…**

Test- 2 examination:

- **Question 3**: Evaluate, plan, organization, preparing data for the model
- **Question 4**: Compare different encryption techniques, and their Cryptanalysis

End Semester examination:

- **Question 5**: Understanding, application of cryptography
- **Question 6**: Understanding number theory and network security
- **Question 7**: Performance evaluation and analysis of various encryption algorithms
- **Question 8**: Compare different key management issues
- **Question 9**: Protective measures for web security
- **Question 10**:
- **Question 11**:
- **…**

8. Program Outcomes relevant to the Outcomes:

Full listing on URL http://www.coep.org.in/index.php?pid=824

(1) Graduates will demonstrate knowledge in fundamentals of theory of computation, programming, algorithms, hardware technology, systems software and networking
(2) Graduates will have knowledge of the best practices in software engineering, project management and professional work environments.
(3) Graduates will be aware of professional ethics, environmental and sustainability issues.
(4) Graduates will be able to demonstrate the ability to design creative solutions to real life and most relevant problems faced by the industry and society at large.
(5) Graduates will demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software tools in developing software

9. Mapping of Questions to CO's: (Sequence of Questions as per item 7)

Questions	CO's
1	1,3
2	3,10
3	4
4	3, 6
5	7

10. Mapping of CO's to PO's:

CO's	PO's
1	1
2	1, 4
3	2, 5
4	3

11. Evaluation Scheme:

Examination	Marks	Date
Quiz I	20	As per academic schedule
Quiz II	20	As per academic schedule
End Sem Exam	60	As per academic schedule

(Dr V. Z. Attar)
Head, Comp IT Dept

(Dr V. K. Pachghare)
Course in charge

College of Engineering, Pune www.coep.org.in
Department of Computer Engineering and Information Technology
Course Plan

Course Code: **Course:** Cryptography and Network Security Lab

Teaching Scheme: **Practical- 2** hours/week Examination Scheme: T1:25 T2:25 ESE-50 Marks

Academic Year: 2019-20 **Class:** Final Year B Tech **Semester: VII**

1. **Teaching Learning Interaction**: (Class, Tutorials, Assignments, presentations, home works)

Week No.	Topic	Total Hrs.
1.	Study papers on a network security topic and write a study report 1. Wireless Network Security, 2. Key Exchange Protocols, 3. Block chain.	4
2.	Implement any one classical encryption technique in any programming language	4
3.	Design and implement a symmetric encryption algorithm based on Feistel structure	4
4.	Demonstrate how Diffie-Hellman key exchange works with Man-In-The-Middle attack	4
5.	Study different approaches for Anti-virus software and write one document. a) Examine files to look for viruses by means of a virus dictionary b) Identifying the suspicious behavior from any computer program which might indicate infection	2
6.	Study and demonstrate system hacking and write a report. a) How to crack a password? b) How to use Ophcrack / Crowbar / John the Ripper / Aircrack-ng to Crack Passwords	2
7.	Study and demonstrate system hacking and write a report. a) How to crack a password? b) How to use Ophcrack / Crowbar / John the Ripper / Aircrack ng to Crack Passwords	6

2. Learning Outcomes of the Course:

After completing the laboratory students will be capable of:

1. Analyse the optimal features and time required for an encryption technique.
2. Implement cryptographic algorithms in any programming language.
3. Demonstrate the ability to detect attacks on a system and tackle it.
4. Write a security application to protect a system from some attacks.

3. Program Outcomes relevant to the Outcomes:

Full listing on URL http://www.coep.org.in/index.php?pid=824

(1) Graduates will demonstrate knowledge in fundamentals of theory of computation, programming, algorithms, hardware technology, systems software and networking
(2) Graduates will have knowledge of the best practices in software engineering, project management and professional work environments.
(3) Graduates will be aware of professional ethics, environmental and sustainability issues.
(4) Graduates will be able to demonstrate the ability to design creative solutions to real life and most relevant problems faced by the industry and society at large.
(5) Graduates will demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software tools in developing software

4. Mapping of CO's to PO's:

CO's	PO's
1	1
2	1, 4
3	2, 5
4	3

5. Evaluation Scheme:

Examination	Marks	Date
T1	25	As per academic schedule
T2	25	As per academic schedule
End Sem Exam (Oral)	50	As per academic schedule

(Dr V. Z. Attar)
Head, Comp IT Dept

(Dr V. K. Pachghare)
Course in charge

Department of Computer Engineering & Information Technology

COLLEGE OF ENGINEERING, PUNE

Course Plan

Multicore Technology

COURSE PLAN – PART I			
Course Title	Multicore Technology		
Course Code	IT[HO]-18002 & CT[HO]-18003	**No. of Credits**	3
Course Type	Honors course		
Pre-requisite subject(s)	Computer Organization/ Parallel Computer Architecture and Programming		
Semester/ Academic Session	B. Tech. Computer Engineering and Information Technology Sem VIII / 2019 – 2020		
Teaching Scheme	3 Lectures/ week	**Exam Scheme**	Two Quizzes/ Assignments – 40 Marks (20 Marks each) ESE- 60 Marks
Name of Faculty	Amit D. Joshi		
Email	adj.comp@coep.ac.in	**Telephone No.**	020-25507110

COURSE PLAN – PART II

Course Outcomes

1. Understand the working principles of multicore architectures.
2. Optimize performance of multicore systems.
3. Specify the necessity of GPU.
4. Comprehend and differentiate between CPU and GPU.
5. Identify and demonstrate the need of domain specific architectures.

Course Overview

Multicore Technology course gives an overview of recent generation processor architectures and the programming methodologies to solve different problems exploiting parallelism. It also focuses on many core architecture and programming that uses parallelism to solve problems in different domains.

Course Teaching and Learning Activities as per the Syllabus approved in SENATE

S. No.	**Unit/ Contact Hours**	**Topic**	**Mode of Delivery**
1	I/1	Fundamentals, The Era of Multicore Machines, Unicore vs Multicore, Understanding Performance	Power Point

2	I/2	Shared Memory Multicore Systems, Distributed Memory Multicore Systems, Hybrid Systems, Symmetric and Asymmetric Multicore Systems	Power Point
3	I/3	Overview of Multithreading, Multithreading in different forms	Power Point
4	I/4	Homogeneous and Heterogeneous Multicore systems	Power Point
5	I/5	Examples of different Multicore Systems	Power Point
6	II/1	Large Cache Design: Shared vs Private Caches, Centralized vs. Distributed	Power Point
7	II/2	Shared Caches, Coherence: Snoopy cache coherence protocol, Examples	Power Point
8	II/3	Directory cache coherence protocol, Examples	Power Point
9	II/4	Uniform Cache Access, Non-Uniform Cache Access, S-NUCA, D-NUCA,	Power Point
10	II/5	Inclusion, Exclusion	Power Point
11	II/6	Examples of different Cache Organization	Power Point
12	II/7	Cache Optimization Techniques and Problems	Power Point
13	III/1	Select the right core, Improve serial performance, Achieve proper load balancing	Power Point
14	III/2	Improve data locality, Reduce or eliminate false sharing, Use of affinity scheduling	Power Point
15	III/3	Lock granularity and frequency, Remove synchronization barriers	Power Point
16	III/4	Minimize communication latency, Use of thread pools	Power Point
17	III/5	Managing thread count, Use of parallel libraries	Power Point
18	IV/1	Programming models for Multicore Systems, Shared Memory Programming using pthreads	Power Point
19	IV/2	Shared Memory Programming using compiler directives, #pragma with different clauses	Power Point
20	IV/3	Understanding parallelized loops	Power Point
21	IV/4	Synchronization Constructs towards dependencies	Power Point
22	IV/5	Function parallel program	Power Point
23	IV/6	OpenMP Library Functions, OpenMP Environment Variables	Power Point
24	IV/7	Compilation, Debugging, Performance	Power Point
25	IV/8	Practice examples	Power Point
26	IV/9	Practice examples	Power Point
27	V/1	CPU architecture: The need	Power Point
28	V/2	GPU hardware, Design Goals of CPU and GPU	Power Point
29	V/3	Compute levels	Power Point
30	V/4	Case Study of Nvidia GPU, GPGPU	Power Point

31	V/5	Compute Unified Device Architecture (CUDA) Programming model	Power Point
32	V/6	Applications of CUDA	Power Point
33	V/7	Threads, Blocks, Grids	Power Point
34	V/8	Scheduler, CUDA Memory Structure	Power Point
35	V/9	Examples	Power Point
36	VI/1	Examples	Power Point
37	VI/2	Guidelines for domain specific architectures, Example Domain: Deep Neural Networks	Power Point
38	VI/3	Deep Learning Architecture, Google's Tensor Processing Unit (TPU) for Deep Neural Networks (DNNs)	Power Point
39	VI/4	Pixel Visual Core	Power Point
40	VI/5	A Personal Mobile Device Image Processing Unit	Power Point

Text and Reference Books

Text Books:

- Gerassimos Barlas, "Multicore and GPU Programming: An Integrated Approach", Morgan Kaufmann, 2015, ISBN: 978-0-12-417137-4.
- Rob Oshana, "Multicore Application Development Techniques: Applications, Tips and Tricks", Elsevier, 2016, ISBN: 978-0-12-800958-1.
- John L Hennessy, David A Patterson, "Computer Architecture: A Quantitative Approach", Sixth Edition, Morgan Kaufmann, 2018, ISBN: 978-0-12-811905-1.

Reference Books:

- Rajeev Balasubramonian, Norman P. Jouppi, and Naveen Muralimanohar, "Multicore Cache Hierarchies", Morgan & Claypool Publishers, 2011,ISBN: 9781598297546.
- Daniel J. Sorin, Mark D. Hill, David A. Wood "A Primer on Memory Consistency and Cache Coherence", Morgan & Claypool Publishers, 2011, ISBN: 9781608455652.
- Shane Cook, "CUDA Programming: A Developer's Guide to Parallel Computing with GPUs", Morgan Kaufmann, 2013, ISBN: 978-0-12-415933-4.

Course Assesment Schedule

S. No.	Mode of Assessment	Date	Duration	Weightage
1	Test I	As per Schedule#	1 Hr	20
2	Assignment	As per Schedule#	--	20
3	ESE	As per Schedule#	3 Hrs	60
4	Compensation Assignments*	After T2	--	--

*For students with less attendance. # See Academic Calender

Question Distribution

T1: Q. 1, 2, 3 – Unit I and Some Part of Unit II
T II: Q. 4, 5, 6 – Unit II, III and Some Part of Unit IV
ESE: Q. 7, 8, 9, 10, 11 – Proportional weightage for all units

COURSE PLAN – PART III

Course Feedback

1. Online feedback
2. Live feedback in the class

Course Outcomes – Program Outcome Mapping

Question	COs	Question	COs
1	1, 2	7	1, 2
2	1, 2	8	1, 2, 3
3	1, 2	9	1, 2, 4
4	1, 3	10	2, 4, 5
5	1, 3, 4	11	2, 4, 5
6	1, 3, 4	--	–

COs	POs
1	1, 2, 6, 8
2	1, 5, 6
3	4, 5, 6
4	1, 2, 5, 6
5	4, 6, 8

Course Policy (preferred mode of correspondence with students, policy on attendance, academic honesty and plagiarism etc.)

Mode of Correspondence (email/ phone etc)

In person and Email correspondence is preferable.

Attendance

75% Attendance is mandatory. For Less attendance students there will be compensation assignment. Though if the attendance is not fulfilled then a valid proof need to be submitted.

Academic Honesty & Plagiarism

- Students should attend the classes sincerely and maintain discipline
- Students should not do any kind of malpractice like copying etc., with regard to the writing of cycle tests and assignments.

Additional Information

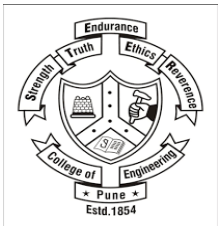
Students can contact the faculty to clarify their doubts in person any time during working hours.

FOR APPROVAL

Course Faculty

Head,
Dept. of Computer Engg. & IT

Date:-06/01/2020



Department of Computer Engineering & Information Technology

COLLEGE OF ENGINEERING, PUNE

Course Plan

Multicore Technology

COURSE PLAN – PART I			
Course Title	Multicore Technology		
Course Code	COC(DE)-19012	**No. of Credits**	3
Course Type	Elective course		
Pre-requisite subject(s)	Advanced Computer Architecture		
Semester/ Academic Session	M. Tech. Computer Engineering Sem II / 2019 – 2020		
Teaching Scheme	3 Lectures/ week	**Exam Scheme**	Two Quizzes/ Assignments – 40 Marks (20 Marks each) ESE- 60 Marks
Name of Faculty	Amit D. Joshi		
Email	adj.comp@coep.ac.in	**Telephone No.**	020-25507110

COURSE PLAN – PART II

Course Outcomes

1. Understand the working principles of multicore architectures.
2. Analyze and Optimize performance of multicore systems.
3. Specify the necessity of GPU and differences between CPU and GPU.
4. Solve different problems using multicore and manycore programming.
5. Identify and demonstrate the need of domain specific architectures.

Course Overview

Multicore Technology course gives an overview of recent generation processor architectures and the programming methodologies to solve different problems exploiting parallelism. It also focuses on many core architecture and programming that uses parallelism to solve problems in different domains.

Course Teaching and Learning Activities as per the Syllabus approved in SENATE

S. No.	Unit/ Contact Hours	Topic	Mode of Delivery
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4	1, 3	10	2, 4, 5
5	1, 3, 4	11	2, 4, 5
6	1, 3, 4	--	–

COs	POs
1	1, 2, 4, 5
2	1, 2, 3, 5
3	2, 3, 5
4	1, 2, 4, 5
5	2, 3, 5, 6

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FOR APPROVAL

Course Faculty

Head,
Dept. of Computer Engg. & IT

Date:-06/01/2020

College of Engineering, Pune - 05

Department of Computer Engineering and Information Technology

Course Teaching Plan

Course Name: Security in Computing

Teaching Scheme: Lectures- 3 Hrs/Week
Examination Scheme:
Assignments/Quizzes/Tests: - 40% Marks.
End Sem Exam: - 60% Marks.

Academic Year: 2019-20 **Class:** First Year M.Tech (Computer Engineering)
Semester: IV

1. **Teaching Learning Interaction**: (Class, Tutorials, Assignments, presentations, home works)

Sr. No.	Unit	Topic	No. of Lectures	Total
01	I	Introduction to Cryptography and Modern Cryptography, Threat and Vulnerability, Security Services	01	05
		A Model for Network security, Attacks: Active vs. Passive, Symmetric Key Encryption, Asymmetric Key Encryption Techniques	01	
		Classical Encryption Techniques like substitution ciphers and their cryptanalysis	01	
		One time passwords, Transposition ciphers,	01	
		Steganography	01	
02	II	Number Theory, Computational Modular Arithmetic	01	06
		Congruences: Definitions and properties – linear congruences, residue classes	01	
		Euclid's Algorithm,	01	
		Fermat's and Euler's Theorem	01	
		Euler's phi function – Fermat's Little Theorem	01	
		Chinese Remainder Theorem	01	
03	III	Block ciphers, Data Encryption Standard, Triple DES	01	07

		Stream ciphers,	01	
		AES,	01	
		IDEA,	01	
		ElGamal	01	
		Stream cipher, RC5, RC4	01	
		Security analysis of all symmetric algorithm	01	
04	**IV**	Public Key Infrastructure (PKI), Digital Signatures, Digital Signature Standards X.509 Digital Certificate Standard	01	**06**
		RSA, Key Distribution and Management,	01	
		Diffie-Hellman Key Exchange	01	
		Elliptic Curve Cryptography,	01	
		Message Authentication Code, hash functions,	01	
		Message digest algorithms: MD4, MD5, Secure Hash algorithm, RIPEMD-160, HMAC	01	
05	**V**	Authentication Protocols, Kerberos	01	**07**
		Secure Socket Layer and Transport Layer Security,	01	
		Secure Electronic Transaction, IP security Architecture	01	
		Wireless Network Security, Privacy challenges	01	
		Interception and Monitoring Wireless traffic,	01	
		Wireless Attacks: Surveillance, War Driving, Client-to-Client Hacking,	01	
		Rogue Access Points, Jamming and Denial of Service.	01	
06	**VI**	Access Point-Based Security Measures,	01	**06**
		Thin Party Security Methods, Funk's Steel-Belted Radius,	01	
		VVLAN Protection Enhancements,	01	
		Blue-tooth Security Implementation,	01	
		Security in WIMAX, UWB security	01	
		Satellite network security	01	
			Total	**37**

2. Text books:

1) William Stallings, “Cryptography and Network Security, Principles and Practices”, Pearson Education, Third Edition

2) Charlie Kaufman, Radia Perlman and Mike speciner, “Network security, Private communication in a Public World”
3) Atul Kahate, “Cryptography and Network Security”, TMH, Third Edition.

3. Reference books:

1) Christopher M. King, “Security architecture, design deployment and operations”, Curtis patton and RSA Press.
2) Stephen Northcatt, Leny Zeltser, “INSIDE NETWORK Perimeter Security”, Pearson Education Asia.
3) Robert Bragge, Mark Rhodes, Heith straggberg, “Network Security the Complete Reference”, Tata McGraw Hill Publication.
4) C. Pfleeger and S. Pfleeger, Security in Computing, Prentice Hall,4th Edition, 2007.
5) Behrouz A Forouzan, Cryptography & Network Security, McGraw-Hill, 2008
6) Eric Maiwald, Fundamentals of Network Security, McGraw-Hill, 2004.
7) Jay Ramachandran, Designing Security Architecture Solutions, Wiley Computer Publishing, 2002.
8) Bruce Schneier, Applied Cryptography, John Wiley & Sons Inc, 2001.
9) Charlie Kaufman, Radia Perlman and Mike Speciner, Network Security Private Communication in a public world, Prentice Hall of India Private Ltd., New Delhi

4. Web Resources:

1. http://nptel.iitm.ac.in/courses/106105031/
2. http://www.cert.org/
3. http://www.howard.edu/csl/research_crypt.htm
4. http://www.cs.purdue.edu/homes/ninghui/courses/426_Fall10/lectures.html
5. http://www.cs.uwp.edu/staff/lincke/infosec/
6. http://www.cisa.umbc.edu/courses/cmsc/426/fall06/
7. http://www.cs.northwestern.edu/~ychen/classes/cs395-w05/lectures.html
8. http://www.cs.iit.edu/~cs549/cs549s07/lectures.htm

5. Course Outcomes:

After learning this course students will be able to

CO-1: Understand the need of information security and awareness

CO-2: Comprehend the history of computer security and how it evolved into information security, threats and attacks associated with it

CO-3: Solve various problems in number theory, Public Key Encryption algorithms

CO-4: Design and develop encryption/ decryption algorithms using open source tools

CO-5: Analyze the various techniques of encryption, key management in security, Secure Electronic Transaction

CO-6: Understand basics of Web Security, IP Security, Intrusion Detection Systems, Cyber crime and prepare brief reports on it

6. **Questions :**

Test- 1 examination:

- **Question 1**: Understanding, describe and interpret concepts of Information Security
- **Question 2**: Understanding, problem solving
- **…**

Test- 2 examination:

- **Question 3**: Evaluate, plan, organization, preparing data for the security model
- **Question 4**: Compare different encryption techniques, and their Cryptanalysis

End Semester examination:

- **Question 5**: Understanding, application of cryptography
- **Question 6**: Solving number theory, Public Key Encryptions and its Problems
- **Question 7**: Performance evaluation and analysis of various encryption algorithms
- **Question 8**: Compare different key management issues
- **Question 9**: Protective measures for web security
- **Question 10**: IP Security issues, Secure Electronic Transactions
- **Question 11**: Cyber crime, IT Act 2000
- **...**

7. **Program Outcomes relevant to the Outcomes:**

Full listing on URL http://www.coep.org.in/index.php?pid=824

1. Graduates will demonstrate basic knowledge in fundamentals of Information Technology and related programming technologies.
2. Graduates will demonstrate basic knowledge of networking with wireless technologies, multimedia technology and distributed computing, software testing and topics of current relevance to IT industry.
3. Graduates will have knowledge of the best practices in software development in industry.
4. Graduates will demonstrate the ability to design creative solutions to real life problems.

5. Graduates will demonstrate capability to work in teams and in professional work environments.
6. Graduates will be able to communicate technical topics in written and verbal forms.
7. Graduates will demonstrate an understanding of the problems of the IT industry.
8. Graduates will demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software (FOSS) tools in developing software.
9. Graduates will demonstrate good performance at the competitive examinations like GATE, GRE, CAT for higher education and / or seek employment.
10. Graduates will demonstrate their qualities of learning and demonstrating latest technology.
11. Graduates will have developed the capability for self-learning.

8. **Mapping of Questions to CO's:** (Sequence of Questions as per item 6)

Questions	CO's
1	CO-1, CO-2
2	CO-3, CO-4
3	CO-2, CO-5
4	CO-3 CO-5 CO-6
5	CO-1 CO-4 CO-6
6	CO-3, CO-2

9. **Mapping of CO's to PO's:**

CO's	PO's
CO-1	1, 2
CO-2	2, 3
CO-3	1, 4, 7
CO-4	3, 4, 8
CO-5	2, 3, 4, 10
CO-6	3, 6, 10, 11

10. Tentative Evaluation schedule

Exmination	Marks	Dates (As per Academic Calender)
T1/ Assignments	20%	As per the Academic Calender
T2 /Assignments	20%	As per the Academic Calender
End Semester Exam	60%	As per the Academic Calender

Subject In charge
(Dr. Sunil B. Mane)

Head,
Dept. of Computer Engg. and IT

College of Engineering, Pune www.coep.org.in
Department of Computer Engineering and Information Technology

Course Plan

Course Code: IOC- 19002 **Course: Data Structures**

Teaching Scheme: **Lectures- 3** hours/week Examination Scheme: **Tests/ Quizzes- 40 Marks**
ESE- 60 Marks

Academic Year: 2019-20 **Class: FY MTech** **Semester: II**

1. Teaching Learning Interaction: (Class, Tutorials, Assignments, presentations, home works)

SN	Unit	Topic	Lecture(s)	Total
01	I	Review of Basic Concepts of Data structures	1	7
		Abstract data types, Algorithms	2	
		Asymptotic Notations: Big Oh, Small Oh, Omega and Theta notations,	2	
		Solving recurrence equations: Master theorems, Constructive induction.	2	
02	II	Advanced Search Structures for Dictionary ADT	1	9
		Amortized analysis	1	
		AVL Tree, Splay trees	1	
		2-3 trees, 2-3-4 trees, Red-black trees,	3	
		Randomized structures: Skip lists, Treaps,	2	
		Universal hash functions	1	
03	III	Advanced Structures for Priority Queues and Their Extensions: Binary Heap,	1	6
		Min Heap, Max Heap,	1	
		Binomial heaps, Leftist heaps, Skewed heaps,	1	
		Fibonacci heaps and its amortized analysis,	2	
		Applications to minimum spanning tree algorithms	1	
04	IV	Data Structures for Partition ADT	1	6
		Weighted union	2	
		path compression	1	
		Applications to finite state automata minimization, Code optimization.	2	
05	V	Graph Algorithms: DFS, BFS,	2	8
		Biconnected components,	1	
		Cut vertices,	1	
		Matching, Network flow; Maximum-Flow / Minimum-Cut;	2	
		Ford–Fulkerson algorithm, Augmenting Path	2	
06	VI	Computational Geometry	1	4
		Geometric data structures	1	
		Plane sweep paradigm	2	
			Total	**40**

2. Text Book:

1. Introduction to Algorithms; 3rd Edition; by by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein; Published by PHI Learning Pvt. Ltd. ; ISBN-13: 978-0262033848 ISBN-10: 0262033844
2. Algorithms; 4th Edition; by Robert Sedgewick and Kevin Wayne; Pearson Education, ISBN-13: 978-0321573513

3. Reference Books:

1. Algorithms; by S. Dasgupta, C.H. Papadimitriou, and U. V. Vazirani; Published by Mcgraw-Hill, 2006; ISBN-13: 978-0073523408 ISBN-10: 0073523402
2. Algorithm Design; by J. Kleinberg and E. Tardos; Published by Addison-Wesley, 2006; ISBN-13: 978-0321295354 ISBN-10: 0321295358

4. On-line Course Resources:

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://nptel.ac.in/courses/106/102/106102011/
3. https://www.coursera.org/learn/data-structures
4. http://cse.iitkgp.ac.in/~pds/notes/
5. https://www.cise.ufl.edu/~sahni/cop5536/

5. Learning Outcomes of the Course:

- **CO 1**: Apply and implement advanced data structures, such as B-trees, multi-way trees, balanced trees, heaps, priority queues, to solve computational problems
- **CO 2** : Analyze the time and space complexity of advanced data structures and their supported operations
- **CO 3**: Compare the time and space tradeoff of different advanced data structures and their common operations

6. Evaluation Scheme:

Examination	Marks	Date
Test I	20	As per academic schedule
Test II	20	As per academic schedule
End Sem Exam	60	As per academic schedule

(Dr. V. Z. Attar)
Head, Computer & IT Dept

(Mrs. S. P. Kalamkar)
Subject in charge

College of Engineering, Pune www.coep.org.in
Department of Computer Engineering and Information Technology
Course Plan
Course Code: **Course:** Network Security

Teaching Scheme: **Lectures- 3** hours/week Examination Scheme: **Tests/ Quizzes-** 40 Marks
ESE-60 Marks
Academic Year: 2019-20 **Class:** First Year M. Tech [IS] **Semester:** II

1. **Teaching Learning Interaction**: (Class, Tutorials, Assignments, presentations, home works)

SN	Unit	Topic	Lecture(s)	Total
01	I	Overview of security in networking,	1	07
		Vulnerabilities in TCP/IP model	2	
		Vulnerabilities at Application layer	2	
		Transport Layer	1	
		Internetwork Layer, Network Access Layer	1	
02	II	Message Authentication	1	07
		Authentication Methods	1	
		Message Digest	2	
		Kerberos	2	
		X.509 Authentication Service	1	
03	III	Digital Certificates and PKI: Introduction	1	07
		Algorithms for Digital Signature,	2	
		Digital Signature Standards	1	
		Private- Key Management, The PKIX model	2	
		Public key Cryptography Standards (PKCS)	1	
04	IV	MAIL and IP Security: Introduction	**1**	06
		Pretty Good Privacy (PGP)	1	
		MIME, S/MIME	**1**	
		IPsec, IPv4, IPv6, VPN	**1**	
		Authentication Header Protocol, Encapsulating Security Payload Protocol	**2**	
05	V	Web Security: Introduction	1	06
		Secure Socket Layer (SSL), Secure Electronic Transaction (SET) Transport Layer Security (TLS)	03	
		Secure Hyper Text Transfer Protocol (SHTTP)	02	
06	VI	Types of Firewall, Firewall Architectures	02	06
		Trusted System, Access Control,	01	
		Intrusion Detection systems, types of IDS, Intrusion Prevention Systems (IPS), Honeypots	03	
		Total		**39**

Text books:

1. V. K. Pachghare, "Cryptography and Information Security", PHI, Second Edition
2. William Stallings, "Cryptography and Network Security, Principles and Practices", Pearson Education, Seventh Edition ISBN-10: 0134444280
3. Charlie Kaufman, Radia Perlman and Mike speciner, "Network security, Private communication in a Public World". Pearson, Second Edition *ISBN*-10: 0130460192

Reference books:

1. Christopher M. King, "Security architecture, design deployment and operations", Curtis patton and RSA Press. McGraw-Hill, 2001, ISBN 0072133856, 1st Edition.
2. Stephen Northcatt, Leny Zeltser, "INSIDE NETWORK Perimeter Security", Pearson Education Asia. Pearson Education Asia, ISBN 8178087618, 1st Edition
3. Robert Bragge, Mark Rhodes, Heith straggberg, "Network Security the Complete Reference", Tata McGraw Hill Publication.

Web Resources:

1. http://nptel.iitm.ac.in/courses/106105031/
2. http://www.cert.org/
3. http://www.howard.edu/csl/research_crypt.htm
4. http://www.cs.purdue.edu/homes/ninghui/courses/426_Fall10/lectures.html
5. http://www.cs.uwp.edu/staff/lincke/infosec/
6. http://www.cisa.umbc.edu/courses/cmsc/426/fall06/
7. http://www.cs.northwestern.edu/~ychen/classes/cs395-w05/lectures.html
8. http://www.cs.iit.edu/~cs549/cs549s07/lectures.htm

5. Learning Outcomes of the Course:

By the end of this course, students should be able to

- Apply footprinting, scanning, enumeration and similar techniques to discover network and system vulnerabilities
- Analyze and use of message authentication techniques
- Understand the working and the role of digital signatures and digital certificates

- Describe the working of standard security mechanism and develop algorithms and methods for web security
- Understand security issues related to networking vulnerabilities, firewalls, intrusion detection systems

6. Evaluation Scheme:

Examination	Marks	Date
Quiz I	20	As per academic schedule
Quiz II	20	As per academic schedule
End Sem Exam	60	As per academic schedule

(Dr V. Z. Attar)
Head, Comp IT Dept

(Dr V. K. Pachghare)
Course in charge

College of Engineering, Pune www.coep.org.in
Department of Computer Engineering and Information Technology

Course Plan

Course Code: COC(DE)-19006 **Course:** Natural Language Processing
Teaching Scheme: **Lectures-** 3 hrs/week Examination Scheme: **Tests/ Quizzes- 40 Marks**
ESE- 60 Marks
Academic Year: 2019-20 **Class: MTech-Computer Engg.** **Semester: II**

1. Teaching Learning Interaction: (Class, Tutorials, Assignments, presentations, home works)

SN	Unit	Topic	Lect	Tot
01	I	Discussion about Course objectives, course outcomes, lecture plan, evaluation methodology	1	6
		Introduction: What is NLP, Fundamental and Scientific goals, Engineering goals, Applications	1	
		Why NLP is hard , Ambiguity problems in every stage of NLP,	1	
		Empirical Laws of language, zipf's law, Heap's law.	1	
		Stages of NLP	1	
		Sequence labeling task in NLP (case study)	1	
02	II	Basic text processing in text: Tokenization, word token, word type, sentence segmentation, feature extraction, issues in tokenization for different languages, word segmentation, text segmentation, normalization, case folding,	1	8
		Morphological Analysis and Synthesis, Stemming and lemmatization, Porters Algorithm, Spelling correction	2	
		Dynamic programming approach for finding edit distance for spell correction- Levenstein, Symmetric delete and variants	2	
		Language Modeling, Evaluation and perplexity	2	
		Smoothing techniques	1	
03	III	Introduction to POS tagging, POS tagset	1	8
		Hidden Markov Model-Introduction, Markov Processes, HMM characterization	1	
		Likelihood of a sequence (Forward Procedure, Backward Procedure)	1	
		Best state sequence (Viterbi Algorithm), Re-estimation(Baum-Welch - Forward-Backward Algorithm	2	
		Maximum Entropy model for Sequential tagging , Conditional Random Field for Sequential tagging	3	
04	IV	Constituency parser -Syntactic structure, Parsing methodology, Different parsing algorithms, Parsing in case of ambiguity, Probabilistic parsing, CKY algorithm, Issues in parsing,	3	10
		Dependency parsing-Syntactic structure, Parsing methodology, Transition-Based Dependency Parsing	3	
		Graph-Based dependency parsing, Evaluation	2	
		Co-reference resolution, Named-entity recognition	2	
05	V	WordNet: Word Senses, Word relations, Word similarity and thesaurus methods, Word sense disambiguation, WordNet	2	6
		Lexical Semantics -Introduction, models of semantics, applications	2	
		Distributional Semantics -Introduction, models of semantics, applications	2	
06	VI	Word Embeddings Introduction, one-hot vectors, methods of generating word embeddings, Skip-gram, CBOW	2	6
		Glove model, Fast Text model	2	
		evaluation measures-rough scores	2	
			Total	**44**

2. Text Book:

1. Daniel Jurafsky and James H. Martin, "Speech and Language Processing", Second Edition, Prentice Hall, 2008, ISBN: 978-0131873216.
2. Allen James, "Natural Language Understanding", Second Edition, Benjamin/Cumming, 1994, ISBN: 978-0805303346.
3. Chris Manning and Hinrich Schuetze, "Foundations of Statistical Natural Language Processing", MIT Press, ISBN: 978-0262133609.

3. Reference Books:

1. Journals: Computational Linguistics, Natural Language Engineering, Machine Learning, Machine Translation, Artificial Intelligence
2. Conferences: Annual Meeting of the Association of Computational Linguistics (ACL), Computational Linguistics (COLING), European ACL (EACL), Empirical Methods in NLP (EMNLP), Annual Meeting of the Special Interest Group in Information Retrieval (SIGIR), Human Language Technology (HLT)

4. On-line Course Resources:

1. http://web.stanford.edu/class/cs224n/
2. https://nptel.ac.in/courses/106/101/106101007/
3. https://swayam.gov.in/nd1_noc19_cs56/preview

5. List of Assignments/ home works /problems:

1. Study of state-of-art morphological analyzers

2. Study of state-of-art stemmers and lemmatizers

3. Performance analysis of different POS taggers

4. Study of different parsers for different languages

5. Study of Knowledge based dictionary, WordNet

6. Learning Outcomes of the Course:

CO 1: Demonstrate the understanding of basic text processing techniques in NLP.
CO 2 : Design, implement and evaluate part-of-speech taggers and parsers for a language.
CO 3: Build language models and demonstrate Word Sense Disambiguation using WordNet.
CO 4: Analyze and build word embeddings for different languages.

7. Questions (Not full question – just type/ theme/topic / abstract):

Test- 1 examination:

- **Question 1**: evaluating understanding of basic text processing techniques in NLP.
- **Question 2**: evaluating understanding of morphological analysis, spell checkers

Test- 2 examination:

- **Question 3**: Practical assignments for evaluating understanding of language model
- **Question 4**: Practical assignments for evaluating understanding of POS tagger
- …

End Semester examination:

- **Question 5**: evaluating understanding of constituent based parsers
- **Question 6**: evaluating understanding of graph based parsers
- **Question 7**: Analyzing the problems and methodology of WSD
- **Question 8**: evaluating understanding of lexical semantics
- **Question 9**: evaluating understanding of distributional semantics
- **Question 10**: evaluating understanding of word embeddings
- **...**

8. Program Outcomes relevant to the Outcomes:
Full listing on URL https://www.coep.org.in/departments/computerit/peospos

9. Mapping of Questions to CO's: (Sequence of Questions as per item 7)

Questions	CO's
Q1	CO-1
Q2	CO-1
Q3	CO-3
Q4	CO-2
Q5	CO-2
Q6	CO-2
Q7	CO-3
Q8	CO-1, CO-3
Q9	CO-1, CO-3
Q10	CO-4

10. Mapping of CO's to PO's:

CO's	PO's
CO-1	1,2
CO-2	1, 2,3,4
CO-3	1, 2,3,4
CO-4	1, 2,3,4,6,7

11. Evaluation Scheme:

Examination	Marks	Date
Quiz I	20	As per academic schedule
Quiz II	20	Practical Assignments
End Sem Exam	60	As per academic schedule

(Dr. Yashodhara V. Haribhakta)
Course in charge

College of Engineering, Pune www.coep.org.in
Department of Computer Engineering and Information Technology

Course Plan

Course Code: (CT(DE)-17024)/(IT(DE)-17038) Course: Graphics & Multimedia

Teaching Scheme: **Lectures-** hours/week Examination Scheme: **Tests/ Quizzes- Marks**

Academic Year: 2019-20 **Class: TY CE & IT** **Semester: VI**

Teaching Learning Interaction: (Class, Tutorials, Assignments, presentations, home works)

SN	Unit	Topic	Lecture(s)	Total
01	I	Introduction to computer graphics, lines, line segments	**1**	6
		vectors, pixels and frame buffers, vector generation	**1**	
		DDA and Bresenham's line	1	
		circle drawing algorithms	**1**	
		anti-aliasing, polygon representation, entering Polygons	**1**	
		anti-aliasing, polygon representation, entering Polygons	**1**	
02	II	Introduction, matrices, homogeneous coordinates, Basic 2D transformation	**2**	8
		Scaling, Rotation, Translation, reflection	**1.5**	
		3-D Transformations: 3-D geometry, primitives, transformations, Rotation about an arbitrary axis	**2**	
		Concept of parallel and perspective projections, Viewing parameters, 3D viewing transformations	**1.5**	
		A brief introduction to hidden surface removal algorithms and Fractals	**1**	
03	III	Introduction, segment table, segment creation, closing, deletion, renaming.	**1**	6
		Image transformations, raster techniques, Devices for producing animation,	**2**	
		computer assisted animation, video formats, real time animation, frame-by-frame animation	**1**	
		method for controlling animation, animation software	**2**	
04	IV	Multimedia basics, Multimedia applications	**1**	6
		Multimedia system architecture , Evolving technologies for multimedia	**1**	
		Defining objects for multimedia systems	**2**	
		Multimedia data interface standards , Multimedia databases	**2**	
05	V	Compression and decompression	2	6
		Data and file format standards , Multimedia I/O technologies	1	
		Digital voice and audio, Video image and animation	2	
		Full motion video, Storage and retrieval technologies	1	
06	VI	Multimedia authoring and user interface	2	8
		Hypermedia messaging, Mobile messaging, Hypermedia message component	2	
		Creating hypermedia message, Integrated multimedia message standards	2	
		Integrated document management, Distributed multimedia systems	2	
			Total	**40**

Text Book:

- D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education,
- J. Foley, Van Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9
- Ze-Nian Li, Mark S. drew, " Fundamentals of Multimedia ", Pearson education, ISBN 81-7758-823-0

Reference Books:

- D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, TATA Mc-GrawHill Publication, 2001, ISBN 0 – 07 – 047371 - 4
- F. Hill, "Computer Graphics: Using OpenGL", 2nd Edition, Pearson Education, 2003 ISBN 81– 297 – 0181 – 2
- S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987 ISBN 0 – 07 – 100472 – 6
- G.S. BALUJA "Computer Graphics and multimedia ", DHANPAT Rai and Co.
- Rajan Parekh , " Principles of multimedia : Tata McGraw-Hill, ISBN 978-0-07-058833-2

Learning Outcomes of the Course:

Students will be able to

- CO 1: Categories and compare various graphics drawing algorithms, 2D-3D transformations and polygon functions
- CO 2 : Classify basic graphics principles which are used in games, animations and film making
- CO 3: Estimate the components in multimedia system design (image, video, audio, etc)
- CO 4: Analyze and categories various software programs used in the creation and implementation of multi-media(interactive, audio, video, presentation, etc.)

Mapping of Questions to CO's:

Questions	CO's
1	1,2
2	1,2
3	1,2
4	3,4
5	3,4
6	3,4

Mapping of CO's to PO's:

CO's	PO's
1	1,2,8
2	1,2,3,8
3	1,2,3,8,10
4	1,,3,8,10

Evaluation Scheme:

Examination	Marks	Date
Quiz I	20	As per academic schedule
Quiz II	20	As per academic schedule
End Sem Exam	60	As per academic schedule

SHEETAL DEVIDAS RATHOD
Course in charge