Sinhgad Technical Education Society's®
NBN SINHGAD TECHNICAL INSTITUTES CAMPUS
NBN SINHGAD SCHOOL OF ENGINEERING
Approved by AICTE, New Delhi, Recognized by Government of Maharashtra &
Affiliated to Savitribai Phule Pune University (ID No. - PU/PN/Engg/432/2012)
Sinhgad Institutes
S. No. 10/1, Ambegaon (Budruk), Off Sinhgad Road, Pune 411041
Tel. : +91-20-24355042 / 46, +91-20-24610880/881 • Tele Fax : +91-20-24355042 • Website : www.sinhgad.edu • Email : nbnssoe@sinhgad.edu

DEPARTMENT OF COMPUTER ENGINEERING

VISION

उत्तमपुरुषान् उत्तमाभियंतृन् निर्मातुं कटीबध्दा: वयम् ।

We are committed to produce not only good engineers but good human beings, also.

MISSION

"Holistic development of students and teachers is what we believe in and work for. We strive to achieve this by imbibing a unique value system, transparent work culture, excellent academic and physical environment conducive to learning, creativity and technology transfer. Our mandate is to generate, preserve and share knowledge for developing a vibrant society".

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PROGRAMME OUTCOMES

The graduates of Computer Engineering will be able to:

PO1	**Engineering knowledge**	Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems.
PO2	**Problem analysis**	Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics natural sciences, and Engineering sciences.
PO3	**Design / Development of Solutions**	Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO4	**Conduct Investigations of Complex Problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage**	Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modeling to complex Engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and Sustainability**	Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.
PO9	**Individual and Team Work**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication Skills**	Communicate effectively on complex Engineering activities with the Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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PO11	**Project Management and Finance**	Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary Environments.
PO12	**Life-long Learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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PROGRAMME SPECIFIC OUTCOMES

PSO1	**Professional Skills**-The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexities.
PSO2	**Problem-Solving Skills**- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3	**Successful Career and Entrepreneurship**- The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Faculty of Science and Technology
Savitribai Phule Pune University
Maharashtra, India

Curriculum
for
Second Year of Computer Engineering
(2019 Course)
(With effect from 2020-21)

Savitribai Phule Pune University

Second Year of Computer Engineering (2019 Course) (With effect from Academic Year 2020-21)

Semester-III

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit			
		Theory	Practical	Tutorial	Mid-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
210241	Discrete Mathematics	03	-	01	30	70	-	-	-	100	03	--	01	04
210242	Fundamentals of Data Structures	03	-	-	30	70	-	-	-	100	03	-	-	03
210243	Object Oriented Programming	03	-	-	30	70	-	-	-	100	03	-	-	03
210244	Computer Graphics	03	-	-	30	70	-	-	-	100	03	-	-	03
210245	Digital Electronics and Logic Design	03	-	-	30	70	-	-	-	100	03	-	-	03
210246	Humanity and Social Science	-	-	01	-	-	-	-	-	-	-	-	-	-
210247	Data Structures Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210248	OOP and Computer Graphics Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210249	Digital Electronics Lab	-	02	-	-	-	25	-	-	25	-	01	-	01
210250	Business Communication Skills Lab	-	02	-	-	-	25	-	-	25	-	01	-	01
210251	Audit Course 3	-	-	-	-	-	-	-	-	-	-	-	-	-
										Total Credit	15	06	01	22
	Total	**15**	**12**	**02**	**150**	**350**	**100**	**100**	-	**700**	-	-	-	-

Semester-IV

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit			
		Theory	Practical	Tutorial	Mid-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
210252	Mathematics III	03	-	01	30	70	-	-	-	100	03	--	01	04
210253	Data Structures and Algorithms	03	-	-	30	70	-	-	-	100	03	-	-	03
210254	Software Engineering	03	-	-	30	70	-	-	-	100	03	-	-	03
210255	Microprocessor	03	-	-	30	70	-	-	-	100	03	-	-	03
210256	Principles of Programming Languages	03	-	-	30	70	-	-	-	100	03	-	-	03
210257	Data Structures and Algorithms Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210258	Microprocessor Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210259	Code of Conduct	-	-	01	-	-	-	-	-	-	-	-	-	-
210260	Project Based Learning	-	04	-	-	-	50	-	-	50	-	02	-	02
210261	Audit Course 4	-	-	-	-	-	-	-	-	-	-	-	-	-
										Total Credit	15	06	01	22
	Total	**15**	**12**	**02**	**150**	**350**	**100**	**100**	-	**700**	-	-	-	-

Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210241: Discrete Mathematics		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week **TUT: 01 Hours/Week**	**04**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**
Prerequisite Courses, if any: Basic Mathematics		
Companion Course, if any: ---		

Course Objectives:

- To use appropriate set, function and relation models to understand practical examples, and interpret the associated operations and terminologies in context.
- Determine number of logical possibilities of events.
- Learn logic and proof techniques to expand mathematical maturity.
- Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction

CO2: Develop skill in expressing mathematical properties of relation and function

CO3: Identify number of logical possibilities of events to design professional engineering Solutions

CO4: Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure

CO5: Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions

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Course Articulation Matrix

Course Title: Discrete Mathematics **SPPU Course Code:** 210241

Designation of Course: Professional

Class: SE Computer **Semester:** III **AY:** 2021 - 22

Teaching Scheme: Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210241 CO1	3	3	3	2	-	-	-	-	-	-	-	-	2	–	–
210241 CO2	3	3	3	2	-	-	-	-	-	-	-	-	1	–	1
210241 CO3	3	3	3	2	-	-	-	-	-	-	-	-	1	–	–
210241 CO4	3	3	3	2	-	-	-	-	-	-	-	-	3	–	–
210241 CO5	3	3	3	2	-	-	-	-	-	-	-	-	1	1	–
210241 CO6	3	3	3	2	-	-	-	-	-	-	-	-	1	–	–
210241	**3.00**	**3.00**	**3.00**	**2.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.50**	**1.00**	**1.00**

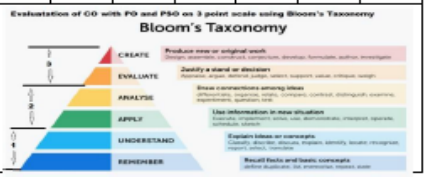
CO- PO mapping is done with corelation level 1, 2, 3 and —

1 : Slightly (low)

2 : Moderately (Medium)

3 : Substantionally (High)

— : No corelation between CO and PO



Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210242: Fundamentals of Data Structures		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any: 110005: Programming and Problem Solving

Companion Course, if any: 210247: Data Structures Laboratory

Course Objectives:

- To understand the basic techniques of algorithm analysis.
- To understand various algorithmic strategies to approach the problem solution.
- To understand the memory requirement for various data structures.
- To understand various data searching and sorting methods with pros and cons.
- To acquaint with the structural constraints and advantages in usage of the data.
- To understand the standard and abstract data representation methods.
- To identify the appropriate data structure and algorithm design method for a specified application.

Course Outcomes:

CO1: To demonstrate a detailed understanding of behaviour of data structures like array, linked list, stack, and queue by developing programs.
CO2: To use appropriate algorithmic strategy for better efficiency
CO3: To summarize data searching and sorting techniques.
CO4: To discriminate the usage of various structures in approaching the problem solution.
CO5: To analyze and use effective and efficient data structures in solving various Computer Engineering domain problems.
CO6: To design the algorithms to solve the programming problems.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Fundamentals of Data Structures **SPPU Course Code:** 210242
Designation of Course: Core Subjects
Class: SE Computer **Semester:** SE Computer **AY:** 2021 - 22
Teaching Scheme: Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool					External Assessment Tool			
Theory	Unit Test	Assignment / Tuto		Prelim Exam		Online / Insem		Endsem	
Practical / Tutorial	TW					TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210242 CO1	3	3	2	2	–	–	–	–	–	–	–	–	3	–	–
210242 CO2	1	2	2	3	–	–	–	–	–	–	–	–	3	2	1
210242 CO3	3	1	2	2	–	–	–	–	–	–	–	–	1	–	–
210242 CO4	3	3	3	3	–	–	–	–	–	–	–	–	1	–	–
210242 CO5	2	3	3	3	–	–	–	–	–	–	–	–	1	1	–
210242 CO6	1	2	3	3	–	–	–	–	–	–	–	–	1	–	–
210242	**2.17**	**2.33**	**2.50**	**2.67**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.67**	**1.50**	**1.00**

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1 : Slightly (low)
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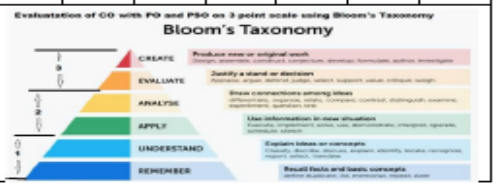

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210243: Object Oriented Programming		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any: Good understanding of Programming and Problem Solving concepts

Companion Course, if any:

Course Objectives:

- To explore & understand the principles of Object Oriented Programming (OOP).
- To use the object-oriented paradigm in program design.
- To provide object-oriented programming insight using C++
- To lay a foundation for advanced programming.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Analyze the strengths of object oriented programming
CO2: Design and apply OOP principles for effective programming
CO3: Develop the application using object oriented programming language(C++)
CO4: Apply object-oriented concepts for advanced programming.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Object Oriented Programming (OOP) **SPPU Course Code:** 210243
Designation of Course: Core Subjects
Class: SE Computer **Semester:** III **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam		Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210243 CO1	2	1	1	1	-	-	-	-	-	-	-	-	1	–	–
210243 CO2	2	2	3	2	-	-	-	-	-	-	-	-	1	–	1
210243 CO3	2	2	3	2	-	-	-	-	-	-	-	-	1	–	–
210243 CO4	3	3	3	2	-	-	-	-	-	-	-	-	1	–	–
210243 CO5	-	-	-	-	-	-	-	-	-	-	-	-	1	1	–
210243 CO6	-	-	-	-	-	-	-	-	-	-	-	-	1	–	–
210243	**2.25**	**2.00**	**2.50**	**1.75**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**

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2 : Moderately (Medium)
3 : Substantionally (High)
— : No corelation between CO and PO

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210244: Computer Graphics		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any:

Companion Course, if any: OOP

Course Objectives:

- **Remembering:** To acquaint the learner with the basic concepts of Computer Graphics
- **Understanding:** To learn the various algorithms for generating and rendering graphical figures.
- **Applying:** To get familiar with mathematics behind the graphical transformations
- **Understanding:** To understand and apply various methods and techniques regarding projections, animation, shading, illumination and lighting
- **Creating:** To generate Interactive graphics using OpenGL

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Define basic terminologies of Computer Graphics, interpret the mathematical foundation of the concepts of computer graphics and apply mathematics to develop Computer programs for elementary graphic operations.

CO2: Define the concept of windowing and clipping and apply various algorithms to fill and clip polygons.

CO3: Explain the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.

CO4: Explain the concepts of color models, lighting, shading models and hidden surface elimination.

CO5: Describe the fundamentals of curves, fractals, animation and gaming.

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Course Articulation Matrix

Course Title: Computer Graphics **SPPU Course Code:** 210244
Designation of Course: Core Subjects
Class: SE Computer **Semester:** III **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool						External Assessment Tool						
Theory	Unit Test		Assignment / Tuto		Prelim Exam		Online / Insem		Endsem				
Practical / Tutorial	TW						TW		OR		PR		

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210244 CO1	2	1	1	-	-	-	-	-	-	-	-	-	1	–	–
210244 CO2	1	2	-	-	-	-	-	-	-	-	-	-	1	–	1
210244 CO3	2	1	1	-	-	-	-	-	-	-	-	-	1	–	–
210244 CO4	1	-	1	-	-	-	-	-	-	-	-	-	1	–	–
210244 CO5	-	2	2	1	-	-	-	-	-	-	-	-	1	1	–
210244 CO6	-	-	-	-	-	-	-	-	-	-	-	-	1	–	–
210244	**1.50**	**1.50**	**1.25**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**

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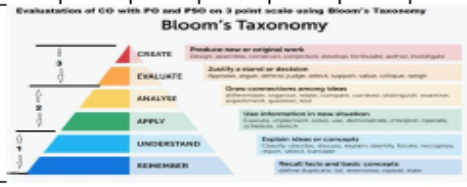

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210245: Digital Electronics and Logic Design		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any: 104010 Basic Electronics Engineering

Companion Course, if any: 210249 Digital Electronics Lab

Course Objectives:

- To study number systems and develop skills for design and implementation of combinational logic circuits and sequential circuits
- To understand the functionalities, properties and applicability of Logic Families.
- To introduce programmable logic devices and ASM chart and synchronous state machines.
- To basics of microprocessor.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Simplify Boolean Expressions using K Map.
CO2: Design and implement combinational circuits.
CO3: Design and implement sequential circuits.
CO4: Develop simple real-world application using ASM and PLD.
CO5: Choose appropriate logic families IC packages as per the given design specifications.
CO6: Explain organization and architecture of computer system

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Digital Electronics and Logic Design **SPPU Course Code:** 210245
Designation of Course: Core Subjects
Class: SE Computer **Semester:** III **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210245 CO1	3	-	2	-	-	-	-	-	-	-	-	-	1	–	–
210245 CO2	3	1	3	-	-	-	-	-	-	-	-	-	1	–	1
210245 CO3	3	1	3	-	-	-	-	-	-	-	-	-	1	–	–
210245 CO4	3	-	2	1	-	-	-	-	-	-	-	-	1	–	–
210245 CO5	3	2	-	-	-	-	-	-	-	-	-	-	1	1	–
210245 CO6	3	-	-	-	-	-	-	-	-	-	-	-	1	–	–
210245	**3.00**	**1.33**	**2.50**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**

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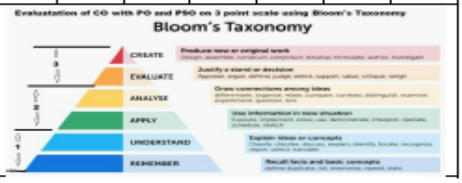

Course Co-ordinator Program Co-ordinator Director / Principal

Savitribai Phule Pune University Second Year of Engineering (2019 Course) 210253: Data Structures & Algorithms		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any:

- Fundamentals of Data Structure
- Basic Mathematics, Geometry, linear algebra, vectors and matrices

Companion Course, if any:

Course Objectives:

- To develop a logic for graphical modeling of the real life problems.
- To suggest appropriate data structure and algorithm for graphical solutions of the problems.
- To understand advanced data structures to solve complex problems in various domains.
- To operate on the various structured data
- To build the logic to use appropriate data structure in logical and computational solutions.
- To understand various algorithmic strategies to approach the problem solution.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

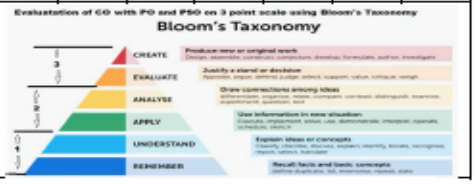
Course Title: Data Stuctures and Algorithms **SPPU Course Code:** 210253
Designation of Course: Core Subjects
Class: SE Computer **Semester:** IV **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool					External Assessment Tool							
Theory	Unit Test	Assignment / Tuto		Prelim Exam		Online / Insem		Endsem					
Practical / Tutorial	TW					TW		OR		PR			

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210253 CO1	3	1	3	1	–	–	–	–	1	–	–	1	1	–	–
210253 CO2	3	2	3	1	-	-	–	–	1	-	–	-	3	1	1
210253 CO3	3	2	3	1	-	–	–	–	1	-	-	-	3	2	1
210253 CO4	3	2	3	1	1	–	–	-	1	-	-	-	3	2	1
210253 CO5	3	2	3	1	1	-	–	–	1	-	-	1	3	1	1
210253 CO6	3	2	3	1	1	-	-	-	1	-	-	1	3	2	1
210253	**2.00**	**2.00**	**2.00**	**1.00**	**3.00**	**3.00**	**3.00**	**1.00**	**1.00**	**1.00**	**1.00**	**2.00**	**3.00**	**2.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
1 : Slightly (low)
2 : Moderately (Medium)
3 : Substantionally (High)
— : No corelation between CO and PO



Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Engineering (2019 Course) 210254: Software Engineering		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any: Fundamentals of Programming Languages

Companion Course, if any:

Course Objectives:

- To learn and understand the principles of Software Engineering.
- To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements.
- To apply Design and Testing principles to S/W project development.
- To understand project management through life cycle of the project.

Course Outcomes:

CO1: Apply software engineering principles to develop software.
CO2: Analyze software requirements and formulate design solution for a software.
CO3: Explain concepts of project estimation, planning and scheduling.
CO4: Explain risk management and software configuration management.
CO5: Explain various types of software testing.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Software Engineering **SPPU Course Code:** 210254
Designation of Course: Core Subjects
Class: SE Computer **Semester:** IV **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210254 CO1	2	-	-	-	-	-	-	-	-	-	-	-	1	–	–
210254 CO2	2	1	-	-	2	-	-	-	-	-	-	1	1	–	1
210254 CO3	2	-	-	-	1	-	-	-	1	-	1	-	1	–	–
210254 CO4	2	-	-	-	-	-	-	-	-	-	-	-	1	–	–
210254 CO5	2	-	-	-	1	-	-	-	-	-	-	1	1	1	–
210254 CO6	-	-	-	-	-	-	-	-	-	-	-	-	1	–	–
210254	**2.00**	**1.00**	**0.00**	**0.00**	**1.33**	**0.00**	**0.00**	**0.00**	**1.00**	**0.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

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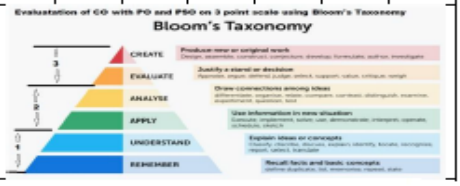

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Engineering (2019 Course) 210255: Microprocessor		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any: Digital Electronics and Logic Design

Companion Course, if any:

Course Objectives:

- To learn the architecture and programmer's model of advanced processor
- To understand the system level features and processes of advanced processor
- To acquaint the learner with application instruction set and logic to build assembly language programs.
- To understand debugging and testing techniques confined to 80386 DX

Course Outcomes:

On completion of the course, student will be able to–

CO1: To apply the assembly language programming to develop small real life embedded application.

CO2: To understand the architecture of the advanced processor thoroughly to use the resources for programming

CO3: To understand the higher processor architectures descended from 80386 architecture

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Microprocessor **SPPU Course Code:** 210255
Designation of Course: Core Subjects
Class: SE Computer **Semester:** IV **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210255 CO1	2	2	2	2	2	-	-	-	2	2	2	-	1	–	–
210255 CO2	2	2	2	2	-	-	-	-	2	2	-	-	1	–	1
210255 CO3	2	2	1	1	-	-	-	-	2	1	-	-	1	–	–
210255 CO4	2	2	2	2	-	-	-	-	2	2	-	-	1	–	–
210255 CO5	-	-	-	-	-	-	-	-	-	-	-	-	1	1	–
210255 CO6	-	-	-	-	-	-	-	-	-	-	-	-	1	–	–
210255	**2.00**	**2.00**	**1.75**	**1.75**	**2.00**	**0.00**	**0.00**	**0.00**	**2.00**	**1.75**	**2.00**	**0.00**	**1.00**	**1.00**	**1.00**

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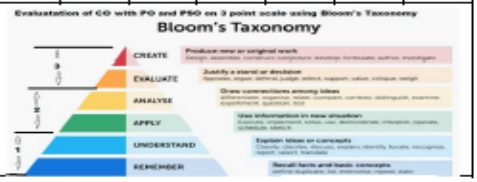

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Engineering (2019 Course) 210256: Principles of Programming Languages		
Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: 03 Hours/Week	**03**	**Mid_Semester(TH): 30 Marks** **End_Semester(TH): 70 Marks**

Prerequisite Courses, if any: Fundamentals of Data Structures, Object Oriented Programming, Fundamentals of programming language.

Companion Course, if any: Software Engineering, Data Structures and Algorithms, Project based learning

Course Objectives:

- To learn basic principles of programming languages and programming paradigms
- To learn structuring the data and manipulation of data, computation and program structure
- To learn Object Oriented Programming (OOP) principles using Java Programming Language
- To learn basic concepts of logical and functional programming language

Course Outcomes:

On completion of the course, student will be able to–

CO1: Make use of basic principles of programming languages
CO2: Able to develop a program with Data representation and Computations
CO3: Able to develop programs using Object Oriented Programming language : Java
CO4: Develop application using inheritance, encapsulation, and polymorphism
CO5: Able to demonstrate Applet and Multithreading for robust application development
CO6: Able to develop a simple program using basic concepts of Functional and Logical programming paradigm

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Principles of Programming Languages **SPPU Course Code:** 210256
Designation of Course: Core Subjects
Class: SE Computer **Semester:** IV **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool									
Theory	Unit Test		Assignment / Tuto		Prelim Exam		Online / Insem		Endsem					
Practical / Tutorial	TW						TW		OR		PR			
CO - PO Mapping														
CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210256 CO1	3	2	2	2	2	1	-	1	2	-	1	3	1	–	–
210256 CO2	3	3	3	3	2	1	-	1	2	1	3	3	1	–	1
210256 CO3	3	3	3	3	3	2	1	3	2	1	3	3	1	–	–
210256 CO4	3	3	3	3	3	2	1	3	2	1	3	3	1	–	–
210256 CO5	3	3	3	3	3	2	1	3	2	1	3	3	1	1	–
210256 CO6	3	3	3	3	3	2	1	3	2	1	3	3	1	–	–
210256	**3.00**	**2.83**	**2.83**	**2.83**	**2.67**	**1.67**	**1.00**	**2.33**	**2.00**	**1.00**	**2.67**	**3.00**	**1.00**	**1.00**	**1.00**

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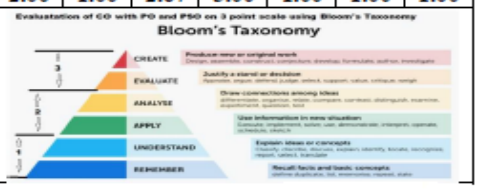

Co-ordinator Program Co-ordinator Director / Principal

Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210260: Project Based Learning		
Teaching Scheme: **PR: 04 Hours/Week**	**Credit** **02**	**Examination Scheme:** **TW: 50 Marks**

Prerequisite Courses, if any: Problem Based Learning.

Companion Course, if any: Software Engineering.

Course Objectives:

- To develop critical thinking and problem solving ability by exploring and proposing solutions to realistic/social problem.
- To Evaluate alternative approaches, and justify the use of selected tools and methods,
- To emphasizes learning activities that are long-term, inter-disciplinary and student-centric.
- To engages students in rich and authentic learning experiences.
- To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.
- To develop an ecosystem this may promote entrepreneurship and research culture among the students.

Course Outcomes:

CO1: Ability to solve real life problems by applying knowledge.
CO2: Ability to analyze alternative approaches, apply and use most appropriate one for feasible solution.
CO3: Ability to understand basics of IT Project management
CO4: Students should be able to accept and meet challenges in the real world, mirroring what professionals do every day.
CO5: Able to Classify software applications and identify unique features of various domains
CO6: Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Project Based Learning II **SPPU Course Code:** 210260
Designation of Course: Project Work
Class: SE Computer **Semester:** IV **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210260 CO1	2	-	3	-	0	-	3	-	-	2	-	2	1	–	–
210260 CO2	3	2	3	-	2	2	-	-	2	-	-	-	1	–	1
210260 CO3	3	-	-	-	3	3	-	-	-	-	-	-	1	–	–
210260 CO4	3	-	-	-	0	2	-	-	-	-	-	-	1	–	–
210260 CO5	3	-	-	-	3	-	-	-	-	-	-	-	1	1	–
210260 CO6	3	-	2	-	3	-	3	-	-	-	-	-	1	–	–
210260	**2.83**	**2.00**	**2.67**	**0.00**	**1.83**	**2.33**	**3.00**	**0.00**	**2.00**	**2.00**	**0.00**	**2.00**	**1.00**	**1.00**	**1.00**

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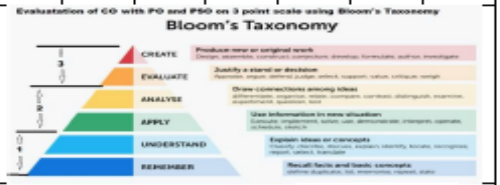

Co-ordinator Program Co-ordinator Director / Principal

Faculty of Science and Technology
Savitribai Phule Pune University
Maharashtra, India

http://unipune.ac.in

Curriculum
for
Third Year of Computer Engineering
(2019 Course)
(With effect from 2021-22)

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310241: Database Management Systems

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: Discrete Mathematics (210241), Data Structures and Algorithms (210252)

Companion Course: Database Management Systems Laboratory (310246)

Course Objectives:

- To understand the fundamental concepts of Database Management Systems
- To acquire the knowledge of database query languages and transaction processing
- To understand systematic database design approaches
- To acquire the skills to use a powerful, flexible, and scalable general-purpose databases to handle Big Data
- To be familiar with advances in databases and applications

Course Outcomes:

On completion of the course, learners should be able to

CO1: Analyze and design Database Management System using ER model
CO2: Implement database queries using database languages
CO3: Normalize the database design using normal forms
CO4: Apply Transaction Management concepts in real-time situations
CO5: Use NoSQL databases for processing unstructured data
CO6: Differentiate between Complex Data Types and analyze the use of appropriate data types

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Course Articulation Matrix

Course Title: Database Management Systems **SPPU Course Code:** 310241
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto		Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310241 CO1	2	2	3	1	-	-	-	1	-	-	-	3	1	–	–
310241 CO2	-	2	3	-	-	2	-	-	-	-	-	3	1	–	1
310241 CO3	-	2	3	-	1	-	-	-	-	-	-	3	1	–	–
310241 CO4	2	2	2	2	-	-	-	-	-	1	-	3	1	–	–
310241 CO5	-	2	3	-	-	-	-	-	-	-	1	3	1	1	–
310241 CO6	2	2	-	-	-	-	1	-	2	-	1	1	1	–	–
310241	**2.00**	**2.00**	**2.80**	**1.50**	**1.00**	**2.00**	**1.00**	**1.00**	**2.00**	**1.00**	**1.00**	**2.67**	**1.00**	**1.00**	**1.00**

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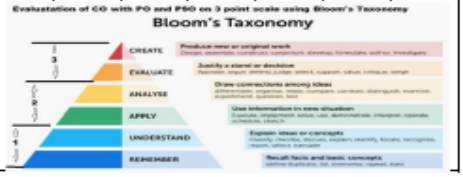

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310242: Theory of Computation

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: Discrete Mathematics (210241)

Companion Course: --

Course Objectives:

- To introduce the students to basics of Theory of Computation
- To study abstract computing models to provide a formal connection between algorithmic problem solving and the theory of languages
- To learn Grammar, Pushdown Automata and Turing Machine for language processing and algorithm design
- To learn about the theory of computability and complexity for algorithm design

Course Outcomes:

After completion of the course, learners should be able to

CO1: Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants

CO2: Construct regular expression to present regular language and understand pumping lemma for RE

CO3: Design Context Free Grammars and learn to simplify the grammar

CO4: Construct Pushdown Automaton model for the Context Free Language

CO5: Design Turing Machine for the different requirements outlined by theoretical computer science

CO6: Understand different classes of problems, classify and analyze them and study concepts of NP completeness

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Theory of Computation **SPPU Course Code:** 310242
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto		Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310242 CO1	3	3	2	2	1	-	-	-	-	-	-	2	1	–	–
310242 CO2	3	3	2	2	1	-	-	-	-	-	-	1	1	–	1
310242 CO3	3	3	2	2	1	-	-	-	-	-	-	1	1	–	–
310242 CO4	3	3	2	2	1	-	-	-	-	-	-	1	1	–	–
310242 CO5	3	3	3	2	1	-	-	-	-	-	-	2	1	1	–
310242 CO6	3	3	3	3	1	-	-	-	-	-	-	1	1	–	–
310242	**3.00**	**3.00**	**2.33**	**2.17**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.33**	**1.00**	**1.00**	**1.00**

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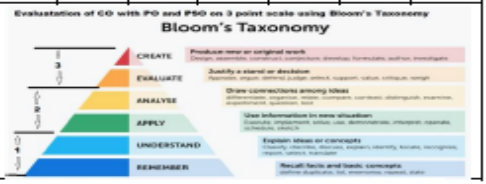

Co-ordinator

Program Co-ordinator

Director / Principal

Document certified by SHIVPRASAD PANDURANG PATIL<nbnsoe@sinhgad.edu>,

Digitally signed by SHIVPRASAD PANDURANG PATIL

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310243: Systems Programming and Operating System

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: Programming and Problem solving (110005), Data Structures and Algorithms (210252), Principles of Programming Languages (210255), Microprocessor (210254)

Companion Course: Laboratory Practice I (310248)

Course Objectives:

- To get acquainted with the basics of System Programming
- To acquire knowledge of data structures used in the design of System Software
- To be familiar with the format of object modules, the functions of linking, relocation, and loading
- To comprehend the structures and functions of Operating Systems and process management.
- To deal with concurrency and deadlock in the Operating System
- To learn and understand memory management of Operating System

Course Outcomes:

On completion of the course, learners should be able to

CO1: Analyze and synthesize basic System Software and its functionality.
CO2: Identify suitable data structures and Design & Implement various System Software
CO3: Compare different loading schemes and analyze the performance of linker and loader
CO4: Implement and Analyze the performance of process scheduling algorithms
CO5: Identify the mechanism to deal with deadlock and concurrency issues
CO6: Demonstrate memory organization and memory management policies

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Systems Programming and Operating System **SPPU Course Code:** 310243
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310243 CO1	2	2	2	1	-	-	-	-	-	-	-	-	1	–	–
310243 CO2	2	2	1	2	-	-	-	-	-	-	-	-	1	–	1
310243 CO3	2	2	1	1	-	-	-	-	-	-	-	-	1	–	–
310243 CO4	2	1	2	1	-	-	-	-	-	-	-	-	1	–	–
310243 CO5	2	2	1	2	-	-	-	-	-	-	-	-	1	1	–
310243 CO6	2	1	2	1	-	-	-	-	-	-	-	-	1	–	–
310243	**2.00**	**1.67**	**1.50**	**1.33**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
1 : Slightly (low)
2 : Moderately (Medium)
3 : Substantionally (High)
— : No corelation between CO and PO

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310244: Computer Networks and Security

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: --

Companion Course: Computer Networks and Security Laboratory (310247)

Course Objectives:

- To understand the fundamental concepts of networking standards, protocols and technologies
- To learn different techniques for framing, error control, flow control and routing
- To learn different layer protocols in the protocol stacks
- To understand modern network architectures with respect to design and performance
- To learn the fundamental concepts of Information Security

Course Outcomes:

On completion of the course, learners should be able to

- **CO1:** Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies
- **CO2:** Illustrate the working and functions of data link layer
- **CO3:** Analyze the working of different routing protocols and mechanisms
- **CO4:** Implement client-server applications using sockets
- **CO5:** Illustrate role of application layer with its protocols, client-server architectures
- **CO6:** Comprehend the basics of Network Security

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Computer Networks and Security **SPPU Course Code:** 310244
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310244 CO1	1	-	1	2	2	1	-	-	-	-	1	1	1	–	–
310244 CO2	1	1	1	1	1	-	1	-	-	1	-	-	1	–	1
310244 CO3	3	1	2	1	2	-	-	-	-	-	-	1	1	–	–
310244 CO4	1	2	1	2	2	-	-	-	1	-	1	1	1	–	–
310244 CO5	1	3	-	-	1	-	1	1	-	-	-	-	1	1	–
310244 CO6	1	-	2	1	-	1	-	-	-	-	-	1	1	–	–
310244	**1.33**	**1.75**	**1.40**	**1.40**	**1.60**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

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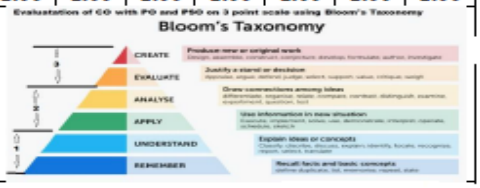

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
Elective I
310245(A): Internet of Things and Embedded Systems

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: Computer Networks and Security (310244)

Companion Course: Laboratory Practice I (310248)

Course Objectives:

- To understand fundamentals of Internet of Things (IoT) and Embedded Systems
- To learn advances in Embedded Systems and IoT
- To learn methodologies for IoT application development
- To learn the IoT protocols, cloud platforms and security issues in IoT
- To learn real world application scenarios of IoT along with its societal and economic impact using case studies and real time examples

Course Outcomes:

On completion of the course, learners should be able to

CO1: Understand the fundamentals and need of Embedded Systems for the Internet of Things
CO2: Apply IoT enabling technologies for developing IoT systems
CO3: Apply design methodology for designing and implementing IoT applications
CO4: Analyze IoT protocols for making IoT devices communication
CO5: Design cloud based IoT systems
CO6: Design and Develop secured IoT applications

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Internet of Things and Embedded Systems **SPPU Course Code:** 310245A
Designation of Course: Elective Sujects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool							External Assessment Tool						
Theory	Unit Test		Assignment / Tuto			Prelim Exam		Online / Insem				Endsem		
Practical / Tutorial	TW							TW		OR		PR		

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310245A CO1	3	1	1	2	-	-	-	-	1	-	1	-	1	–	–
310245A CO2	3	2	1	2	1	-	-	-	-	-	-	-	1	–	1
310245A CO3	2	3	3	3	2	3	-	-	2	-	1	-	1	–	–
310245A CO4	1	2	2	2	3	3	-	-	2	1	2	2	1	–	–
310245A CO5	2	2	2	3	3	3	–	–	2	1	2	2	1	1	–
310245A CO6	2	2	1	2	2	2	–	1	1	–	1	1	1	–	–
310245A	**2.17**	**2.00**	**1.67**	**2.33**	**2.20**	**2.75**	**0.00**	**1.00**	**1.60**	**1.00**	**1.40**	**1.67**	**1.00**	**1.00**	**1.00**

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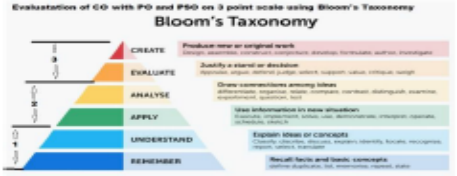

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Program Co-ordinator

Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310246:Database Management Systems Laboratory

Home

Teaching Scheme	Credit Scheme: 02	Examination Scheme and Marks
Practical: 04 Hours/Week		Term work: 25 Marks Practical: 25 Marks

Companion Course: Database Management Systems (310241)

Course Objectives:

- To develop Database programming skills
- To develop basic Database administration skills
- To develop skills to handle NoSQL database
- To learn, understand and execute process of software application development

Course Outcomes:

On completion of the course, learners will be able to

CO1: Design E-R Model for given requirements and convert the same into database tables
CO2: Design schema in appropriate normal form considering actual requirements
CO3: Implement SQL queries for given requirements , using different SQL concepts
CO4: Implement PL/SQL Code block for given requirements
CO5: Implement NoSQL queries using MongoDB
CO6: Design and develop application considering actual requirements and using database concepts

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Database Management Systems Laboratory **SPPU Course Code:** 310246
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310246 CO1	-	1	3	-	3	1	1	1	3	1	-	1	1	–	–
310246 CO2	2	2	3	-	2	-	1	-	3	-	1	-	1	–	1
310246 CO3	-	1	2	-	2	1	-	1	3	-	-	2	1	–	–
310246 CO4	-	1	2	-	2	-	-	-	3	2	1	-	1	–	–
310246 CO5	-	1	2	-	2	-	2	-	3	1	-	1	1	1	–
310246 CO6	2	2	3	-	3	1	-	-	3	-	2	1	1	–	–
310246	**2.00**	**1.33**	**2.50**	**0.00**	**2.33**	**1.00**	**1.33**	**1.00**	**3.00**	**1.33**	**1.33**	**1.25**	**1.00**	**1.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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Course Co-ordinator Program Co-ordinator Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310247:Computer Networks and Security Laboratory

Home

Teaching Scheme	Credit Scheme: 01	Examination Scheme and Marks
Practical: 02 Hours/Week		Term work: 25 Marks Oral: 25 Marks

Companion Course: Computer Network and Security (310244)

Course Objectives:

- To learn computer network hardware and software components
- To learn computer network topologies and types of network
- To develop an understanding of various protocols, modern technologies and applications
- To learn modern tools for network traffic analysis
- To learn network programming

Course Outcomes:

On completion of the course, learners will be able to

CO1: Analyze the requirements of network types, topology and transmission media
CO2: Demonstrate error control, flow control techniques and protocols and analyze them
CO3: Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms
CO4: Develop Client-Server architectures and prototypes
CO5: Implement web applications and services using application layer protocols
CO6: Use network security services and mechanisms

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Computer Networks and Security Laboratory **SPPU Course Code:** 310247
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto		Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310247 CO1	1	-	2	–	2	1	1	–	-	1	-	1	1	–	–
310247 CO2	-	3	-	1	1	–	–	1	-	–	–	–	1	–	1
310247 CO3	3	2	1	1	–	–	–	1	–	–	1	1	1	–	–
310247 CO4	-	1	2	1	1	1	–	–	–	–	–	1	1	–	–
310247 CO5	2	3	-	–	1	–	–	–	1	–	–	–	1	1	–
310247 CO6	-	1	3	1	1	–	1	–	2	–	–	1	1	–	–
310247	**2.00**	**2.00**	**2.00**	**1.00**	**1.20**	**1.00**	**1.00**	**1.00**	**1.50**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

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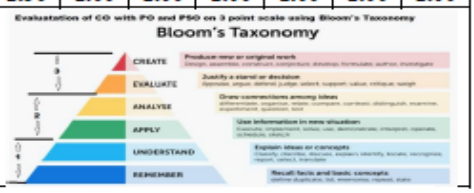

Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310248: Laboratory Practice I

Home

Teaching Scheme	Credit Scheme:	Examination Scheme and Marks
Practical: 04 Hours/Week	02	Term work: 25 Marks Practical: 25 Marks

Companion Course: Systems Programming and Operating System (310243), Elective I (310245)

Course Objectives:

- To learn system programming tools
- To learn modern operating system
- To learn various techniques, tools, applications in IoT and Embedded Systems /Human Computer Interface/Distributed Systems/ Software Project Management

Course Outcomes:

On completion of the course, learners will be able to

- **Systems Programming and Operating System**
  - **CO1:** Implement language translators
  - **CO2:** Use tools like LEX and YACC
  - **CO3:** Implement internals and functionalities of Operating System
- **Internet of Things and Embedded Systems**
  - **CO4:** Design IoT and Embedded Systems based application
  - **CO5:** Develop smart applications using IoT
  - **CO6:** Develop IoT applications based on cloud environment

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Laboratory Practice I **SPPU Course Code:** 310248
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310248 CO1	1	2	2	2	3	-	-	-	-	-	-	1	1	–	–
310248 CO2	1	2	2	2	2	-	-	-	-	-	-	1	1	–	1
310248 CO3	1	2	2	2	2	-	-	-	-	-	-	1	1	–	–
310248 CO4	1	2	3	2	-	2	-	-	2	1	2	-	1	–	–
310248 CO5	1	2	2	1	-	2	-	-	3	2	1	-	1	1	–
310248 CO6	2	2	2	1	-	2	-	-	2	-	2	1	1	–	–
310248	**1.17**	**2.00**	**2.17**	**1.67**	**2.33**	**2.00**	**0.00**	**0.00**	**2.33**	**1.50**	**1.67**	**1.00**	**1.00**	**1.00**	**1.00**

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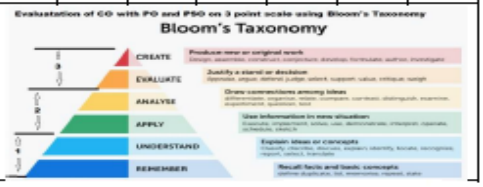

e Co-ordinator | Program Co-ordinator | Director / Principal

Document certified by SHIVPRASAD PANDURANG PATIL<nbnsoe@sinhgad.edu>,

Digitally signed by SHIVPRASAD PANDURANG PATIL

SavitribaiPhule Pune University
Third Year of Computer Engineering (2019 Course)
310249: Seminar and Technical Communication

Home

Teaching Scheme	Credit Scheme	Examination Scheme and Marks
Practical: 01 Hours/Week	01	Term Work: 50 Marks

Course Objectives:

- To explore the basic principles of communication (verbal and non-verbal) and active, empathetic listening, speaking and writing techniques
- To explore the latest technologies
- To enhance the communication skills
- To develop problem analysis skills

Course Outcomes:

On completion of the course, learners will be able to

CO1: Analyze a latest topic of professional interest
CO2: Enhance technical writing skills
CO3: Identify an engineering problem, analyze it and propose a work plan to solve it
CO4: Communicate with professional technical presentation skills

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Seminar and Technical Communication **SPPU Course Code:** 310249
Designation of Course: Core Subjects
Class: TE Computer **Semester:** V **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310249 CO1	–	1	2	1	-	-	-	-	-	-	-	-	1	–	–
310249 CO2	–	1	2	1	-	-	-	-	-	-	-	-	1	–	1
310249 CO3	2	1	1	-	-	-	-	-	-	-	-	-	1	–	–
310249 CO4	1	2	2	1	-	-	-	-	-	-	-	-	1	–	–
310249 CO5	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–
310249 CO6	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
310249	**1.50**	**1.25**	**1.75**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**

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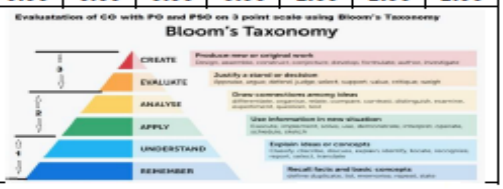

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310251: Data Science and Big Data Analytics

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: Discrete Mathematics (210241), Database Management Systems (310341)

Companion Course: Data Science and Big Data Analytics Laboratory (310256)

Course Objectives:

- To understand the need of Data Science and Big Data
- To understand computational statistics in Data Science
- To study and understand the different technologies used for Big Data processing
- To understand and apply data modelling strategies
- To learn Data Analytics using Python programming
- To be conversant with advances in analytics

Course Outcomes:

After completion of the course, learners should be able to

CO1: Analyze needs and challenges for Data Science Big Data Analytics
CO2: Apply statistics for Big Data Analytics
CO3: Apply the lifecycle of Big Data analytics to real world problems
CO4: Implement Big Data Analytics using Python programming
CO5: Implement data visualization using visualization tools in Python programming
CO6: Design and implement Big Databases using the Hadoop ecosystem

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Data Science and Big Data Analytics **SPPU Course Code:** 310251
Designation of Course: Core Subjects
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool		Internal Assessment Tool						External Assessment Tool						
Theory		Unit Test		Assignment / Tuto		Prelim Exam		Online / Insem				Endsem		
Practical / Tutorial		TW						TW		OR		PR		
CO - PO Mapping														
CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310251 CO1	1	3	2	1	-	-	-	-	1	-	-	1	1	–	–
310251 CO2	1	2	1	2	-	1	-	-	1	-	-	1	1	–	1
310251 CO3	2	1	2	1	-	1	-	-	1	-	-	1	1	–	–
310251 CO4	1	2	2	2	2	-	-	-	1	-	-	1	1	–	–
310251 CO5	1	2	2	1	2	-	-	-	1	-	-	1	1	1	–
310251 CO6	1	2	1	2	2	-	-	-	1	-	-	1	1	–	–
310251	**1.17**	**2.00**	**1.67**	**1.50**	**2.00**	**1.00**	**0.00**	**0.00**	**1.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**	**1.00**

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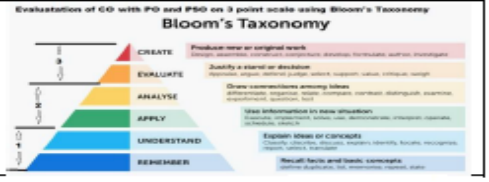

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310252: Web Technology

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: Database Management Systems (310341), Computer Networks and Security (310244)

Companion Course: Web Technology Laboratory (310257)

Course Objectives:

- To learn the fundamentals of web essentials and markup languages
- To use the Client side technologies in web development
- To use the Server side technologies in web development
- To understand the web services and frameworks

Course Outcomes:

On completion of the course, learners should be able to

CO1: Implement and analyze behavior of web pages using HTML and CSS
CO2: Apply the client side technologies for web development
CO3: Analyze the concepts of Servlet and JSP
CO4: Analyze the Web services and frameworks
CO5: Apply the server side technologies for web development
CO6: Create the effective web applications for business functionalities using latest web development platforms

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Web Technology **SPPU Course Code:** 310252
Designation of Course: Core Subjects
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310252 CO1	1	1	2	1	1	-	-	-	-	-	-	-	1	–	–
310252 CO2	-	2	1	3	1	-	-	-	1	-	-	-	1	–	1
310252 CO3	2	-	2	1	-	1	-	-	-	-	1	-	1	–	–
310252 CO4	1	3	1	2	2	1	-	1	-	-	-	1	1	–	–
310252 CO5	1	1	2	-	3	-	1	1	-	1	-	-	1	1	–
310252 CO6	2	1	-	2	1	1	-	1	-	-	-	-	1	–	–
310252	**1.40**	**1.60**	**1.60**	**1.80**	**1.60**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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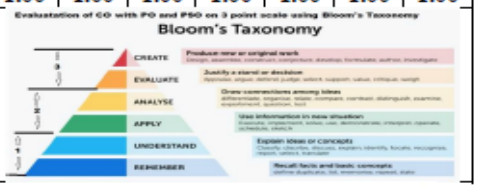

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310253: Artificial Intelligence

Home

Teaching Scheme:	Credit: 03	Examination Scheme:
TH: 03 Hours/Week		Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: Programming and Problem solving (110005), Data Structures and Algorithms (210252)

Companion Course: Laboratory Practice II (310258)

Course Objectives:

- To understand the concept of Artificial Intelligence (AI) in the form of various Intellectual tasks
- To understand Problem Solving using various peculiar search strategies for AI
- To understand multi-agent environment in competitive environment
- To acquaint with the fundamentals of knowledge and reasoning
- To devise plan of action to achieve goals as a critical part of AI
- To develop a mind to solve real world problems unconventionally with optimality

Course Outcomes:

After completion of the course, students should be able to

CO1: Identify and apply suitable Intelligent agents for various AI applications
CO2: Build smart system using different informed search / uninformed search or heuristic approaches
CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem
CO4: Apply the suitable algorithms to solve AI problems
CO5: Implement ideas underlying modern logical inference systems
CO6: Represent complex problems with expressive yet carefully constrained language of representation

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Artificial Intelligence **SPPU Course Code:** 310253
Designation of Course: Core Subjects
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool					External Assessment Tool							
Theory	Unit Test	Assignment / Tuto		Prelim Exam		Online / Insem			Endsem				
Practical / Tutorial	TW					TW		OR		PR			

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310253 CO1	1	2	2	1	-	-	1	3	-	2	-	-	1	–	–
310253 CO2	1	3	3	2	3	1	-	3	1	2	-	-	1	–	1
310253 CO3	3	2	2	2	1	1	1	-	-	2	-	-	1	–	–
310253 CO4	1	2	2	1	-	-	1	3	1	2	-	-	1	–	–
310253 CO5	1	2	2	1	-	-	1	3	1	2	-	-	1	1	–
310253 CO6	1	2	2	1	-	-	1	3	1	2	-	-	1	–	–
310253	**1.33**	**2.17**	**2.17**	**1.33**	**2.00**	**1.00**	**1.00**	**3.00**	**1.00**	**2.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**

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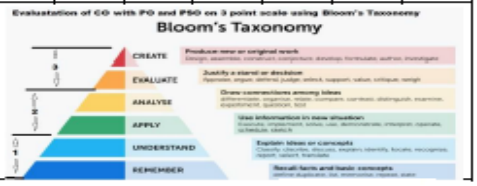

Co-ordinator | Program Co-ordinator | Director / Principal

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Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
Elective II
310254(A): Information Security

Home

Teaching Scheme: TH: 03 Hours/Week	Credit: 03	Examination Scheme: Mid-Sem (TH) : 30 Marks End-Sem (TH): 70 Marks

Prerequisites Courses: -- Computer Networks and Security (310244)

Companion Course: -- Laboratory Practice II (310258)

Course Objectives:

- To understand the fundamental approaches, principles and apply these concepts in Information Security
- To acquire the knowledge of mathematics for cryptography, understand the concepts of basic cryptography
- To learn standard algorithms and protocols employed to provide confidentiality, integrity and authenticity
- To acquire the knowledge of security protocol deployed in web security
- To study Information Security tools

Course Outcomes:

On completion of the course, learners should be able to

CO1: Model the cyber security threats and apply formal procedures to defend the attacks
CO2: Apply appropriate cryptographic techniques by learning symmetric and asymmetric key cryptography
CO3: Design and analyze web security solutions by deploying various cryptographic techniques along with data integrity algorithms
CO4: Identify and Evaluate Information Security threats and vulnerabilities in Information systems and apply security measures to real time scenarios
CO5: Demonstrate the use of standards and cyber laws to enhance Information Security in the development process and infrastructure protection

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: ElectiveII **SPPU Course Code:** 310254A
Designation of Course: Elective II
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool					External Assessment Tool							
Theory	Unit Test		Assignment / Tuto		Prelim Exam			Online / Insem			Endsem		
Practical / Tutorial	TW							TW		OR	PR		

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310254A CO1	3	3	2	2	–	2	–	1	–	–	–	1	1	–	–
310254A CO2	3	3	2	3	–	2	–	–	–	–	–	–	1	–	1
310254A CO3	3	3	2	3	–	2	–	–	–	1	–	–	1	–	–
310254A CO4	3	3	2	2	–	–	1	–	–	–	–	–	1	–	–
310254A CO5	3	2	1	2	–	2	1	2	–	1	1	1	1	1	–
310254A CO6	-	–	–	–	–	–	–	–	–	–	–	–	1	–	–
310254A	**3.00**	**2.80**	**1.80**	**2.40**	**0.00**	**2.00**	**1.00**	**1.50**	**0.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

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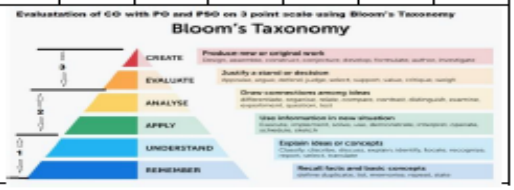

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Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310255: Internship**

Home

Teaching Scheme:	Credit: 04	Examination Scheme:
**		Term work: 100 Marks

Course Objectives:

Internship provides an excellent opportunity to learner to see how the conceptual aspects learned in classes are integrated into the practical world. Industry/on project experience provides much more professional experience as value addition to classroom teaching.

- To encourage and provide opportunities for students to get professional/personal experience through internships.
- To learn and understand real life/industrial situations.
- To get familiar with various tools and technologies used in industries and their applications.
- To nurture professional and societal ethics.
- To create awareness of social, economic and administrative considerations in the working environment of industry organizations.

Course Outcomes:

On completion of the course, learners should be able to

CO1: To demonstrate professional competence through industry internship.
CO2: To apply knowledge gained through internships to complete academic activities in a professional manner.
CO3: To choose appropriate technology and tools to solve given problem.
CO4: To demonstrate abilities of a responsible professional and use ethical practices in day to day life.
CO5: Creating network and social circle, and developing relationships with industry people.
CO6: To analyze various career opportunities and decide carrier goals.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Internship **SPPU Course Code:** 310255
Designation of Course: Internship
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto		Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310255 CO1	2	2	2	2	3	1	1	1	1	2	1	1	1	–	–
310255 CO2	1	2	2	2	3	2	1	1	1	2	2	1	1	–	1
310255 CO3	-	-	-	-	-	1	-	-	2	2	1	1	1	–	–
310255 CO4	2	-	-	-	-	2	2	3	-	1	-	2	1	–	–
310255 CO5	-	-	-	-	-	1	2	1	1	1	2	1	1	1	–
310255 CO6	-	-	-	-	-	1	-	-	2	1	-	1	1	–	–
310255	**1.67**	**2.00**	**2.00**	**2.00**	**3.00**	**1.33**	**1.50**	**1.50**	**1.40**	**1.50**	**1.50**	**1.17**	**1.00**	**1.00**	**1.00**

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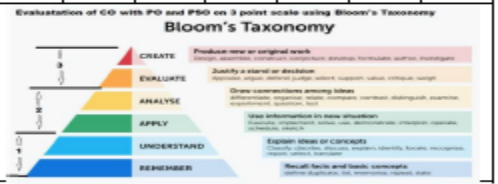

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Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310256: Data Science and Big Data Analytics Laboratory

Home

Teaching Scheme	Credit Scheme:	Examination Scheme and Marks
Practical: 04 Hours/Week	02	Term work: 50 Marks Practical: 25 Marks

Companion Course: Data Science and Big Data Analytics (310251)

Course Objectives:

- To understand principles of Data Science for the analysis of real time problems
- To develop in depth understanding and implementation of the key technologies in Data Science and Big Data Analytics
- To analyze and demonstrate knowledge of statistical data analysis techniques for decision-making
- To gain practical, hands-on experience with statistics programming languages and Big Data tools

Course Outcomes:

On completion of the course, learners will be able to

CO1: Apply principles of Data Science for the analysis of real time problems
CO2: Implement data representation using statistical methods
CO3: Implement and evaluate data analytics algorithms
CO4: Perform text preprocessing
CO5: Implement data visualization techniques
CO6: Use cutting edge tools and technologies to analyze Big Data

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Data Science and Big Data Analytics Laboratory **SPPU Course Code:** 310256
Designation of Course: Core Subjects
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto		Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310256 CO1	2	2	2	2	2	2	–	–	–	–	3	–	1	–	–
310256 CO2	2	2	2	2	3	–	–	–	–	–	–	–	1	–	1
310256 CO3	2	2	2	–	2	–	–	–	–	–	–	–	1	–	–
310256 CO4	2	2	2	2	2	2	–	–	–	–	–	–	1	–	–
310256 CO5	2	2	2	2	2	2	–	–	–	–	–	–	1	1	–
310256 CO6	2	2	2	2	2	2	–	–	–	–	3	–	1	–	–
310256	**2.00**	**2.00**	**2.00**	**2.00**	**2.17**	**2.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**0.00**	**1.00**	**1.00**	**1.00**

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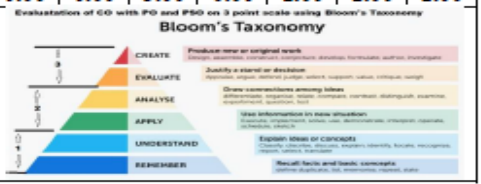

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Savitribai Phule Pune University
Third Year of Computer Engineering (2019 Course)
310257: Web Technology Laboratory

Home

Teaching Scheme	Credit Scheme	Examination Scheme and Marks
Practical: 02 Hours/Week	01	Term Work: 25 Marks Oral: 25 Marks

Companion Course : Web Technology (310252)

Course Objectives:

- To learn the web based development environment
- To use client side and server side web technologies
- To design and develop web applications using front end technologies and backend databases

Course Outcomes:

On completion of the course, learners will be able to

CO1: Understand the importance of website planning and website design issues
CO2: Apply the client side and server side technologies for web application development
CO3: Analyze the web technology languages, frameworks and services
CO4: Create three tier web based applications

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Web Technology Laboratory **SPPU Course Code:** 310257
Designation of Course: Core Subjects
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam		Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310257 CO1	-	1	3	1	–	1	1	–	–	1	–	–	1	–	–
310257 CO2	2	2	–	2	1	–	–	–	1	–	–	–	1	–	1
310257 CO3	2	–	3	–	–	1	–	–	–	1	1	–	1	–	–
310257 CO4	1	2	2	1	2	1	1	–	–	–	–	1	1	–	–
310257 CO5	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–
310257 CO6	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
310257	**1.67**	**1.67**	**2.67**	**1.33**	**1.50**	**1.00**	**1.00**	**0.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

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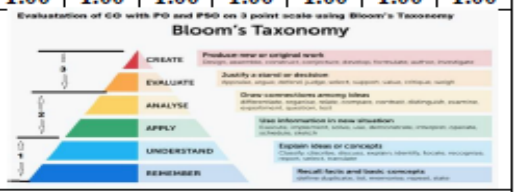

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SavitribaiPhule Pune University
Third Year of Computer Engineering (2019 Course)
310258: Laboratory Practice II

Home

Teaching Scheme	Credit Scheme	Examination Scheme and Marks
Practical: 04 Hours/Week	02	Term Work: 50 Marks Practical: 25 Marks

Companion Course: Artificial Intelligence (310253), Elective II (310245)

Course Objectives:

- To learn and apply various search strategies for AI
- To Formalize and implement constraints in search problems
- To understand the concepts of Information Security / Augmented and Virtual Reality/Cloud Computing/Software Modeling and Architectures

Course Outcomes:

On completion of the course, learner will be able to

- **Artificial Intelligence**

  CO1: Design system using different informed search / uninformed search or heuristic approaches
  CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
  CO3: Design and develop an expert system

- **Information Security**

  CO4: Use tools and techniques in the area of Information Security
  CO5: Use the knowledge of security for problem solving
  CO6: Apply the concepts of Information Security to design and develop applications

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Laboratory Practice II **SPPU Course Code:** 310258
Designation of Course: Core Subjects
Class: TE Computer **Semester:** VI **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310258 CO1	2	–	2	–	3	–	–	2	2	2	1	2	1	–	–
310258 CO2	1	–	2	2	3	2	–	2	2	2	1	2	1	–	1
310258 CO3	1	–	2	2	3	2	–	2	2	2	2	2	1	–	–
310258 CO4	1	–	2	–	3	–	–	2	2	2	2	2	1	–	–
310258 CO5	1	–	2	–	3	–	–	2	2	2	2	2	1	1	–
310258 CO6	1	–	2	–	3	–	–	2	2	2	2	2	1	–	–
310258	**1.17**	**0.00**	**2.00**	**2.00**	**3.00**	**2.00**	**0.00**	**2.00**	**2.00**	**2.00**	**1.67**	**2.00**	**1.00**	**1.00**	**1.00**

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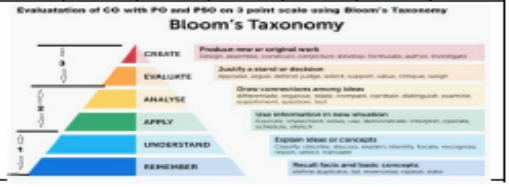

Co-ordinator Program Co-ordinator Director / Principal

Faculty of Engineering
Savitribai Phule Pune University, Pune

Maharashtra, India

Syllabus

for

Fourth Year of Computer Engineering
(2015 Course)

(with effect from 2018-19)

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410241: High Performance Computing

Teaching Scheme:	Credit	Examination Scheme:
TH: 04 Hours/Week	04	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 210253-Microprocessor, 210244- Computer Organization and Architecture, 210254-Principles of Programming Languages, 310251- Systems Programming and Operating System

Companion Course: 410246-Laboratory Practice I

Course Objectives:

- To study parallel computing hardware and programming models
- To be conversant with performance analysis and modeling of parallel programs
- To understand the options available to parallelize the programs
- To know the operating system requirements to qualify in handling the parallelization

Course Outcomes:

On completion of the course, student will be able to–

- Describe different parallel architectures, inter-connect networks, programming models
- Develop an efficient parallel algorithm to solve given problem
- Analyze and measure performance of modern parallel computing systems
- Build the logic to parallelize the programming task

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: High Performance Computing **SPPU Course Code:** 410241
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410241 CO1	2	1	-	-	-	-	-	-	-	-	-	-	1	–	–
410241 CO2	2	1	-	-	-	-	-	-	-	-	-	-	1	–	1
410241 CO3	2	1	-	-	-	-	-	-	-	-	-	-	1	–	–
410241 CO4	1	2	-	2	-	-	-	-	-	-	-	-	1	–	–
410241 CO5	1	2	-	2	-	-	-	-	-	-	-	1	1	1	–
410241 CO6	2	2	-	2	-	-	-	-	-	-	-	1	1	–	–
410241	**1.67**	**1.50**	**0.00**	**2.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**	**1.00**

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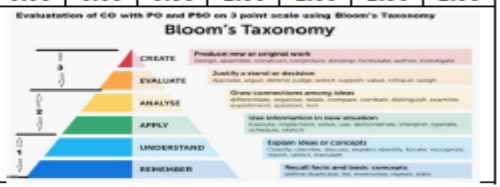

Co-ordinator Program Co-ordinator Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410242: Artificial Intelligence and Robotics

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	03	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 210254-Principles of Programming Languages

Companion Course: 410246-Laboratory Practice I

Course Objectives:

- To understand the concept of Artificial Intelligence (AI)
- To learn various peculiar search strategies for AI
- To acquaint with the fundamentals of mobile robotics
- To develop a mind to solve real world problems unconventionally with optimality

Course Outcomes:

On completion of the course, student will be able to–

- Identify and apply suitable Intelligent agents for various AI applications
- Design smart system using different informed search / uninformed search or heuristic approaches.
- Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
- Apply the suitable algorithms to solve AI problems

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Artificial Intelligence and Robotics **SPPU Course Code:** 410242
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool						External Assessment Tool						
Theory	Unit Test		Assignment / Tuto		Prelim Exam		Online / Insem		Endsem				
Practical / Tutorial	TW						TW		OR		PR		
CO - PO Mapping													

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410242 CO1	3	2	3	2	1	1	–	–	–	–	–	1	3	2	–
410242 CO2	3	2	3	2	1	–	–	–	–	–	–	1	3	2	–
410242 CO3	3	2	3	2	1	1	–	–	–	–	–	1	3	2	–
410242 CO4	3	2	3	2	1	1	–	–	–	–	–	1	3	2	–
410242 CO5	3	2	3	2	–	–	–	–	–	–	–	1	3	2	–
410242 CO6	3	2	3	2	1	1	–	–	–	–	–	1	3	2	–
410242	**3.00**	**2.00**	**3.00**	**2.00**	**1.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**3.00**	**2.00**	**0.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
1 : Slightly (low)
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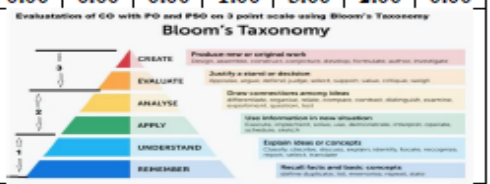

Course Co-ordinator | Program Co-ordinator | Director / Principal

Document certified by SHIVPRASAD PANDURANG PATIL<nbnssoe@sinhgad.edu>,
Digitally signed by SHIVPRASAD PANDURANG PATIL

Savitribai Phule Pune University

Fourth Year of Computer Engineering (2015 Course)

410243: Data Analytics

Teaching Scheme:	Credit	Examination Scheme:
		In-Sem (Paper): 30 Marks
TH: 03 Hours/Week	03	End-Sem (Paper): 70 Marks

Prerequisite Courses: 310242-Database Management Systems

Companion Course: 410246-Laboratory Practice I

Course Objectives:

- To develop problem solving abilities using Mathematics
- To apply algorithmic strategies while solving problems
- To develop time and space efficient algorithms
- To study algorithmic examples in distributed, concurrent and parallel environments

Course Outcomes:

On completion of the course, student will be able to–

- Write case studies in Business Analytic and Intelligence using mathematical models
- Present a survey on applications for Business Analytic and Intelligence
- Provide problem solutions for multi-core or distributed, concurrent/Parallel environments

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Course Articulation Matrix

Course Title: Data Analytics **SPPU Course Code:** 410243
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410243 CO1	3	2	2	2	2	-	-	-	-	-	-	1	2	2	-
410243 CO2	3	2	2	2	2	1	1	-	-	-	-	-	2	2	-
410243 CO3	3	2	2	2	2	-	-	-	-	-	-	1	2	2	-
410243 CO4	2	2	-	3	3	-	-	-	-	-	-	1	2	2	-
410243 CO5	3	2	2	2	2	1	-	-	-	-	-	1	2	2	-
410243 CO6	2	2	2	1	3	-	-	-	-	-	-	-	2	2	-
410243	**3.00**	**2.00**	**3.00**	**3.00**	**3.00**	**2.00**	**2.00**	**3.00**	**3.00**	**3.00**	**2.00**	**2.00**	2.00	3.00	1.00

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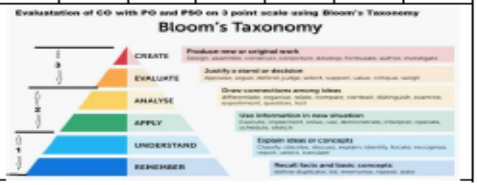

Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
Elective I
410244(D): Data Mining and Warehousing

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	03	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 310242-Database Management Systems, 310244- Information Systems and Engineering Economics

Companion Course: 410247-Laboratory Practice II

Course Objectives:

- To understand the fundamentals of Data Mining
- To identify the appropriateness and need of mining the data
- To learn the preprocessing, mining and post processing of the data
- To understand various methods, techniques and algorithms in data mining

Course Outcomes:

On completion of the course the student should be able to-

- Apply basic, intermediate and advanced techniques to mine the data
- Analyze the output generated by the process of data mining
- Explore the hidden patterns in the data
- Optimize the mining process by choosing best data mining technique

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Course Articulation Matrix

Course Title: Data Mining and Warehousing **SPPU Course Code:** 410244 (D)
Designation of Course: Elective I
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410244 (D) CO1	2	1	-	2	1	1	-	-	-	-	-	1	1	–	–
410244 (D) CO2	2	-	-	2	-	1	-	-	-	-	-	-	1	–	1
410244 (D) CO3	3	2	-	1	-	2	-	-	-	-	-	1	1	–	–
410244 (D) CO4	2	2	3	-	-	1	-	-	-	-	-	2	1	–	–
410244 (D) CO5	3	2	1	1	-	2	-	-	-	-	-	2	1	1	–
410244 (D) CO6	3	-	-	-	-	2	-	-	-	-	-	-	1	–	–
410244 (D)	**2.50**	**1.75**	**2.00**	**1.50**	**1.00**	**1.50**	**0.00**	**0.00**	-	**0.00**	**0.00**	**1.50**	**1.00**	**1.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
1 : Slightly (low)
2 : Moderately (Medium)
3 : Substantionally (High)
— : No corelation between CO and PO

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Program Co-ordinator

Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
Elective II
410245(B): Software Testing and Quality Assurance

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	03	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 310243- Software Engineering and Project Management,310263- Software Modeling and Design

Companion Course: 410247-Laboratory Practice II

Course Objectives:

- Introduce basic concepts of software testing
- Understand white box, block box, object oriented, web based and cloud testing
- Know in details automation testing and tools used for automation testing
- Understand the importance of software quality and assurance software systems development.

Course Outcomes:

On completion of the course, student will be able to–

- Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
- Design and develop project test plan, design test cases, test data, and conduct test operations
- Apply recent automation tool for various software testing for testing software
- Apply different approaches of quality management, assurance, and quality standard to software system
- Apply and analyze effectiveness Software Quality Tools

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Course Articulation Matrix

Course Title: Software Testing and Quality Assurance **SPPU Course Code:** 410245 (B)
Designation of Course: Elective II
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410245 (B) CO1	3	1	1	2	2	–	–	1	2	1	2	1	–	1	–
410245 (B) CO2	1	3	3	2	1	–	–	1	2	1	2	–	–	–	–
410245 (B) CO3	1	–	1	2	3	–	–	–	2	1	1	–	1	–	–
410245 (B) CO4	1	1	2	3	1	1	1	2	2	2	2	–	–	–	–
410245 (B) CO5	1	2	1	2	3	1	-	–	1	1	2	–	–	–	–
410245 (B) CO6	1	2	3	2	3	1	–	–	2	1	1	–	–	–	–
410245 (B)	1.33	1.80	1.83	2.17	2.17	1.00	1.00	1.33	1.83	1.17	1.67	1.00	1.00	1.00	0.00

CO- PO mapping is done with corelation level 1, 2, 3 and —
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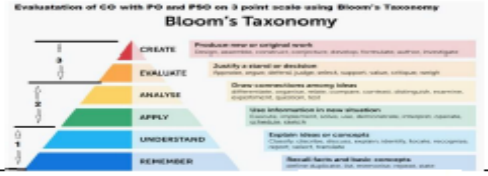

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Savitribai Phule Pune University

Fourth Year of Computer Engineering (2015 Course)

410246:Laboratory Practice I

Teaching Scheme:	Credit	Examination Scheme:
Practical : 04 Hours/Week	02	Term Work: 50 Marks Practical: 50 Marks

Companion Courses: 410241, 410242 and 410243

Course Objectives and Outcomes: Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.

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Course Articulation Matrix

Course Title: Laboratory Practice I **SPPU Course Code:** 410246
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410246 CO1	3	3	2	3	3	1	3	1	2	1	3	-	-	1	-
410246 CO2	3	2	1	3	2	3	-	1	-	1	3	2	-	2	-
410246 CO3	3	3	2	3	1	3	-	1	1	1	3	-	-	-	-
410246 CO4	3	3	3	3	2	2	3	1	2	1	3	-	-	-	-
410246 CO5	3	3	3	3	3	1	-	1	2	1	3	-	-	2	-
410246 CO6	3	3	3	3	2	3	1	1	-	1	3	-	-	1	-
410246	**3.00**	**2.83**	**2.33**	**3.00**	**2.17**	**2.17**	**2.33**	**1.00**	**1.75**	**1.00**	**3.00**	**2.00**	**0.00**	**1.50**	**0.00**

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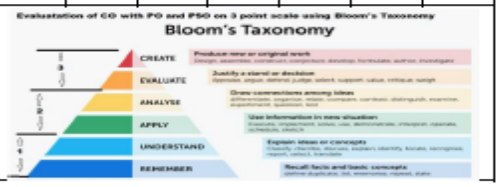

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410247:Laboratory Practice II

Teaching Scheme:	Credit	Examination Scheme:
Practical : 04 Hours/Week	02	Term Work: 50 Marks Presentation: 50 Marks

Companion Courses: 410244 and 410245

Course Objectives and Outcomes: Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses. Enough choice is provided to the learner to choose an elective of one's interest.

Laboratory Practice II is companion lab for elective course I and elective course II.

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Course Articulation Matrix

Course Title: Laboratory Practice II **SPPU Course Code:** 410247
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem
Practical / Tutorial	TW			TW	OR	PR

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410247 CO1	3	3	3	3	1	3	1	-	1	-	2	-	3	3	-
410247 CO2	3	2	3	2	2	3	2	-	-	-	3	-	3	2	-
410247 CO3	3	3	3	3	1	3	-	1	2	3	3	2	3	1	-
410247 CO4	3	2	2	3	3	2	3	2	1	2	-	3	2	-	-
410247 CO5	3	2	2	3	1	1	1	3	2	1	-	2	1	-	-
410247 CO6	3	2	3	3	3	3	2	1	3	3	2	3	1	1	-
410247	**3.00**	**2.33**	**2.67**	**2.83**	**1.83**	**2.50**	**1.80**	**1.75**	**1.80**	**2.25**	**2.50**	**2.50**	**2.17**	**1.75**	**0.00**

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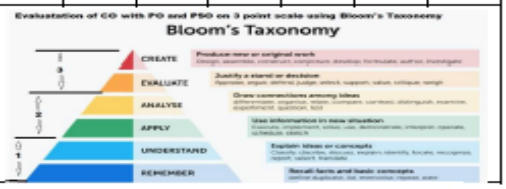

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410248:Project Work Stage I

Teaching Scheme:	Credit	Examination Scheme:
Practical : 02 Hours/Week	02	Presentation: 50 Marks

Course Objectives:

- To Apply the knowledge for solving realistic problem
- To develop problem solving ability
- To Organize, sustain and report on a substantial piece of team work over a period of several months
- To Evaluate alternative approaches, and justify the use of selected tools and methods,
- To Reflect upon the experience gained and lessons learned,
- To Consider relevant social, ethical and legal issues,
- To find information for yourself from appropriate sources such as manuals, books, research journals and from other sources, and in turn increase analytical skills.
- To Work in TEAM and learn professionalism.

Course Outcomes:

On completion of the course, student will be able to–

- Solve real life problems by applying knowledge.
- Analyze alternative approaches, apply and use most appropriate one for feasible solution.
- Write precise reports and technical documents in a nutshell.
- Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.

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Course Articulation Matrix

Course Title: Project Work Stage I **SPPU Course Code:** 410248
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool				External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam		Online / Insem		Endsem	
Practical / Tutorial	TW				TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410248 CO1	1	3	1	3	3	1	2	3	2	1	1	3	3	3	2
410248 CO2	1	3	2	3	3	1	1	3	2	3	1	3	3	2	2
410248 CO3	3	2	2	3	2	3	1	1	3	3	3	3	2	2	1
410248 CO4	1	3	3	3	3	2	1	3	2	1	2	3	2	2	1
410248 CO5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410248 CO6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410248	**1.50**	**2.75**	**2.00**	**3.00**	**2.75**	**1.75**	**1.25**	**2.50**	**2.25**	**2.00**	**1.75**	**3.00**	**2.50**	**2.25**	**1.50**

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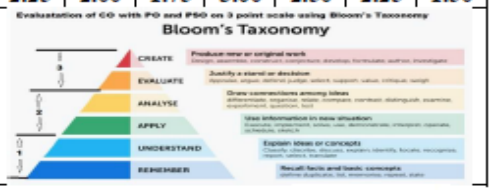

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410250: Machine Learning

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	03	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 207003- Engineering Mathematics III

Companion Course: 410254- Laboratory Practice III

Course Objectives:

- To understand human learning aspects and relate it with machine learning concepts.
- To understand nature of the problem and apply machine learning algorithm.
- To find optimized solution for given problem.

Course Outcomes:

On completion of the course, student will be able to–

- Distinguish different learning based applications
- Apply different preprocessing methods to prepare training data set for machine learning.
- Design and implement supervised and unsupervised machine learning algorithm.
- Implement different learning models
- Learn Meta classifiers and deep learning concepts

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Course Articulation Matrix

Course Title: Machine Learning **SPPU Course Code:** 410250
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VIII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410250 CO1	2	–	–	2	–	–	1	1	1	1	1	1	1	1	1
410250 CO2	2	1	–	1	1	1	1	1	1	1	1	1	1	1	1
410250 CO3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
410250 CO4	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
410250 CO5	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
410250 CO6	2	–	2	1	1	1	1	1	1	1	1	1	1	1	1
410250	**2.00**	**1.75**	**2.00**	**1.17**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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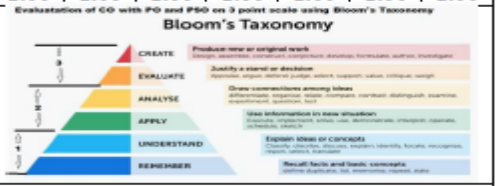

Co-ordinator Program Co-ordinator Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410251: Information and Cyber Security

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	03	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 310245-Computer Networks

Companion Course: 410254: Laboratory Practice III

Course Objectives:

- To offer an understanding of principle concepts, central topics and basic approaches in information and cyber security.
- To know the basics of cryptography.
- To acquire knowledge of standard algorithms and protocols employed to provide confidentiality, integrity and authenticity.
- To enhance awareness about Personally Identifiable Information (PII), Information Management, cyber forensics.

Course Outcomes:

On completion of the course, student will be able to–

- Gauge the security protections and limitations provided by today's technology.
- Identify information security and cyber security threats.
- Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
- Build appropriate security solutions against cyber-attacks.

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Course Articulation Matrix

Course Title: Information and Cyber Security **SPPU Course Code:** 410251
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VIII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410251 CO1	3	2	2	3	2	1	2	1	-	1	3	2	2	-	-
410251 CO2	3	3	3	3	2	-	-	-	-	1	2	2	3	-	-
410251 CO3	3	3	2	3	2	-	1	2	1	2	3	3	3	3	-
410251 CO4	3	3	3	3	3	-	1	-	1	2	2	3	2	1	-
410251 CO5	3	3	3	3	3	1	-	1	-	-	3	3	2	2	-
410251 CO6	3	2	2	2	3	2	-	2	1	1	2	2	1	-	-
410251	**3.00**	**2.67**	**2.50**	**2.83**	**2.50**	**1.33**	**1.33**	**1.50**	**1.00**	**1.40**	**2.50**	**2.50**	**2.17**	**2.00**	**0.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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2 : Moderately (Medium)
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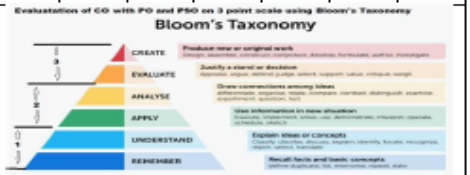
— : No corelation between CO and PO



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Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
Elective III
410252(D): Soft Computing and Optimization Algorithms

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	03	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 310250-Design and Analysis of Algorithm

Companion Course: 410255-Laboratory Practice IV

Course Objectives:

- To know the basics behind the Design and development intelligent systems in the framework of soft computing
- To acquire knowledge of Artificial Neural Networks Fuzzy sets, Fuzzy Logic, Evolutionary computing and swarm intelligence
- To explore the applications of soft computing
- To understand the need of optimization

Course Outcomes:

On completion of the course, student will be able to–

- Apply soft computing methodologies, including artificial neural networks, fuzzy sets, fuzzy logic, fuzzy inference systems and genetic algorithms
- Design and development of certain scientific and commercial application using computational neural network models, fuzzy models, fuzzy clustering applications and genetic algorithms in specified applications.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Soft Computing and Optimization Algorithms **SPPU Course Code:** 410252
Designation of Course: Elective
Class: BE Computer **Semester:** VIII **AY:** 2021- 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool						External Assessment Tool						
Theory	Unit Test		Assignment / Tuto		Prelim Exam		Online / Insem		Endsem				
Practical / Tutorial	TW						TW		OR		PR		

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410252 CO1	3	3	2	2	3	2	1	1	1	1	1	1	3	2	–
410252 CO2	3	3	2	2	2	1	–	1	–	1	1	1	3	3	–
410252 CO3	3	3	3	3	1	1	1	1	1	1	2	1	3	3	–
410252 CO4	2	3	2	2	3	1	1	1	1	2	1	2	2	3	–
410252 CO5	2	3	3	3	–	2	2	2	1	2	2	3	3	3	–
410252 CO6	2	3	3	3	3	2	2	1	2	2	1	3	3	3	–
410252	**2.50**	**3.00**	**2.50**	**2.50**	**2.40**	**1.50**	**1.40**	**1.17**	**1.20**	**1.50**	**1.33**	**1.83**	**2.83**	**2.83**	**0.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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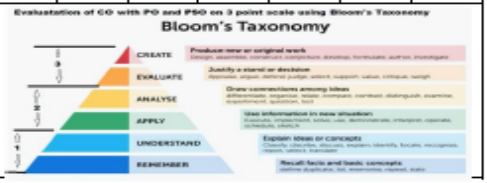

se Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
Elective IV
410253(C): Cloud Computing

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	03	In-Sem (Paper): 30 Marks End-Sem (Paper): 70 Marks

Prerequisite Courses: 310245 Computer Networks

Companion Course: 410255-Laboratory Practice IV

Course Objectives:

- To understand cloud computing concepts;
- To study various platforms for cloud computing
- To explore the applications based on cloud computing

Course Outcomes:

On completion of the course, student will be able to–

- To install cloud computing environments.
- To develop any one type of cloud
- To explore future trends of cloud computing

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Cloud Computing **SPPU Course Code:** 410253
Designation of Course: Elective
Class: BE Computer **Semester:** VIII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410253 CO1	3	3	2	3	2	3	2	2	-	–	–	2	2	2	–
410253 CO2	3	2	2	2	1	–	–	–	–	–	–	3	3	3	–
410253 CO3	3	3	2	3	2	2	1	3	3	–	–	3	2	3	–
410253 CO4	3	3	2	–	–	1	1	–	–	–	–	2	2	3	–
410253 CO5	3	3	2	3	2	2	2	1	–	–	–	3	3	–	–
410253 CO6	3	3	2	2	2	1	1	–	–	–	–	1	–	2	–
410253	**3.00**	**2.83**	**2.00**	**2.60**	**1.80**	**1.80**	**1.40**	**2.00**	**3.00**	**0.00**	**0.00**	**2.33**	**2.40**	**2.60**	**0.00**

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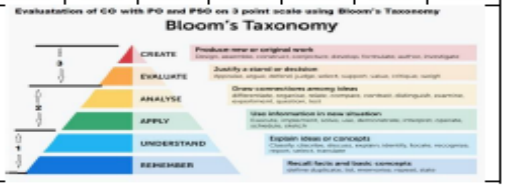

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410254:Laboratory Practice III

Teaching Scheme:	Credit	Examination Scheme:
Practical : 04 Hours/Week	02	Term Work: 50 Marks Practical: 50 Marks

Companion Courses: 410250 and 410251

Course Objectives and Outcomes: Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Laboratory Practice III **SPPU Course Code:** 410254
Designation of Course: Core Subjects
Class: BE Computer **Semester:** VIII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410254 CO1	3	3	3	2	3	2	1	0	0	0	0	1	3	3	–
410254 CO2	3	3	2	3	3	2	1	0	0	0	0	1	3	3	–
410254 CO3	3	3	3	2	3	2	1	0	0	0	0	1	3	3	–
410254 CO4	3	3	3	2	3	2	1	0	0	0	0	1	2	2	–
410254 CO5	3	2	3	3	3	2	1	0	0	0	0	1	3	3	–
410254 CO6	3	3	3	3	3	2	1	0	0	0	0	1	3	3	–
0	3.00	2.83	2.83	2.50	3.00	2.00	1.00	0.00	0.00	0.00	0.00	1.00	2.83	2.83	0.00

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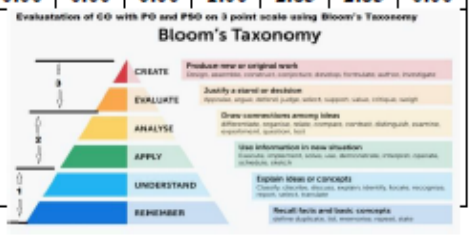

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Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410255:Laboratory Practice IV

Teaching Scheme:	Credit	Examination Scheme:
Practical : 04 Hours/Week	02	Term Work: 50 Marks Presentation: 50 Marks

Companion Courses: 410252 and 410253

Course Objectives and Outcomes: Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the elective courses. Enough choice is provided to the learner to choose an elective of one's interest.

Laboratory Practice II is companion lab for elective course III and elective course IV.

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Course Articulation Matrix

Course Title: Laboratory Practice IV **SPPU Course Code:** 410255

Designation of Course: Core Subjects

Class: BE Computer **Semester:** VIII **AY:** 2021 - 22

Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410255 CO1	3	3	2	0	2	1	1	2	3	2	1	3	–	–	–
410255 CO2	3	3	3	3	2	1	0	2	2	1	1	1	2	–	–
410255 CO3	3	3	3	2	2	1	1	1	2	0	1	1	–	1	–
410255 CO4	2	2	2	1	3	2	2	3	3	1	1	0	–	–	–
410255 CO5	1	1	1	1	3	3	2	2	1	0	1	1	1	–	–
410255 CO6	3	3	3	2	2	2	1	1	1	1	0	0	–	–	–
0	**2.50**	**2.50**	**2.33**	**1.50**	**2.33**	**1.67**	**1.17**	**1.83**	**2.00**	**0.83**	**0.83**	**1.00**	**1.50**	**1.00**	**0.00**

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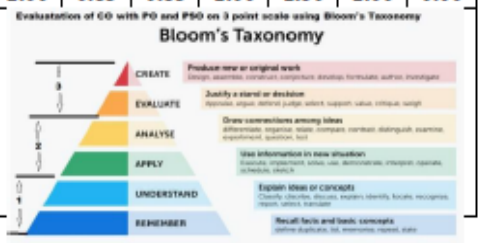

Course Co-ordinator

Program Co-ordinator

Director / Principal

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Savitribai Phule Pune University
Fourth Year of Computer Engineering (2015 Course)
410256:Project Work Stage II

Teaching Scheme:	Credit	Examination Scheme:
Practical : 06 Hours/Week	06	Term Work: 100 Marks Presentation: 50 Marks

Course Objectives:

- To follow SDLC meticulously and meet the objectives of proposed work
- To test rigorously before deployment of system
- To validate the work undertaken
- To consolidate the work as furnished report.

Course Outcomes:

On completion of the course, student will be able to–

- Show evidence of independent investigation
- Critically analyze the results and their interpretation.
- Report and present the original results in an orderly way and placing the open questions in the right perspective.
- Link techniques and results from literature as well as actual research and future research lines with the research.
- Appreciate practical implications and constraints of the specialist subject

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DEPARTMENT OF COMPUTER ENGINEERING

Course Articulation Matrix

Course Title: Project Work Stage II **SPPU Course Code:** 410256
Designation of Course: Project work
Class: BE Computer **Semester:** VIII **AY:** 2021 - 22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool										
Theory	Unit Test		Assignment / Tuto		Prelim Exam		Online / Insem			Endsem				
Practical / Tutorial	TW						TW		OR		PR			
CO - PO Mapping														
CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410256 CO1	3	3	3	3	2	3	2	2	-	–	–	2	2	2	–
410256 CO2	2	2	2	2	1	–	–	–	–	–	–	1	3	3	–
410256 CO3	3	3	2	3	2	2	2	3	2	–	–	2	2	2	–
410256 CO4	2	3	3	–	–	1	1	–	–	–	–	2	2	3	2
410256 CO5	3	3	2	3	2	2	2	2	–	–	–	3	1	–	–
410256 CO6	3	3	2	2	2	2	1	–	–	–	–	1	–	2	–
0	2.67	2.83	2.33	2.60	1.80	2.00	1.60	2.33	2.00	0.00	0.00	1.83	2.00	2.40	2.00

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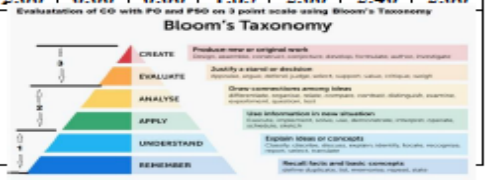

Co-ordinator

Program Co-ordinator

Director / Principal

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DEPARTMENT OF COMPUTER ENGINEERING

PROGRAM ARTICULATION MATRIX

Academic Year: 2021 - 22

Sr. No.	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	110005	2.00	2.00	3.00	1.33	2.50	0.00	0.00	0.00	1.00	3.00	0.00	1.33	1.00	1.00	1.00
2	210241	3.00	3.00	3.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.00	1.00
3	210242	2.17	2.33	2.50	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	1.50	1.00
4	210243	2.25	2.00	2.50	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
5	210244	1.50	1.50	1.25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
6	210245	3.00	1.33	2.50	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
7	210247	2.00	2.00	2.00	1.50	2.00	1.50	1.67	0.83	1.83	1.50	0.33	1.83	1.00	1.00	1.00
8	210248	2.50	2.33	2.17	2.00	2.17	2.50	2.00	2.00	2.50	2.00	1.83	2.17	1.00	1.00	1.00
9	210249	1.17	1.50	1.33	1.50	1.00	0.80	0.80	1.00	0.50	1.17	1.00	0.67	2.50	2.67	2.50
10	210250	1.50	1.50	1.25	1.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
11	210246	0.00	0.00	0.00	0.00	0.00	0.00	3.00	2.25	2.33	0.00	0.00	1.00	1.00	1.00	1.00
12	310241	2.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00	1.00	1.00	1.00	0.00	0.00
13	310242	3.00	3.00	2.33	2.17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	1.00	1.00	1.00
14	310243	2.00	1.67	1.50	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
15	310244	1.33	1.75	1.40	1.40	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	310245A	2.17	2.00	1.67	2.33	2.20	2.75	0.00	1.00	1.60	1.00	1.40	1.67	1.00	1.00	1.00
17	310246	2.00	1.33	2.50	0.00	2.33	1.00	1.33	1.00	3.00	1.33	1.33	1.25	1.00	1.00	1.00
18	310247	2.00	2.00	2.00	1.00	1.20	1.00	1.00	1.00	1.50	1.00	1.00	1.00	1.00	1.00	1.00
19	310248	1.17	2.00	2.17	1.67	2.33	2.00	0.00	0.00	2.33	1.50	1.67	1.00	1.00	1.00	1.00
20	310249	1.50	1.25	1.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
21	410241	1.67	1.50	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
22	410242	3.00	2.00	3.00	2.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	3.00	2.00	0.00
23	410243	3.00	2.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	3.00	1.00
24	410244 (D)	2.50	1.75	2.00	1.50	1.00	1.50	0.00	0.00	0.00	0.00	0.00	1.50	1.00	1.00	1.00
25	410245 (B)	1.33	1.80	1.83	2.17	2.17	1.00	1.00	1.33	1.83	1.17	1.67	1.00	1.00	1.00	0.00
26	410246	3.00	2.83	2.33	3.00	2.17	2.17	2.33	1.00	1.75	1.00	3.00	2.00	0.00	1.50	0.00
27	410247	3.00	2.33	2.67	2.83	1.83	2.50	1.80	1.75	1.80	2.25	2.50	2.50	2.17	1.75	0.00
28	410248	1.50	2.75	2.00	3.00	2.75	1.75	1.25	2.50	2.25	2.00	1.75	3.00	2.50	2.25	1.50
29	110005	2.67	2.00	2.17	1.83	2.17	2.17	2.17	1.67	1.50	1.67	1.50	2.17	2.50	1.67	2.00
30	210252	2.50	2.80	2.20	1.25	2.60	1.00	1.00	0.00	0.00	0.00	1.50	1.50	2.83	1.40	1.25
31	210253	2.00	2.00	2.00	1.00	3.00	3.00	3.00	1.00	1.00	1.00	1.00	2.00	3.00	2.00	1.00
32	210254	2.00	1.00	0.00	0.00	1.33	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00

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DEPARTMENT OF COMPUTER ENGINEERING

PROGRAM ARTICULATION MATRIX

Academic Year: 2021 - 22

Sr. No.	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
33	210255	2.00	2.00	1.75	1.75	2.00	0.00	0.00	0.00	2.00	1.75	2.00	0.00	1.00	1.00	1.00
34	210256	3.00	2.83	2.83	2.83	2.67	1.67	1.00	2.33	2.00	1.00	2.67	3.00	1.00	1.00	1.00
35	210257	2.83	2.33	2.67	2.00	2.33	1.17	1.17	1.00	1.33	1.00	1.00	2.00	1.00	1.00	1.00
36	210258	3.00	2.33	1.67	2.00	1.83	2.17	2.00	1.00	1.50	1.67	1.00	1.67	1.00	1.00	1.00
37	210260	2.83	2.00	2.67	0.00	1.83	2.33	3.00	0.00	2.00	2.00	0.00	2.00	1.00	1.00	1.00
38	210259	1.33	1.33	1.00	0.00	0.50	0.50	0.50	0.50	2.00	0.50	0.50	1.00	1.00	1.00	1.00
39	310251	1.17	2.00	1.67	1.50	2.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00
40	310252	1.40	1.60	1.60	1.80	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
41	310253	1.33	2.17	2.17	1.33	2.00	1.00	1.00	3.00	1.00	2.00	0.00	0.00	1.00	1.00	1.00
42	310254A	3.00	2.80	1.80	2.40	0.00	2.00	1.00	1.50	0.00	1.00	1.00	1.00	1.00	1.00	1.00
43	310255	1.67	2.00	2.00	2.00	3.00	1.33	1.50	1.50	1.40	1.50	1.50	1.17	1.00	1.00	1.00
44	310256	2.00	2.00	2.00	2.00	2.17	2.00	0.00	0.00	0.00	0.00	3.00	0.00	1.00	1.00	1.00
45	310257	1.67	1.67	2.67	1.33	1.50	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	310258	1.17	0.00	2.00	2.00	3.00	2.00	0.00	2.00	2.00	2.00	1.67	2.00	1.00	1.00	1.00
47	410250	2.00	1.75	2.00	1.17	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
48	410251	3.00	2.67	2.50	2.83	2.50	1.33	1.33	1.50	1.00	1.40	2.50	2.50	2.17	2.00	0.00
49	410252	2.50	3.00	2.50	2.50	2.40	1.50	1.40	1.17	1.20	1.50	1.33	1.83	2.83	2.83	0.00
50	410253	3.00	2.83	2.00	2.60	1.80	1.80	1.40	2.00	3.00	0.00	0.00	2.33	2.40	2.60	0.00
51	410254	3.00	2.83	2.83	2.50	3.00	2.00	1.00	0.00	0.00	0.00	0.00	1.00	2.83	2.83	0.00
52	410255	2.50	2.50	2.33	1.50	2.33	1.67	1.17	1.83	2.00	0.83	0.83	1.00	1.50	1.00	0.00
53	410256	2.67	2.83	2.33	2.60	1.80	2.00	1.60	2.33	2.00	0.00	0.00	1.83	2.00	2.40	2.00
Average PO		**2.18**	**2.09**	**2.14**	**1.89**	**2.00**	**1.61**	**1.47**	**1.53**	**1.68**	**1.46**	**1.47**	**1.53**	**1.41**	**1.34**	**1.10**
% Average		**72.75**	**69.77**	**71.43**	**63.04**	**66.63**	**53.60**	**48.91**	**51.11**	**56.01**	**48.68**	**48.97**	**50.99**	**47.05**	**44.71**	**36.63**

Course Co-ordinator | **Program Co-ordinator** | **Principal / Director**

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Sinhgad Institutes

NBN Sinhgad School of Engineering, Ambegaon, Pune -41.

Department of Mechanical Engineering

Course: 410253(C) CC **Class:** BE

Academic Year	Semester		Course Outcomes	CO1												CO2											
			Type of Assessment	Internal						External						Internal						External					
2021 - 22	I		Assessment Tools	UT1	TW		ASSI/ TUT	% of all tools	Students Attained	IN SEM	OR / PR	END SEM	TW	% of all tools	Students Attained	UT1	TW	PRELIM	ASSI/ TUT	% of all tools	Students Attained	IN SEM	OR / PR	END SEM	TW	% of all tools	Students Attained
Sr. No	ROLL NO.	EXAM SEAT NO.	Total Marks	30	0			30.00	Y/N	30	50	0	50	130.00	Y/N	30	0	0	0	30.00	Y/N	30	50	0	50	130.00	Y/N
			Name of the Students	Avg. Relevant Marks %					66	Avg. Relevant Marks %					66	Avg. Relevant Marks %					66	Avg. Relevant Marks %					66
1	B5546	B151054201	ABHINAV SINHA PRERNA SINH	29				97	Y	27	42		43	86	Y	29				97	Y	27	42		43	86	Y
2	B5557	B151054202	ABHISHEK VAISHYA SANGITA	26				87	Y	27	43		44	88	Y	26				87	Y	27	43		44	88	Y
3	B5401	B151054203	ADMANE AJINKYA PRADIPKUMA	16				53	N	29	44		43	89	Y	16				53	N	29	44		43	89	Y
4	B5402	B151054204	AJMERI ISHAN RAKESHCHANDR	28				93	Y	24	41		41	82	Y	28				93	Y	24	41		41	82	Y
5	B5451	B151054205	AKASH GUPTA GEETA 7192200	28				93	Y	26	42		43	85	Y	28				93	Y	26	42		43	85	Y
6	B5492	B151054206	AKASH MAURYA VIDYA MAURYA	29				97	Y	29	43		44	89	Y	29				97	Y	29	43		44	89	Y
7	B5558	B151054207	AKHIL V SATHI VARIER M.V.	28				93	Y	29	43		42	88	Y	28				93	Y	29	43		42	88	Y
8	B5551	B151054208	ALISH SULKIYA PUSHPA SULK	25				83	Y	27	42		41	85	Y	25				83	Y	27	42		41	85	Y
9	B5403	B151054209	ALLEPALLY PRANAY VEERABRA	28				93	Y	29	44		44	90	Y	28				93	Y	29	44		44	90	Y
10	B5510	B151054210	AMRITESH PANDEY SAVITA 71	0				0	N	27	41		42	85	Y	0				0	N	27	41		42	85	Y
11	B5439	B151054211	ANIMESH GAHARWAR PRATIBHA	28				93	Y	28	42		43	87	Y	28				93	Y	28	42		43	87	Y
12	B5404	B151054212	ANPAT ROHIT SHANKAR SAVIT	0				0	N	28	43		44	88	Y	0				0	N	28	43		44	88	Y
13	B5481	B151054213	ANSHULI KUMARI SUDHA KUMA	29				97	Y	29	43		43	88	Y	29				97	Y	29	43		43	88	Y
14	B5421	B151054214	APURVA CHATURVEDI MEENA C	27				90	Y	27	43		45	88	Y	27				90	Y	27	43		45	88	Y
15	B5405	B151054215	ARGADE OMKAR CHANDRAKANT	29				97	Y	28	44		43	88	Y	29				97	Y	28	44		43	88	Y
16	B5544	B151054216	ASHISH KUMAR SRIVASTVA US	28				93	Y	27	42		44	87	Y	28				93	Y	27	42		44	87	Y
17	B5417	B151054217	ATHARV SHASHIKANT BIRARI	28				93	Y	27	43		41	85	Y	28				93	Y	27	43		41	85	Y
18	B5406	B151054218	AUNDHKAR AAKASH AVINASH A	28				93	Y	27	44		45	89	Y	28				93	Y	27	44		45	89	Y
19	B5407	B151054219	BANKAR NIRANJAN ANANDRAO	29				97	Y	27	43		45	88	Y	29				97	Y	27	43		45	88	Y
21	B5410	B151054221	BHARUKA AMAN ANKALESH KAN	29				97	Y	29	41		41	85	Y	29				97	Y	29	41		41	85	Y
22	B5411	B151054222	BHAVE SAURABH RAKESH REKH	29				97	Y	28	42		43	87	Y	29				97	Y	28	42		43	87	Y
23	B5412	B151054223	BHAVSAR SIDDHARTH KAILAS	28				93	Y	24	42		43	84	Y	28				93	Y	24	42		43	84	Y
24	B5413	B151054224	BHORE ANIKET DURGADAS PRE	29				97	Y	29	43		44	89	Y	29				97	Y	29	43		44	89	Y
25	B5414	B151054225	BHUJBAL RUSHIKESH BHASKAR	29				97	Y	26	42		43	85	Y	29				97	Y	26	42		43	85	Y
26	B5418	B151054226	BORAWAKE KANCHAN MANGESH	28				93	Y	28	40		42	85	Y	28				93	Y	28	40		42	85	Y
27	B5419	B151054227	CHAHAL GAURAV DILIP SAVIT	26				87	Y	28	41		44	87	Y	26				87	Y	28	41		44	87	Y
28	B5420	B151054228	CHAND SIDHARTH SHAILESH S	29				97	Y	28	41		43	86	Y	29				97	Y	28	41		43	86	Y
29	B5423	B151054229	CHAUDHARI GHANSHYAM MADAN	28				93	Y	29	42		43	88	Y	28				93	Y	29	42		43	88	Y
30	B5424	B151054230	CHAVAN PRATHMESH MANOJ CH	29				97	Y	29	43		42	88	Y	29				97	Y	29	43		42	88	Y
			Total	4281.0	0.0	0.0	0.0	14270.0	**152.0**	4488.0	6935.0	0.0	9641.0	#VALUE!	**162.0**	4281.0	0.0	0.0	0.0	14270.0	**153.0**	4570.0	6935.0	0.0	7083.0	14298.5	**164.0**
			Average	26.76	0.00	0.00	0.00	89.19		19.86	30.69	0.00	42.66	#VALUE!		26.76	0.00	0.00	0.00	89.19		27.04	41.04	0.00	41.91	84.61	

Attainment Level	CO1			CO2		
	Total No fo Students	**160**	**226**	Total No fo Students	**160**	**169**
If % Attainment <=50, Level obtained = **1 (Low)**	No of students achieved	**152**	**162**	No of students achieved	**153**	**164**
If % Attainment >50 & <66, Level obtained = **2 (Medium)**	% Attainment	**95.00**	**71.68**	% Attainment	**95.63**	**97.04**
If % Attainment >=66, Level obtained = **3 (High)**	**Attainment level**	**3**	**3**	**Attainment level**	**3**	**3**

	CO1		CO2
A. Internal Attainment Level (20%)	**0.60**	A. Internal Attainment Level (20%)	**0.60**
B. External Attainment Level (80%)	**2.4**	B. External Attainment Level (80%)	**2.4**
Total CO1 Attainment level (A+B)	**3.00**	Total CO2 Attainment level (A+B)	**3.00**
Final CO Attainment level	**2.73**		

Gap Analysis

A Y	% RESULT
2017 - 18	78
?018 - 19	82
?019 - 20	68.00
?t Value	76

To measure course outcomes **attained level** through University examination are obtained by using **precribed levels** defined by program.

410253(C)	CO	CO1	CO2	CO3	CO4	CO5	CO6	CO
Target Level		**1.98**	**1.98**	**1.98**	**1.98**	**1.98**	**1.98**	**1.98**
Attained Level		**3.00**	**3.00**	**2.60**	**2.60**	**2.60**	**2.60**	**2.73**
Action Required (Y/N)		**N**	**N**	**N**	**N**	**N**	**N**	**N**

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SINHGAD TECHNICAL EDUCATION SOCIETY'S

NBN SINHGAD TECHNICAL INSTITUES CAMPUS

NBN SINHGAD SCHOOL OF ENGINEERING, AMBEGOAN (BK), PUNE - 41

DEPARTMENT OF COMPUTER ENGINEERING

CO ATTAINMENT

Academic Year: 2021 - 22

Sr. No.	Course	CO1	CO2	CO3	CO4	CO5	CO6	CO
26	410246	3.00	3.00	3.00	3.00	3.00	3.00	3.00
27	410247	3.00	3.00	3.00	3.00	3.00	3.00	3.00
28	410248	3.00	3.00	3.00	3.00	3.00	3.00	3.00
29	110005	3.00	3.00	3.00	3.00	3.00	3.00	3.00
30	210252	3.00	2.60	3.00	3.00	2.60	3.00	2.87
31	210253	3.00	3.00	3.00	3.00	3.00	3.00	3.00
32	210254	3.00	3.00	3.00	3.00	3.00	3.00	3.00
33	210255	3.00	3.00	3.00	3.00	3.00	3.00	3.00
34	210256	3.00	3.00	3.00	3.00	3.00	3.00	3.00
35	210257	3.00	3.00	3.00	3.00	3.00	3.00	3.00
36	210258	3.00	2.60	3.00	3.00	3.00	3.00	2.93
37	210260	3.00	3.00	3.00	3.00	3.00	3.00	3.00
38	210259	3.00	3.00	3.00	3.00	3.00	2.60	2.93
39	310251	3.00	3.00	3.00	3.00	3.00	3.00	3.00
40	310252	3.00	3.00	3.00	3.00	3.00	3.00	0.73
41	310253	3.00	3.00	3.00	3.00	3.00	3.00	3.00
42	310254A	3.00	3.00	3.00	3.00	3.00	3.00	3.00
43	310255	3.00	3.00	3.00	3.00	3.00	3.00	3.00
44	310256	3.00	2.60	3.00	3.00	3.00	3.00	2.93
45	310257	3.00	3.00	3.00	3.00	2.60	3.00	2.93
46	310258	3.00	3.00	3.00	2.60	3.00	3.00	2.93
47	410250	2.60	3.00	3.00	3.00	3.00	3.00	2.93
48	410251	3.00	3.00	3.00	3.00	3.00	2.80	2.97
49	410252	2.60	3.00	3.00	3.00	3.00	3.00	2.93
50	410253	3.00	3.00	2.40	3.00	3.00	3.00	2.90

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NBN SINHGAD TECHNICAL INSTITUES CAMPUS

NBN SINHGAD SCHOOL OF ENGINEERING, AMBEGOAN (BK), PUNE - 41

DEPARTMENT OF COMPUTER ENGINEERING

CO ATTAINMENT

Academic Year: 2021 - 22

Sr. No.	Course	CO1	CO2	CO3	CO4	CO5	CO6	CO
1	110005	3.00	3.00	3.00	2.60	2.60	2.60	2.80
2	210241	3.00	3.00	3.00	2.60	2.60	2.60	2.80
3	210242	3.00	3.00	3.00	2.60	3.00	3.00	3.00
4	210243	3.00	3.00	3.00	3.00	3.00	3.00	3.00
5	210244	3.00	3.00	3.00	3.00	3.00	3.00	3.00
6	210245	3.00	3.00	3.00	2.60	3.00	3.00	2.93
7	210247	2.60	2.60	3.00	3.00	3.00	3.00	2.87
8	210248	3.00	3.00	3.00	3.00	3.00	3.00	3.00
9	210249	2.60	2.60	3.00	3.00	3.00	3.00	2.87
10	210250	3.00	3.00	3.00	3.00	3.00	3.00	3.00
11	210246	3.00	3.00	2.40	3.00	3.00	3.00	2.90
12	310241	3.00	3.00	3.00	2.60	3.00	3.00	2.93
13	310242	3.00	3.00	3.00	3.00	3.00	3.00	3.00
14	310243	3.00	3.00	3.00	3.00	3.00	3.00	3.00
15	310244	3.00	3.00	3.00	3.00	3.00	3.00	3.00
16	310245A	3.00	3.00	3.00	3.00	3.00	3.00	3.00
17	310246	3.00	3.00	3.00	3.00	3.00	3.00	3.00
18	310247	3.00	3.00	3.00	3.00	3.00	3.00	3.00
19	310248	3.00	3.00	2.60	3.00	3.00	3.00	2.93
20	310249	3.00	3.00	3.00	3.00	3.00	3.00	3.00
21	410241	3.00	3.00	3.00	3.00	3.00	3.00	3.00
22	410242	3.00	3.00	3.00	3.00	3.00	3.00	3.00
23	410243	3.00	3.00	3.00	3.00	3.00	3.00	3.00
24	410244 (D)	3.00	3.00	3.00	3.00	3.00	3.00	3.00
25	410245 (B)	3.00	3.00	3.00	3.00	3.00	3.00	3.00

SINHGAD TECHNICAL EDUCATION SOCIETY'S

NBN SINHGAD TECHNICAL INSTITUES CAMPUS

NBN SINHGAD SCHOOL OF ENGINEERING, AMBEGOAN (BK), PUNE - 41

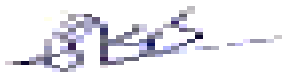
DEPARTMENT OF COMPUTER ENGINEERING

CO ATTAINMENT

Academic Year: 2021 - 22

Sr. No.	Course	CO1	CO2	CO3	CO4	CO5	CO6	CO
51	410254	3.00	3.00	3.00	3.00	3.00	2.60	2.93
52	410255	3.00	3.00	3.00	3.00	3.00	2.60	2.93
53	410256	3.00	3.00	3.00	3.00	3.00	2.60	2.93
Average		2.97	2.96	2.97	2.95	2.97	2.97	
% Average		98.93	98.67	98.93	98.40	98.93	99.07	

Course Co-ordinator



Program Co-ordinator

Principal / Director

PO and PSO Attainment

Calculating PO attainment for direct method

The PO attainment is calculated by using the predefined CO/PO matrix and the value of Final CO attainment for the subject

The PO attainment is calculated by using the formula

PO attainment = Avg, of CO's of a PO /3 **X** Final CO attainment for the subject

For Example, if you want to calculate the PO attainment value for PO1 in the below table

PO attainment for PO1 = (Avg. of CO's for PO1 / 3) **X** 2.97

PO attainment for PO1 = **2.97**

SINHGAD TECHNICAL EDUCATION SOCIETY'S

NBN SINHGAD TECHNICAL INSTITUES CAMPUS

NBN Sinhgad School of Engineering, Ambegaon, Pune -41.

DEPARTMENT OF COMPUTER ENGINEERING

PO ATTAINMENT

Academic Year: 2021 - 22

Direct PO Attainment

Sr. No.	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	110005	1.87	1.87	2.80	1.24	2.33	0.00	0.00	0.00	0.93	2.80	0.00	1.24	0.93	0.93	0.93
2	210241	2.80	2.80	2.80	1.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	0.93	0.93
3	210242	2.17	2.33	2.50	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	1.50	1.00
4	210243	2.25	2.00	2.50	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
5	210244	1.50	1.50	1.25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
6	210245	2.93	1.30	2.44	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.98	0.98
7	210247	1.91	1.91	1.91	1.43	1.91	1.43	1.59	0.80	1.75	1.43	0.32	1.75	0.96	0.96	0.96
8	210248	2.50	2.33	2.17	2.00	2.17	2.50	2.00	2.00	2.50	2.00	1.83	2.17	1.00	1.00	1.00
9	210249	1.12	1.43	1.27	1.43	0.96	0.76	0.76	0.96	0.48	1.12	0.96	0.64	2.39	2.55	2.39
10	210250	1.50	1.50	1.25	1.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
11	210246	0.00	0.00	0.00	0.00	0.00	0.00	2.90	2.18	2.26	0.00	0.00	0.97	0.97	0.97	0.97
12	310241	1.96	1.96	0.00	0.00	0.00	0.00	0.98	0.00	1.96	0.00	0.98	0.98	0.98	0.00	0.00
13	310242	3.00	3.00	2.33	2.17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	1.00	1.00	1.00
14	310243	2.00	1.67	1.50	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
15	310244	1.33	1.75	1.40	1.40	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	310245A	2.17	2.00	1.67	2.33	2.20	2.75	0.00	1.00	1.60	1.00	1.40	1.67	1.00	1.00	1.00
17	310246	2.00	1.33	2.50	0.00	2.33	1.00	1.33	1.00	3.00	1.33	1.33	1.25	1.00	1.00	1.00
18	310247	2.00	2.00	2.00	1.00	1.20	1.00	1.00	1.00	1.50	1.00	1.00	1.00	1.00	1.00	1.00
19	310248	1.14	1.96	2.12	1.63	2.28	1.96	0.00	0.00	2.28	1.47	1.63	0.98	0.98	0.98	0.98
20	310249	1.50	1.25	1.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
21	410241	1.67	1.50	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
22	410242	3.00	2.00	3.00	2.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	3.00	2.00	0.00
23	410243	3.00	2.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	3.00	1.00
24	410244 (D)	2.50	1.75	2.00	1.50	1.00	1.50	0.00	0.00	0.00	0.00	0.00	1.50	1.00	1.00	1.00
25	410245 (B)	1.33	1.80	1.83	2.17	2.17	1.00	1.00	1.33	1.83	1.17	1.67	1.00	1.00	1.00	0.00
26	410246	3.00	2.83	2.33	3.00	2.17	2.17	2.33	1.00	1.75	1.00	3.00	2.00	0.00	1.50	0.00
27	410247	3.00	2.33	2.67	2.83	1.83	2.50	1.80	1.75	1.80	2.25	2.50	2.50	2.17	1.75	0.00
28	410248	1.50	2.75	2.00	3.00	2.75	1.75	1.25	2.50	2.25	2.00	1.75	3.00	2.50	2.25	1.50
29	110005	2.67	2.00	2.17	1.83	2.17	2.17	2.17	1.67	1.50	1.67	1.50	2.17	2.50	1.67	2.00
30	210252	2.39	2.68	2.10	1.19	2.48	0.96	0.96	0.00	0.00	0.00	1.43	1.43	2.71	1.34	1.19
31	210253	2.00	2.00	2.00	1.00	3.00	3.00	3.00	1.00	1.00	1.00	1.00	2.00	3.00	2.00	1.00
32	210254	2.00	1.00	0.00	0.00	1.33	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00
33	210255	2.00	2.00	1.75	1.75	2.00	0.00	0.00	0.00	2.00	1.75	2.00	0.00	1.00	1.00	1.00
34	210256	3.00	2.83	2.83	2.83	2.67	1.67	1.00	2.33	2.00	1.00	2.67	3.00	1.00	1.00	1.00
35	210257	2.83	2.33	2.67	2.00	2.33	1.17	1.17	1.00	1.33	1.00	1.00	2.00	1.00	1.00	1.00
36	210258	2.93	2.28	1.63	1.96	1.79	2.12	1.96	0.98	1.47	1.63	0.98	1.63	0.98	0.98	0.98
37	210260	2.83	2.00	2.67	0.00	1.83	2.33	3.00	0.00	2.00	2.00	0.00	2.00	1.00	1.00	1.00
38	210259	1.30	1.30	0.98	0.00	0.49	0.49	0.49	0.49	1.96	0.49	0.49	0.98	0.98	0.98	0.98
	310251	1.17	2.00	1.67	1.50	2.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00
	310252	0.34	0.39	0.39	0.44	0.39	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24

SINHGAD TECHNICAL EDUCATION SOCIETY'S

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DEPARTMENT OF COMPUTER ENGINEERING

PO ATTAINMENT

Academic Year: 2021 - 22

41	310253	1.33	2.17	2.17	1.33	2.00	1.00	1.00	3.00	1.00	2.00	0.00	0.00	1.00	1.00	1.00
42	310254A	3.00	2.80	1.80	2.40	0.00	2.00	1.00	1.50	0.00	1.00	1.00	1.00	1.00	1.00	1.00
43	310255	1.67	2.00	2.00	2.00	3.00	1.33	1.50	1.50	1.40	1.50	1.50	1.17	1.00	1.00	1.00
44	310256	1.96	1.96	1.96	1.96	2.12	1.96	0.00	0.00	0.00	0.00	2.93	0.00	0.98	0.98	0.98
45	310257	1.63	1.63	2.61	1.30	1.47	0.98	0.98	0.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98
46	310258	1.14	0.00	1.96	1.96	2.93	1.96	0.00	1.96	1.96	1.96	1.63	1.96	0.98	0.98	0.98
47	410250	2.00	1.75	2.00	1.17	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
48	410251	2.97	2.64	2.47	2.80	2.47	1.32	1.32	1.48	0.99	1.38	2.47	2.47	2.14	1.98	0.00
49	410252	2.44	2.93	2.44	2.44	2.35	1.47	1.37	1.14	1.17	1.47	1.30	1.79	2.77	2.77	0.00
50	410253	2.90	2.74	1.93	2.51	1.74	1.74	1.35	1.93	2.90	0.00	0.00	2.26	2.32	2.51	0.00
51	410254	2.93	2.77	2.77	2.44	2.93	1.96	0.98	0.00	0.00	0.00	0.00	0.98	2.77	2.77	0.00
52	410255	2.44	2.44	2.28	1.47	2.28	1.63	1.14	1.79	1.96	0.81	0.81	0.98	1.47	0.98	0.00
53	410256	2.61	2.77	2.28	2.54	1.76	1.96	1.56	2.28	1.96	0.00	0.00	1.79	1.96	2.35	1.96
DPOA	**46**	**2.14**	**2.04**	**2.09**	**1.84**	**1.95**	**1.57**	**1.43**	**1.49**	**1.64**	**1.42**	**1.43**	**1.50**	**1.38**	**1.31**	**1.07**

Indirect PO Atainment

Sr. No	Survy	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	Student Exit	2.63	2.55	2.61	2.59	2.61	2.51	2.62	2.62	2.62	2.64	2.56	2.58	2.55	2.61	2.62
2	Alumni	0.00	0.00	0.00	2.81	2.81	2.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.72	2.76
3	Placement	2.78	2.04	2.04	2.04	0.00	2.46	0.00	0.00	0.00	0.00	3.00	3.00	2.04	2.04	2.04
4	Parent	2.61	0.00	0.00	0.00	0.00	2.51	0.00	0.00	0.00	0.00	2.58	2.55	2.51	2.58	2.55
5	Teacher	2.81	2.76	0.00	2.76	2.54	2.74	0.00	0.00	2.74	0.00	2.78	2.84	2.81	2.76	2.84
IPOA	**Average**	**2.71**	**2.45**	**2.33**	**2.55**	**2.65**	**2.61**	**2.62**	**2.62**	**2.68**	**2.64**	**2.73**	**2.74**	**2.48**	**2.54**	**2.56**

Direct PO Atainment	2.14	2.04	2.09	1.84	1.95	1.57	1.43	1.49	1.64	1.42	1.43	1.50	1.38	1.31	1.07
Indirect PO Atainment	2.71	2.45	2.33	2.55	2.65	2.61	2.62	2.62	2.68	2.64	2.73	2.74	2.48	2.54	2.56
A. 80% of Direct PO	1.71	1.64	1.67	1.47	1.56	1.26	1.14	1.19	1.31	1.14	1.15	1.20	1.10	1.05	0.85
B.20% of In Direct PO	0.54	0.49	0.47	0.51	0.53	0.52	0.52	0.52	0.54	0.53	0.55	0.55	0.50	0.51	0.51
PO Atainment (A+B)	**2.25**	**2.13**	**2.14**	**1.98**	**2.09**	**1.78**	**1.67**	**1.72**	**1.85**	**1.66**	**1.69**	**1.74**	**1.60**	**1.56**	**1.37**

Target PO	**2.18**	**2.09**	**2.14**	**1.89**	**2.00**	**1.61**	**1.47**	**1.53**	**1.68**	**1.46**	**1.47**	**1.53**	**1.41**	**1.34**	**1.10**
Achieved PO	**2.25**	**2.13**	**2.14**	**1.98**	**2.09**	**1.78**	**1.67**	**1.72**	**1.85**	**1.66**	**1.69**	**1.74**	**1.60**	**1.56**	**1.37**
Action Reuired	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N

Course Co-ordinator **Program Co-ordinator** **Principal / Director**

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NBN SINHGAD SCHOOL OF ENGINEERING, AMBEGOAN (BK), PUNE - 41

DEPARTMENT OF COMPUTER ENGINEERING

POs & PSOs Attainment Levels and Actions for improvement

Academic Year: 2021 - 22

POs	Target Level	Attainment Level	Observations
PO1:	**Engineering knowledge:** Apply knowledge of mathematics, science and engineering to analyze, design and evaluate mechanical components & systems using state -of-the-art IT tools.		
PO1	2.24	2.29	Target Achieved
Action			

POs	Target Level	Attainment Level	Observations
PO2:	**Problem analysis:** Analyze problems of mechanical engineering including thermal, manufacturing and industrial systems to formulate design requirements		
PO2	2.15	2.17	Target Achieved
Action			

POs	Target Level	Attainment Level	Observations
PO3:	**Design/development of solutions:** Design, implement, and evaluate mechanical systems and processes considering public health, safety, cultural, societal and environmental issues.		
PO3	2.14	2.15	Target Achieved
Action			

	Target Level	Attainment Level	Observations

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DEPARTMENT OF COMPUTER ENGINEERING

POs & PSOs Attainment Levels and Actions for improvement

Academic Year: 2021 - 22

PO4:	**Conduct investigations of complex problems:** Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theInformation to provide valid conclusions.		
PO4	**1.93**	**2.01**	Target Achieved
Action			

POs	**Target Level**	**Attainment Level**	**Observations**
PO5:	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with anUnderstanding of the limitations.		
PO5	**2.00**	**2.08**	Target Achieved
Action			

POs	**Target Level**	**Attainment Level**	**Observations**
PO6:	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to theProfessional engineering practice.		
PO6	**1.60**	**1.77**	Target Achieved
Action			

	Target Level	**Attainment Level**	**Observations**

PO7:	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.		
PO7	**1.49**	**1.68**	Target Achieved
Action			

POs	**Target Level**	**Attainment Level**	**Observations**
PO8:	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.		
PO8	**1.59**	**1.76**	Target Achieved
Action			

POs	**Target Level**	**Attainment Level**	**Observations**
PO9:	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.		
PO9	**1.63**	**1.80**	Target Achieved
Action			

POs	**Target Level**	**Attainment Level**	**Observations**

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DEPARTMENT OF COMPUTER ENGINEERING

POs & PSOs Attainment Levels and Actions for improvement

Academic Year: 2021 - 22

PO10:	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.		
PO10	**1.50**	**1.69**	Target Achieved
Action			

POs	Target Level	Attainment Level	Observations
PO11:	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.		
PO11	**1.49**	**1.70**	Target Achieved
Action			

POs	Target Level	Attainment Level	Observations
PO12:	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.		
PO12	**1.58**	**1.78**	Target Achieved
Action			

PSOs	Target Level	Attainment Level	Observations
	raduate will apply their knowledge in the domain of mechanical and multi-disciplinary engineering elds to solve real life problems in industries utilizing advanced technology		

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DEPARTMENT OF COMPUTER ENGINEERING

POs & PSOs Attainment Levels and Actions for improvement

Academic Year: 2021 - 22

PSO1	**1.47**	**1.64**	Target Achieved
Action			

PSOs	Target Level	Attainment Level	Observations
PSO2:	Graduate will implement their technical skills to solve social and environmental issues.		
PSO2	**1.39**	**1.59**	Target Achieved
Action			

PSOs	Target Level	Attainment Level	Observations
PSO3:	Graduate will apply their knowledge and leadership qualities to identify entrepreneurial opportunities		
PSO3	**1.11**	**1.38**	Target Achieved
Action			

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