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Late Sau. Kantabai Bhavarlalji Jain College of Engineering

(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune) Shri Neminath Jain Brahmacharyashram (SNJB) (Jain Gurukul) Neminagar, Chandwad - 423101, Dist. Nashik (MS, India). Tele: (02556) 253750, Web: www.snjb.org, Email: principalcoe@snjb.org



Curriculum and Evaluation Scheme for Second Year B. Tech. in Artificial Intelligence & Data Science Department Engineering with Multidisciplinary Minor and Honor

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DEMIC COUCIL SNJB's LSKBJ COLLEGE OF ENGINEERING Chandwad Dist Nashik

(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

Curriculum and Evaluation Scheme for Second Year B. Tech. in Artificial Intelligence & Data Science Department Engineering with Multidisciplinary Minor

To be implemented for 2024-28 Batch

(With Effect from Academic Year 2025-26)

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Vision of the Institute

Transform young aspirant learners towards creativity and professionalism for societal growth through quality technical education.

Mission of the Institute

- 1. To transfer the suitable technology, particularly for rural development.
- 2. To enhance diverse career opportunities among students for building a nation.
- 3. To acquire the environment of learning to bridge the gap between industry and academics.
- 4. To share values, ideas, and beliefs by encouraging faculties and students for the welfare of society.

The vision of the Artificial Intelligence & Data Science Department

To nurture and excel in the domain of Artificial Intelligence and Data Science by providing exposure to develop intellectual professionals and ethical values to serve the greater cause of society.

Mission of the Artificial Intelligence & Data Science Department

- 1. To foster students with the latest technologies and thrust areas in the field of AI & DS.
- 2. To inculcate values that will assist in developing professionals with social and ethical responsibilities.
- 3. To collaborate with industry, academic, and research organizations to create competent IT professionals.

Program Outcomes (POs) for an engineering graduate:

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

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Program Specific Outcomes

- 1. **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.
- 2. **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.
- 3. **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.



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GENERAL COURSE STRUCTURE

A. Definition of Credit:

Table 1: Credit Definition

1 Hour Lecture (L) per week	1 Credit
1 Hour Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

B. Range of Credits: (B.Tech. or Equivalent) in Tech. with Multidisciplinary Minor:

In the light of the fact that a typical NEP Compliant Model Four-year Undergraduate degree program in Technology has about 176 credits, the total number of credits proposed for the four-year B.Tech. in **Artificial Intelligence & Data Science Department Engineering** with Multidisciplinary minor degree is kept as **172**.

Credits As PER NEP Proposed Credits Course Category Guidelines **Basic Science Course** 14-18 15 BSC/ESC 14 **Engineering Science Course** 16-12 47 44-56 Programme Core Course (PCC) Program Courses 20 20 Programme Elective Course (PEC) 14 Multidisciplinary Minor (MD M) 17 Multidisciplinary Courses Open Elective (OE) Other than a particular 8 8 program Vocational and Skill Enhancement Course 8 8 **Skill Courses** (VSEC) 4 Ability Enhancement Course (AEC) 6 Entrepreneurship/Economics/ Management 2 4 Humanities Social Science and Courses Management (HSSM) Indian Knowledge System (IKS) 2 2 4 5 Value Education Course (VEC) 4 4 Research Methodology(RM) Community Engagement Project (CEP)/ Field 2 2 Project (FP) Experiential Learning Courses 4 5 Project 12 12 Internship/ OJT Co-curricular Courses (CC) 4 3 Liberal Learning Courses **Total Credits** 160-176 172

Table 2: Range of Credits

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C. Semester wise Credit Distribution Structure for Four Year B. Tech in Artificial Intelligence & Data Science Department Engineering with Multidisciplinary Minor:

Semester		I	II	III	IV	۷	VI	VII	VIII	Total Credits
Basic Science Course		8	7	-	-	-	-	-	-	15
Engineering Science Course	B2C/E2C	7	7	-	-	-	-	-	-	14
Programme Core Course (PCC)		-	3	11	8	9	4	9	3	47
Programme Elective Course (PEC)	Program Courses	-	-	-	-	6	5	6	3	20
Multidisciplinary Minor (MD M)	Multidisciplinary	-	-	3	3	3	2	3	3	17
Open Elective (OE) Other than a particular program	Courses	-	-	-	3	2	3	-	-	8
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	2	2	-	2	-	2	-	-	8
Ability Enhancement Course (AEC)		1	-	1	2	2	-	-	-	6
Entrepreneurship/Economics/ Management Courses	Humanities Social Science and	-	-	2	2	-	-	-	-	4
Indian Knowledge System (IKS)	Management (HSSM)	2	-	-	-	-	-	-	-	2
Value Education Course (VEC)		-	-	3	2	-	-	-	-	5
Research Methodology		-	-	-	-	-	4	-	-	4
Community Engagement Project (CEP)/ Field Project (FP)	Experiential Learning Courses	-	-	2	-	-	-	-	-	2
Project		-	-	-	-	-	2	3	-	5
Internship / OJT		-	-	-	-	-	-	-	12	12
Co-curricular Courses (CC)	Liberal Learning Courses	1	2	-	-	-	-	-	-	3
Total Credits (Major)			21	22	22	22	22	21	21	172

Table3: Semester-wise Credit Distribution Structure

Students can opt for any of the following as per the rules and regulations given by the institute:

- **1.** B. Tech with Multidisciplinary Minor = Total 172 Credits
- 2. B. Tech with Multidisciplinary Minor and Honor = Total 190 Credits

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HONORS

- In addition to 172 credits of B. Tech Programmes (Bachelor of Technology) i.e. Major in which the student has taken admission, a student may opt for Honors in the same Tech. discipline/branch / Emerging Areas.
- A student is required to earn an additional 18 credits in the same Tech. discipline/ branch / Emerging Areas for Honors distributed over semesters III to VIII.
- The total number of credits required to complete the Honors in the same Tech. discipline/ Emerging Areas is 18 credits, in addition to 172 credits in Major.
- Students will have to compulsorily choose Honors from the same Tech. discipline/branch.
- Honors Degree in the Bachelor of Engineering programme shall be awarded to students earning additional total credits of all six semesters from the second year to final year, i.e., 18 Credits, in addition to 172 credits or 130 credits respectively. The student admitted in the first year must earn 172 credits and 130 credits admitted in lateral entry (admitted after Diploma or B.Sc.) in the second year.
- Minor Courses can be completed through an online platform.

The student has to choose One Honor out of the Two Honor groups provided below

Honors offered by Artificial Intelligence & Data Science Department Engineering Engineering are as follows:

Table 4: Honors				
Sr No	Name of Honors Offered by Department			
A.	Cutting edge Game Development and Integrative system .			
B.	Innovative cybersecurity and forensic Technology.			

The detailed syllabus structure for the same is as follows:

Table 5A: Specialization Honors in Artificial Intelligence & Data Science Engineering

						1	Teaching	g Scheme			
Sr No	Category	SEM	Course Code Course Name		Course Code	Course Name			Hours		
51.110	category	JEN			L	т	Ρ	Total Hours	Credits		
01	HOC		24-HOC-AD-2-01A	Human Computer Interaction	3	-	-	3	3		
02	HOC	IV	24-HOC-AD-2-02A	Computer Vision	3	-	-	3	3		
03	HOC	V	24-HOC-AD-3-03A	AI for Gaming	3	-	-	3	3		
04	HOC	VI	24-HOC-AD-3-04A	Virtual and Augmented Reality	3	-	-	3	3		
05	НОС	VII	24-HOC-AD-4-05A	Game Design and Development using Unity	3	-	-	3	3		
06	HOC	VIII	24-HOC-AD-4-06A	Game Testing and Debugging	3	-	-	3	3		
			Total		18	-	-	18	18		

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Table 5B: Specialization Honors in Artificial Intelligence & Data Science Engineering

						Ţ	eachin	ig Scheme			
Sr.	Category	SEM	Course Code	Course Code Course Name				Hours			
					L	Т	Р	Total Hours	Credits		
01	HOC	III	24-HOC-AD-2-01B	Cyber Security	3	-	-	3	3		
02	HOC	IV	24-HOC-AD-2-02B	Digital Forensic	3	-	-	3	3		
03	HOC	۷	24-HOC-AD-3-03B	Cryptocurrency	3	-	-	3	3		
04	HOC	VI	24-HOC-AD-3-04B	Ethical Hacking	3	-	-	3	3		
05	HOC	VII	24-HOC-AD-4-05B	Physical Cyber World	3	-	-	3	3		
06	HOC	VIII	24-HOC-AD-4-06B	IoT Security	3	-	-	3	3		
			Total		18	-	-	18	18		

#Note for NPTEL/SYAYAM: Approved courses and platforms will be enlisted timely by authorities along with rules and regulations



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Honors Syllabus for SEM III and SEM IV

of.

24-HOC-AD-2-01A : Human-Computer Interaction					
Teaching Theory: 2	J Scheme: 3 Hours/Week	Credit: 03	Examination Scheme: CIE: 20 Marks MSE: 20 Marks SEE: 60 Marks		
Prerequi	sites Courses: NA				
Compan	i on Course: Computer Graphics & Animat	ion			
 Course Objectives: To understand the importance of HCI design process in software development. To acquire knowledge about a variety of effective human-computer-interactions. To co-evaluate the technology with respect to adapting changing user requirements in interacting with computers. To acquire knowledge about variety of effective human-computer-interactions 					
After cor	npletion of the course, learners should be	able to			
CONo	No Course Outcomes (CO)			BL	
C01	CO1 Understand the historical evolution of HCI and its impact on modern interactive system design.				
CO2 Analyze the impact of human emotions on user experience and interface design.					
CO3	Evaluate user experience (UX) and appl	y principles to create intuitive and satisfying	interactions.	3	
CO4	Understand the UI layer and its execution interfaces.	on framework to create responsive, scalable, a	and functional	2	
C05	Understand techniques for finding thin	gs on the web to improve search and navigati	on systems.	2	
Unit I Introduction 6 Hours Historical evolution of the field ,What is HCI? Disciplines involved in HCI , Why is HCI study important? The psychology of everyday things , Principles of HCI , User-centered Design , Interaction styles: Command line, Menu Selection, Form fill-in, Direct Manipulation.					
#Exemplar/Case Studies: Designing a User-Friendly Mobile Banking App					
*Mappin	g of Course Outcomes	CO1			
Unit II	Understanding the Human & Interact	ive system design	6 Hours		
Input-ou	tput channels, Human memory, Thinking:	Reasoning and Problem Solving, Human Emo	tions, Individual difference	S,	

of.

Psycholog aesthetics	y and Design ,Concept of usability - defin , Prototyping techniques.	nition and elaboration, HCI and software engi	neering , GUI design and	
#Exempla	r/Case Studies	Designing a Voice-Activated Smart Home System		
*Mapping	of Course Outcomes	C02		
Unit III	Understanding The Interaction & HCI	CI - Design Rules. 6 Hours		
Models of interaction, Ergonomics, Interaction styles, WIMP Interface, Interactivity, Context of interaction, User experience, Paradigms of Interactions, Principles that support usability, Design standards, Design Guidelines, Golden rules and heuristics, Norman's seven principles, Using toolkits, Goals of evaluation, Evaluation Criteria, Evaluation through expert analysis, Evaluation through user participation, Choosing an Evaluation Method				
#Exempla	rr/Case Studies:) Designing an E-Comm	erce Website for Enhanced User Shopping Ex	xperience	
*Mapping of Course Outcomes CO3				
Unit IV	HCI- Design Process		6 Hours	
What is in technique	teraction design?, The software design p s, Wire-Framing, Understanding the UI L	process, User focus, Scenarios, Navigation Des ayer and Its Execution Framework, Model-Vie	ign, Screen Design, Prototyping w-Controller(MVC) Framework.	
#Exempla	r/Case Studies:- MultiKey press Hindi T	Fext Input Method on a Mobile Phone		
*Mapping	of Course Outcomes	C04		
Unit V	Model-based Design and evaluation		6 Hours	
Basic idea law, Mode	, introduction to different types of mode l-based design case studies ,User interfa	ls, GOMS Family of models (KLM and CMN-GO ice management system (UIMS)	DMS) ,Fitts' law and HickHyman's	
#Exempla	rr/Case Studies: GUI design for a mobile	e phone based Matrimonial application.		
*Mapping	of Course Outcomes	C05		
Unit VI	HCI Models And Theories		6 Hours	
Goal and task hierarchy model, Linguistic model, Physical and device models, Cognitive architectures, Hierarchical task analysis (HTA), Uses of task analysis, Diagrammatic dialog design notations, Computer mediated communication, Ubiquitous Computing, Finding things on web Future of HCI				
#Exemplar/Case Studies: Employment Information System for unorganised construction workers on a Mobile Phone.				
*Mapping	of Course Outcomes	C05		
Learning Resources				
Text Books				
T1. Alan	Div (2008) Human Computer Interaction	Pearson Education ISBN 978-81-317-1703-	ς	

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978-1-4822-3390-2.

Reference Books :

R1:Shneiderman; Catherine Plaisant; Maxine Cohen; Steven Jacobs (29 August 2013). Designing the User Interface: Strategies for Effective Human-Computer Interaction. Pearson Education Limited. ISBN 978-1- 292-03701-1. R2: Donald A. Norman (2013). The Design of Everyday Things Basic Books. ISBN 978-0-465-07299-6

R3:Wilbert O.Galitz, The Essential Guide to user Interface Design, Wiley India, ISBN: 9788126502806

Additional Resources: (Books, e-Resources)

- 1. Interaction Design: Beyond Human-Computer Interaction
- 2. The Design of Everyday Things

MOOC Courses links :

- <u>http://hcibib.org/</u>
- . Andriod Design Guidelines <u>https://developer.android.com/guide/practices/ui_guidelines</u>
- MacOS Human Interface Guidelines https://developer.apple.com/library/content/documentation/UserExperience/Conceptual/OSXHIGui deli nes/



24-HOC-AD-2-02A : Computer Vision					
Teaching S Theory: 3	icheme: Hours/Week	Credit: 03	Examination Scheme: CIE: 20 Marks MSE: 20 Marks SEE: 60 Marks		
Prerequisi	tes Courses:				
Companio	n Course:				
 Course Objectives: To review image processing techniques for computer vision. To understand shape and region analysis. To understand three-dimensional image analysis techniques. To understand motion detection techniques. To study some applications of computer vision algorithms. 					
CO.NO	CO.NO Course Outcomes (CO BL				
C01	D1 Describe the fundamental concepts of computer vision and digital image processing, including image formation, sensing, and quantization.			2	
CO2	Explain feature detection and object pattern analysis.	recognition techniques such as SIFT, SURF, H	OG, and boundary	2	
CO3	Demonstrate image segmentation an detection, and feature tracking.	d shape modeling techniques, including activ	ve contours, edge	3	
CO4	CO4 Apply geometric transformations and Hough Transform for object detection, including line, circle, and 3 ellipse detection.				
CO5	05 Implement basic 3D vision techniques, including shape from shading, structured lighting, and optical 3 flow.				
C06	CO6 Use machine learning-based methods for object tracking, occlusion handling, and real-world applications 3 such as pedestrian detection.				
Course Contents					
Unit I	Fundamentals of Digital Image Proces	ssing	7 Hours		
Introductio	Introduction to Computer Vision,Fundamentals of Image Formation,Image Formation Concepts,Digital Image Processing: Origin,				

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Applicatio	ons, and Examples,Image Sensing & Acqu	iisition, Sampling & Quantization,Basic Relati	onships Between Pixels.	
#Exempla employed	ar/Case Studies: In autonomous driving I for real-time obstacle detection, ensurir	, computer vision techniques such as edge de ng safe navigation in complex environments.	tection and corner detection are	
*Mapping	of Course Outcomes	C01		
Unit II	SHAPES And REGIONS		8 Hours	
Interest or Corner Point Detectors (SIFT, SURF, HOG), Saliency & Binary Shape Analysis, Connectedness, Object Labeling & Counting, Distance Functions, Skeletons, Thinning, Shape Recognition & Boundary Pattern Analysis.				
#Exemplar/Case Studies		Binary shape analysis and segmentation techniques, like active contours and centroidal profiles, improve tumor detection and treatment planning in CT scans.		
*Mapping	of Course Outcomes	CO2		
Unit III	FEATURE DETECTION AND MATCHING			
Object Se Edge Link	gmentation & Shape Models,Active Con sing,Applications: Performance-Driven An	tours & Shape Models,Feature Matching & Fe imation, Edge Editing.	eature Tracking,Edge Detection &	
#Exempla object rec	ar/Case Studies :Feature detection and e cognition and rectangle detection.	dge enhancement techniques are used in aug	mented reality for real-time	
*Mapping	of Course Outcomes	C03		
Unit IV	HOUGH TRANSFORM			
Radiomet Detection	ry & Geometric Transformations,Geometric Transformations,Geometric (Hough Transform, RANSAC),Case Study:	etric Camera Models,Vanishing Points & Re Human Iris Location, Graph-Based Object De	ctangle Detection,Line & Ellipse tection.	
#Exempla and ellips	ar/Case Studies: The Generalized Hough se detection.	Transform (GHT) is used in biometric systems	for precise human iris location	
*Mapping	of Course Outcomes	C04		
Unit V	3D VISION AND MOTION		8 Hours	
Methods for 3D Vision, Projection Schemes, Shape from X: Shading, Texture, Focus, Structured Lighting 3D Reconstruction & Active Range Finding, Optical Flow & Motion Estimation, Structure from Motion.				
#Exemplar/Case Studies: 3D reconstruction and structure-from-motion techniques, including triangulation and bundle adjustment, are used in autonomous vehicles for environment mapping.				
*Mapping of Course Outcomes CO5				
Unit VI	COMPUTER VISION APPLICATIONS		7 Hours	
Basics of Statistical Decision Theory, Clustering & Dimension Reduction (LDA, Regression), Particle Filters, Chamfer Matching, Object Tracking, Multi-camera Systems & Occlusion Handling, Applications: License Plate Recognition, Roadway & Pedestrian				

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Detection, Human Gait Analysis.						
#Exemplar/Case Studies: In surveillance, face detection, tracking, and license plate recognition are used for security, while vehicle vision systems enhance autonomous driving.						
*Mapping of Course Outcomes	C05					
	Learning Resources					
Text Books						
T1. Simon J. D. Prince, "Computer Vision: Models, L T2. Rafael C. Gonzalez, Richard E. Woods, "Digital I	T1. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012. T2. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", 3rdEdition, Pearson, ISBN: 978-81- 317-2695-2					
Reference Books :						
R1 .R. Davies, "Computer & Machine Vision", Fourth R2. R. Szeliski, "Computer Vision: Algorithms and A R3 .D. L. Baggio et al., "Mastering OpenCV with Pra	R1 .R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012. R2. R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 2011. R3 .D. L. Baggio et al., "Mastering OpenCV with Practical Computer Vision Projects", Packt Publishing, 2012.					
Additional Resources: (Books, e-Resources) 1. http://kercd.free.fr/linksKCD.html 2. http://www.cs.ubc.ca/spider/lowe/vision.html 3. http://www.visionscience.com/ 4. https://www.fritz.ai/object-detection/						

https://archive.nptel.ac.in/courses/106/105/106105216/

		24-HOC-AD-2-01B Cyber Security						
Teaching S Theory: 3 I	cheme: lours/Week	Credit: 03	Examination Scheme: CIE : 20 Marks MSE : 20 Marks SEE : 60 Marks					
Prerequisi	Prerequisites Courses: NA							
Companio	Course: Fundamentals of Co	mputer Network (24-DMC-AD-2-01)						
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: After completion of the course, learners should be able to CO BL C01 Understand Cyber Security Fundamentals and Risk Management. 2 C02 Analyze and Defend Against Advanced Persistent Threats (APT) and Cyber Attacks. 4 C03 Implement Network Security Measures and Firewall Configurations. 3 C04 Conduct Security Assessments and Penetration Testing. 3								
C06	Understand Cyber Laws, Soo	cial Engineering, and Cybercrime Prevention		2				
		Course Contents						
Unit I	Cybersecurity Fundamentals		6 Hr					
Cyber Secur #Exemplar/	ity Essentials Attack Vectors, T Case Studies: Data Breach at	Threat, Risk, and Vulnerability Information Security B Equifax (2017)	l asics to Policy Cyber Securit	y Framework				
*Mapping o	f Course Outcomes	C01						
Unit II	Advanced Threats and Defen	ise Mechanisms	6 Hr					
Advanced Persistent Threat (APT) and Cyber Kill Chain, Firewall and Packet Filters, Introduction to Windows and Linux Firewall , Intrusion Detection System (IDS).								
#Exemplar/	Case Studies: The Stuxnet Wo	orm Attack on Iran's Nuclear Program (2010)						
*Mapping o	f Course Outcomes	CO2						
Unit III Network and Web Security			6 Hr					

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Attacks on Wireless Se	Wireless Networks ,Scanning curity .	for Web Vulnerabilities Tools and HTTP Utilities ,A	pplication Inspection Tools ,IT Assets and
#Exemplar,	/Case Studies: The Marriott Ir	nternational Data Breach (2018)	
Mapping of	Course Outcomes	CO3	I
Unit IV	Cyber Attacks and Ethical Ha	acking	6 Hr
Password C	racking and Brute-Force Tools	, Web Attacks , Cyber Security Assurance Framework	, Desktop Security and Malware.
#Exemplar,	/Case Studies: Brute-Force At	tack on Twitter Accounts (2020)	
Mapping of	Course Outcomes	C03,C04	
Unit V	Specialized Cybersecurity To	ppics	6 Hr
E-Commerc	e and Web-Application Securi	ty, Social Engineering, Internet Crime and Act, Intelle	ectual Property in the Cyber World
#Exemplar,	/Case Studies: The WannaCry	Ransomware Attack (2017)	
Mapping of	Course Outcomes	C05	
Unit VI	Practical Implementation ar	nd Case Studies	6 Hr
Hands-on Countermea	Lab: Configuring Firewalls asures.	and IDS ,Case Studies on Cyber Attacks and D	L Defense Strategies, Ethical Hacking and
#Exemplar	/Case Studies: Ethical Hackin	g Investigation – Penetration Testing on E-Commerc	e Platform
*Mapping o	f Course Outcomes	C06	
Learning Ro	esources		
Text Books			
T1. Cyber S T2:Cyber Se	ecurity"Goyal Pravin". curity:Understanding cyber ci	imes computer forensics and legal perspective."Gond	dbole Nina"
Reference I	Books :		
R1.Cyber Se R2.The Cyb	curity Essentials" – by Charle er Kill Chain" – by Andrew Wł	s J. Brooks, Christopher Grow, Philip Craig, and Dona nitaker	Id Short
Additional https://ww https://ww	Resources: (Books, e-Resourc w.coursera.org/browse/com w.edx.org/learn/cybersecuri	tes) buter-science/cybersecurity ty	
MOOC Cour <u>ht</u>	ses links : tps://onlinecourses.swayam2	ac.in/nou25_ge21/preview_	

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24-HOC-AD-2-02B: Digital Forensic				
Teaching S Theory: 3 F	feaching Scheme: Credit: 03 Examination Scheme: heory: 3 Hours/Week CIE : 20 Marks MSE : 20 Marks SEE : 60 Marks SEE : 60 Marks			
Prerequisi	tes Courses: NA			
Companio	ı Course: NA			
Course Obj D la G R Ir C Course Out After comp	ectives: lefine and explain the core cor dentify different file system str ain hands-on experience usin econstruct network events an nplement and evaluate differe ulminating in the creation of a tcomes: letion of the course, learners	acepts of digital forensics. Fuctures and operating system artifacts. In forensic software and hardware tools for data acque I trace cyber incidents. Funt password cracking methods I professional forensic report and presentation.	isition	
CO. No		СО		BL
C01	Apply the fundamental principles and methodologies of digital forensics. 3			3
CO2	Apply and Analyze digital forensics techniques to investigate various operating systems and file 3 systems.			3
C03	Utilize industry-standard tools to perform practical digital forensic investigations. 2			2
C04	Analyze network forensic	investigations and network traffic.		3
C05	Apply various password cracking techniques, analyze file and network data, and conduct web 3 vulnerability assessments.			3
C06	Demonstrate practical ap	plication of various forensic tools.		3
Course Contents				
Unit I	Introduction to Digital Foren	sic and investigation Process	o nours	
Definition c Forensics I Investigatio	of Computer Forensics, Cyber nvestigator, Forensics Read n Process-Assessment Phase, A Case Studies: The Insider Thr	Crime, Evolution of Computer Forensics, Objecti ness,Steps for Forensics, Digital Forensics Inve Acquire the Data Analyze the Data, Report the Invest eat (Data Exfiltration)	ves of Computer Forensic estigation Process, Digital igation	s, Roles of Forensics
*Mansing	*Mapping of Course Outcomes CO1			
Unit II	Digital Evidence and File Sys	tem	6 Hours	

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Digital Evic Investigatio Sequence, F	dence, Digital Evidence Inve n,Techniques in digital forens ile System, Type of File Systen	stigation Process,First Responders Toolkit,Issues ics,The Booting Process,LINUX Boot Process, Mac O ns	Facing Computer Forensics, Types of S Boot Sequence, Windows 10 Booting	
#Exemplar/	#Exemplar/Case Studies: The Tampered Log Files (System Intrusion)			
*Mapping o	f Course Outcomes	CO 2		
Unit III	Windows Forensics and Parti	tions	7 Hours	
Introduction to Windows Forensics, Windows Forensics Volatile Information, Windows Forensics Non- Volatile Information, Recovering deleted files and partitions, Windows Forensics Summary, Digital Forensics Road map: Static Data Acquisition from windows using FTK Imager, Live Data Acquisition using FTK Imager, FTK Imager, Installation of KALI Linux, RAM Dump Analysis using Volatility, Static Data Acquisition from Linux OS,Digital Forensics Tools,Overview of EnCase Forensics, Deep Information Gathering Tool: Dmitry Page, Computer Forensics Live Practical by using Autopsy and FTK Imager				
#Exemplar/	Case Studies: The Ransomwa	re Attack (Data Recovery)		
*Mapping o	f Course Outcomes	C 03		
Unit IV	Network Forensics , Logs and	l Event Analysis	7 Hours	
Forensics, Wireshark Packet Analyzer, Packet Capture using TCP DUMP, Website Penetration: WHOIS, nslookup, Forensic Analysis using AUTOPSY: Linux and Windows, Forensics and Log analysis, Compare and AUDIT Evidences using Hashdeep Page, Data Carving using Bulk Extractor: Kali Linux and Windows, Recovering Evidence from Forensic Images using Foremost #Exemplar/Case Studies: The Denial-of-Service Attack (Network Intrusion) *Manning of Course Outcomes				
Unit V	Application Password Cracki	ng, Wireless and Web Attacks	7 Hours	
Introduction to Password Cracking, Password Cracking using John the Ripper, Password Cracking using Rainbow Tables, PDF File Analysis, Remote Imaging using E3 Digital Forensics, WiFi Packet Capture and Password Cracking using Aircrack ng, Introduction to Web Attacks, , Website Copier: HTTRACK, SQL Injection, Site Report Generation: Netcraft, Vulnerability Analysis: Nikto, Wayback Machine, Deep Information Gathering Tool: Dmitry, Image Metadata Extraction using Imago #Exemplar/Case Studies: The Web Application Breach (SQL Injection)				
*Mapping o	f Course Outcomes	CO5		
Unit VI	Forensics Investigation		6 Hours	
Email Forensics Investigations, Email Forensics Investigations, Mobile Forensics, Preparation for Digital Forensic investigation, Introduction to Report Writing, Forensic Reports & Expert Witness, Demonstration of Some Forensics Tools #Exemplar/Case Studies: The Mobile Device Investigation (Email & Mobile)				
*Mapping o	f Course Outcomes	CO6		
Learning Resources				
Text Books	Text Books			

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SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad (Autonomous Institute)

T1. Digital Evidence Computer Crime - Forensic Science Computers and the Internet
by Casey Eoghan Academic Press; 2014, ISBN:10959
T2. Digital Forensic by Jain Nilakshi, New Delhi Wiley India; 2019 ISBN:12935
Reference Books :
R1. Keith J. Jones, Richard Bejtiich, Curtis W. Rose, "Real Digital Forensics", Addison-
Wesley Pearson Education
R2. Tony Sammes and Brian Jenkinson, "Forensic Compiling", A Tractitioneris Guide, Springer
International edition.
R3. Christopher L.T. Brown, "Computer Evidence Collection & Presentation", Firewall Media.
Additional Resources: (Books, e-Resources)
1. <u>https://www.pdfdrive.com/computer-forensics-investigating-network-intrusions-and-cyber-crime-e15858265.html</u>
2. https://dokumen.pub/handbook-of-computer-crime-investigation-forensic-tools-and-technology-1stnbsped-0121631036
<u>9780121631031.html</u>
3. <u>https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-858-computer-systems-security-fall-2014/</u>
MOOC Courses links :
<u>https://onlinecourses.swayam2.ac.in/nou25_cs05/preview</u>

Mid Semester Examination (MSE: March 2025)

Programme: AIDS	
Class	Pattern:
Course Name:	Course Code:
AY:	Semester:
Time:	Maximum Marks: 20
Instructions to the candidates:	
1. Solve Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6	

- 2. Bold-faced figures to the right indicate full marks.
- З.
- Assume the suitable data if necessary Any other instruction required for particular course may be added by subject/course chairman 4.

QN	Question	Mark
1a)	Q 1 can be bifurcated to maximum two sub questions	07
1b)		
	OR	
2	Q 2 can be bifurcated to maximum two sub questions	07
3	Q 3 can be bifurcated to maximum two sub questions	07
	OR	
4	Q 4 can be bifurcated to maximum two sub questions	07
5	Q 5 can be bifurcated to maximum two sub questions	06
	OR	
6	Q 6 can be bifurcated to maximum two sub questions	06

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Shree Neminath Jain Brahmacharyashram's Late Sau. Kantabai Bhavarlalji Jain College of Engineering

Neminagar, Chandwad -423 101 Dist. Nashik.

An Autonomous Institute, Affiliated to Savitribai Phule Pune University, Pune

	Semester End Examination (Regular) < <month year="">></month>				
Programme: Class:					
Cours	se and Code:		Semester		
Acade	emic Year:		Pattern:		
Time	: 2Hr 30 Min	Examination: SEE (Month Year)	Max. Marks	s: 60	
Instru	ctions to the candida	tes:			
1.	Solve Q.1 OR Q.2,	Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8			
2.	Bold-faced figures	to the right indicate full marks.			
3.	Assume the suitable	e data if necessary, but Justify it.			
4.	Draw the neat labe	lled diagrams, wherever necessary.			
QN		Question		Marks	
1 a)	Unit I			6	
1 b)	Unit II			7	
1 c)	Unit III			7	
	•	OR			
2 a)	Unit I			6	
2 b)	Unit II			7	
2 c)	Unit III			7	
3 a)	Unit IV			7	
3 b)	Unit IV			7	
		OR			
4 a)	Unit IV			7	
4 b)	Unit IV			7	
5 a)	Unit V			7	
5 b)	Unit V			6	
OR					
6 a)	Unit V			7	
6 b)	Unit V			6	
7 a)	Unit VI			7	
7 b)	Unit VI			6	
OR					
8 a)	Unit VI			7	
8 b)	Unit VI			6	

Supporting Document

Sr.N o.	Syllabus Contains	Short Answer	Yes / No	Page No. (In Syllabus)
1	अभ्यासक्रम	Enclosed in Syllabus	Yes	1
2	पात्रता	(As per the Rules and Regulations mentioned in MoM)	Yes	22
3	अभ्यासक्रमाची उद्दिष्टे	Enclosed in Syllabus	Yes	2
4	विषयाचे नाव	Enclosed in Syllabus	Yes	05
5	घटकांचा तपशील	Enclosed in Syllabus	Yes	05
6	तासिका	Enclosed in Syllabus	Yes	05
7	श्रेयांक पद्धत	Enclosed in Syllabus	Yes	05
8	संदर्भ साहित्य	Enclosed in Syllabus	Yes	09
9	संदर्भ ग्रंथ	Enclosed in Syllabus	Yes	11
10	प्रश्नपत्रिकेचे स्वरूप	Enclosed in Syllabus	Yes	20
11	अंतर्गत मूल्यमापनाचे स्वरूप	Enclosed in Syllabus	Yes	05
12	सत्र परीक्षेचे स्वरूप	Enclosed in Syllabus	Yes	20
13	गुणांकन	Enclosed in Syllabus	Yes	05