Walchand College of Engineering, Sangli								
AY 2021-22								
			Cour	rse Information				
Progr	Programme M. Tech. (Computer Science and Engineering)							
Class,	Semes	ster	First Year M. Tec	h., Sem I				
Cours	e Cod	e	5CO560					
Cours	e Nam	e	Research Method	ology				
Desire	ed Reg	uisites:						
			<u> </u>					
Т	eachin	g Scheme		Examination Sche	eme (Marks)			
Lectu	re	-	LA1	LA2	ESE	Total		
Tutor	ial	-	30	30	40	100		
Practi	ical	-		Nil				
Intera	ction	2 Hrs/week		Credits:	2			
		1	1					
			Cou	rse Objectives				
1	To de resea	evelop a researc rch methods.	h orientation among	g the students and to acq	uaint them with fundame	entals of		
2	To de	evelop understar	nding of the basic fi	ramework of research pr	ocess and techniques			
3	3 To identify various sources of information for literature review and data collection.							
4 To develop an understanding of the ethical dimensions of conducting applied research.								
5	5 To develop understanding about patent process.							
At the	and of	Cou	students will be abl	D) with Bloom's Taxon	omy Level			
CO1	Clas	sify various met	hods to solve resear	rch problem		Apply		
CO2	Cons	struct a research	problem in respec	tive engineering domain	l.	Apply		
CO3	Inve	stigate various o	lata analysis techni	ques for a research prob	lem.	Analyze		
CO4	Iden	tify various Inte	llectual Property R	ights procedures		Apply		
Modu	ıle		Mo	dule Contents		Hours		
I	R V re	Research Funda What is research eview , Formula	mentals , types of research, tion of a research p	, the process of research roblem.	n, Literature survey and	4		
п	R R aı aı	Research Metho esearch design- nd scaling techr nd analysis of da	ds Meaning, Need and hiques, Data Collec ata, Design of Expe	Types , Research Desig tion – concept, types a riment	n Process, Measurement nd methods, Processing	5		
III	IIIAnalysis Techniques Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses.5							
IV	R V W L	Research Comm Vriting a confer vriting. Presenta atex etc. Types	unication rence paper, Journ tion techniques, so of journal/conferen	al Paper, Technical re ftware used for report v ce papers	port, dissertation/thesis writing such as WORD,	4		

	Intellectual Property Rights					
v	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting,	_				
	development. International Scenario: International cooperation on Intellectual	5				
	Property. Procedure for grants of patents, Patenting under PCT.					
	Patents and Patenting Procedures					
	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent					
VI	information and databases. Geographical Indications. New Developments in IPR:					
	Administration of Patent System. New developments in IPR; IPR of Biological	4				
	Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and ITS					
	Text Books					
1	C. R. Kothari, Research Methodology, New Age international					
2	2 Deepak Chopra and Neena Sondhi, Research Methodology : Concepts and cases, Vikas					
<u></u>	Publishing House, New Delhi					
	References					
1	E. Philip and Derek Pugh, How to get a Ph. D. – a handbook for students and their sup	ervisors,				
1	open university press					
2	Stuart Melville and Wayne Goddard, Research Methodology: An Introduction for Scie	ence &				
	Engineering Students					
	Useful Links					
1	Formulate a Research <u>Video</u>					
2	Publication Ethics Video					
3	Introduction to Copyright Video					
4	Roadmap for Patent Creation NPTEL Course: Link					

CO-PO Mapping															
	Programme Outcomes (PO)								PSO						
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		1												
CO2					2	2									
CO3				2											
CO4		2													
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High															
Each CO	Each CO of the course must map to at least one PO.														
Assessment															
There are IMP: Lab	three of ESE i	compoi s a sepa	nents o arate he	f lab a ead of	ssessm	ent, LA g. LA1	A1, LA , LA2 ⁻	2 and I togethe	Lab ES er is tre	E. ated as	s In-Sei	nester	Evalua	ation.	
Assessme	e	Base	ed on		Condu	cted by	y 7	Typical	Schee	lule (fo	or 26-v	veek S	em)	Ma	rks
nt															
ΤΔ1		Lab ac	tivities	,	Lab C	Course	Du	ring W	eek 1 t	o Weel	k 6			3	0
	att	tendanc	e, jour	nal	Fac	ulty	Ma	ırks Su	bmissi	on at tl	ne end	of Wee	k 6	5	0
ΙΔ2		Lab ac	tivities	,	Lab C	Course	Du	ring W	eek 7 t	o Wee	k 12			3	0
	att	tendanc	e, jour	Sournal Faculty Marks Submission at the end of Week 12							<u> </u>				
I ah ESE		Lab ac	tivities	,	Lab C	Course	Du	ring W	ring Week 15 to Week 18					40	
	att	tendanc	e, jour	nal	Fac	ulty	Ma	irks Su	bmissi	on at tl	ne end	of Wee	k 18	- T	v

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)									
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total					
Remember									
Understand									
Apply	15			15					
Analyze	15	10		25					
Evaluate		10	20	30					
Create		10	20	30					
Total Marks	30	30	40	100					

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)							
AY 2021-22								
			Cou	rse Information				
Progra	Programme M. Tech. (Computer Science and Engineering)							
Class,	Semes	ter	First Year M. Te	ch., Sem I				
Cours	e Code		5CO501	,				
Cours	e Name	2	Mathematical Fo	oundations of Compute	ter Science			
Desire	d Rear	usites:	Discrete Mathem	natics				
			21001000 1.100101					
Т	eaching	Scheme		Examination S	cheme (Marks)			
Lectu	re	3 Hrs/week	T1	T2	ESE	Total		
Tutori	ial	-	20	20	60	100		
Practi	cal	-				100		
Intera	ction			Cred	lits• 3			
Intera	ction				11.5. 5			
			Co	urse Objectives				
1	To int	roduce the mat	hematical fundame	entals for computer so	cience and engineering	σ		
2	To str	dy various sar	nling and classific	pation problems	clence and engineering	5.		
2	10 stt	luy various sair	ipning and classific	auon problems.				
		Соц	rsa Autoomas (Cl)) with Bloom's Tax	vonomy Laval			
At the	end of	the course the	students will be ab	ole to				
CO1	CO1explain the basic notions of discrete and continuous probability.Apply					Apply		
CO2 analyze the methods of statistical inference, and the role that sampling Analyze distributions play in those methods					Analyze			
	perfor	m correct and i	meaningful statisti	cal analysis of simple	to moderate	Create		
CO3	compl	exity	neuningrui stutisti	cui unurysis or simple		Create		
	comp	entry.						
						1		
Modu	le		Modu	ile Contents		Hours		
	Pr	obability mass.	density, and cumu	lative distribution fu	nctions. Parametric			
I	fai	nilies of distrib	outions. Expected y	value, variance, condi	tional expectation.	6		
-	A	plications of th	ne univariate and n	nultivariate Central L	imit Theorem			
	Ra	ndom samples.	sampling distribu	tions of estimators. N	Iethods of Moments			
II	an	d Maximum Li	kelihood			7		
	Li	near algebra an	d statistics: vector	s. vector multiplication	on, equation of			
Ш	lin	e/plane/hyperp	lane, stats: gaussic	on distribution. log no	ormal distribution.	7		
	po	wer law distrib	ution, variance, co	o-variance	,			
	Sta	atistical inferen	ce. Introduction to	multivariate statistic	al models:			
IV	res	pression and cla	assification problem	ms, principal compon	ents analysis. The	7		
	nroblem of overfitting model assessment							
	G	aph Theory: Is	omorphism. Plana	r graphs, graph colori	ng, Hamiltonian			
	cir	cuits and Euler	cvcles. Permutation	ons and Combination	s with and without			
	rei	petition. Specia	lized techniques to	o solve combinatorial	enumeration	7		
	br	oblems						
		mputer science	e and engineering a	applications: Data mi	ning. Network			
	n	otocols, analysi	s of Web traffic	Computer security So	ftware engineering			
VI		mputer archite	cture. Operating sy	vstems. Distributed sy	vstems.	6		
	Bi	oinformatics N	Iachine learning	,,	, ~ ,			
Diomormatics, Machine learning.								

	Text Books									
1	Trivedi K., Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley.									
2										
3										
	References									
1	John Vince, Foundation Mathematics for Computer Science, Springer.									
2	Mitzenmacher M. and Upfal E., Probability and Computing: Randomized Algorithms and									
2	Probabilistic Analysis, Cambridge University Press.									
3	Tucker Alan, Applied Combinatorics, Wiley									
	Useful Links									
1										
2										
3										
4										

CO-PO Mapping										
	Programme Outcomes (PO)									
	1	2	3	4	5	6				
CO1			3							
CO2	1			2						
CO3	CO3 2 3 2 1									
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High										
Each CO	of the course mu	ist map to at leas	t one PO.							

Assessment

Assessment Plan based on Bloom's Taxonomy Level (Marks)									
Bloom's Taxonomy Level T1 T2 ESE Total									
1	Remember								
2	Understand								
3	Apply	10	10	15	35				
4	Analyze	10	10	15					
5	Evaluate				35				
6	Create			30	30				
	Total 20 20 60 100								

		Wa	alchand Colle	ege of Enginee	ring, Sangli		
			Government	AY 2021-22	<i>ынинс)</i>		
			Cou	rse Information			
Progr	amme		M Tech (Comr	uter Science and F	ngineering)		
Class	Somost	or	First Vear M Te	ach Sem I	angineering)		
Class,	Semest		5CO502				
Cours	o Nomo		Advanced Date	Structures			
Docimo	d Dogu	iaitaa.	Auvaliceu Data	Decies			
Desire	ea Kequ	isites:	Data Structures	Dasics			
Т	eaching	Scheme		Examination	Scheme (Marks)		
Lectu	ro	3 Hrs/week	T1	T?	FSF	Total	
Tutor	ic ial	J III S/ WCCK	20	20	60 ESE	100	
Drooti		-	20	20	00	100	
Fracu Interne		-		C			
Intera	iction	-			realts: 5		
			Ca	una Ohiostina			
	T.			urse Objectives		
1	dote et	part knowledge	e of advanced data	structures such as	temporal data structures	s and geometric	
	To mo	luctures.	niliar with advance	ad concepts related	to troop graphs hashin	a and string	
2	matchi	no		eu concepts retateu	i to trees, graphs, hashin	g and sumg	
		ntribute in choo	sing appropriate o	data structures and	using them for solving i	eal world	
3	proble	ms.	sing appropriate (auta structures and	using them for sorving i	cui worra	
4	procee						
	1	Cou	rse Outcomes (C	O) with Bloom's T	Saxonomy Level		
At the	end of t	he course, the	students will be al	ble to,			
CO1	interp	et and summa	rize the purpose a	nd operation of adv	anced data structures	Understand	
CO2	apply	and demonstra	ate knowledge of	advanced data stru	actures for solving real	Apply	
	world	problems.	ompara data stru	sturas and avaluata	the performance of the		
CO3	allarys	e algorithms, c	ires	stules and evaluate	the performance of the	Evaluate	
Modu	ıle		Modu	ule Contents		Hours	
mouu		mnoral and C	ecometric data st	ructuras		nouis	
	Te	mporal data si	tructures - Persist	tent data structures	- Model and definitions		
	Pa	rtial persisten	ice. Full persis	stence. Retroactiv	e data structures –		
Ι	Re	troactivity, Ful	l retroactivity, No	on-oblivious Retroa	ctivity.	8	
	Ge	Geometric data structures - One Dimensional Range Searching. Two-					
	Di	mensional Ran	ge Searching, con	structing a Priority	Search Tree, Searching		
	a P	riority Search	Tree, Priority Ran	ige Trees, Quadtree	es, k-D Trees.		
П	Ad	vanced Trees				6	
Binary Search Trees, AVL trees, Red-black trees, Splay Trees, Tango Trees							
Selected Graph Problems							
	Ve	rtex coloring, o	edge coloring, Ne	twork flows: Max f	flow – Mincut theorem,	6	
	Fo	rd-Fulkerson N	lethod, Push-relat	bel method, Randor	n Graph based analysis.		
		sh Function D	osio Choinina EV	S Darfast Usshina	Linear Drobing Cuckes		
T V	Па	shing Skin Lie	asic Channing, FK	lomizing Data Stru	Linear Frooring, Cuckoo	Q	
		arch and Unde	te Operations on	Skin Liste Probab	ilistic Analysis of Skin	0	
		ats Determinis	tic Skin Liste	5 MP LISIS, F10040	more maryors or okip		
			it ship Libts.				

V	String Matching	6					
	String Operations, Brute-Force Pattern Matching, The Boyer-Moore						
	Algorithm, The Knuth-Morris-Pratt Algorithm, Predecessor Problem, Tries,						
	Trie node structure and its applications, Suffix trees and suffix arrays.						
	Miscellaneous						
VI	Dynamic trees - Link-cut Trees, Operations on link-cut trees, Dynamic	6					
	Connectivity, Euler-Tour Trees, Other Dynamic Graph Problems.	0					
	Text Books						
1	Cormen Thomas H., Leiserson Charles E., Rivest Ronald L., Stein Clifford,	Introduction to					
1	Algorithms PHI, Third Edition, 2009						
Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, Computational Geometry							
2	² Algorithms and Applications, Springer, Third Edition, 2008						
3	3 Erik Demaine, Lecture Notes on MIT Courseware						
	References						
1	O'Rourke Joseph, Computational Geometry in C, Cambridge University Press						
2	Diestel Reinhard, Graph Theory, Springer-Verlag, 2000						
3	Brass Peter, Advanced Data Structures, Cambridge University Press.						
	Useful Links						
1	NPTEL Videos of 'Data Structures and Algorithms' Course: Link						
2	Data Structures with Visualization: Link						
3	Lecture Videos from Erik Demaine from MIT: Link						
4							

CO-PO Mapping										
		Programme Outcomes (PO)								
	1	2	3	4	5	6				
CO1				2						
CO2	2			3	1	2				
CO3	3		1							
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High										
Each CO	of the course mu	ust map to at leas	t one PO.							

Assessment

Assessment Plan based on Bloom's Taxonomy Level (Marks)									
Bloom's Taxonomy Level T1 T2 ESE Total									
1	Remember								
2	Understand	5	5	10	20				
3	Apply	5	5	20	30				
4	Analyze	5	5	20	30				
5	Evaluate	5	5	10	20				
6	Create								
	Total	20	20	60	100				

Walchand College of Engineering, Sangli				
	(Government Aided Autonomous Institute)			
	AY 2021-22			
Course Information				
Programme	M. Tech. (Computer Science & Engineering)			
Class, Semester	First Year M. Tech., Sem I			
Course Code	Course Code 5CO551			
Course Name Mathematical foundations of Computer Science Lab				
Desired Requisites:	Desired Requisites: Discrete Mathematics, Programming			

Teaching Scheme		Examination Scheme (Marks))
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	Credits: 1			

	Course Objectives				
1	To demonstrate fundamentals of Mathematical foundations of Computer Science.				
2	To have hands-on of Probability, Random variables in computer Mathematics.				
3					
4					
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	At the end of the course, the students will be able to				

I ti the	it the chu of the course, the students will be able to,				
CO1	apply the principles in mathematical foundations of computer science to design real time applications.	Apply			
CO2	analyze the complex problems individually or in groups, develop and demonstrate the mathematical and logical basis to modern techniques in Computer Science.	Analyze			

Mini Project Guidelines

Course Contents:

Students are expected to carry out independent research work on the chosen topic in this domain. Initially, student would be able to understand the usage of different data structures, use them and apply its operations for solving real-world problems. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Student would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Implementation Details (with proper screenshots), Complexity of using particular data structure, Conclusion and Future work.

	Text Books
1	Trivedi K., Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley.
2	
3	

	References				
1	John Vince, Foundation Mathematics for Computer Science, Springer.				
2	Mitzenmacher M. and Upfal E., Probability and Computing: Randomized Algorithms and				
	Probabilistic Analysis, Cambridge University Press.				
3	Tucker Alan, Applied Combinatorics, Wiley				
	Useful Links				
1					
2					
3					
4					

CO-PO Mapping							
	Programme Outcomes (PO)						
	1 2 3 4 5 6						
CO1			1		1		
CO2	1	1	2			1	
The strong	The strength of magning is to be written as 1.2.2. Here, 1. Law, 2. Medium, 2. High						

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

Assessment						
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.					
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluat	ion.		
Assessmen	Based on	Conducted by	Typical Schedule	Mark		
t				s		
TA1	Lab activities,	Lab Course	During Week 1 to Week 6	30		
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6			
LA2	Lab activities,	Lab Course	During Week 7 to Week 12	30		
	attendance, journal	Faculty	Marks Submission at the end of Week 12			
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40		
ESE attendance, journal Faculty Marks Submission at the end of Week 18						
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown,						
considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab						
activities/Lab	performance shall inc	clude performing of	experiments, mini-project, presentations, drav	wings,		

programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	LA1	LA2	ESE	Total
Remember				
Understand				
Apply	20	10	30	60
Analyze	10	20	10	40
Evaluate				
Create				
Total	30	30	40	100

Walchand College of Engineering, Sangli			
	(Government Aided Autonomous Institute)		
AY 2021-22			
Course Information			
Programme	M. Tech. (Computer Science & Engineering)		
Class, Semester	First Year M. Tech., Sem I		
Course Code	Course Code 5CO552		
Course Name Advanced Data Structures Lab			
Desired Requisites:	Data Structures Basics, Programming		

Teaching Scheme		Examination Scheme (Marks)			s)
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	Credits: 1			

	Course Objectives				
1	1 To impart knowledge of advanced data structures such as temporal data structures and geometric data structures.				
2	2 To make students familiar with advanced concepts related to trees, graphs, hashing and string matching.				
3	To contribute in choosing appropriate data structures and using them for solving re problems.	al world			
	Course Outcomes (CO) with Bloom's Taxonomy Level				
At the	At the end of the course, the students will be able to,				
C01	apply and demonstrate knowledge of advanced data structures for solving real world problems.	Apply			
CO2	analyse algorithms, compare data structures and evaluate the performance of the advanced data structures	Evaluate			
CO3	Create an application using novel data structures and/ or create our own abstract data type	Create			

Mini Project Guidelines

Course Contents:

Students are expected to carry out independent research work on the chosen topic in this domain. Initially, student would be able to understand the usage of different data structures, use them and apply its operations for solving real-world problems. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Student would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Implementation Details (with proper screenshots), Complexity of using particular data structure, Conclusion and Future work.

	Text Books							
1	Cormen Thomas H., Leiserson Charles E., Rivest Ronald L., Stein Clifford, Introduction to Algorithms PHI, Third Edition, 2009							
2	Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, Computational Geometry -							
	· · · · · · ·							

	Algorithms and Applications, Springer, Third Edition, 2008
3	Erik Demaine, Lecture Notes on MIT Courseware
	References
1	O'Rourke Joseph, Computational Geometry in C, Cambridge University Press
2	Diestel Reinhard, Graph Theory, Springer-Verlag, 2000
3	Brass Peter, Advanced Data Structures, Cambridge University Press.
	Useful Links
1	NPTEL Videos of 'Data Structures and Algorithms' Course: Link
2	Data Structures with Visualization: Link
3	Lecture Videos from Erik Demaine from MIT: Link

	CO-PO Mapping								
		Programme Outcomes (PO)							
	1 2 3 4 5 6								
CO1			2						
CO2	3					2			
CO3		2		2	1				
CO3		2		2	1				

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

Assessment									
There are thre IMP: Lab ES	There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.								
Assessmen	Assessmen Based on Conducted by Typical Schedule Mark								
t				S					
т а 1	Lab activities,	Lab Course	During Week 1 to Week 6	20					
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50					
T A C	Lab activities,	Lab Course	During Week 7 to Week 12	20					
	attendance, journal	Faculty	Marks Submission at the end of Week 12	50					
ECE	Lab activities,	Lab Course	During Week 15 to Week 18	40					
ESE	attendance, journal	Faculty	Marks Submission at the end of Week 18	40					
Week 1 indic	ates starting week of a	semester. The ty	pical schedule of lab assessments is shown.						

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)							
Bloom's Taxonomy Level	LA1	LA2	ESE	Total			
Remember							
Understand							
Apply	20	10	5	35			
Analyze	10	10	10	30			
Evaluate		10	10	20			
Create			15	15			
Total	30	30	40	100			

Walchand College of Engineering, Sangli					
	(Government Aided Autonomous Institute)				
	AY 2021-22				
	Course Information				
Programme	M. Tech. (Computer Science and Engineering)				
Class, Semester	First Year M. Tech., Sem I				
Course Code	5CO553				
Course Name Presentation and Technical Report Writing					
Desired Requisites:					

Teaching	Scheme		Examin	ation Scheme (Marks)			
Lecture	-	LA1	LA2	ESE	Total		
Tutorial	-	30	30	40	100		
Practical	-			·			
Interaction 1 Hr/Week				Credits: 1			

	Course Objectives					
1	To provide an opportunity to students to do work independently on a topic.					
2	To encourage creative thinking process in technical report writing					
3	3 To enable students for good technical report writing and effective presentations.					
	Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	end of the course, students will be able to,					
CO1	demonstrate the characteristics of technical and business writing.	Apply				
CO2	use a variety of materials to produce appropriate visual presentation for documents, such as instructions, descriptions, and research reports.	Evaluate				
CO3	produce documents related to technology and writing in the workplace and will have improved their ability to write clearly, concisely, and accurately.	Create				

Course Content

This course introduces students to the discipline of technical communication. Preparation of visuals to supplement text, workplace communication, descriptions of mechanisms, explanations of processes, and writing reports are the major topics included.

This course is designed for students enrolled in technical degree programs for making them industry ready.

Text Books			
Suitable books based on the contents of the topic.			
References			
Suitable books based on the contents of the selected topic and research papers from reputed			
national and international journals and conferences.			
Useful Links			
As per the need of the topic of report and presentation			

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1		3	1				
CO2		3	1				

CO3		3	1					
The streng	The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							
Each CO	of the course mu	st map to at leas	st one PO.					

Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluat	ion.				
Assessmen	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Mark				
t				s				
τ. Α.1	Lab activities,	Lab Course	During Week 1 to Week 6	30				
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6					
L A 2	Lab activities,	Lab Course	During Week 7 to Week 12	20				
	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
Lob ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40				
Lab ESE	attendance, journal	Faculty	Marks Submission at the end of Week 18	40				
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown,								
considering a	26-week semester. Th	ne actual schedule	shall be as per academic calendar. Lab					

activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							
Understand							
Apply	15	15	15	45			
Analyze							
Evaluate	15	15	15	45			
Create			10	10			
Total Marks	30	30	40	100			

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2021-22								
				(Cour	se Informa	tion		
Progra	amme			M. Tech.	. (Con	nputer Scie	nce and Engine	eering)	
Class,	Semeste	r		First Yea	ar M. '	Tech., Sem	I		
Cours	e Code			5CO554		,			
Cours	e Name			Professio	onal S	kills 1			
Desire	d Reaui	sites:							
	1			I					
r	Teaching	g Scheme				Exan	nination Scher	me (Marks)	
Lectu	re	-		LA1		LA2		ESE	Total
Tutori	ial	-		30		30		40	100
Practi	cal	-			I			-	
Intera	ction	1 Hr/W	/eek				Credits:	1	
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					010000	-	
					Сош	rse Obiecti	ves		
1	To prov	vide a hand	s on a	vnorionco	of sof	tware for m	odel building		
1			.s-011 C	· ·	$\frac{01}{c}$.			· 1 · D /1	1.1 .
Z	To prov	vide a hand	s-on e	xperience	of usi	ng methods	from libraries	in basic Python	libraries.
		C	ourse	Outcomes	s (CO) with Bloo	om's Taxonom	ny Level	
At the	end of th	ne course, s	tudent	s will be a	ble to	,			
	Apply	different m	ethods	of the sof	tware	effectively	·	· · · · · · · · · · · · · · · · · · ·	Apply
002	Develo	p the soluti	on for	computer	scien	ce engineer	ing problems u	ising the softwar	e Create
					Car	unas Canta			
	•	1 1	1	. 1 1	Col	urse Conte	nt 		. 1
I fils C	ourse is	based on	naving	g nands-or	n exp	erience wh	en using Pyth	on programming	g languages for
and so	lve simn	l. III ule III le problem	s using	uay work o		nrovided as	a part of basi	c libraries. The e	able to simulate
the stu	dent can	be enhance	ed by r	providing s	softwa	are training	of this course t	to every student	inployability of
the stu	dent eun	oe ennanes		noviding b	501000	are training		to every student.	
					Г	Fext Books			
1	Sui	table books	based	l on the sof	- ftware	e selected.			
	I								
					ŀ	References			
1	1 Suitable books based on the contents of software selected								
					U	seful Links	5		
1	As	per the nee	d of th	e software	traini	ing			
	CO-PO Mapping								
					Prog	gramme O	utcomes (PO)		
		1		2		3	4	5	6

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

CO1

CO2

3

2

2

1

Assosment									
Assessment									
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.								
IMP: Lab ES	IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.								
Assessmen	Assessmen Based on Conducted by Typical Schedule (for 26-week Sem) Mark								
t				s					
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	30					
	attendance, journal	Faculty	Marks Submission at the end of Week 6	50					
L A 2	Lab activities,	Lab Course	During Week 7 to Week 12	20					
	attendance, journal	Faculty	Marks Submission at the end of Week 12	50					
Lob ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40					
Lab ESE attendance, journal Faculty Marks Submission at the end of Week 18 40									
Week 1 indic	Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown,								
considering a	26-week semester. Th	ne actual schedule	shall be as per academic calendar. Lab						

considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							
Understand							
Apply	20	20	10	50			
Analyze							
Evaluate							
Create	10	10	30	50			
Total Marks	30	30	40	100			

Walchand College of Engineering, Sangli								
	AV 2021-22							
	Course Information							
Progra	Programme M. Tech. (Computer Science and Engineering)							
Class,	Semest	er	First Year M. Tec	ch., Sem I				
Cours	e Code		5CO511	,				
Cours	e Name		Elective 1 - Introd	luction to Artificial Intelligence				
Desire	Desired Requisites: Data Structures, Probability							
T	eaching	Scheme		Examination Scheme (Marks)	•			
Lectur	re	3 Hrs/week	T1	T2 ESE	Total			
Tutor	ial	-	20	20 60	100			
Practi	cal	-						
Intera	ction	-		Credits: 3				
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					
1	<b>m</b> : (	1 .1 .	Cou	rse Objectives				
1	To inti	roduce the vari	ety of concepts in t	he field of artificial intelligence.				
2	To dis	cuss the philos	opny of AI, and no	w to model a new problem as an Al	problem.			
3	To pre	pare student to	o take a variety of to	bcused, advanced courses in various	subfields of AI.			
	<u> </u>	Соц	rse Outcomes (CO	)) with Bloom's Taxonomy Level				
At the	end of t	he course, the	students will be abl	e to,				
CO1	CO1Demonstrate first algorithms to solve each formulation.Apply							
CO2	Exami	ne a variety of model a new	such as search, log	gic, Bayes nets, and MDPs, which ca	an be Analyze			
			<u>proceeding</u>					
					1			
Modu	le		Modu	e Contents	Hours			
I	Int Pro	roduction: Phil bblem, Uninfor	losophy of AI, Defi med Search	nitions, Modelling a Problem as Sea	rch 6			
II	He	uristic Search,	Domain Relaxation	ns, Local Search, Genetic Algorithm	s 7			
III	Ad	versarial Searc	ch, Constraint Satis	faction	7			
IV	Pro	opositional Log	gic & Satisfiability,	Uncertainty in AI, Bayesian Networ	rks 7			
v	Ba Pro	yesian Networ beesses	ks Learning & Infe	rence, Decision Theory, Markov Dec	ision 7			
VI	VI     Reinforcement Learning, Introduction to Deep Learning & Deep RL							
					· · · · · · · · · · · · · · · · · · ·			
			r	Text Books				
1	Stuart Edition	Russell & Pet n (2009)	er Norvig, Artifici	al Intelligence: A Modern Approach	n, Prentice-Hall, Third			
2								
3								
1	Icm C	odEallow V-	abua Danaia e A	Keterences	$P_{rang}(2016)$			
	an Go	ourellow, Yo	snua Bengio & Aar	on Courville, Deep Learning, MIT P	Tess (2010).			

3

Useful Links						
NPTEL Videos of 'Introduction to Artificial Intelligence' Course: Link						

CO-PO Mapping								
	Programme Outcomes (PO)							
	1	2	3	4	5	6		
CO1				2				
CO2	2			3	1	2		
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High								

Each CO of the course must map to at least one PO.

	Assessment Plan based on Bloom's Taxonomy Level (Marks)								
Bl	oom's Taxonomy Level	T1	Т2	ESE	Total				
1	Remember								
2	Understand								
3	Apply	10	10	30	50				
4	Analyze	10	10	30	50				
5	Evaluate								
6	Create								
Total		20	20	60	100				

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
	AY 2021-22								
	Course Information								
Progra	Programme         M. Tech. (Computer Science and Engineering)								
Class,	Semest	er	First Year M. Te	ch., Sem I					
Cours	e Code		5CO512						
Cours	e Name		Elective 1 - Imag	e Processing					
Desire	ed Requ	isites:	Mathematics – L	inear Algebra, Probal	oility Theory				
T	eaching	Scheme		Examination S	cheme (Marks)				
Lectu	re	3 Hrs/week	T1	T2	ESE	Total			
Tutor	ial	-	20	20	60	100			
Practi	cal	-							
Intera	ction	-		Cred	its: 3				
			Cou	irse Objectives					
1	To pro	vide knowledg	ge about fundamen	tals of digital image p	processing.				
2	To illu morph	strate concepts ological operat	s of image transfor tions, color image	ms, image enhanceme processing, compress	ent, image segmentat	on,			
3	To app	bly the image p	rocessing algorith	ms to real world prob	lems.				
4	4								
		Cou	rse Outcomes (CC	)) with Bloom's Tax	onomy Level				
At the	end of t	he course, the	students will be ab	le to,		1			
<b>CO1</b> explain fundamental concepts of digital image processing, mathematical transforms, image enhancement, segmentation, morphology, compression					Understand				
CO2	apply	image process	ing algorithms to	solve real life proble	ms and compare the	Apply,			
	results				Analyze				
CO3	design	and compare of	different image pro	cessing algorithms		Evaluate			
Modu	ما		Modu	le Contents		Hours			
Mouu		rital Image Fu	indamentals	le Contents		Hours			
I	Digital Image Fundamentals         Introduction:       Concept, Fundamental Steps and Components of Image         Processing System         I         Digital Image Fundamentals:         Image System         I				6				
II	III       Images         III       Image Transforms         2D systems and Necessary Mathematical preliminaries, 2D Orthogonal and         Unitary Transforms, 1-D DFT, KL-Transforms, Cosine, Hadamard         Transforms, Introduction to Wavelet transforms					8			
III	Image Enhancement         Frequency domain filtering         6           Spatial domain Filtering, Frequency domain filtering         6								
IV	Im Ed det Tra Seg Ex	age Segmenta ge Detection – ector, Boundar ansform, Act gmentation – traction	tion and Analysis using first and server vy Extraction – Cor tive Contour, region growing,	cond order derivative mectivity, Heuristic C Watershed Transfo region splitting and	s, LoG, Canny edge Graph Search, Hough rm, Region-based d merging, Feature	8			

v	<b>Image Compression</b> Fundamentals, Compression model, Lossless Vs Lossy Compression, Fundamentals of Information Theory, Run-length coding, Huffman coding, Dictionary-based compression, Predictive coding, Transform-based coding, Image Compression Standards	6
VI	VIMorphological Image Processing Introduction, Dilation and Erosion, Opening and Closing, The Hit-or-miss transformation, Basic Morphological Algorithms, Boundary Extraction, Region Filling, Extraction of connected components, Thinning, Thickening	
1		0.02
	Gonzalez R. C., Woods R. E., "Digital Image Processing", PHI, Second Edition. 2	.002
2	Jain A. K., "Fundamentals of Digital Image Processing", PHI	
3		
4		
	References	
1	Sonka Milan, Vaclav Hlavac, Boyle, "Digital Image Processing and Computer V Learning, Third edition, 2013	<i>ision</i> ", Cengage
2	S. Jayaraman, S. Esakkirajan, T. Veerkumar, "Digital Image Processing", Tata Mc edition, 2010	GrawHill, Third
3		
4		
	1	
	Useful Links	
1	NPTEL Videos of 'Digital Image Processing' Course: Link	
2	Digital Image Processing Laboratory (Arizona): Link	
3	Few Videos on DIP. Link	
4		

CO-PO Mapping									
	Programme Outcomes (PO)								
	1	2	3	4	5	6			
CO1	1			3					
CO2	2			1	2				
CO3	CO3 1 3								
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High									
Each CO	Each CO of the course must map to at least one PO.								

#### Assessment

Assessment Plan based on Bloom's Taxonomy Level (Marks)							
Bl	oom's Taxonomy Level	T1	T2	ESE	Total		
1	Remember						
2	Understand	5	5	10	20		

3	Apply	5	5	20	30
4	Analyze	5	5	20	30
5	Evaluate	5	5	10	20
6	Create				
Total		20	20	60	100

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)							
				AY 2021-22	,			
			Cou	rse Information				
Progr	amme		M. Tech. (Comp	uter Science and Er	ngineering)			
Class,	Semes	ter	First Year M. Te	ech., Sem I				
Cours	e Code	•	5CO513					
Cours	e Nam	e	Elective 2 - Data	a Science				
Desire	ed Requ	uisites:	Database Concep	pts				
Т	eachin	g Scheme		Examination	Scheme (Marks)			
Lectu	re	3 Hrs/week	T1	T2	ESE	Total		
Tutor	ial	-	20	20	60	100		
Practi	cal	-						
Intera	ction	-		Cr	edits: 3			
	1		Co	urse Objectives				
1	To pr	ovide the know	ledge and expertis	e to become a profi	cient data scientist.			
2	To cr	itically evaluate	data visualization	is based on their des	sign and use for communica	ting.		
3								
		Cou	rse Outcomes (CO	O) with Bloom's T	axonomy Level			
At the	end of	the course, the	students will be at	ple to,				
<b>CO1</b>	Imple	ment data colle	ction and manage	ment using differen	t technologies.	Apply		
<b>CO2</b> Explain how data is collected, managed and stored for data science.				Analyze				
CO3	Study	the key concep	ots in data science,	including their real	-world applications and	Analyze		
	toolk	its used by data	scientists.					
Mod	lule		Μ	odule Contents		Hours		
	iuit	Introduction	to core concepts a	and technologies. I	ntroduction Terminology			
		data science pr	ocess, data science toolkit, Types of data, Example applications			6		
		Data collectio	n and manageme					
n	[	collection and APIs, Exploring and fixing data. Data storage						
	L	and manageme	ent. Using multiple	t Using multiple data sources				
_	_	Data Preproc	essing: Data Clear	ning, Data Integratio	on, Data Reduction. Data			
	I	Transformation	n and Data Discret	tization.	, , ,	8		
		Data analysis:	: Introduction, Ter	minology and conc	epts, Introduction to			
	7	statistics, Cent	ral tendencies and	distributions, Varia	ance, Distribution	0		
IV		properties and	arithmetic, Sampl	es/CLT, Correlation	n, Linear Regression, Least	8		
		Squares, Resid	luals, Regression I	nference.				
		Data visualiza	ation: Introduction	n, Types of data visu	alization, Data for			
V		visualization: l	Data types, Data e	ncodings,		6		
Retinal variab			es, Mapping varia	bles to encodings, v	visual encodings.	0		
		Recent trends	Recent trends in	various data collect	tion and analysis			
V	I	techniques, van	rious visualization	techniques, Case S	tudy, application	6		
		development n	nethods used in da	ta science.		0		
				Text Books				

1	Adhikari Ani and DeNero John. Computational and Inferential Thinking, The Foundations of Data Science, UC Berkeley.					
2	Jiawei Han, Micheline Kamber and Jian Pei. Data Mining Concepts and Techniques. Morgan Kaufmann, Third Edition.					
3						
	References					
1	O'Neil Cathy and Schutt Rachel. Doing Data Science, Straight Talk From The Frontline. O'Reilly.					
2	Leskovek Jure, Rajaraman Anand and Ullman Jeffrey. Mining of Massive Datasets. v2.1, Cambridge University Press.					
3						
	Useful Links					
1	'Foundations of Data Science' : Link					

CO-PO Mapping								
		Programme Outcomes (PO)						
	1	2	3	4	5	6		
CO1				2				
CO2	2			3	1	2		
CO3	1		2		1	1		
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High								
Each CO	of the course mu	ust map to at leas	t one PO.					

2

Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bl	oom's Taxonomy Level	T1	T2	ESE	Total	
1	Remember					
2	Understand					
3	Apply	10	10	30	50	
4	Analyze	10	10	30	50	
5	Evaluate					
6	Create					
Total		20	20	20	20	

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)						
AY 2021-22						
	Course Information					
Programme	M. Tech. (Computer Science and Engineering)					
Class, Semester	First Year M. Tech., Sem I					
Course Code	5CO514					
Course Name	Elective 2 - Advanced Network Technologies					
<b>Desired Requisites:</b>	Knowledge of Data Communication and Computer Networks					

Teaching	Scheme	Examination Scheme (Marks)				
Lecture	3 Hrs/week	T1	T2	ESE	Total	
Tutorial	-	20	20	60	100	
Practical	-				·	
Interaction	-	Credits: 3				

	Course Objectives					
1	To explain key concepts of wireless networks, standards, technologies and their operations.	basic				
2	To appraise architectures, functions and performance of wireless sensor networl	k systems.				
3	To examine SDN/NFV motivation and its benefits in data center					
Course Outcomes (CO) with Bloom's Taxonomy Level						
CO1	apply acquired knowledge to recognize the performance and related issues of different wireless network technologies	Apply				
CO2	apply acquired knowledge to recognize the performance and related issues of Software Defined Networks	Apply				
CO3	analyze different networks with case study and analyze SDN/NFV techniques in Data center	Analyze				

Module	Module Contents	Hours			
	Fundamentals of Wireless Communication				
Ι	Wireless Communication System, Wireless Media Frequency Spectrum, Technologies				
	in Digital Wireless Communication, Wireless Communication Channel Specifications,				
	Types of Wireless Communication Systems, Dense wavelength division multiplexing	7			
	Wireless Body Area Networks				
	Properties, Network Architecture, Network Components, Design Issues, Network				
	Protocols, WBAN Technologies, Research issues and applications				
	Wireless Personal Area Networks and Wireless Local Area Networks Wireless				
II	Metropolitan Area Networks	6			
	Properties, Network Architecture, Components, Technologies and Protocols (Wifi 6,	0			
	5G, Optical Networking, SONET SDH Standard), Research issues and Applications				
	Wireless Wide Area Networks and Wireless Ad Hoc Networks				
III	Properties, Network Architecture, Components, Technologies and Protocols, Research	7			
	issues and Applications				
	Evolution of Software Defined Networking (SDN)				
	Separation of Control Plane and Data Plane: Concepts, Advantages and Disadvantages,				
	OpenFlow protocol. Control Plane: Introduction of existing SDN Controllers including				
IV	Floodlight and Open Daylight projects. Data Plane: Software-based and Hardware	7			
	based; Programmable Network Hardware. Programming SDNs: Northbound				
	Application				
	Programming Interface				

V	Network Virtualization         Concepts, Applications, Existing Network Virtualization Framework (VMWare and others),(assignments related to Mininet based examples)       6         Network Functions Virtualization (NFV) and SDN: Network architecture, NFV Infrastructure, NFV Management and Orchestration (MANO), NFV and SDN       6         Data Center Networks       0					
VI	Data Center Networks       Data Center Networks: Packet, Optical and Wireless Architectures, Network         Topologies.       6         Use Cases of SDNs: Data Centers, Backbone Networks, Home Networks, Traffic Engineering.					
	Text Books					
1	Sunilkumar S., Mahabaleshwar Manvi, Kakkasageri S., "Wireless and Mobile Network Concepts and Protocols", Wiley Second edition, 2016.	S:				
2	Schiller J, "Mobile Communications", Addison Wesley, 2000					
3	Stallings W, "Wireless Communications and Networks", Pearson Education, Schiller, 2005.					
4	Nadeau Thomas D., "SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies", Ken Gray Publisher: O'Reilly Media, August 2013.					
5	Goransson Paul and Black Chuck, "Software Defined Networks: A Comprehensive Approach", Morgan Kaufmann, June 2014.					
	Deferences					
1	Stojmenic Ivan, "Handbook of Wireless Networks and Mobile Computing", John Wiley Inc 2002.	and Sons				
2	Yi Bing Lin and Imrich Chlamtac, "Wireless and Mobile Network Architectures", Jo and Sons Inc 2000.	hn Wiley				
3	Pandya Raj, "Mobile and Personal Communications Systems and Services", PHI 2008.					
4	Dargie W. and Poellabauer C., "Fundamentals of Wireless Sensor Networks – Theory a Practice", Wiley 2010.	nd				
5	Kazem Sohraby, Minoli Daniel and Znati Taieb, "wireless sensor networks -Technolog Protocols, and Applications", Wiley Interscience, 2007.	у,				
6	Hara Takahiro, Zadorozhny Vladimir I, and Buchmann Erik, "Wireless Sensor Networ Technologies for the Information Explosion Era", Springer, 2010.	'k				
	Useful Links					
1	Coursera Link					

CO-PO Mapping							
Programme Outcomes (PO)							
1 2 3 4 5 6							
CO1		1	1	1			
CO2			1	2		2	
CO3         1         1         3         2							
The stren	gth of mapping i	s to be written as	1,2,3; Where, 1:	Low, 2:Medium	, 3:High		

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

# Assessment Plan based on Bloom's Taxonomy Level (Marks)

Bloo	<b>Bloom's Taxonomy Level</b>		T2	ESE	Total
1	Remember				
2	Understand				
3	Apply	15	15	40	67
4	Analyze	5	5	20	33
5	Evaluate				
6 Create					
Total		20	20	60	100

		Wa	Ichand Colle (Government F	ge of Engineeri Aided Autonomous Inst	<b>ng, Sangli</b>		
	AY 2021-22						
			Cou	rse Information			
Progr	amme		M. Tech. (Com	puter Science and Er	igineering)		
Class,	Semest	er	First Year M. 7	Fech., Sem I			
Cours	e Code		5CO515				
Cours	e Name	;	Elective 2- Adv	vanced Database Syst	ems		
Desire	ed Requ	isites:	Database Engir	neering Basics			
				-			
ſ	<b>Feachin</b>	g Scheme		Examination	Scheme (Marks)		
Lectu	re	3 Hrs/week	T1	T2	ESE	Total	
Tutor	ial	-	20	20	60	100	
Practi	ical	-			L I		
Intera	ction	-		Cre	dits: 3		
		1	1				
			Cou	urse Objectives			
	To co	nprehend the ess	sential principles	of the design, analys	is and use of contemp	oorary DBMS	
1	system	18.	r r	,			
2	To im	nlement Web da	tabase application	ns that interact with a	hack end DBMS		
2	To pro	wide the method	lology to implem	ent the complex and	real world database a	nnlications	
	To im	plomont data wa	rehouse to perfor	m OLAD operations	ical world database a	ppileations.	
4	10 111	piemeni uata wa	renouse to perior	III OLAP operations.	T1		
At the	and of	Cours he course the st	e Outcomes (CC	<b>D) WITH BIOOM'S TAX</b>	conomy Level		
At the end of the course, the students will be able to,							
CO1	handli	ng applications	incepts involved		ses in complex data	Apply	
~~~	Analy	ze the architect	ures and perform	nance of different d	atabases for domain		
CO2	specif	ic applications.	F			Analyze	
CO2	Apply	the acquired k	nowledge in databases to design and build the different			Creata	
	busine	ess applications.				Create	
Modu	ıle		Modu	le Contents		Hours	
	Pa	rallel Database					
I	Int	roduction, I/O p	arallelism, Inter-	query parallelism, Int	ra-query parallelism,	7	
-	Int	ra-operation pa	arallelism, Inter	operation paralleli	sm, parallel query	,	
	pro	ocessing.					
п		stributed Datab	ase Data fragmantati	on Doution and	allo antion tashni suas	C	
11	for	distributed doms, 1	base Query proc	essing in distributed	databases	0	
	101	ultimedia Datal	base, Query proc	cosing in distributed	Gatabases.		
	M	iltimedia datab	base system fu	indamentals. Multir	nedia data access.	-	
Multimedia inform		nation modelling	and querying, Mul	timedia storage and	6		
	ret	rieval.					
	Sp	atial Databases					
IV	Ty	pes of spatial da	ata and queries, A	Application involving	g spatial data, Spatial	8	
	inc	lexes, Indexing	based on space fi	illing curves, Grid fil	es, r-trees: point and		
	reg	gion data.	107.15				
× 7		ta Warehouse a	and OLAP	ut Date W 1			
	Int	roduction to	rehouse OI AD	ori, Data Warehous Multidimonsional	sing, Creating and		
		umanning a wa	ICHOUSE. OLAP	winnensional	uata wiouei, OLAP		

	Queries, Database design for OLAP.	
VI	Advanced TopicsCase Studies and Applications-Graph Database, NoSql database, Firebase etc.	5
	Text Books	
1	Silberschatz, Korth & Sudarshan, "Database System Concepts." MGH. 6th Edition	2011
2	Ramakrishnan & Gehrke, "Database Management System." MGH. 3rd Edition 200	3
3	Spatial database by Shashi shekhar, sanjay chawla "Pearson education"	
4		
	References	
1	Jeffrey A. Hoffer, Mary B. Prescott, Fred R. McFadden, "Modern Database Manag Pearson, 6th Edition 2002.	gement."
2	V.S. Subrahmanian, "Multimedia database systems", Springer.	
3	Jiawei Han and Micheline Kamber, "Data Mining –concepts and Technique", 3rd Kaufmann, 2012.	Edition, Morgan
4		
	Useful Links	
1	Parallel processing :- <u>Link</u>	
2	Distributed database:- Link	
3	NoSQL Databases:- MongoDB, Cassandra	
4	Graph Database:- Link	

CO-PO Mapping						
			Programme (Dutcomes (PO)		
	1	2	3	4	5	6
CO1				2		
CO2		2		3		
CO3			2	3	1	
The stren	The strength of manning is to be written as 1.2.3. Here 1. Low 2. Medium 3. High					

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

Assessment

	Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level		T1	Т2	ESE	Total		
1	Remember						
2	Understand						
3	Apply	10	10	20	40		
4	Analyze	10	05	20	35		
5	Evaluate						
6	Create		05	20	25		
Total		20	20	60	100		

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)							
	AY 2021-22						
			Cou	rse Information			
Progr	amme		M. Tech. (Com	puter Science and En	gineering)		
Class.	Semest	er	First Year M T	First Vear M Tech Sem II			
Cours	se Code		5CO521				
Cours	se Name		Advanced Algo	orithms and Applicati	ons		
Desire	ed Reau	isites:	Design and An	alysis of Algorithms	Basics		
	cu nequ		Design and Thi		Dubleb		
	Feaching	g Scheme		Examination S	Scheme (Marks)		
Lectu	re	3 Hrs/week	T1	T2	ESE	Total	
Tutor	 ial	-	20	20	60	100	
Practi	ical	_					
Intera	nction	_		Cre	dits: 3		
		1	I				
			Сог	irse Obiectives			
1	To int	oduce students t	the advanced n	nethods of designing	and analysing algori	thms.	
2	To allo	ow students choo	ose appropriate al	gorithm and use it fo	r a specific problem.		
•	To im	oart knowledge	of different classe	es of problems along	with recent develop	nents in the area	
3	of algo	brithmic design.			1		
4							
		Cours	e Outcomes (CC)) with Bloom's Tax	onomy Level		
At the	end of t	he course, the st	udents will be ab	le to,		1	
C01	apply	algorithms invol	ving different str	ategies for problem s	olving	Apply	
CO2	analyz	e algorithm for	given problem at	hand		Analyze	
<u>CO3</u>	evalua	te the complexit	y of the algorithm	n		Evaluate	
Modu	lo		Modu	la Contonta		Uoung	
Mout	ne Fl	montary Algor	ithms			nours	
I	Soi Gr pat sea con	rting: Review o aph: Topologica h by BFS, sho arch and compu- rectness proof ortized analysis	f various sorting al sorting, Definit rtest path in edg tation of strong of the algorithr	algorithms ions and Elementary ge-weighted case (D ly connected compo n and time/space a	Algorithms: Shortest ijkstra's), depth-first onents, emphasis on nalysis, example of	8	
п	amortized analysis. Graph Algorithms Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to Minimum Spanning Tree. Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to				6		
III	Introduction, Data and Temporal parallelism, RAM and PRAM Model, Shared I Memory and Message Passing Models, PRAM Algorithms: Prefix Sum, List 7 Ranking, Merging two sorted lists, Matrix multiplication, Analysis of PRAM 7				7		
IV	Ma Ma Th rep Dis	odulo Represen odulo Represen eorem, Conve presentation, Pov screte Fourier	tation and DFT ntation of inter ersion between vers of an elemen Fransform (DFT	egers/polynomials: base-representation t, The RSA public-ko c): In complex field,	Chinese Remainder on and modulo- ey cryptosystem. DFT in modulo ring.	7	

	East Eaurier Transforme algorithm	
	Fast Fourier Transform algorithm.	
	NP-completeness: Basic concepts of complexity classes- P, NP, NP-Hard,	
	NP-Complete, Examples, Proof of NP-hardness and NP-completeness.	
	One or more of the following topics based on interest- Approximation	6
	algorithms, Randomized Algorithms, Interior Point Method, Advanced	0
	Number Theoretic Algorithm	
	Recent Trends	
VI	Recent Trends in problem solving paradigms using recent searching and	5
	sorting techniques by applying recently proposed data structures.	5
	Text Books	
1	Cormen Thomas H., Leiserson Charles E., Rivest Ronald L., Stein Clifford,	Introduction to
1	Algorithms PHI, Third Edition, 2009	
2	Aho, Hopcroft, Ullman, The Design and Analysis of Computer Algorithms, Addis	on-Wesley Pub.
2	Co., 1974.	·
	References	
1	Kleinberg and Tardos, Algorithm Design, Pearson Education Limited	
2	Robert Sedgewick, "Algorithms in C++", Addison-Wesley Professional, Third Ed	ition
	Useful Links	
1	NPTEL Videos of 'Data Structures and Algorithms' Course: Link	
2	Data Structures with Visualization: Link	

CO-PO Mapping								
		Programme Outcomes (PO)						
	1	2	3	4	5	6		
CO1				2				
CO2	2			3				
CO3	1		1			2		
The street			102 II	L O. M. I'	· 2. II 1.	-		

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

Assessment

Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level		T1	T2	ESE	Total	
1	Remember					
2	Understand	5	5	10	20	
3	Apply	5	5	20	30	
4	Analyze	5	5	20	30	
5	Evaluate	5	5	10	20	
6	Create					
Total		20	20	60	100	

Walchand College of Engineering, Sangli							
AY 2021-22							
			Course Inform	 nation			
Programme M. Tech. (Computer Science and Engineering)							
Class,	Semeste	r	First Year M. Tech.,	Sem II			
Cours	e Code		5CO522				
Cours	e Name		Soft Computing				
Desire	d Requis	sites:	Basic knowledge of	mathematics			
			1				
T	Teaching	Scheme	Exa	mination Scheme	e (Marks)		
Lectur	re	3 Hrs/week	T1	T2	ESE	Total	
Tutor		-	20	20	60	100	
Practi		-					
Intera	ction	-		Credits: 3			
			Course Ohie	ativos			
	To fost	er student's abi	lities to implement so	off computing base	d solutions fo	r real world	
1	problem	is	indes to implement so	nt computing-base	a solutions to	i icai-woiiu	
	problem	15					
2	To impa	art knowledge o	of non-traditional tech	nologies and funda	amentals of art	ificial	
2	neural r	ietworks, fuzzy	sets, fuzzy logic, gen	etic algorithms			
3	To disc	uss hybrid appl	ications of ANN, Fuz	zy and GA			
		2 11					
	I	Course Ou	tcomes (CO) with B	loom's Taxonomy	v Level	1	
CO1	analyz machii	e soft computin nes	ng techniques and thei	r roles in building	intelligent	Analyze	
CO2	evalua	te fuzzy logic a	and neural networks te	chniques to solve	various	Evaluate	
	engine	ering problems	8				
CO3	build p	prototyping app	olications using genetic	c algorithms and h	ybrid	Create	
	approa	iches					
				4		TT	
Modu			Module Cont	ents		Hours	
		rouucuon: EVO	Conventional AI to C	Soli Computing	lligence		
_	Ch	Constituents, From Conventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing					
1	Dif	Difference between Hard Computing and Soft Computing					
	Cor	ncepts of Learn	ing and Adaptation	a 2011 Company,			
	Fuz Dul	zy Logic: Fuzz	zy Sets, Operations on	Fuzzy Sets, Fuzzy	У		
п	Rei	Relations, Membership Functions: Fuzzy Rules and Fuzzy					
Keasoning, Ft Decision Mak		vision Making	Interence Systems, Fuzzy Expert Systems, Fuzzy				
	Nei	iral Networks	: Machine Learning U	sing Neural Netwo	ork,		
	Ada	aptive Network	s, Feed forward Netwo	orks, Supervised L	earning		
III	Nei	Iral Networks,	Radial Basis Function	Networks : Reinfo	orcement	7	
	Lea	rning, Unsuper	vised Learning Neura	I Networks, Adapt	ive		
	Kes	Resonance Architectures, Advances in Neural Networks					

IV	Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition7					7
V	Hybrid Syste Inference Sys	Hybrid Systems: Introduction to Hybrid Systems, Adaptive Neuro Fuzzy Inference System(ANFIS) 6				
VI	Deep Learnin Recurrent neu	ng: Spark auto o ral networks, D	encoder, Convo Deep belief netw	lutional neural p orks	networks,	7
			Text Books			
1	Rajasekaran S and Genetic A	S., Vijayalakshn Algorithms", PH	ni Pai G.A., "No II, 2003	eural Networks,	Fuzzy Logic	
2	Ian Goodfello book	ow, Yoshua Be	ngio, Aaron Co	ourville, "Deep	Learning", MI	T Press e-
			References			
1	1Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2003					
2	George J. Klin PHI, 1995	and Bo Yuan,	"Fuzzy Sets and	d Fuzzy Logic: '	Theory and App	olications",
			Useful Links			
1						
CO-PO	Mapping					
	Programme	Outcomes (PO)			
	1	2	3	4	5	6
CO1	2			3		
CO2			2	2		2
CO3	2		2	2		2
The stren	gth of mapping	is to be written	as 1,2,3; Here,	1: Low, 2: Med	lium, 3: High	
Each CO	of the course m	nust map to at le	east one PO.		5	

Assessment

	Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level		T1	Т2	ESE	Total		
1	Remember						
2	Understand						
3	Apply						
4	Analyze	20	10	20	50		
5	Evaluate		10	20	30		
6	Create			20	20		
Total		20	20	60	100		

Walchand College of Engineering, Sangli				
	(Government Aided Autonomous Institute)			
AY 2021-22				
Course Information				
Programme	M. Tech. (Computer Science & Engineering)			
Class, Semester	First Year M. Tech., Sem II			
Course Code	5CO571			
Course Name	Advanced Algorithms and Applications Lab			
Desired Requisites:	Design and Analysis of Algorithms Basics, Programming			

Teaching Scheme			Examination	on Scheme (Marks	5)
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-		(Credits: 1	

	Course Objectives	
1	To introduce students to the advanced methods of designing and analysing algorith	ims.
2	To allow students choose appropriate algorithm and use it for a specific problem.	
2	To impart knowledge of different classes of problems along with recent developme	ents in the area
3	of algorithmic design.	
4		
	Course Outcomes (CO) with Bloom's Taxonomy Level	
At the	end of the course, the students will be able to,	
CO1	apply and analyse algorithms involving different strategies for problem solving	Analyse
CO2	evaluate the complexity of the algorithm	Evaluate
CO3	develop the solution for open-ended problems and document it	Create

Mini Project Guidelines

Course Contents:

Students are expected to carry out independent research work on the chosen topic in this domain. Initially, student would be able to understand the concepts involved, perform proper initialization, employ programming strategy and apply it for problem solving. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Student would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Programming Strategy used, Implementation Details (with proper screenshots), Conclusion and Future work.

	Text Books
1	Cormen Thomas H., Leiserson Charles E., Rivest Ronald L., Stein Clifford, Introduction to Algorithms PHI, Third Edition, 2009
2	Aho, Hopcroft, Ullman, <i>The Design and Analysis of Computer Algorithms</i> , Addison-Wesley Pub. Co., 1974.

	References
1	Kleinberg and Tardos, Algorithm Design, Pearson Education Limited
2	Robert Sedgewick, "Algorithms in C++", Addison-Wesley Professional, Third Edition
3	
	Useful Links
1	NPTEL Videos of 'Data Structures and Algorithms' Course: Link
2	Data Structures with Visualization: Link
3	

			CO-PO Mapp	oing		
			Programme O	utcomes (PO)		
	1	2	3	4	5	6
CO1			2			
CO2	3					2
CO3		2		2	1	
The stron	ath of manning i	s to be written a	1 2 3. Hara 1.	Low 2. Medium	3. High	

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

		Asses	sment		
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.				
IMP: Lab ES	E is a separate head of	passing. LAI, LA	A2 together is treated as In-Semester Evaluat	ion.	
Assessmen	Based on	Conducted by	Typical Schedule	Mark	
t				s	
TA1	Lab activities,	Lab Course	During Week 1 to Week 6	30	
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6		
1.4.0	Lab activities,	Lab activities, Lab Course During Week 7 to Week 12		20	
	attendance, journal	Faculty	Marks Submission at the end of Week 12	30	
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40	
ESE	attendance, journal	Faculty	Marks Submission at the end of Week 18	40	
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown,					
considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab					
activities/Lab performance shall include performing experiments, mini-project, presentations, drawings,					

programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	LA1	LA2	ESE	Total
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	30	30	40	100

Walchand College of Engineering, Sangli			
	(Government Aided Autonomous Institute)		
AY 2021-22			
Course Information			
Programme	M. Tech. (Computer Science & Engineering)		
Class, Semester	First Year M. Tech., Sem II		
Course Code	5CO572		
Course Name	Soft Computing Lab		
Desired Requisites:	Programming knowledge		

Teaching Scheme			Examinatio	on Scheme (Marks	5)
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-		(Credits: 1	

	Course Objectives			
1	To demonstrate knowledge of implementation of artificial neural networks, fuzzy sets, fuzzy			
1	logic, genetic algorithms and hybrid systems			
2	To evaluate soft computing based solutions of real-world problems			

Course Outcomes (CO) with Bloom's Taxonomy Level

At the	end of the course, the students will be able to,	
CO1	apply appropriate soft computing technique for creating prototyping applications	Apply
CO2	evaluate soft computing techniques in building intelligent machines	Evaluate

Mini Project Guidelines

Course Contents:

3

Students are expected to carry out independent research work on the chosen topic in this domain. Initially, student would be able to understand the usage of different data structures, use them and apply its operations for solving real-world problems. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Student would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Implementation Details (with proper screenshots), Complexity of using particular data structure, Conclusion and Future work.

	Text Books
1	Rajasekaran S., Vijayalakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003
2	Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press e-book
3	
	References
1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2003
2	George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", PHI, 1995

	Useful Links				
1					
2					
3					
4					

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	3		1			2
CO2 1 1						
The stren	gth of mapping i	is to be written as	s 1,2,3; Here, 1:	Low, 2: Medium	n, 3: High	

Each CO of the course must map to at least one PO.

	Assessment						
There are thre IMP: Lab ES	There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.						
Assessmen	AssessmenBased onConducted byTypical ScheduleMark						
t				S			
TA1	Lab activities,	Lab Course	During Week 1 to Week 6	20			
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	30			
I A 2	Lab activities, Lab Course During Week 7 to Week 12		During Week 7 to Week 12	20			
	attendance, journal	Faculty	Marks Submission at the end of Week 12	50			
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40			
ESE	attendance, journal	Faculty	Marks Submission at the end of Week 18	40			
Week 1 indic	ates starting week of a	semester. The ty	pical schedule of lab assessments is shown,				
considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab							
activities/Lab performance shall include performing experiments, mini-project, presentations, drawings,							
programming and other suitable activities, as per the nature and requirement of the lab course. The							
experimental	lab shall have typicall	y 8-10 experimen	ts.				

Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level	LA1	LA2	ESE	Total		
Remember						
Understand						
Apply	20	10	20	50		
Analyze						
Evaluate	10	20	20	50		
Create						
Total	30	30	40	100		

Walchand College of Engineering, Sangli					
	AV 2021-22				
Course Information					
Programme M. Tech. (Computer Science and Engineering)					
Class, Semester	First Year M. Tech., Sem II				
Course Code	Course Code 5CO573				
Course Name Industrial Project					
Desired Requisites:	Domain knowledge of mechanical engineering				

Teaching Scheme		Examination Scheme (Marks)				
Lecture	-	LA1	LA2	ESE	Total	
Tutorial	-	30	30	40	100	
Practical	-		· · · ·			
Interaction	2 hrs/week	Credits: 2				

	Course Objectives					
1	To review and increase students' understanding of the specific topics					
2	To induce learning management of values					
2	To teach how research papers are written and read such papers critically and efficientl	y and to				
5	summarize and review them to gain an understanding of a new field, in the absence of	a textbook				
1	To teach how to judge the value of different contributions and identify promising new direction					
-+	in specified area					
Course Outcomes (CO) with Bloom's Taxonomy Level						
At the	end of the course, students will be able to,					
CO1	Apply the existing knowledge on real life problems	Apply				
CO2	CO2 Investigate the selected topic/ system Analyze					
CO3 Build models and verify that the outcomes of the work have solved the specified						
05	problems					

Course Content

The Industrial Project work will start in semester II and should be an industrial problem with research potential and should involve scientific research review, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. Students should undergo industrial projects in a registered company/organization after consulting with the faculty guide assigned by the department. Industrial projects should be based preferably in the area in which the candidate is interested to undertake the dissertation work. The student has to be in regular contact with the guide and the topic of the industrial project must be mutually decided. The examination shall consist of the preparation of a report consisting literature review, detailed problem statement, methodology, implementation details, results etc., according to the type of work carried out. The work has to be presented in front of the examiners panel formed by DPGC for evaluation.

- 1. This course will have students assigned to Industry Mentor and a Guide (from institute) to enable students to be acquainted with Industry standards and become industry ready.
- 2. Based upon the Area of Interest, at least 50% students will have Industry Mentor allocated.
- 3. With the mutual consent of Industry Mentor, Guide and student, the small Mini-project topic/ Task allocation would be finalized.
- 4. The meeting of the concerned would be held every week and updates and progress would be documented.

5. The submission of a Mini-project would be done with a Presentation Seminar and document which will talk about the prototype/ models built, new tools and techniques, and coding standard learnt.

	Text Books				
1	As per topic Selected and Journal papers, Conference papers, Handbooks				
References					
1	1 As per topic Selected and Journal papers, Conference papers, Handbook				
Useful Links					
1	Project Ideas: Link				
2	CSE Project Ideas: Link				

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1	3	2	1				
CO2	2			2			
CO3		2			1		

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessmen	Assessmen Based on		Typical Schedule (for 26-week Sem)	Marks
t				
ΤΑΊ	Lab activities,	Lab Course	During Week 1 to Week 6	20
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50
T A O	Lab activities,	Lab Course	During Week 7 to Week 12	20
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50
Lob ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40
Lao ese	attendance, journal	Faculty	Marks Submission at the end of Week 18	40

Week 1 indicates the starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember						
Understand						
Apply	15	15	15	45		
Analyze	15	15	15	45		
Evaluate			10	10		
Create						
Total Marks	30	30	40	100		

Walchand College of Engineering, Sangli				
	(Government Aided Autonomous Institute)			
	AY 2021-22			
	Course Information			
Programme M. Tech. (Computer Science and Engineering)				
Class, Semester First Year M. Tech., Sem II				
Course Code	5CO574			
Course Name Professional Skills 2				
Desired Requisites:				

Teaching Scheme		Examination Scheme (Marks)				
Lecture	-	LA1	LA2	ESE	Total	
Tutorial	-	30	30	40	100	
Practical	-		·		·	
Interaction	1 Hr/Week	Credits: 1				

	Course Objectives						
1	To provide a hands-on experience of using LaTeX software for Reports and presentations						
2	To enhance the paper writing and presentation skills of students.						
	Course Outcomes (CO) with Bloom's Taxonomy Level						
At the	end of the course, students will be able to,						
CO1	Use of the LaTeX software related to Report writing and presentations effectively	Apply					
CO2	Write a paper based on work done as a part of Industrial Project	Create					
CO3							

Course Content

This course is based on using LaTeX software as a tool to write report and Research Paper. LaTeX is a high-quality typesetting system which includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents. LaTeX is available as free software.

 Text Books

 1
 Suitable books based on the software selected.

 References

 1
 Suitable books based on the contents of software selected

Useful Links

As per the need of the software training

1

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1	2						
CO2			3				
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							
Each CO of the course must map to at least one PO.							

Assessment								
There are three components of lab assessment, LA1, LA2 and Lab ESE.								
E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluat	ion.					
nen Based on Conducted by Typical Schedule (for 26-week Sem) Mar								
			s					
Lab activities,	Lab Course	During Week 1 to Week 6	20					
attendance, journal	Faculty	Marks Submission at the end of Week 6	50					
Lab activities,	Lab Course	During Week 7 to Week 12	20					
attendance, journal	Faculty	Marks Submission at the end of Week 12	50					
Lab activities,	Lab Course	During Week 15 to Week 18	40					
attendance, journal	Faculty	Marks Submission at the end of Week 18	40					
	e components of lab a E is a separate head of Based on Lab activities, attendance, journal Lab activities, attendance, journal Lab activities, attendance, journal	Assessee components of lab assessment, LA1, E is a separate head of passing. LA1, LABased onConducted byLab activities, attendance, journalLab Course FacultyLab activities, attendance, journalLab Course Faculty	Assessmentee components of lab assessment, LA1, LA2 and Lab ESE.E is a separate head of passing. LA1, LA2 together is treated as In-Semester EvaluateBased onConducted byTypical Schedule (for 26-week Sem)Lab activities,Lab CourseDuring Week 1 to Week 6attendance, journalFacultyMarks Submission at the end of Week 6Lab activities,Lab CourseDuring Week 7 to Week 12attendance, journalFacultyMarks Submission at the end of Week 12Lab activities,Lab CourseDuring Week 15 to Week 18attendance, journalFacultyMarks Submission at the end of Week 12					

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							
Understand							
Apply	20	20	10	50			
Analyze							
Evaluate							
Create	10	10	30	50			
Total Marks	30	30	40	100			

Walchand College of Engineering, Sangli								
AV 2021-22								
Course Information								
Programme M Tech (Computer Science and Engineering)								
Class.	Semest	er	First Year M Te	ch Sem II				
Cours	e Code	-	5CO523					
Cours	e Name		Elective 3 – Natu	ral Language Proces	sing			
Desire	d Reau	isites:	Mathematics – L	inear Algebra Proba	hility Theory			
Desire	u nequ		Mathematics E	incui riigeoru, rioou	onity Theory			
Т	eaching	Scheme		Examination S	cheme (Marks)			
Lectu	re	2 Hrs/week	T1	T2	ESE	Tota	1	
Tutor	ial	-	20	20	60	100		
Practi	cal		20	20	00	100		
Intera	ction			Cred	lits. 7			
Intera				Citta	115. 2			
			Cou	urse Objectives				
1	To bui	ld AI applicati	one such that it wil	ll enable computer to	read text hear speech s	nd inter	prot it	
2		uaint students	with the basics of	text processing	Teau text, near specen a		piet n.	
3	To acq	strate steps in	volved in building t	text mining application	ns			
4	To sha	re the importa	nce of different set	of features for mach	ine learning tasks			
	10 5114		rse Outcomes (CC)) with Bloom's Tax	conomy Level			
At the	end of t	he course, the	students will be ab	le to,				
CO1	explain	n fundamental	concepts of text pr	ocessing		Unde	rstand	
CO2	apply t	ext processing	algorithms to deri	ve different represen	tations of text	Ar	ply	
CO3	automa	ate the real-life	e problems by choo	osing appropriate feat	ures and models	Eva	luate	
CO4	develo	p models for I	nformation Retriev	al and Chatbot appli	cation	Cre	ating	
Modu	L		M	odule Contents			Hou	
le							rs	
	Intro	oduction	x 1 1 m 1					
	Intro	duction, Step	s Involved, Tok	tenization, Stemmir	ig, Lemmatization, F	Regular	4	
	expre	essions- extrac	tion of information	n using Regex, Text	Normalization, Minimu	im edit	4	
	nythe	nce, Document	NI TK SciPy re	ires - Cosine and cit	ister measures, explora	tion of		
	Land	mage Models	c iveli i k, seni y, ie.	•				
	Infor	mation Retriev	al & Language Mo	odels				
П	Intro	Introduction, IDF, Tf-Idf, Boolean Model Vector Space Model N-gram Language						
	Mod	els, Spelling co	prrection - Edit dist	ance, Advanced smo	othing for language mod	lelling,		
	POS	tagging, Perfo	rmance Measures,	Precision, Recall, F-	measure			
	Distr	ributed Word	Representation					
Ш	Vect	or Space Mo	del - word vecto	ors, GloVe/Word2V	ec model, word embe	edding,	4	
	Cont	extual Embed	dings, Deriving	Word Vectors from	Corpus, Word Sense	es and		
	Word	iNet						
	Text	Classification	l mana Contaut En	an Crommon Const	ituanay Dansing Dana	adamari		
IV	Dorsi	ng Levicons	for Sentiment Di	ee Grammar, Const estributional Semanti	cs Topic Models Ser	timent	4	
	Class	sification	ior sentiment, Di	istributional Semanti	es, ropie widdels, sei	minem		
	Seau	ence Classific	ation					
1 7	Sequ	ence Labelling	for Parts of Speec	h and Named Entities	, Deep Learning Archit	ectures	_	
	for S	Sequence Proc	essing, Models fo	or Sequential tagging	g – MaxEnt, CRF, Re	current	5	
	Neur	al network rele	evant to NLP					

VI	Case StudyMachine Translation and Encoder-Decoder Models, Discourse Coherence, QuestionAnswering, Chatbots & Dialogue Systems, Sentiment Analysis and Opinion Mining, TextGeneration using Language Models					
1	Steven Bird, Ewan Klein, and Edward Loper, " <i>Natural Language Processing with Python</i> ", O'reilly Publications, 2009.					
2	Yoav Goldberg, " <i>Neural Network Methods for Natural Language Processing</i> ", Synthesis Lectures on Human Language Technologies, 2017					
	References					
1	Dan Jurafsky and James H. Martin, "Speech and Language Processing", Standford University, 3 rd Edition, 2020					
2	Jason Brownlee, "Deep Learning for Natural Language Processing", 2017.					
3	Karthiek Reddy Bokka, Shubhangi Hora, Tanuj Jain, Monicah Wambugu, "Deep Learning for Natural Language Processing: Solve your natural language processing problems with smart deep neural networks",					
Useful Links						
1	NLP Course on NPTEL: Link					
2	Applied NLP Course on NPTEL: Link					
3	NLP Resources by Mausam: Link					
4	NLTK Book: Link					

CO-PO Mapping									
	Programme Outcomes (PO)								
	1	2	3	4	5	6			
CO1	1								
CO2	2		3						
CO3			2	1					
CO4		1			1	2			
The stre	ngth of mapping i	s to be written a	as 1,2,3; Here,	1: Low, 2: Medi	um, 3: High				
Each CO	O of the course mu	ist map to at lea	st one PO.						
			Assessm	ient					
The asse	essment is based o	n 2 in-semester	examinations	in the form of T	1 (Test-1) and T2	(Test-2) of 20			
marks e	ach. Also, there sh	all be 1 End-Se	em examination	n (ESE) of 60 m	arks. T1 shall be t	ypically on			
modules	s 1 and 2, T2 base	d typically on m	odules 3, 4 an	d ESE shall be c	n all modules wit	h nearly 50%			
weighta	ge on modules 1 t	o 4 and 50% we	eightage on mo	odules 5, 6.					
	Asse	ssment Plan ba	ised on Bloom	n's Taxonomy L	evel (Marks)				
Blo	oom's Taxonomy	Level	T1	T2	ESE	Total			
1	Rememb	ber							
2	Understa	ind	5	5	10	20			
3	Apply	,	5	5	20	30			
4	Analyz	ie 🛛	5	5	10	20			
5	Evaluat	te	5	5	10	20			
6	Create	,			10	10			
	Total 20 20 60 100								

	Walchand College of Engineering, Sangli							
	AY 2021-22							
			Cour	se Information				
Progr	amme	<u>,</u>	M. Tech. (Comput	er Science and Engir	neering)			
Class.	Seme	ster	First Year M. Tech	n. Sem II	, , , , , , , , , , , , , , , , , , , ,			
Cours	e Cod	le	5CO524					
Cours	e Nar	ne	Elective 3 – Data C	Compression and Enc	ryption			
Desire	ed Red	misites:	Computer Networl	k Basics	- jption			
		quisitest	Computer retwork					
Т	eachir	ng Scheme		Examination Sc	heme (Marks)			
Lectu	re	2 Hrs/week	T1	T2	ESE	Total		
Tutor	ial	-	20	20	60	100		
Practi	ical			20		100		
Intera	oction			Credi	its: 2			
			Сон	rse Objectives				
1	Toi	ntroduce the stu	dents Lossless and I	ossy compression te	chniques for differen	t types of data		
2	Toi	ntroduce the stu	dents to the data end	cryption techniques.	eninques for anteren			
3	To i	ntroduce the stu	dents to the advance	ed network security a	nd ethical hacking co	ncepts.		
4				2	0			
		Cou	urse Outcomes (CO)) with Bloom's Tax	onomy Level			
At the	end o	f the course, the	students will be abl	le to,		1		
CO1	illus	trate different	data compression	techniques, crypto	graphy techniques,	Apply		
	netv	vork security and	d ethical hacking co	ncepts.		· · · · · · · · · · · · · · · · · · ·		
CO2	anal	yse different dat	ta compression techi	niques, cryptography	techniques, network	Analyse		
	secu	inty and ethical	nacking concepts.			-		
Modu	ıle		Modul	le Contents		Hours		
Mout		Introduction to	Data Compression			liturs		
		Compression 7	Fechniques: Loss	less compression.	Lossy compression.			
	I	measure of performance, modelling and coding, different types of models, and						
I	0	coding technique	8					
	r	Fext Compress						
	0	coding, Adaptiv	e Huffman coding	. Arithmetic coding	, Dictionary coding			
	t	echniques, Slidi	ing Window Compre	ession: LZ 77, LZ 78	, LZW			
Audio Compression								
II	II High quality digital audio, frequency and temporal masking, lossy sound				4			
		compression, μ -	law and A-law comp	banding, and MP3 au	dio standard			
	1	mage and vide	compression	M IDEC IDEC I	S and IDEC 2000			
		mage Compre	soluli. ruivi, DPC	wi ji lo, ji lo –L	is, and fred 2000			
III		Video Compro	ssion. Analog Vid	eo Digital Video	Intra frama codina	8		
		notion estimatic	on and compensation	introduction to MDI	FG-2 H-264 encoder			
		and decoder						

	Introduction to Data Security						
	Security goals, cryptography, stenography cryptographic attacks, services and Mechanics.						
IV	Substitution cipher, transposition cipher, stream and block cipher, and arithmetic	8					
	modes for block ciphers.						
	Data encryption standard, double DES, triple DES, attacks on DES, AES, key						
	distribution centre.						
	Number Theory and Asymmetric Key Cryptography						
	Primes, factorization, Fermat's little theorem, Euler's theorem, and extended	<i>.</i>					
	Euclidean algorithm.	6					
	RSA, attacks on RSA, Diffie Hellman key exchange, key management, and						
	Network Security						
	Malware Intruders Intrusion detection system firewall design antivirus						
VI	techniques digital Immune systems biometric authentication Web Security	5					
	Considerations, SSL Architecture, TLS, Secure Electronic Transactions and	5					
	introduction to ethical hacking.						
	Text Books						
1	Khalid Sayood, "Introduction to Data Compression", Fifth Edition, Morg	gan Kaufmann,					
1	2020, ISBN-10: 9351073904						
David Saloman, "Data Compression: The complete reference", 2011, Springer public							
	² ISBN-10: 9788184898002						
3	Behrouz Forouzen, "Cryptography and Network Security", Tata Mc Graw-	-Hill					
	Education, 2011, ISBN-10: 0070660468						
4	William Stallings, "Cryptography and Network Security: Principles a	and Practice",					
	Pearson Education Asia Publication, 7 th Edition, 2017, ISBN-10: 97893325	85225					
	References						
1	Jean-Loup Gailly, Mark Nelson, "The Data Compression Book", 2nd	Edition, BPB					
	Publication, 1996, ISBN-10: 817029729X						
2	olt McAnlis, Aleks Haecky, "Understanding Compression: Data Compression for						
	Modern Developers", Shroff/O'Reilly; First edition, 2016, ISBN-10: 93521	3446X					
3	Atul Kahate, "Cryptography and Network Security", 4th Edition, McGr	aw-Hill, 2019,					
	ISBN-10: 9353163307						
4	4 Bruce Schnerer, "Applied Cryptography: Protocols, Algorithms, and Source Code in C						
John Willey & Sons Inc. Publication, 2nd Edition, 1995, ISBN-10: 9780471117094							
	Useful Links						
$\frac{1}{2}$	Coursera Week 5 of Algorithms -II Course: Link						
$\frac{2}{2}$	Coursera Course: Cryptography I: Link						
	SWAYAM Course: Cyber Security: Link						
4							

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	2		2		1	
CO2				2	1	2
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High						

Each CO of the course must map to at least one PO.

Assessment

Assessment Plan based on Bloom's Taxonomy Level (Marks)							
Bl	oom's Taxonomy Level	T1	T2	ESE	Total		
1	Remember						
2	Understand						
3	Apply	10	10	30	50		
4	Analyse	10	10	30	50		
5	Evaluate						
6	Create						
	Total	20	20	60	100		

Walchand College of Engineering, Sangli					
	(Government Aided Autonomous Institute)				
	AY 2021-22				
Course Information					
Programme	M. Tech. (Computer Science and Engineering)				
Class, Semester First Year M. Tech., Sem II					
Course Code 4CO525					
Course Name Elective 3 – Theory and Applications of Remote Sensing & GIS					
Desired Requisites: Fundamentals of Image processing					

Teachin	g Scheme	Scheme Examination Scheme (Mark					
Lecture	2 Hrs/week	T1 T2 ESE Total					
Tutorial	-	20	20	60	100		
Practical	-						
Interaction	-	Credits: 2					

	Course Objectives					
1	To impart knowledge of the fundamentals of Remote Sensing (RS) and geographics systems (GIS)	al information				
2	To make students familiar with Data and Data Products in RS and GIS.					
3	To acquaint students advantages and applications of RS and GIS					
4						
Course Outcomes (CO) with Bloom's Taxonomy Level						
At the	end of the course, the students will be able to,					
CO1	Understand and summarize fundamental concepts in RS and GIS	Understand				
CO2	Interpret and Apply various satellite RS data and demonstrate GIS data and GIS database management system	Apply				
CO3	Compare and examine data and data Products of RS and GIS	Analyse				
CO4	Select and Verify RS and GIS data and data products to design solution for various interdisciplinary problems	Evaluate				

Mod	Module Contents	Hours
ule		
I	Concepts and Foundation of Remote Sensing Introduction, Remote Sensing System, Electromagnetic Energy, Electromagnetic Spectrum and its Characteristics, Energy Interaction in the Atmosphere and with the Earth's Surface, Resolution in Remote Sensing, Broad Classifications of Sensors and Platform, Earth Observation Satellite and Sensors, Data Reception, Transmission and Processing, Remote Sensing Data and Data Products.	7
П	Satellite Image Interpretation and Processing Interpretation Procedure and Elements, Interpretation strategies and keys, Digital Image processing and Image Analysis steps, Image Rectification and Restoration, Image Enhancement, Spatial Filtering, Image Transformation, Image Classification and Analysis.	4
III	Applications of Remote SensingLand use Land Cover Mapping, Crop Inventory, Ground Water Mapping, UrbanGrowth, Flood Plain Mapping, Disaster Management.	2
IV	GIS – An Overview Introduction, Geographical concepts and Terminology, Difference between Image Processing system and GIS, Various GIS packages and their salient features, Essentials components of GIS, Utility of GIS, GPS	4
V	GIS Data	

	GIS Data types and Data Representation, Data Acquisition, Georeferencing of	5			
	GIS Data, Raster and Vector data, Raster to Vector conversion, Remote Sensing				
	Data in GIS, GIS Database and Database Management System				
	GIS Spatial Data Analysis and Applications				
N/I	Measurements in GIS-Lengths, Perimeters, and Areas, Queries, Reclassification,				
VI	Buffering and Neighborhood Functions, Map Overlay, Spatial Interpolation,	4			
	Analysis of Surfaces, Network Analysis, GIS Applications				
	Text Books				
1	Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing Ho	ouse. 2008			
Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Inform		nation System",			
	² Prentice Hall India. 20012				
	References				
1	Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wil	ey and Sons, 6th			
1	Edition. 2012				
2	Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition	n. 2010			
	Useful Links				
1	NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08				
1	https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10				
2	https://www.usgs.gov				
3	https://bhuvan.nrsc.gov.in/bhuvan links.php#				

CO-PO Mapping								
			Programme C	Outcomes (PO)				
	1	1 2 3 4 5 6						
CO1			2					
CO2			2					
CO3	2			2				
CO4	3			2		2		
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High								
Each CO	Each CO of the course must map to at least one PO							

Assessment

Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level T1 T2 ESE Total						
1	Remember					
2	Understand	10	5	15	30	
3	Apply	5	5	20	30	
4	Analyze	5	5	15	25	
5 Evaluate			5	10	15	
6	Create					
	Total	20	20	60	100	

Walchand College of Engineering, Sangli						
	AV 2021-22					
			Course Infor			
Programm	ne		M. Tech. (Compute	r Science and Eng	zineering)	
Class. Sem			First Year M. Tech	Sem II	,	
Course Co	de		5CO526	.,		
Course Na	me		Elective 4 - Machin	e Learning		
Desired Re	equisites:		Data Science			
Tea	aching Sc	heme]	Examination Sch	eme (Marks)	
Lecture	0	2 Hrs/week	T1	T2	ESE	Total
Tutorial		-	20	10	60	100
Practical		-		1		
Interaction	n	-		Credits	: 2	
		1				
			Course Obj	ectives		
1	To form	ulate machine l	earning problems co	rresponding to dif	ferent applications	
2	To illust	rate a range of	machine learning alg	orithms along wit	h their strengths a	nd
2	To apply	v machina laarr	ing algorithms to sol	ve problems of m	oderate complexity	7
<u> </u>	10 appry			ive problems of m		y.
		Course Ou	tcomes (CO) with B	Bloom's Taxonom	v Level	
CO1	implement a range of machine learning algorithms along with their strengths Apply and weaknesses.					
CO2	apply ma Learning	achine learning g.	algorithms to solve	typical problems i	n Machine	Apply
CO3	analyze	various machin	e learning tools			Analyze
Module			Module Con	itents		Hours
I	Statistic Regress	al Decision The	eory - Regression, Cl te Regression	lassification, Bias	Variance, Linear	4
II	Linear	Classification,	Logistic Regression	n, Support Vector	Machines	4
III	Neural M Backpro MLE, M	Networks - Intr pagation, Initia IAP, Bayesian	oduction, Early Mod alization, Training & Estimation Decision	els, Perceptron Le Validation, Paran Trees, Regression	arning, neter Estimation - Trees	5
IV	Bootstra Matrix,	apping & Cross F1 score, ROC	Validation, Class Ev	valuation Measure	s, Confusion	4
V	Clusteri CURE A	ng, KMeans, H Algorithm, Den	DBSCAN, Hierarchi sity-based Clustering	ical Clustering, Bi	rch Algorithm,	6
VI Hyper-parameter tuning, Deployment of Machine Learning models, introduction to deep learning 3				3		
Text Books						
1	Jason B 2015	ell, "Machine I	Learning Hands-On f	or Developers and	Technical Profess	sionals" Wiley
2	Tom M.	Mitchell "Mad	chine Learning" MGI	Н		
3	Stephen	Marsland, Tay	lor & Francis "Mach	ine Learning: An	Algorithmic Persp	ective" (CRC)
4	Trevor Hastie, Robert Tibshirani, Jerome H. Friedman "The Elements of Statistical Learning".					

	References						
1	William Whsieh "Machine Learning Methods in the Environmental Sciences, Neural Networks" Cambridge Univ Press.						
2	Richard O Duda, Peter E. Hart and David G. Stork, John "Pattern classification" Wiley & Sons						
۷	Inc., 2001						
3	Chris Bishop "Neural Networks for Pattern Recognition" Oxford University Press, 1995						
4							
Useful Links							
1	NPTEL Videos of 'Introduction to Machine Learning' Course: Link						
2							
3							

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1	2		2	1			
CO2		1	1	2			
CO3			2	3	2	2	
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.							

Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level T1 T2 ESE Total						
1	Remember					
2	Understand					
3	Apply	20	10	30	60	
4	Analyze		10	30	40	
5	Evaluate					
6	Create					
	Total	20	20	60	100	

	Walchand College of Engineering, Sangli						
(Government Alded Autonomous Institute)							
A Y 2021-22 Course Information							
Drogn	Decourse information Decourse information						
Progr	amme		M. Tech. (Computer Sch		neering)		
Class,	Semester	ſ	First Year M. Tech., Ser	n II			
Cours	Course Name Elective 4 - Internet of Things						
Desire	ed Requis	ates:	Basic programming kno	wledge			
	T 1 •	C 1	T.	• • • • • •			
-	Teaching	Scheme	Exa	amination Sch	eme (Marks)		
Lectu	re	2 Hrs/week	<u>T1</u>	<u>T2</u>	ESE	Total	
Tutor	ial	-	20	20	60	100	
Practi	ical	-					
Intera	iction	-		Credit	s: 2		
			Course Objec	ctives			
1	To illus	trate the basic co	oncepts of Internet of Thin	igs.			
2	To dem	onstrate working	g of Physical Devices				
3	To illus	trate Advanced	concepts of IOT.				
4	To deve	lop the skill of p	providing solution for real	life problem u	sing IOT.		
	D 1 '	Course	Outcomes (CO) with Ble	oom's Taxono	omy Level	TT 1 / 1	
CO1 Explain Basic concepts of IOT.			Understanding				
CO2 Identify how IOT devices works			Apply				
C03	To asse	ss different IOT	operations.	ahlam		Croate	
<u>C04</u>	10 Desi	gn a IOT solutio	on to solve a real-world pro	oblem.		Cleate	
Madu	la		Madula Conton	t a		Houng	
Moau	lle Intu	aduation to IoT	Module Conten			Hours	
Ι	Introduction to IoTIntroduction to IoT, Future of IoT, Applications of IoT, Advantages of IoT, Enabling Technologies. Overview of Internet of Things, building blocks of IoT, characteristics of IoT systems and IoT levels. IoT and M2M, IoT design methodology, Technology Considerations- IoT Problem Statement, IoT , Technology Enablers, IoT Technology Stack, IoT, Data Considerations, IoT				4		
П	II IoT Physical Devices & Endpoints Microprocessor, Microcontroller, Microcomputer hardware and software concepts. Study and usage of Prototyping boards like - Arduino, Intel edison, raspberry pi etc. (from software and hardware perspective) programming using sketches and python. Other PL used for IoT. A generic design methodology for IOT 4				4		
III	IOT Intro prote Com prote Com (lim intro with Show	Communication oduction to commo ocols: RF: Z immunication Ch ocols: MQTT/M iparison of the itations) of these oduction to IPv6 RF protocol - wcase the GSM	nunication architecture- N igBee, Blue Tooth, E annels: GSM/GPRS, 2G, IQTTS, CoAP, 6LoWPA different IoT protocols, se IoT protocols. IPv4 ac is required to address m power consumption, LO module.	etwork protoco 3LE, Zwave, 3G, 4G, 5G N, like TCP, advantages an ldressing prob ore devices. A S, reliability,	ol stack, Differen Mesh network , LTE, WiFi, IoT UDP, HTTP/S. nd disadvantages lem for IoT and application issues Security aspects	4	
IV IV	IOT	IOT Testing: 3					

	Introduction, Challenges in IoT Testing, IOT Testing framework, IOT	
	Testing Tools, Best practices for effective IOT software testing	
	Data and Analytics for IoT,	
	An Introduction to Data Analytics for IoT, Machine Learning, Big Data	
	Analytics Tools. Fundamentals of Stream data processing and Batch data	
V	processing.	
•	Cloud platform and framework for developing IoT	8
	An introduction to the use of cloud platforms and frameworks for developing	
	IoT applications. Sample use case, Temperature sensor Arduino as edge and	
	sending data to AWS cloud.	
	Case Studies:	
VI	IoT Applications Retail, Healthcare & Agriculture, IoT Architecture, what	
V1	is digital disruption? Examples of Digital Disruption. Case Study: Agriculture,	3
	Healthcare, Activity Monitoring, smart cities, smart home	
	Text Books	
1	Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach	", Universities
1	Press, 2015.	
2	S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge Unit	iversity Press.
3	S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet	of Things and
	Industry 4.0. CRC Press.	
	References	
1	Stephanie Moyerman, "Getting Started with Intel Edison", Published by Maker I	Media, Inc., San
1	Francisco, 2016. CA 94111.	
2	Agus Kurniawan, "Arduino Uno: A Hands-On Guide for Beginner ,1st	
2	John Boxall, "Arduino Workshop: A Hands-On Introduction with 65 Projects", 1	No Starch Press,
	Inc. San Francisco, CA USA, 2013.	
	Useful Links	
1	Internet sources: Arduino site, Intel IoT site, Raspberry pi site.	
2	https://onlinecourses.nptel.ac.in/noc21_cs17	
3	https://www.softwaretestinghelp.com/internet-of-things-iot-testing/	
4	https://www.clariontech.com/blog/iot-testing-framework	

	CO-PO Mapping					
		Programme Outcomes (PO)				
PO	1	2	3	4	5	6
CO1	3		1			
CO2	1		3			
CO3				2		1
CO4				2		3
The strength of mapping is to be written as 1.2.3: Here, 1: Low, 2: Medium, 3: High						

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

	Assessment				
The a	The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20				
marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on					
modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50%					
weig	htage on modules 1 to 4 and 50	0% weightage on	modules 5, 6.		
Asse	ssment Plan based on Bloom's	Taxonomy Leve	el (Marks)		
B	loom's Taxonomy Level	T1	T2	ESE	Total
1	Remember		5	5	10
2	Understand	5	5	10	20

3	Apply	5		10	15
4	Analyze	10	5	15	30
5	Evaluate		5	10	15
6	Create			10	10
	Total	20	20	60	100

		Walc	hand College (Government Aide	of Engineering	g, Sangli		
			AY	2021-22			
			Course	Information			
Programn	ne		M. Tech. (Comp	uter Science and En	gineering)		
Class, Sen	nester		First Year M. Te	ch., Sem II			
Course Co	ode		5CO528				
Course Na	ame		Elective-4 Comp	outer Vision			
Desired R	equisite	s:	Digital Image Pr	ocessing			
Te	aching	Scheme		Examination S	cheme (Mai	:ks)	
Lecture		2 Hrs/week	T1	T2	ESE]	fotal
Tutorial		-	20	20	60		100
Practical		-				I	
Interacti	on	-		Cred	its: 2		
			Course	e Objectives			
1	To im	part knowledge	of advanced tech	niques in computer v	vision.		
2	To ac	quaint students	with the concepts	of color image proc	essing, textu	re analysis, ob	oject
	recog	nition, video pro	ocessing, 3D imag	ing etc. by applying	the algorith	ms to build ap	plications.
3	To all	ow students to	compare various a	lgorithms and select	the one mo	st appropriate	for a
3	partic	ular application					
		Course	Outcomes (CO) v	vith Bloom's Taxor	nomy Level		
At the end	of the c	ourse, the stude	nts will be able to	,			
CO1	Demo vision	nstrate the kno	wledge of the v	various concepts of	computer	Apply	/ing
CO2	Study applic	and Analyse ation	computer vision	algorithms to build	l practical	Anal	yze
CO3	Desig	n and assess alg	orithms for real we	orld computer vision	problems	Evalua	ating
Module	e		Module Co	ontents		Hou	I rs
	C	olor Image Pr	ocessing				
	Color Fundamentals, Color models, Gray level to color						
I	tr	transformations, Basics of Color Image Processing, Color					
	Transformations, Smoothing and Sharpening, Color						
		egmentation					
		exture Analysi	S of touture Tours	la Tantuna analunia			
		elimitoli, Type	s of texture, fexel	is, rexture analysis	- concept		
II		escriptors - stati	stical - Auto-corre	lation co-occurrence	e matrices	6	
		nd features edu	be density and dir	ection local binary	nartition		
		aw's texture energy measures					
III F		epresentation	& Description				
		epresentation, I	Boundary Descript	ors, Regional Descri	ptors, Use	4	
	of Principal components for description, Relational Descriptors						
	0	bject Recogni	ion & Restoratio	n			
	0	bject Recognit	ion: Object Detec	tion Vs recognition,	Patterns		
IV	aı	nd Pattern Class	es, Knowledge Re	epresentation, Statist	ical	5	
		attern Recognit	ion, Neural Nets, S	Syntactic Pattern Re	cognition,		
	Optimization Techniques in Recognition. Restoration: Image						

	Restora filtering	Restoration Model, Noise Models, Restoration using spatial filtering, Reduction using frequency domain filtering.							
V	Moving Object Detection and Tracking Introduction, Background Modeling, Connected Component Labeling, Shadow Detection, Single Object Tracking, Discrete Kalman Filtering, Particle-filter based tracking, Mean-shift 								
VI	3D Vis Introdu Researce any cas	ion action to 31 ch Paper(s) se study	on extion to 3D imaging and its applications. Study of any h Paper(s) based on the current trends in 3D imaging or e study					3	
				Text Bo	oks				
1]	R. C. Gonz	alez, R. E. '	Woods, Di	gital Image	Processing, 4t	h Edition. 2	018, PHI		
2	Sonka Mila Learning, T	n, Vaclav H	Havac, Bo n, 2013	yle, "Digital	I Image Proces	ssing and Co	omputer V	Vision", C	engage
				Referen	ces				
1	 Jayaram Fhird edition 	an, S. Esak on, 2010	kirajan, T	. Veerkuma	r, "Digital Im	age Proces	sing", Ta	ta McGra	w Hill,
2	D. A. Forsy Hall, 2005	th, J. Ponc	e, "Compu	ter Vision –	- A Modern ap	oproach", Po	earson Ed	ucation, P	Prentice
3 1	Linda Shap	iro, George	C. Stockn	nan, "Comp	uter Vision",	Prentice Hal	1, 2000		
1 7		T ' 1		Useful Li	nks				
	NPTEL COU	irse: <u>Link</u>							
	NF I EL COL	IISE. <u>LIIIK</u>	С	O-PO Map	ping				
			Progra	mme Outco	omes (PO)				
PO		1	2	3	4	5		6	
								-	
CO1		2							
CO2		3		2					
CO3			3		3	2			
1:Low, 2:Me	1:Low, 2:Medium, 3:High								

Assessment (for Theory Course)

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		T1	T2	ESE	Total
1	Remember				

2	Understand				
3	Apply	10	8	15	33
4	Analyse	10	7	25	30
5	Evaluate		5	20	25
6	Create				
Total		20	20	60	100

Walchand College of Engineering, Sangli				
(Government Aided Autonomous Institute)				
AY 2021-22				
Course Information				
Programme	M. Tech. (Computer Science & Engineering)			
Class, Semester	First Year M. Tech., Sem II			
Course Code	5CO575			
Course Name	A B Elective Lab 1- Natural Language Processing Lab			
Desired Requisites:	Statistics and Probability, Programming			

Teaching Scheme			Examination	on Scheme (Marks	3)
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	Credits: 1			

	Course Objectives			
1	To make students do practical implementation of the different AI and ML concepts techniques.	s and		
2	To make students familiar with steps involved in applying machine learning algorithms	thms to real-life		
3	To get insights of how pure AI algorithms can be used			
4	To develop research interest towards this field			
Course Outcomes (CO) with Bloom's Taxonomy Level				
At the	end of the course, the students will be able to,			
CO1	apply and analyse text processing algorithms to derive different representations of text	Analyse		
CO2	automate the real-life problems by choosing appropriate features and models and document the steps involved	Evaluate		
CO3	develop models for Information Retrieval and Chatbot application	Create		

Mini Project Guidelines

Course Contents:

Students are expected to carry out independent research work on the chosen topic in this domain. Initially, student would be able to understand the concepts involved, perform pre-processing and apply text processing algorithms to derive different representations of text. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Students would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Implementation Details (with proper screenshots), Conclusion and Future work.

	Text Books
1	Steven Bird, Ewan Klein, and Edward Loper, " <i>Natural Language Processing with Python</i> ", O'reilly Publications, 2009.
2	Yoav Goldberg, "Neural Network Methods for Natural Language Processing", Synthesis Lectures on Human Language Technologies, 2017

	References					
1	Dan Jurafsky and James H. Martin, "Speech and Language Processing", Standford University, 3rd					
1	Edition, 2020					
2	Jason Brownlee, "Deep Learning for Natural Language Processing", 2017.					
	Karthiek Reddy Bokka, Shubhangi Hora, Tanuj Jain, Monicah Wambugu, "Deep Learning for					
3	Natural Language Processing: Solve your natural language processing problems with smart deep					
	neural networks",					
	Useful Links					
1	NLP Course on NPTEL: Link					
2	Applied NLP Course on NPTEL: Link					
3	NLP Resources by Mausam: Link					
4	NLTK Book: Link					

CO-PO Mapping								
	Programme Outcomes (PO)							
	1 2 3 4 5 6							
CO1	2							
CO2		3				2		
CO3 1 2 2								
The streng	gth of mapping	is to be written a	s 1,2,3; Here, 1: I	low, 2: Mediu	m, 3: High			

Each CO of the course must map to at least one PO.

Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluat	ion.				
Assessmen	Based on	Conducted by	Typical Schedule	Mark				
t				s				
TA1	Lab activities,	Lab Course	During Week 1 to Week 6	20				
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50				
1 4 2	Lab activities,	Lab Course	During Week 7 to Week 12	30				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40				
ESE	attendance, journal	Faculty	Marks Submission at the end of Week 18	40				

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)							
Bloom's Taxonomy Level LA1 LA2 ESE Total							
Remember							
Understand							
Apply	20	10	5	35			
Analyze	10	10	10	30			
Evaluate		10	10	20			
Create			15	15			
Total	30	30	40	100			

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
	AY 2021-22				
	Course Information				
Programme M. Tech. (Computer Science and Engineering)					
Class, Semester	First Year M. Tech., Sem II				
Course Code	Course Code 5CO576				
Course Name	Course Name A B Elective Lab 1- Data Compression and Encryption Lab				
Desired Requisites:	Computer Network Basics, Programming				

Teaching Scheme			Examination Scheme (Marks)			
Lecture		LA1	LA2	ESE	Total	
Tutorial	-	30	30	40	100	
Practical	2 Hrs/week				÷	
Interaction	-		Cred	lits: 1		

	Course Objectives					
1	To introduce the students Lossless and Lossy compression techniques for different	types of data.				
2	To introduce the students to the data encryption techniques.					
3	To introduce the students to the advanced network security and ethical hacking cor	cepts.				
4	4					
	Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	end of the course, the students will be able to,					
CO1	CO1 illustrate different data compression techniques, cryptography techniques, Apply Apply					
CO2	analyse different data compression techniques, cryptography techniques, network security and ethical hacking concepts.	Analyse				

Mini Project Guidelines

Course Contents:

Students are expected to carry out independent research work on the chosen topic in this domain. Initially, students would be able to understand the concepts involved, perform pre-processing and apply different encryption algorithms to data. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Students would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Implementation Details (with proper screenshots), Conclusion and Future work.

	Text Books
1	Khalid Sayood, "Introduction to Data Compression", Fifth Edition, Morgan Kaufmann, 2020, ISBN-10: 9351073904
2	David Saloman, "Data Compression: The complete reference", 2011, Springer publication, ISBN-10: 9788184898002
3	Behrouz Forouzen, "Cryptography and Network Security", Tata Mc Graw –Hill Education, 2011, ISBN-10: 0070660468
4	William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson
	Education Asia Publication, /** Educin, 2017, ISBN-10: 9789532585225

	References					
1	Jean-Loup Gailly, Mark Nelson, "The Data Compression Book", 2nd Edition, BPB Publication,					
1	1996, ISBN-10: 817029729X					
2	Colt McAnlis, Aleks Haecky, "Understanding Compression: Data Compression for Modern					
	Developers", Shroff/O'Reilly; First edition, 2016, ISBN-10: 935213446X					
2	Atul Kahate, "Cryptography and Network Security", 4th Edition, McGraw-Hill, 2019, ISBN-10:					
3	9353163307					
4	Bruce Schnerer, "Applied Cryptography: Protocols, Algorithms, and Source Code in C", John					
	Willey & Sons Inc. Publication, 2nd Edition, 1995, ISBN-10: 9780471117094					
	Useful Links					
1	Coursera Week 5 of Algorithms -II Course: Link					
2	Coursera Course: Cryptography I: Link					
3	SWAYAM Course: Cyber Security: Link					

CO-PO Mapping								
	Programme Outcomes (PO)							
	1 2 3 4 5 6							
CO1	2		2		1			
CO2				2	1	2		
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High								
Each CO c	of the course m	ust map to at leas	t one PO					

Assessment								
There are thre IMP: Lab ES	There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.							
Assessmen	Based on	Conducted by	Typical Schedule	Mark				
t l								
T A 1	Lab activities,	Lab Course	During Week 1 to Week 6	30				
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6					
T A D	Lab activities,	Lab Course	During Week 7 to Week 12	20				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40				
ESE attendance, journal Faculty Marks Submission at the end of Week 18 40								
Week 1 indic	Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown,							

considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level	LA1	LA2	ESE	Total		
Remember						
Understand						
Apply	20	10	5	35		
Analyze	10	10	10	30		
Evaluate		10	10	20		
Create			15	15		
Total	30	30	40	100		

W	alchand College of Engineering, Sangli	
	(Government Aided Autonomous Institute)	
	AY 2021-22	
	Course Information	
Programme	M. Tech. (Computer Science & Engineering)	
Class, Semester	First Year M. Tech., Sem II	
Course Code	3CO577	
Course Name	A B Elective Lab 1- Theory and Applications of Remote Sensing & GIS	
	Lab	
Desired Requisites: Fundamentals of Image processing, Programming		

Teaching Scheme			Examinatio	on Scheme (Marks	5)
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	Credits: 1			

	Course Objectives	
1	To inculcate and demonstrate knowledge of Remote Sensing (RS) and Geographic	Information
	System (GIS)	
2	To practice RS and GIS tools and techniques using RS and GIS data and data produced	ucts
	To provide students hands on experience on processing RS and GIS data and use the	ne advanced
3	concepts in computer science and engineering (DIP, RDBMS, ML, etc) to solve va	arious
	interdisciplinary problems.	
	Course Outcomes (CO) with Bloom's Taxonomy Level	
At the	end of the course, the students will be able to,	
CO1	Practice theory and concepts of RS and GIS	Apply
CO2	Verify and process data and data products of RS and GIS using tools/software	Evaluate
	Design solutions for various interdisciplinary problems using RS and GIS	
CO3	tools/software and advanced concepts in computer science and engineering (DIP,	Create
	RDBMS, ML, etc.).	

Mini Project Guidelines

Course Contents:

Students are expected to practice on RS and GIS tools/software and get acquainted with characteristics and features of the tools/software. Initially students will be given few assignments in order to help them to understand the features and scope of the software along with limitations. Course faculty will help students during practical hours and solve their queries through discussion and demonstration. Further, students will select an application (RS and GIS based) and study it in detail through research papers, define their problem statement and implement the same on the basis of theory and practical knowledge acquired during theory and practical hours respectively. The progress of the work done and discussion would be documented from time-to-time. Students would submit a brief report of the work he/she has carried out during the semester.

Text Books	
1 Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing Hous	se. 2008
2 Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Informa	tion System",

	Prentice Hall India. 20012
	References
1	Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th
1	Edition. 2012
2	Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010
	Useful Links
1	NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08
1	https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10
2	https://www.usgs.gov
3	https://bhuvan.nrsc.gov.in/bhuvan_links.php#
4	https://webapps.itc.utwente.nl/sensor/default.aspx?view=searchsen

			CO-PO Mapp	oing		
			Programme C	Outcomes (PO)		
	1	2	3	4	5	6
CO1			2			
CO2	2			2		
CO3	3	2		2		2
The strength of mapping is to be written as 1.2.3; Here 1: Low 2: Medium 3; High						

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.

	Assessment				
There are thre	There are three components of lab assessment, LA1, LA2 and Lab ESE.				
IMP: Lab ES	E is a separate field of Bosod on	Conducted by	Typical Schodulo	1011. Mark	
t	Daseu on	Conducted by	i ypical Schedule	S INIAL K	
	Lab activities	Lab Course	During Wook 1 to Wook 6		
LA1	Lab activities,	Lab Course	During week I to week o	30	
	attendance, journal	Faculty	Marks Submission at the end of Week 6		
1.4.2	Lab activities,	Lab Course	During Week 7 to Week 12	20	
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50	
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40	
ESE	attendance, journal	Faculty	Marks Submission at the end of Week 18	40	

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	LA1	LA2	ESE	Total
Remember				
Understand				
Apply	20	10	05	35
Analyze				
Evaluate	10	10	10	30
Create		10	25	35
Total	30	30	40	100

Walchand College of Engineering, Sangli		
(Government Aided Autonomous Institute)		
AY 2021-22		
Course Information		
Programme	M. Tech. (Computer Science & Engineering)	
Class, Semester	First Year M. Tech., Sem II	
Course Code	5CO578	
Course Name	A B Elective Lab 1- Machine Learning Lab	
Desired Requisites: Linear Algebra, Probability theory, Programming		

Teaching Scheme			Examinatio	on Scheme (Marks	s)
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	Credits: 1			

	Course Objectives	
1	To apply various Machine learning techniques.	
2	To evaluate Machine Learning algorithms.	
3	To build prototype machine learning system.	
4		
	Course Outcomes (CO) with Bloom's Taxonomy Level	
At the	end of the course, the students will be able to,	
CO1	apply machine learning techniques to solve real world problem	Apply
CO2	demonstrate comparative performance of applications.	Evaluate
CO3	build typical machine learning application in a team work	Create

Mini Project Guidelines

Course Contents:

Students are expected to carry out independent research work on the chosen topic in this domain. Initially, student would be able to understand the usage of different data structures, use them and apply its operations for solving real-world problems. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Student would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Implementation Details (with proper screenshots), Complexity of using particular data structure, Conclusion and Future work.

	Text Books
1	Jason Bell "Machine Learning Hands-On for Developers and Technical Professionals" Wiley 2015.
2	Tom M. Mitchell "Machine Learning" MGH.
3	Stephen Marsland, Taylor & Francis "Machine Learning: An Algorithmic Perspective" (CRC).
	References
1	William Whsieh "Machine Learning Methods in the Environmental Sciences" Neural Networks.,
1	Cambridge Univ Press.
2	Richard O Duda, Peter E. Hart and David G. Stork "Pattern classification" John Wiley & Sons Inc.,

	2001.
3	Chris Bishop "Neural Networks for Pattern Recognition" Oxford University Press, 1995.
	Useful Links
1	'Scikit-learn' tutorial: Link
2	
3	
4	

CO-PO Mapping									
		Programme Outcomes (PO)							
	1	2	3	4	5	6			
CO1	3								
CO2		1							
CO3			3			3			
The streng	The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High								

Each CO of the course must map to at least one PO.

Assessment								
There are three components of lab assessment, LA1, LA2 and Lab ESE.								
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.								
Accessmon	Basad on	Conducted by	Typical Schodula	Mork				

Assessmen	nen Based on Conducted by Typical		Typical Schedule	Mark
t				S
ΤΑ1	Lab activities, Lab Course During Week 1 to Week 6		During Week 1 to Week 6	20
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50
T A C	Lab activities,	Lab Course	During Week 7 to Week 12	20
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40
	attendance, journal	Faculty	Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)							
Bloom's Taxonomy Level	LA1	LA2	ESE	Total			
Remember							
Understand							
Apply	20	10	5	35			
Analyze	10	10	10	30			
Evaluate		10	10	20			
Create			15	15			
Total	30	30	40	100			

Walchand College of Engineering, Sangli				
	(Government Aided Autonomous Institute)			
	AY 2021-22			
	Course Information			
Programme	M. Tech. (Computer Science & Engineering)			
Class, Semester First Year M. Tech., Sem II				
Course Code	5CO579			
Course Name	A B Elective Lab 1- Internet of Things Lab			
Desired Requisites: Basic Programming Knowledge				

Teaching Scheme		Examination Scheme (Marks)				
Lecture	-	LA1	LA2	ESE	Total	
Tutorial	-	30	30	40	100	
Practical	2 Hrs/Week					
Interaction	-	Credits: 1				

	Course Objectives				
1	To apply various IOT techniques.				
2	To deliver hand-on experience in the field				
3	To inculcate interest in different domain areas				
4	To build prototype in IOT system.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	end of the course, the students will be able to,				
CO1	apply IOT techniques to solve real world problem	Apply			
CO2	To Demonstrate basics of IOT	Apply			
CO3	To analyse and evaluate the solutions and compare them.	Evaluate			
CO4	build typical IOT application in a team work	Create			

Mini Project Guidelines

Course Contents:

Students are expected to carry out independent research work on the chosen topic in IOT domain. Apply IOT operations for solving real-world problems. In discussion with the concerned faculty during laboratory hours, the student would plan the Mini project and prepare a synopsis. The progress of the work done and discussion would be documented from time-to-time. The final system would be checked if it meets the requirements specified and the corrections if any would be incorporated in discussion with the faculty. Student would submit a brief Project Report that must include proper documentation including Introduction, Literature survey, Hardware & Software Requirements, System Design Architecture or Block Diagram, Implementation Details (with proper screenshots), Conclusion and Future work.

	Text Books
	Mandler B., Barja J., Campista Mitre, M.E., Cagá_ová, D. Chaouchi, H. Zeadally, S. Badra,
1	M. Giordano, S. Fazio, M. Somov, A. Vieriu, RL., "Internet of Things. IoT
	Infrastructures", Springer International Publishing, Second International Summit, IoT 360°
	2015, Rome, Italy, October 27-29, 2015. Revised Selected Papers, Part I
2	Kyung, CM., Yasuura, H. Liu, Y. Lin, YL., "Smart Sensors and Systems", Springer
2	International Publishing,2017.

	References					
1	Hersent Olivier, Boswarthick David , Elloumi Omar , "The Internet of Things: Key Applications and Protocols", Wiley-Blackwell, Second Edition ,2012					
2	S. Misra, A. Mukherjee, and A. Roy, 2020. <i>Introduction to IoT</i> . Cambridge University Press.					
3	S. Misra, C. Roy, and A. Mukherjee, 2020. <i>Introduction to Industrial Internet of Things and Industry 4.0.</i> CRC Press.					
	Useful Links					
1	https://onlinecourses.nptel.ac.in/noc21_cs17/preview					
-						

2 https://www.tinkercad.com/things/55ubLwvGK0g-1st-iot-project

CO-PO Mapping						
			Programme (Dutcomes (PO)		
	1	2	3	4	5	6
CO1	3					
CO2		1				
CO3			3			3
CO4						3
The stren	gth of mapping i	s to be written a	s 1,2,3; Here, 1:	Low, 2: Mediun	n, 3: High	

Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks			
ТАТ	Lab activities,	Lab Course	During Week 1 to Week 6	30			
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50			
T A D	Lab activities,	Lab Course	During Week 7 to Week 12	20			
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50			
ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40			
	attendance, journal	Faculty	Marks Submission at the end of Week 18	40			

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)						
Bloom's Taxonomy Level	LA1	LA2	ESE	Total		
Remember						
Understand						
Apply	20	10	5	35		
Analyze	10	10	10	30		
Evaluate		10	10	20		
Create			15	15		
Total	30	30	40	100		

Walchand College of Engineering, Sangli			
	(Government Aided Autonomous Institute)		
	AY 2021-22		
Course Information			
Programme	M. Tech. (Computer Science and Engineering)		
Class, Semester	First Year M. Tech., Sem II		
Course Code	5CO580		
Course Name A B Elective Lab 1- Computer Vision Lab			
Desired Requisites:	Digital Image Processing, Programming		

Teaching Sch	eme (Hrs)	Examination Scheme (Marks)				
Lecture	-	LA1	LA2	ESE	Total	
Tutorial	-	30	30	40	100	
Practical	2					
Interaction	-	Credits: 1				

	Course Objectives						
1	To dig up theoretical and practical knowledge in computer vision						
2	To demonstrate the use of various algorithms in the course						
3	3 To inculcate interest in different domain areas and related real time applications						
Course Outcomes (CO) with Bloom's Taxonomy Level							
At the end	of the course, the students will be able to,						
CO1	Demonstrate knowledge of various techniques of color image processing	Applying					
and computer vision related to theoretical knowledge gained.							
CO2	To analyse and evaluate the results of various algorithms for building	Evaluating					
	solution of real time problems						

List of Experiments / Lab Activities

List of Experiments:

Lab sessions are to be utilized for problem solving/designing/implementation, to ensure that students have properly learnt the topics covered in the theory course. The partial list is as follows (the list may be updated during actual implementation) :

- 1. Work around with different different color models and perform color transformations
- 2. Implement and apply different texture analysis techniques
- 3. Implement and / or apply different ways of representing images
- 4. Implement and / or apply different object recognition techniques
- 5. Implement different ways of detecting moving objects

Text Books					
1	R. C. Gonzalez, R. E. Woods, Digital Image Processing, 4th Edition. 2018, PHI				
2	Sonka Milan, Vaclav Hlavac, Boyle, "Digital Image Processing and Computer Vision", Cengage				
2	Learning, Third edition, 2013				
References					
1	S. Jayaraman, S. Esakkirajan, T. Veerkumar, "Digital Image Processing", Tata McGraw Hill,				
1	Third edition, 2010				
2	D. A. Forsyth, J. Ponce, "Computer Vision – A Modern approach", Pearson Education, Prentice				
2	Hall, 2005				

3	Linda Shapiro, George C. Stockman, "Computer Vision", Prentice Hall, 2000				
Useful Links					
1	NPTEL course: Link				
2	NPTEL course: Link				

CO-PO Mapping						
Programme Outcomes (PO)						
РО	1	2	3	4	5	6
CO1	1		3			
CO2	3		2	3		
1:Low, 2:Medium, 3:High						

Assessment							
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.							
Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks			
I A 1	Lab activities,	Lab Course	During Week 1 to Week 6	30			
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50			
1.4.2	Lab activities,	Lab Course	During Week 7 to Week 12	20			
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50			
Lob ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40			
Lab ESE	attendance, journal	Faculty	Marks Submission at the end of Week 18	40			

Week 1 indicates the starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							
Understand							
Apply	20	20	25	65			
Analyze							
Evaluate	10	10	15	35			
Create							
Total Marks	30	30	40	100			

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2021-22								
	Course Information								
Progra	Programme M. Tech. (Computer Science and Engineering)								
Class,	Class, Semester First Year M. Tech., Sem II								
Cours	Course Code 50E109								
Course Name Open Elective: Machine Learning in Practice									
Desire	Desired Requisites:								
1	Teaching	ks)							
Lectur	re	2 Hrs/week	T1	T2	ESE		Total		
Tutori	ial	-	20	20	60		100		
Practi	cal	-							
Intera	ction	-		Cre	dits: 2				
			Course Ob	jectives					
1	To intro	duce python an	nd mathematical concepts	required for r	nachine learni	ng			
2	To prep	are data for ma	chine learning						
3	To impl	ement supervis	ed and unsupervised learn	ing algorithm	1				
		C			T 1	•			
Course Outcomes (CO) with Bloom's Taxonomy Level							<u> </u>		
CO2 Implement different Machine Learning algorithms							Apply		
CO2 Implement different Machine Learning algorithms.							Evaluate		
	Lvaluat	eperformance	of the machine learning an	gonunn.			Lvaluate		
Modu	le		Module Conten	nts			Hours		
	Intro	duction: Applie	cations of Machine Learnin	ng, Introducti	on to python:	basic			
Ι	const matp	ructs of pyth lotlib	on (list, tuples, strings,	dictionary),	pandas, Nu	mPy,	4		
II	Data norm	Cleaning: ha	ndling NA values, hand n/test split, cross-validation	ling categori n	cal features,	Data	4		
	Linea	ar algebra and	l statistics: vectors, vect	tor multiplication	ation, equation	on of			
III	line/p	olane/hyperplan	ne, stats: gaussian distrib	oution, log n	ormal distribu	ution,	5		
TT 7	powe	r law distributi	on, variance, co-variance	1		- 4	4		
IV	super	vised learning	tree based alexitim	logistic regre	ssion, decision	n tree	4		
V	casca	nding, Unsuper	vised learning: clustering a	lgorithms: Ki	Means, HDBS	CAN	6		
VI	VI Model Performance: Confusion matrices, F1 score, MAE, RMSE, Hyper- parameter tuning, deployment						3		
				_					
1	<u>م</u> ۲1	ino I comine	Text Bo	ooks	111 1007				
	IVIaci	duction to Mar	i om Milchell. First Edition	II, MCGraw-	niii, 1997.				
2	Intro	unction to Mac	nine Learning Edition 2, b	by Eulem Alp	ayum				
	I								
			Referen	nces					
1									
2									
	1								

Useful Links								
1	NPTEL 'Introduction to Machine learning' video: Link							
2								
3								
CO-PO Mapping								
	Programme Outcomes (PO)							
	1	2	3	4	5	6		
CO1				2				
CO2	2			3				
CO3	1		1			2		
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High								
Each CO of the course must map to at least one PO.								

Assessment

Assessment Plan based on Bloom's Taxonomy Level (Marks)							
Bloom's Taxonomy Level T1 T2 ESE Total							
1	Remember						
2	Understand						
3	Apply	20	10	30	60		
4	Analyze						
5	Evaluate		10	30	40		
6	Create						
	Total	20	20	60	100		

Walchand College of Engineering, Sangli								
AY 2021-22								
Course Information								
Progr	amme		M. Tech. (C	ech. (Computer Science and Engineering)				
Class, Semester			First Year M. Tech., Sem II					
Cours	e Code	9	5IC501					
Cours	e Nam	e	Value Education					
Desire	d Rea	uisites:	Value Education					
	1							
]	Feachi	ng Scheme	Examination Scheme (Marks)					
Lectu	re	2 Hrs./week	T1	T2	ESE	Total		
Tutor	ial	-	20	20	60	100		
Practi	cal	-						
Intera	ction	-	Credits: 0					
			(Course Objec	tives			
1	To ir	Γο impart knowledge on value of education and self- development.						
2	To ir	o imbibe good values in students.						
3	3 To highlight importance of character.							
Course Outcomes (CO) with Bloom's Taxonomy Level								
At the	Evol	in value of odu	action and a	able to	nont	Understanding		
C01	Sum	morizo importon	cation and so	baractor and	I Pahaviar davalopment	Understanding		
Modu		marize importan	Module Contents			Hours		
Withda	1	Values and s	elf_develop	ment _Socia	y values and individua			
	at	titudes Work et	.1					
Т	Ir	dian vision of h	6					
-	2	Moral and non-						
	3	Value judgmen						
	1.	Importance of c						
	2.	Sense of	2,					
т	C	oncentration. Tr						
	C	leanliness.	0					
	3.	Honesty, Huma						
	4.	Patriotism. Lov						
	1.	Personality an	c					
	at	titude. Positive						
III		hinking. Integrit						
	$\begin{vmatrix} 2 \\ 2 \end{vmatrix}$	2. Punctuality, Love and Kindness.						
	3.	5. Avoid fault Thinking.						
	4.	4. Free from anger, Dignity of labour.						
	5.	5. Universal brothernood and religious tolerance.						
		0. True mendsmp. 7 Happiness Vs suffering love for truth						
	8 Awara of salt d		estructiva h					
		9. Association and Cooperation						
	1) Doing hest for						
IV	IV 1 Character and Competence –Holy books vs Rlind faith				7			
11	1 1							

	2. Self-management and Good health.					
	3. Science of reincarnation.					
4. Equality, Nonviolence, Humility, Role of Women.						
5. All religions and same message.						
6. Mind your Mind, Self-control.						
	7. Honesty, Studying effectively					
Text Books						
1	Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford					
1	University Press, New Delhi					
References						
1	https://www.tripurauniv.ac.in/Content/pdf/StudyMaterialsDetail/MA%20Education%					
	203rd%20Semester/EDCN-901C-Value%20Education.pdf					
2	https://www.dypiemr.ac.in/images/value-added-courses/vac/Content-for-Value-					
	Education.pdf					
Useful Links						
1	https://www.youtube.com/watch?v=JK59OcZv8H4					
2	https://www.youtube.com/watch?v=XqQCI_ZhtxA					

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1							
CO2							
CO3							
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							

Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course						
Blo	om's Taxonomy Level	T1	T2	ESE	Total	
1	Remember					
2	Understand	20	20	60	100	
3	Apply					
4	Analyze					
5	Evaluate					
6	Create					
	Total	20	20	60	100	