ACADEMIC REGULATIONS & SYLLABUS

Faculty of Computer Science & Applications

Smt. Chandaben Mohanbhai Patel Institute of Computer Applications

M.Sc.(IT) Programme
(Choice Based Credit System)

ACADEMIC REGULATIONS

To ensure uniform system of education, duration of post graduate programmes, eligibility criteria for and mode of admission, credit load requirement and its distribution between course and system of examination and other related aspects, following academic rules and regulations are recommended.

1. System of Education

The Semester system of education should be followed across the Charotar University of Science and Technology (CHARUSAT) at Master's levels. Each semester will be at least 90 working days' duration. Every enrolled student will be required to take a specified load of course work in the chosen course of specialization and also complete a project/dissertation if any.

2. Duration of Programme

Postgraduate programme: Master of Science in Information Technology

Minimum	4 semesters (2 academic years)
Maximum	6 semesters (3 academic years)

3. Eligibility & Mode of admissions

Eligibility of a candidate and mode of admission to the programme will be according to the regulations for admission committee decided by Government of Gujarat from time to time.

4. Programme structure and Credits

A student admitted to a program should study the course and earn credits specified in the course structure.

5. Attendance

5.1 All activities prescribed under these regulations and listed by the course faculty members in their respective course outlines are compulsory for all students pursuing the courses. No exemption will be given to any student from attendance except on account of serious personal illness or accident or family calamity that may genuinely

prevent a student from attending a particular session or a few sessions. However, such

unexpected absence from classes and other activities will be required to be condoned by the Dean/Principal.

5.2 Student attendance in a course should be 80%.

6 Course Evaluation

6.1 The performance of every student in each course will be evaluated as follows:
   6.1.1 Internal evaluation by the course faculty member(s) based on continuous assessment, for 30% of the marks for the course; and
   6.1.2 Final examination by the University through written paper or practical test or oral test or presentation by the student or a combination of any two or more of these, for 70% of the marks for the course.

6.2 **University Examination**

   6.2.1 The final examination by the University for 70% of the evaluation for the course will be through written paper or practical test or oral test or presentation by the student or a combination of any two or more of these.
   6.2.2 In order to earn the credit in a course a student has to obtain grade other than FF.

6.3 Performance at Internal & University Examination will be done on the relative grading system.

7 Grading

The student's performance in any semester will be assessed by the Semester Grade Point Average (SGPA). Similarly, his performance at the end of two or more consecutive semesters will be denoted by the Cumulative Grade Point Average (CGPA). The SGPA and CGPA are defined as follows:

Range of Marks (%)	≥80	≥75 <80	≥70 <75	≥65 <70	≥60 <65	≥55 <60	≥50 <55	<50
Letter Grade	AA	AB	BB	BC	CC	CD	DD	FF
Grade Point	10	9	8	7	6	5	4	0

SGPA $= \Sigma\, C_i\, G_i / \Sigma\, C_i$ where C_i is the number of credits of course i
G_i is the Grade Point for the course i

and i = 1 to n, n = number of courses in the

semester

$$CGPA = \Sigma\, C_i\, G_i\, /\, \Sigma\, C_i$$

where C_i is the number of credits of course i
G_i is the Grade Point for the course i
and i = 1 to n, n = number of courses of all
semesters up to which CGPA is computed.

8 Detention Rule

A student will be promoted to next year only if he/she has cleared all the courses of the year he/she is studying in

9 Awards of Degree

9.1 Every student of the programme who fulfils the following criteria will be eligible for the award of the degree:

9.1.1 He should have earned at least minimum required credits as prescribed in course structure; and

9.1.2 He should have cleared all evaluation components in every course; and

9.2 The student who fails to satisfy minimum requirement of CGPA will be allowed to improve the grades so as to secure a minimum CGPA for the award of degree. Only latest grade will be considered.

10 Award of Class:

The class awarded to a student in the programme is decided by the final CGPA as per the following scheme:

Distinction:	CGPA ≥7.5 & ≤10
First class:	CGPA ≥ 6.0 & ‹7.5
Second Class:	CGPA ≥ 5.0 & ‹6.0
Pass Class:	CGPA ‹5.0

11 Transcript:

The transcript issued to the student at the time of leaving the University will contain a consolidated record of all the courses taken, credits earned, grades obtained, SGPA, CGPA, class obtained, etc.

CHOICE BASED CREDIT SYSTEM

The choice based credit system provides flexibility in designing curriculum and assigning credits based on the course content and hour of teaching. The choice based credit system provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective and open elective courses. The CBCS provides a cafeteria type approach in which the students can take courses of their choice and adopt an interdisciplinary approach to learning. The courses shall be evaluated on the grading system, which is considered to be better than the conventional marks system.

CBCS – Conceptual Definitions / Key Terms (Terminologies)

Types of Courses: The Programme Structure consist of 3 types of courses:
Foundation Courses, Core Courses and Elective Courses.

Foundation Course

These courses are offered by the institute in order to prepare students for studying courses to be offered at higher levels.

Core Courses

A Course which shall compulsorily be studied by a candidate to complete the requirements of a degree / diploma in a said programme of study is defined as a core course. Following core courses are incorporated in CBCS structure:

A. University Core Courses(UC):
University core courses are compulsory courses which are offered across university and must be completed in order to meet the requirements of programme.

B. Programme Core Courses(PC):

Programme core courses are compulsory courses offered by respective programme owners, which must be completed in order to meet the requirements of programme.

Elective Courses

Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline of study or which provides an extended scope or which enables an exposure to some other discipline / domain or nurtures the candidates

proficiency / skill is called an elective course. Following elective courses are incorporated in CBCS structure:

A. University Elective Courses(UE): The pool of elective courses offered across all faculties / programmes.

B. Institute Elective Course (IE)

Institute elective courses are those courses which any students of the University/Institute of a Particular Level (PG/UG) will choose as offered or decided by the University/Institute from time-to-time irrespective of their Programme /Specialization.

C. Programme Elective Courses(PE): The programme specific pool of elective courses offered by respective programme.

Vision,Mission,PEOs,POs and PSOs

Vision:

To become a leading institution in the field of computer applications and contribute in national efforts of computerizing public systems

Mission

To produce competent computer professionals with the ability to face future challenges.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The graduates will

PEO1: Be able to understand and analyse the requirements of complex real world problems and solve them by designing optimised computer applications.

PEO2: Be able to apply skills in order to excel at professional careers.

PEO3: Be able adopt at rapidly changing technological landscape in domains of their preference.

PEO4: Be able to act ethically and professionally while maintaining high moral values.

PROGRAM OUTCOMES (POs)

The Graduate of Computer Science and Applications will be able to :

PO1. Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.

PO2. Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.

PO3. Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies

PO4. Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PO5. Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions

PO6. Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.

PO7. **Life-long Learning**: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.

PO8. Project Management and Finance: Ability to understand, management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

PO9. Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.

PO10. **Societal & Environmental Concern:** Ability to recognize economical, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.

PO11. Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment.

PO12. Innovation and Entrepreneurship: Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

PROGRAM SPECIFIC OUTCOMES (PSOs)

At the end of the programme, the student should be able to

PSO1: Analyse, design and develop effective software applications for solving contemporary challenges.

PSO2: Harness the necessary skills with spirit of research and entrepreneurship.

   Total Credits of Programme(4 Semesters)   108

TEACHING SCHEME
FOR

M.Sc.IT PROGRAMME
(1ST and 2ND YEAR)

EFFECTIVE FROM
ACADEMIC YEAR 2023-24

Teaching & Examination Scheme
Master of Science in Information Technology (M.Sc.(IT)) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - I

Course Code	Course Title	Teaching Scheme				Examination Scheme						Total
		Contact Hours			Credit	Theory			Practical			
		Theory	Practical	Total		Internal		External	Internal		External	
						Case Study	Tests		Term work	Tests		
MS120-123 OCMSIT1001-1002	Elective-I	4	-	4	4	10	20	70	-	-	-	100
MS124	Advanced Java	3	3	6	6	10	20	70	15	15	70	200
MS125	Web Development using .NET	3	3	6	6	10	20	70	15	15	70	200
MS126	Advanced Database Administration	4	3	7	7	10	20	70	15	15	70	200
HS141.02 C	Foreign Languages	-	2	2	2	- -		-	30	70		100
HS105.02 C	Academic Speaking and Presentation Skills											
		14	11	25	25	400			400			800

Elective-I	
Course Code	Course Title
MS120	Cloud Computing Essentials
MS121	Mobile and Wireless Communications
MS122	Fuzzy Logic and Applications
MS123	Distributed Operating Systems
OCMSIT1001	Ethical Hacking
OCMSIT1002	Introduction to Internet of Things

Teaching & Examination Scheme
Master of Science in Information Technology (M.Sc.(IT)) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - II

Course Code	Course Title	Teaching Scheme			Credit	Examination Scheme						Total
		Contact Hours				Theory			Practical			
		Theory	Practical	Total		Internal		External	Internal		External	
						Case Study	Tests		Term work	Tests		
MS223-226 OCMSIT1003-1004	Elective-II	3	3	6	6	10	20	70	15	15	70	200
MS227	Web Development Using Open Source	3	3	6	6	10	20	70	15	15	70	200
MS228	Advanced Mobile Application Development	3	3	6	6	10	20	70	15	15	70	200
MS229	Modern Software Engineering	4	-	4	4	10	20	70	-	-	-	100
HS106.02 C	Academic Writing	-	2	2	2	-	-	-	30		70	100
	University Elective-I **	-	2	2	2	-		-	30		70	100
		13	13	26	26	400			500			900

Student will take any university elective offered by different institutions of university. CMPICA has decided to offer **Internet and Web Designing and Mobile Application Development** course for others**.**

Elective-II	
Course Code	Course Title
MS223	Game Design
MS224	Advanced Python Programming
MS225	Block Chain Programming
MS226	HTTP Web Service for Enterprise Application
OCMSIT1003	Introduction to Machine Learning
OCMSIT1004	Introduction to Industry 4.0 and Industrial Internet of Things

University Elective-I

No	Course Code	Course Name	Department/Faculty
1	EE782.01	Energy Audit and Management	Engineering
2	CE771.01	Project Management	Engineering
3	PT796.01	Fitness & Nutrition	Physiotherapy
4	MB651	Software based Statistical Analysis	Management
5	NR755	First Aid & Life Support	Nursing
6	OC733.01	Introduction to Polymer Science	Applied Science
7	MA771.01	Reliability and Risk Analysis	Mathematics
8	ME781.01	Occupational Health &Safety	Engineering
9	MA772.01	Design of Experiments	Mathematics
10	RD701.01	Introduction to Analytical Techniques	Applied Science
11	RD702.01	Introduction to Nanoscience And Technology	Applied Science
12	PH891	Community Pharmacy Ownership	Pharmacy
13	PH892	Intellectual Property Rights	Pharmacy
14	PSE55	Astrophysics ,Space and Cosmos	Applied Science
15	CA730	Internet and Web Designing	Computer Science
16	CA842.01	Mobile Application Development	Computer Science

Teaching & Examination Scheme
Master of Science in Information Technology (M.Sc.(IT)) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - III

Course Code	Course Title	Teaching Scheme			Credit	Examination Scheme						Total
		Contact Hours				Theory			Practical			
		Theory	Practical	Total		Internal		External	Internal		External	
						Case Study	Tests		Term work	Tests		
MS328-331	Elective-III	4	3	7	7	10	20	70	15	15	70	200
MS332	Software Quality Assurance and Testing	3	3	6	6	10	20	70	15	15	70	200
MS333	Mini Project	-	12	12	12	-	-	-	100		300	400
CL144.03 C	Environmental Sciences	-	2	2	2	-	-	-	30		70	100
		07	20	27	27	200			700			900

Elective-III	
Course Code	Course Title
MS328	Advanced Game Development
MS329	Data Science
MS330	IOT enabling Technologies
MS331	Advanced web designing

Teaching & Examination Scheme
Master of Science in Information Technology (M.Sc.(IT)) Programme
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Effective from Year 2023 - 24
Semester - IV

Course Code	Course Title	Teaching Scheme				Internal	End Semester Examination		Total
		Contact Hours			Credit	Continuous Evaluation	Report	Presentation & Viva	
		Inst.	Industry	Total					
MS403	Dissertation/ Project Work	2	28	30	30	200	200	400	800

DETAILED SYLLABUS

FOR

M.Sc. (IT) PROGRAMME
(1ˢᵗ SEMESTER)

EFFECTIVE FROM ACADEMIC YEAR
2023-24

Teaching & Examination Scheme
Master of Science in Information Technology (M.Sc.(IT)) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - I

Course Code	Course Title	Teaching Scheme				Examination Scheme						
		Contact Hours			Credit	Theory			Practical			Total
		Theory	Practical	Total		Internal		External	Internal		External	
						Case Study	Tests		Term work	Tests		
MS120-123 OCMSIT1001-1002	Elective-I	4	-	4	4	10	20	70	-	-	-	100
MS124	Advanced Java	3	3	6	6	10	20	70	15	15	70	200
MS125	Web Development using .NET	3	3	6	6	10	20	70	15	15	70	200
MS126	Advanced Database Administration	4	3	7	7	10	20	70	15	15	70	200
HS141.02 C	Foreign Languages	-	2	2	2	- -		-	30		70	100
HS105.02 C	Academic Speaking and Presentation Skills											
		14	11	25	25	400			400			800

Elective-I	
Course Code	Course Title
MS120	Cloud Computing Essentials
MS121	Mobile and Wireless Communications
MS122	Fuzzy Logic and Applications
MS123	Distributed Operating Systems
OCMSIT1001	Ethical Hacking
OCMSIT1002	Introduction to Internet of Things

MS120: Cloud Computing Essentials
(100 Marks)

Contact Hours: 04

Pre-requisite: Operating System and Computer Networking concepts.

Methodology & Pedagogy: During theory lectures the emphasis will be given on the basics of cloud computing. Students will be introduced basic types, planning, service providers, mechanism, security problems and some concealed aspects of cloud computing. Students will give practical introduction in form of case study and by showing cloud infrastructure of university.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Theory Hours
1	Introduction to Cloud Computing	**06**
2	Components and Services of Cloud	**09**
3	Cloud Architecture	**09**
4	Cloud Infrastructure and Mechanisms	**09**
5	Cloud Security Services	**08**
6	Cloud Solutions and Case Studies	**07**

Total Hours (Theory): 48
Total Hours:48

Detail Syllabus:
Unit I : Introduction to Cloud Computing   **Hours 06**

History of Cloud Computing and evolution, Paradigm Shift in Computing, distributed nature of service Provisioning, Support entrepreneurship using Cloud Computing.

Unit II : Components and Services of Cloud   **Hours 09**

Advantages and drawbacks of Cloud Computing, Essential component for Cloud contract, Major outage of Cloud Computing and Enhancers for Cloud Computing. Introduction to SaaS, PaaS, IaaS. Introduction to Public Cloud, Private Cloud, Hybrid Cloud and Community Cloud, Storage Services for Cloud Computing.

Unit III : Cloud Architecture   **Hours 09**

Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Architecture, Redundant Storage Architecture. Introduction to major Cloud Service Provider: Amazon Web Services, Google Cloud. Microsoft Windows Azure and Office 365, Hp Cloud, RackSpace, CSC Corp, Verizon Terrimark, DropBox.

Unit IV : Cloud Infrastructure and Mechanisms   **Hours 09**

Introduction to Cloud Infrastructure Mechanisms: Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Storage Levels, Network Storage Interfaces, Object Storage Interfaces, Database Storage Interfaces, Relational Data Storage, on-Relational Data Storage, Cloud Usage Monitor, Monitoring Agent, Resource Agent, Polling Agent, Resource Replication. Introduction to Cloud Management Mechanisms: Remote Administration System, Resource Management System, SLA Management System, Billing Management System.

Unit V : Cloud Security Services   **Hours 08**

Introduction to Encryption, Symmetric Encryption, Asymmetric Encryption, Hashing, Digital Signature, Public Key Infrastructure (PKI), Identity and Access Management (IAM), Single SignOn (SSO), Cloud-Based Security Groups. Overview of Compliance and Certification, Access Control, Organizational Control. Benefits of Business using Cloud Computing, Risk of Cloud Computing, Cost factor in Cloud Computing.

Unit VI : Cloud Solutions and Case Studies   **Hours 07**

Overview of Cloud services, Designing Solutions for the Cloud, Implement & Integrate Solutions, Emerging Markets and the Cloud, Tools for Building Private Cloud: IaaS using Eucalyptus, PaaS on IaaS - AppScale

Core Books:

1. Kevin L. Jackson, Scott Goessling: Architecting Cloud Computing Solutions: Packt Publication: 2018
2. Thomas Erl, Zaigham Mahmood and Ricardo Puttini: Cloud Computing Concepts, Technology & Architecture, PHI, 2013.
3. S. Srinivasan: Cloud Computing Basics, Springer,2014.

Reference Books:

1. Derrick Rountree, Ileana Castrillo : The Basics of Cloud Computing, Syngress, 2013.
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinsk: Cloud Computing- Principles and Paradigms, John Wiley &Sons, 2011.

Web References:

1. http://whatisCloud.com/basic_concepts_and_terminology/Cloud [For basic terminology of Cloud Computing]
2. http://www.tutorialspoint.com/Cloud_Computing/ [For cloud computing lecture notes]
3. http://www.intel.in/content/dam/www/public/us/en/documents/guides/cloudcomputingvirtualiz ation-building-private-iaas-guide.pdf [For cloud computing virtualization]
4. www.cs.purdue.edu/.../Anya-Kim-Bhargava-MCCWorkshop.ppt [Security issues PPTs]

Course Outcomes: Upon successful completion of the course, students will be,

CO1:	**Students will learn basics of cloud computing**
CO2:	The students will be familiar with various cloud architectures and services.
CO3:	They will get the knowledge of various network mechanics.
CO4:	Students will get various business aspects of cloud computing with security aspects
CO5:	They will be able to design and deploy Cloud Infrastructure

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**

1	Evolution of Cloud Computing	√				
2	Understanding Cloud Computing and basic types		√			
3	Fundamentals of Cloud Architecture and Service Providers		√			
4	Cloud Computing Mechanisms			√		
5	Cloud Computing Security and Business Use				√	
6	Hidden Aspects of Cloud Computing					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	1	-	3	1	2	2	-	-	1	-
CO2	3	1	1	1	1	1	3	1	2	2	1	3	2	-
CO3	3	2	1	2	1	3	3	2	2	2	-	3	2	-
CO4	3	3	2	3	1	3	3	2	2	2	3	-	1	-
CO5	3	3	3	3	1	3	3	3	2	2	2	-	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS 121: Mobile and Wireless Communications
(100 Marks)

Contact Hours: 04

Pre-requisite: Basic of computer and its working

Methodology & Pedagogy: During the lecture sessions, the teacher will discuss the applications of wireless communication, underlying concepts of wireless communication, cellular network and its working. The students will also learn about 5g, edge computing and security issues in wireless communication.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Theory Hours
1	Introduction to wireless communications	**05**
2	Antenna and wave propagation	**07**
3	Encoding and modulation techniques	**05**
4	Cellular wireless network	**08**
5	Wireless link improvement techniques	**06**
6	Advanced concepts in wireless networks	**05**

Total Hours (Theory): 36
Total Hours: 36

Detail Syllabus:
Unit I: Introduction to wireless communications   **Hours 05**

Overview of communication system, component of communication system, digital vs analog communication, interface of analog to digital and digital to analog systems, conversation from analog to digital and digital to analog, examples of wireless communication, wireless vs. wired communication.

Unit II: Antenna and wave propagation   **Hours 07**

Radiation patterns, antenna types, propagation modes, line of sight communication, attenuation and signal distortion, free space loss, noise, atmospheric absorption, multipath refraction.

Unit III: Encoding and modulation techniques   **Hours 05**

Signal encoding criteria, digital data and analog signals – amplitude shift keying, frequency shift keying and phase shift keying, analog data and signal – amplitude modulation, angle modulation, analog data and digital signal – pulse code modulation, delta modulation.

Unit IV: Cellular wireless network   **Hours 08**

Cellular system overview, organization, frequency reuse, increasingly capacity, operation of cellular system, steps in a mobile switching center (MSC) controlled call between mobile users, mobile radio propagation effect, additional function in MSC controlled call, handoff performance metrics, handoff strategies used to determine instance of handoff, power control, traffic engineering.

Unit V: Wireless link improvement techniques   **Hours 06**

Equalization, diversity error detection methods – parity check, cyclic redundancy check, block error correction code – block codes, hamming codes, cyclic codes, reed Solomon codes.

Unit VI: Advanced concepts in wireless concepts   **Hours 05**

Introduction to Wi-Fi, WiMAX, ZigBee Networks, Wireless Adhoc Network, Overview of 4g and 5g cellular technologies, edge computing and fog computing, Security aspects of wireless computing.

Core Books:

1. William Stallings: Wireless communication & networks: 3rd Edition: Pearson: 2012.
2. David Tse: Fundamentals of Wireless Communication: 2nd Edition: Cambridge Uni. Press: 2014
3. Aditya K. Jagannatham: Principles of modern wireless communication Systems Theory and Practice: 1st Edition: McGraw Hill:2017

Reference Books:

1. T.S.Rappaport, "Wireless Communications Principles and Practice", 2nd edition, PHI,2002.
2. William C.Y.Lee, "Mobile Cellular Telecommunications Analog and Digital Systems", 2nd edition, TMH, 1995

Web References:

1. https://www.tutorialspoint.com/wireless_communication/index.htm [Wireless networking tutorials]
2. https://www.javatpoint.com/mobile-communication-tutorial [Mobile computing tutorials]
3. https://www.youtube.com/watch?v=f2wlHL1Sok8 [Cellular system and wireless concepts -NPTEL course YouTube link]

Course Outcomes: Upon successful completion of the course, students will be,

CO1:	**Student will understand role of wireless networks in communication system.**
CO2:	Student will get insight into underlying principles of wireless communication system.

CO3 :	The student will grasp concepts of error and flow control of wireless network.	
CO4 :	The student will get awareness of cellular network system and its working.	
CO5 :	The student will know about modern and upcoming wireless communication technologies and concepts along with security aspects.	

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
1	**Introduction to wireless communications**	√				
2	**Antenna and wave propagation**		√			
3	**Encoding and modulation techniques**			√		
4	**Cellular wireless network**				√	
5	**Wireless link improvement techniques**				√	
6	**Advanced concepts in wireless concepts**					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	2	1	2	2	2	-	1	1	3	2
CO2	3	3	3	3	3	3	3	2	3	-	2	2	3	2
CO3	2	2	3	3	2	2	3	2	2	-	1	1	3	2
CO4	3	3	3	3	3	3	3	2	2	2	3	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS122-Fuzzy Logic and Applications
(100 Marks)

Contact Hours: 04

Pre-requisite: Basics of Set Theory, Fundamental of Computing

Methodology & Pedagogy: During theory lectures Basics of Fuzzy Logic, Fuzzy Set Theory, Fuzzy Relations, Fuzzification, Fuzzy systems and Applications will be introduced to students. Students will be made familiar with applications and systems related to Fuzzy Theory. Appropriate case studies will be discussed and assigned to students for real exposure related to Fuzzy logic.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Theory Hours
1	Introduction to Fuzzy Logic	**07**
2	Classical Sets and Fuzzy Sets	**09**
3	Classical Relations and Fuzzy Relations	**08**
4	Fuzzification and Defuzzification	**07**
5	Fuzzy Systems and Classification	**09**
6	Fuzzy Logic - Applications	**08**

Total Hours (Theory): 48
Total Hours: 48

Detail Syllabus:
Unit I : Introduction to Fuzzy Logic   **Hours 07**

A Historical Perspective, The Utility of Fuzzy Systems, imitations of Fuzzy Systems, The Illusion: Ignoring, Uncertainty and Accuracy, Uncertainty and Information, The Unknown, Fuzzy Sets and Membership, Chance Versus Fuzziness, Sets as Points in Hypercubes.

Unit II : Fuzzy Set Theory   **Hours 09**

Classical Sets : Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions, Fuzzy Sets: Fuzzy Set Operations, Properties of Fuzzy Sets, Alternative Fuzzy Set Operations, Fuzzy Arithmetic.

Unit III : Classical Relations and Fuzzy Relations   Hours 08

Crisp Relations: Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition.

Fuzzy Relations: Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition, Fuzzy Intervals.

Unit IV : Fuzzification and Defuzzification   Hours 07

Features of the Membership Function, Various Forms, Fuzzification, Defuzzification to Crisp Sets and scalers, Approximate Reasoning, Fuzzy Inference, Fuzzy Logic in Databases, Information Retrieval with Fuzzy Logic, Quantification, Activity for choosing a suitable alternative needed for realizing goal.

Unit V : Fuzzy Systems and Classification   Hours 09

Fuzzy Logic - Control System, Adaptive Fuzzy Controller: Basic Steps for Implementing Adaptive Algorithm, Parameters for selecting an Adaptive Fuzzy Controller.

Fuzzy (Rule-Based) Systems, Graphical Techniques of Inference, Classification by Equivalence Relations, Crisp Relations, Fuzzy Relations, Fuzzy Classification: Hard c-Means (HCM), Fuzzy c-Means (FCM)

Unit VI : Fuzzy Logic - Applications   Hours 08

Fuzzy Logic - Applications in Pattern Recognition, Classification, Computer Network, Medical, Knowledge Engineering and Data Mining. Fuzzy logic with Neural Network. Intelligent control of complex systems. Exercises on Fuzzy Logic.

Core Books:

4. Timothy J.Ross: Fuzzy logic with Engineering Applications : Edition (4th), John Wiley & Sons, Ltd., 2017
5. Hans-Jurgen Zimmermann: Fuzzy Set Theory - and its Applications: Edition (4th), Springer Netherlands, 2001

Reference Books:

1. Klir.G, Yuan B. : Fuzzy Sets and Fuzzy Logic: Theory and Applications : Edition (4th), Pearson Education, 2015.
2. G. Chen and T. Pham : Introduction to fuzzy sets, fuzzy logic & Fuzzy control systems CRC Press, 2000.
3.
4. Hung T. Nguyen, Elbert A. Walker: A First Course in Fuzzy Logic, CRC Press, 2005.
5. A. K. BHARGAVA: Fuzzy Set Theory Fuzzy Logic and their Applications S CHAND & Company Limited, 2013.
6. M. GANESH: INTRODUCTION TO FUZZY SETS AND FUZZY LOGIC, PHI Learning, 2006.
7. Barnabas Bede: Mathematics of Fuzzy Sets and Fuzzy Logic, Springer Berlin Heidelberg, 2012.

Web References:

1. https://plato.stanford.edu/entries/logic-fuzzy/ [Fuzzy Logic]
2. https://www.mathworks.com/help/fuzzy/what-is-fuzzy-logic.html [What Is Fuzzy Logic?]
3. https://www.guru99.com/what-is-fuzzy-logic.html [Fuzzy Logic Tutorial: What is, Architecture, Application, Example]
4. https://www.tutorialspoint.com/fuzzy_logic/fuzzy_logic_applications.htm [Fuzzy Logic - Applications]

Course Outcomes: Upon successful completion of the course, students will be able

CO1 :	**To understand concept of fuzzy logic principles.**
CO2 :	To understand the skill in basic understanding of fuzzy logic.
CO3 :	To explore the components of fuzzy set and fuzzy operations.
CO4 :	To explore the functional components of fuzzy logic classification and controller.
CO5 :	To explore applications related to fuzzy logic.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
1	Introduction to Fuzzy Logic	√				
2	Classical Sets and Fuzzy Sets		√	√		
3	Classical Relations and Fuzzy Relations			√	√	
4	Fuzzification and Defuzzification			√	√	
5	Fuzzy Systems and Classification				√	√
6	Fuzzy Logic - Applications					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	3	-	-	-	-	2	3	2
CO2	3	3	2	2	-	-	3	-	-	-	-	2	3	2

CO3	3	3	2	2	1	-	3	-	-	-	-	2	3	2
CO4	3	3	2	2	1	-	3	-	-	-	-	2	3	2
CO5	2	2	2	3	2	-	3	-	-	-	-	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS123: Distributed Operating Systems
(100 Marks)

Contact Hours: 04

Pre-requisite: Operating Systems concepts

Methodology & Pedagogy: During theory lectures fundamental concept of Distributed Systems will be covered along with the issues and management of distributed memory like synchronization in Distributed Operating Systems, Resource Management, Handling file and database in distributed systems and the Security concerns.

Outline of the Course:

Unit No.	Title of the Unit	Minimum Numbers of Hours Theory
1	Overview of Distributed Systems	08
2	Distributed Shared Memory	09
3	Synchronization in Distributed Operating Systems	09
4	Process and Resource Management in Distributed Operating Systems	08
5	Distributed File Systems	07
6	Distributed Web based System and Security	07

Total Hours (Theory): 48

Total: 48

Detailed Syllabus:

Unit – I: Overview of Distributed Systems **Hours: 08**
Computer architecture: CICS, RISC, Multi-core, Computer networking: ISO/OSI Model, Evolution of operating systems, Introduction to Distributed operating system, issues in designing distributed operating system – transparency, Reliability, Flexibility, performance, scalability, heterogeneity, security, Emulation of existing operating system, Introduction to distributed computing environment, Introduction to distributed computing systems (DCS), DCS design goals, Transparencies, Fundamental issues.

Unit – II: Distributed Shared Memory **Hours: 09**

Introduction to RPC, RPC Model, Implementing RPC Mechanism, Stub Generation, RPC Message, Introduction to Distributed Shared Memory, General Architecture of DSM Systems, Design and implementation issues of DSM, Granularity, Structure of Shared memory space, Message passing communication , ,Transaction Communication, Group communication; Broadcast atomic protocols.

Unit – III: Synchronization in Distributed Operating Systems   **Hours: 09**

Distributed Coordination, Temporal ordering of events, Lamport's logical clocks, Vector clocks; Ordering of messages, Physical clocks, Global state detection Clock Synchronization – Implementation, drifting of clocks, Clock synchronization issues, Clock Synchronization algorithms, Mutual Exclusion – Centralized approach, Distributed Approach, Token Passing Approach, Deadlocks in distributed systems ,Load scheduling and balancing techniques.

Unit – IV: Process and Resource Management in Distributed Operating Systems   **Hours: 08**

Introduction to resource management in distributed operating system, Desirable features of good global scheduling algorithm, Task Assignment approach, Load balancing Approach, Load Sharing Approach, Process migration – desirable feature of Process migration, process migration mechanisms, Process migration in heterogeneous systems, Advantages of process migration.

Unit – V: Distributed File and Database Systems   **Hours: 07**

What is Distributed File system – Remote information sharing, User mobility, Availability, Diskless workstation. Types of services in distributed file system – Storage service, True file Service, Name Service. Desirable features of Distributed file system, File Models, File accessing models, Distributed database system.

Unit – VI: Distributed Web based System and Security   **Hours: 07**

Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication: Web Proxy Caching, Replication for Web Hosting Systems, Replication of Web Applications, Introduction of Security in Distributed OS, Overview of security techniques, Features, Need, Access Control, Security Management.

Core Books:

1. Tim Kindberg, George Coulouris, Jean Dollimore : Distributed Systems : Concepts & Design Paperback Pearson Education,2010.
2. Pradip K. Sinha: Distributed Operating Systems Concepts and Design, Eastern Economy Edition, PHI, 2007.
3. Mukesh Singhal, Niranjan Shivaratri : Advanced Concepts In Operating Systems Paperback, McGraw Hill Education,2017.

Reference Books:

1. Andrew S. Tanenbaum: Distributed Operating Systems, 5th Edition, Pearson, 2008.
2. Doreen L. Galli: Distributed Operating Systems Concepts and Practice, Prentice Hall, 2000.

3. Andrew S. Tanenbaum, Herbet Bos: Modern Operating Systems, 4th Edition, Pearson Education, 2014.

Web References:

1. www.geeksforgeeks.org/types-of-operating-systems/ [Overview of Distributed OS]
2. www.javatpoint.com/distributed-operating-system [Examples and application of Distributes OS]
3. www.tutorialspoint.com/Distributed-Database-Management-System [Database Management of Distributes OS]

Course Outcomes: Upon successful completion of the course, the students will:

C01 :   Be familiar with Distributed Operating Systems and Shared Memory.

C02 :   Be familiar with the Synchronization issues in Distributed Operating Systems

C03 :   Be familiar with the Process and Resource management.

C04 :   Understand working of file and database in the distributed environment.

C05 :   Understand the working of web based system and security concerns in the distributed systems.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		C01	**C02**	**C03**	**C04**	**C05**
1	Overview of Distributed Systems	✓				
2	Distributed Shared Memory and Remote Procedure Calls	✓				
3	Synchronization in Distributed Operating Systems		✓			
4	Process and Resource Management in Distributed Operating Systems			✓		
5	Distributed File and Database Systems				✓	
6	Distributed Web based System and Security					✓

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	2	2	2	2	2	2	2	1
CO2	2	3	2	3	3	2	2	2	2	2	2	2	2	1
CO3	2	3	2	3	3	2	2	2	2	2	2	2	2	2
CO4	3	2	2	2	3	2	2	2	2	2	2	2	2	2
CO5	3	2	2	2	3	2	2	2	2	2	2	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

OCMSIT1001: **Ethical Hacking**

Description:

Credit and Week:

Teaching Scheme	Week	Marks	Credit
	12	100	3

About the course:

Ethical hacking is a subject that has become very important in present-day context, and can help individuals and organizations to adopt safe practices and usage of their IT infrastructure. Starting from the basic topics like networking, network security and cryptography, the course will cover various attacks and vulnerabilities and ways to secure them. There will be hands-on demonstrations that will be helpful to the participants. The participants are encouraged to try and replicate the demonstration experiments that will be discussed as part of the course.

Pre-requisites:

Basic concepts in programming and networking

Industry support:

TCS, Wipro, CTS, Google, Microsoft, Qualcomm

Course layout:

Week 1: Introduction to ethical hacking. Fundamentals of computer networking. TCP/IP protocol stack.

Week 2: IP addressing and routing. TCP and UDP. IP subnets.

Week 3: Routing protocols. IP version 6.

Week 4: Installation of attacker and victim system. Information gathering using advanced google search, archive.org, net craft, whois, host, dig, dnsenum and NMAP tool.

Week 5: Vulnerability scanning using NMAP and Nessus. Creating a secure hacking environment. System Hacking: password cracking, privilege escalation, application execution. Malware and Virus. ARP spoofing and MAC attack.

Week 6: Introduction to cryptography, private-key encryption, public-key encryption.

Week 7: Cryptographic hash functions, digital signature and certificate, applications.

Week 8: Steganography, biometric authentication, network-based attacks, DNS and Email security.

Week 9: Packet sniffing using Wireshark and burp suite, password attack using burp suite. Social engineering attacks and Denial of service attacks.

Week 10: Elements of hardware security: side-channel attacks, physical inclinable functions, hardware Trojans.

Week 11: Different types of attacks using Metasploit framework: password cracking, privilege escalation, remote code execution, etc. Attack on web servers: password attack, SQL injection, cross site scripting.

Week 12: Case studies: various attacks scenarios and their remedies.

Books and references

Text Books / Basic Material

1. Data and Computer Communications – W. Stallings.
2. Data Communication and Networking – B. A. Forouzan
3. TCP/IP Protocol Suite – B. A. Forouzan
4. UNIX Network Programming – W. R. Stallings
5. Introduction to Computer Networks and Cybersecurity – C-H. Wu and J. D. Irwin
6. Cryptography and Network Security: Principles and Practice – W. Stallings

Criteria to get a certificate:
Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

OCMSIT1002: **Introduction to Internet of Things (IOT)**

Description:

Credit and Week:

Teaching Scheme	Week	Marks	Credit
	12	100	3

About the course:

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defense sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Pre-requisites:

Basic programming knowledge

Course layout:

Week 1: Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I.

Week 2: Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II.

Week 3: Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II.

Week 4: Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications.

Week 5: Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II.

Week 6: Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.

Week 7: Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT.

Week 8: SDN for IoT (contd), Data Handling and Analytics, Cloud Computing.

Week 9: Cloud Computing(contd), Sensor-Cloud.

Week 10: Fog Computing, Smart Cities and Smart Homes.

Week 11: Connected Vehicles, Smart Grid, Industrial IoT.

Week 12: Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring.

Books and references

Text Books / Basic Material

1) S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press.

Availability: https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1

2) S. Misra, C. Roy, and A. Mukherjee, 2020. *Introduction to Industrial Internet of Things and Industry 4.0.* CRC Press.

Availability: https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=1627359971&sr=8-3.

3) Research Papers

Criteria to get a certificate:
Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

MS124: Advanced Java

(200 Marks)

Contact Hours: 06

Pre-requisite: Fundamental Knowledge of Core Java (Java SE) concepts.

Methodology & Pedagogy: Advanced Java fundamentals like JDBC, Servlet, JSP and Servlet Security provides capabilities and features for developing web application which is essential for developer in order to understand entire web application development life cycle. During the theory sessions of the syllabus, fundamentals of the mentioned technologies will be explained in detail with real time examples. Moreover, practical session will provide hands-on exposure about JDBC, Servlet, JSP and Servlet Security with variety of practical assignment. Also, MVC architecture using these technologies will be covered during theory as well as practical sessions.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	Practical
1	JDBC Programming	06	36
2	Web Application Components Fundamentals	05	
3	Servlet API	08	
4	Advanced Servlet Features and Security	05	
5	Java Server Pages	07	
6	Packaging and Deploying Web Applications	05	

Total Hours (Theory): 36

Total Hours (Lab): 36

Total Hours: 72

Detail Syllabus:

Unit I: JDBC Programming   **Hours 06**

The JDBC Connectivity Model, Database Programming: Connecting to the Database, creating a SQL Query, Getting the Results, Updating Database Data, Error Checking and the SQLException Class, the SQLWarning class, the Statement Interface, PreparedStatement, CallableStatement, the ResultSet Interface, Updatable Result sets, JDBC Types, Executing SQL Queries, ResultSetMetaData, Executing SQL Updates, Transaction Management

Unit II: Web Application Components Fundamentals   **Hours 05**

Basics of web application development and web components, Introduction of MVC design pattern, Fundamentals of: Containers, Packaging Web Applications, Web Application Structure, JAR Files, WAR Files, HTTP, HTTP request methods, HTML Form Processing, HTTP request response cycle.

Unit III: Servlet API   **Hours 08**

Servlet Model: Introducing Servlet, Introducing Servlet & the MVC Pattern, Introducing javax.servlet Packages, Introducing HTTP & Servlets, Understanding the Request/ Response Cycle, Input & Output Streams, Introducing Servlet/ Container Communication, Introducing ServletContext and ServletConfig, RequestDispatcher Interface.

The Filter API: Filter, Filter Chain and Filter Config

Unit IV: Advanced Servlet Features and Security   **Hours 05**

Cookies and Session Management: Understanding state and session, Understanding Session Timeout and Session Tracking, URL Rewriting.

Understanding the Stateless nature of HTTP, Why Track Client Identity & State? Maintain Sessions, Session

Management Using the Servlet API.

Unit V: Java Server Pages   **Hours 07**

JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment

JSP Directives, JSP Action, JSP Implicit Objects JSP Form Processing, JSP Session and Cookies Handling, JSP Session Tracking

JSP Database Access, JSP Standard Tag Libraries, JSP Custom Tag, JSP Expression Language, JSP Exception Handling, JSP XML Processing

Unit VI: Packaging and Deploying Web Applications   **Hours 05**

Basics of server container, build a WAR artifact for the web application, configure the Docker connection node and deploy the application to server container

Core Books:

1. Cay S Horstmann, Gary Cornell: Core Java, Volume II – Advanced Features, 8th Edition, Pearson Education.

2. Marty Hall, Larry Brown: Core Servlets and JavaServer Pages, Volume 2, Advanced Technologies, 2nd Edition, Pearson Education, 2008.

Reference Books:

1. Bryan Basham, Kathy Sierra and Bert Bates: Head First Servlet and JSP, O'Reilly Publication, 1st Edition
2. James Keogh: Complete Reference J2EE, Mcgraw publication

Web References:

1. http://courses.coreservlets.com/Course-Materials/csajsp2.html [Servlet Basics]
2. http://www.ceit.es/asignaturas/InteInfo/Recursos/Servlets/JavaServlets.pdf [Servlet Tutorial PDF]
3. http://www.msuniv.ac.in/AdvancedJavaProgrammingwithDatabaseApplication.pdf [JDBC Tutorial]
4. www.doc.ic.ac.uk/~rcheung/teaching/2720/ppt/lecture12.ppt [JSP Tutorial Slides]

Course Outcomes: Upon successful completion of the course, students will:

CO1 :	**Able to connect Java application with various RDBMS using JDBC**
CO2 :	Have understanding of web application architecture and terminologies
CO3 :	Able to develop real time web application using Servlet and JSP technologies
CO4 :	Be familiar with the concepts of JSPs, Servlets and related security issues.
CO5 :	Apply Model-View-Controller architecture to build complex client-server applications

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	JDBC Programming	√		√		
2	Web Application Components Fundamentals		√	√		
3	Servlet API			√	√	√
4	Advanced Servlet Features and Security			√	√	√
5	Java Server Pages			√	√	√
6	Packaging and Deploying Web Applications					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	1	1	-	-	-	-	-	-	-	3	2
CO2	3	2	3	2	-	-	-	-	-	-	2	1	2	2
CO3	3	2	3	2	2	-	-	-	-	2	2	3	3	3
CO4	3	2	3	2	2	2	-	-	1	-	2	1	3	2
CO5	2	2	3	3	2	-	1	1	-	2	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS125: Web Development Using .NET
(200 Marks)

Contact Hours: 06

Pre-requisite: Familiarity with basic concepts of object oriented programming

Methodology & Pedagogy: In the lectures students will learn about basics of .NET framework, ASP.NET and other advanced concepts related to programming with .NET framework. In the lab sessions the student will learn about solving real world problems with .NET framework and related technologies.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	Introduction to ASP.NET	**05**	
2	Applications development with ASP.NET	**06**	
3	Database with ADO.Net	**08**	
4	MVC architecture in .NET framework	**08**	**36**
5	SOA in .NET framework	**05**	
6	AJAX in .NET	**04**	

Total Hours (Theory): 36
Total Hours (Lab):36
Total Hours: 72

Detail Syllabus:
Unit I: Introduction to ASP.NET Hours 05

Introduction to .NET framework, Introduction to Web Programming, Introduction to ASP and ASP.NET, Deploying ASP.NET Application

Unit II: Applications development with ASP.NET Hours 06

ASP.NET Page Life Cycle, Structure of an ASP.NET Page: ASPX Page, Code behind File, WebConfig and machine config, Developing a web form, Working with master pages, State management techniques, Application Tracing, Error Handling

Unit III: Database with ADO.Net Hours 08

Introduction to ADO and ADO.NET, ADO.NET architecture, Connection Oriented and Connection Less architecture, Binding data to web controls and working with data controls, working with XML

Unit IV: MVC architecture in .NET framework   **Hours 08**

Introduction to MVC Architecture in ASP.NET, CRUD operation using MVC architecture, working with web controls in MVC architecture, introduction to LINQ.

Unit V: SOA in .NET framework   **Hours 05**

Introduction to service oriented architecture concept, SOAP protocol, Concept of UDDI and WSDL, Applications of SOA, Building SOA application with ASP.NET.

Unit VI: AJAX in .NET   **Hours 04**

Introduction to ASP.NET AJAX, AJAX control toolkit and extender controls.

Core Books:

6. Cogent Solutions Inc.: ASP.Net 4.5 Black book, Dreamtech press, 2019
7. Mridila Parihar, Essam Ahmed: ASP .Net Bible, Wiley, 2017
8. Stephon Walther: ASP.Net Unleashed, BPB publication, 2018

Reference Books:

1. Mesbah Ahmed, Chris Garrett, Jeremy Faircloth, Chris Payne: ASP.Net Programming. Developer's Guide, Dreamtech, 2016.
2. Greg Buczek: ASP.Net Tips & Techniques, Tata McGraw Hill Edition, 2016.
3. Bolton, Justin Langford, Glenn Berry, Gavin Payne, Amit Banerjee, Rob Farley: Professional SQL Server 2019 internals and troubleshooting, Wiley India publication, October, 2019.

Web References:

4. http://msdn.microsoft.com/en-us/aa336522.aspx [For software download]
5. https://docs.microsoft.com/en-us/aspnet/overview [For ASP.NET technical documentation]
6. https://www.tutorialspoint.com/dotnet_core/dotnet_core_overview.htm [for .NET Core]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	**Students will be able to understand .NET framework and develop ASP.NET application.**
CO2 :	Students will be able to develop database centric applications.
CO3 :	Students will be familiar with concepts of MVC for application development.
CO4 :	Students will able to understand and develop SOA based applications with .NET framework.
CO5 :	Students will be familiar with the concepts of AJAX

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
1	Introduction to ASP.NET	√				
2	Applications development with ASP.NET	√				
3	Database with ADO.Net		√			
4	MVC architecture in .NET framework			√		
5	SOA in .NET framework				√	
6	AJAX in .NET					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	2	1	-	-	2	-	-	2	1
CO2	2	3	3	2	-	2	1	-	-	2	2	1	3	1
CO3	1	2	2	-	-	-	-	-	-	-	2	1	3	2
CO4	2	3	3	-	2	-	-	-	-	-	2	1	3	2
CO5	3	2	3	2	-	-	3	-	-	-	-	2	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS126: Advanced Database Administration

(200 Marks)

Contact Hours: 07

Pre-requisite: To be able to implement a simple DBMS and design and implement information systems using DBMS technology.

Methodology & Pedagogy: During theory lectures, illustrations of certain complex real world applications, which emphasis the use of advanced concepts of databases, will be discussed. The fundamental concepts regarding database development activities, various database management systems and other advanced issues in database management will also be discussed. In addition, there may be announced or unannounced quizzes/assignments. During Practical sessions, students will be required to carry out case studies using the concepts and techniques they have learnt during theory sessions.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	Introduction to DBA	6	
2	User Access and Security	9	
3	Data Storage management & Migration	9	
4	Managing Database Backup and Recovery	9	**36 Hrs.**
5	Database Security and Auditing	7	
6	Query Processing and Optimization	8	

Total Hours (Theory): 48
Total Hours (Lab) : 36
Total Hours:84

Detail Syllabus:

Unit I: Introduction to DBA **Hours 06**

Types of Oracle Database Users, DBA Roles and Responsibilities; Database Architecture; ORACLE logical and physical database structure; Memory and Process Structure, SQLPLUS Overview, creating a database.

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Unit II: User Access and Security   **Hours 09**

Administrative User Accounts, Database Administrator Authentication, Administrative Privileges and its operations, managing Password authentication, Granting and Revoking Administrative Privileges

Unit III: Data Storage management and Migration   **Hours 09**

Disk Storage, Basic File structure and Indexing, Indexing structure for Files**,** Data Migration

Data Utilities (SQL loader and Import – Export)

Unit IV : Managing Database Back-up and Recovery   **Hours 09**

Backup and Recovery Overview, Database backup, restoration and recovery, defining a backup and recovery strategy, Backup and Recovery options; Data Dump; User-Managed Backup and Recovery; Configuring RMAN; RMAN Backups, Restore and Recovery.

Unit V : Database Security and Auditing   **Hours 07**

Database Security and Auditing; Database Authentication Methods; Database Authorization Methods; Data Encryption Techniques, Virtual Private Database; Managing Users and Security: Profiles, managing users, managing privileges, managing roles

Unit: VI : Query Processing and Optimisation   **Hours 08**

Notation for Query tree and Graphs, Heuristic optimization of Query tree, General rules for transformation, Converting Query trees into Query Execution Plans, Cost component for Query tree and its optimization

Core Books:

1. Oracle® Database Database Administrator's Guide by Mark Doran, Padmaja Potineni, Rajesh Bhatiya, Oracle Press.

Reference Books:

1. Abraham Silberschatz, Henry F.Koeth, S.Sudarshan: Database System Concepts, 6th edition, McGraw Hill Publication.
2. Ramez Elmasri,Shamkant B.Navathe:Fundamentals of Database Systems, 5th Edition, Pearson Publication.
3. C.J. Date, An Introduction to Database Systems (eighth edition), Addison Wesley, 2000

Web References:

A Practical Guide to Oracle Database Adminstration for DBA & Developers (oracletutorial.com)

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	**Create and manage databases**
CO2 :	Be familiar with database storage management
CO3 :	Manage backup and recovery
CO4 :	Control user security
CO5 :	Managing database query optimization

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
1	Introduction to DBA	√				
2	User Access and Security	√	√			
3	Data Storage management & Migration	√	√	√		
4	Managing Database Backup and Recovery		√		√	√
5	Database Security and Auditing			√		√
6	Query Processing and Optimization				√	√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	3	1	3	1	2	-	-	-	-	3	-
CO2	2	2	3	2	1	3	3	2	-	-	-	-	3	-
CO3	3	3	2	1	2	3	2	1	-	-	-	-	3	3
CO4	3	3	3	1	2	3	3	1	-	-	-	-	3	3
CO5	3	3	2	3	2	2	3	1	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

HS141.02 A: FOREIGN LANGUAGES (French)

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02/01	--	30/15	02
Marks	--	100	--	100	

Pre-requisite courses:

- French Language Studies- Introduction (Coursera)

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to French Language	08
2.	Grammar: Articles, Tense, Forms, Numbers, Verbs, Days, Months, Family	08
3.	Grammar : Adjectives, Adverbs, Interrogative Forms, Directions, Countries, Nationalities, Seasons, Weather, Professions, Verbs	08
4.	Grammar: Prepositions, Conjunctions, Tenses, Colours, Vegetables, Fruits, Shapes, Verbs	06

Total hours (Theory):--

Total hours (Practical) :30

Total hours :30

Detailed Syllabus:

1.	Introduction to French Language	08 Hours	28%

Facts and figures about French Language; Basic French Linguistics-*
Alphabets * Accents * Liaison * Nasalization

French Culture, Differ between French and English; **Grammar-**
Subject Pronoun, Verbs: (être, avoir, habiter, regarder, manger …
"er" verb), Form of address, Numbers

(1 to 20), Nouns and plurals of nouns, The expression: C'est, Il y a;
Presentation: -1) Self-Introduction-2) Question and answering;
Dialogue

2.	Grammar: Articles, Tense, Forms, Numbers, Verbs, Days,		08 Hours	28%

Months, Family

Grammar-Definite articles**,** Indefinite articles**,** Present tense
(Positive Forms**,** Negative Forms)**,** Numbers (21 to 100, 100-1000)**,**
Days, Months, Family, Verbs: (aller, venir, finir, pouvoir, vouloir …
"ir" verb)**; Social Links-**1), My family & relations 2) Appointments 3)
Gathering information from someone**; Dialogue**

3.	Grammar : Adjectives, Adverbs, Interrogative Forms, Directions,		08 Hours	28%
	Countries, Nationalities, Seasons, Weather, Professions, Verbs			

Grammar- Common Adjectives**,** Comparative Adjectives**,** Common
Adverbs**,** Interrogative Forms**,** The expression: "On"**,** Directions,
Countries, Nationalities, Seasons, Weather, Professions**,** Verbs:
(Prendre, Apprendre, Comprendre, faire … "re " verb)**; Work ,
Study and Travel-**1) Job/ Profession 2) Ticket Reservation (At
Bus/At Railway/At Airport)**; Dialogue**

4.	Grammar: Prepositions, Conjunctions, Tenses, Colours,		06 Hours	26%
	Vegetables, Fruits, Shapes, Verbs			

Grammar-1) Common Prepositions 2) Common Conjunctions 3)Past
Tense 4) Future Tense 5) Colors ,Shapes, Animals ,Vegetables,
Fruits 6) Verbs: ("er", "ir","re" etc...)**; Food & Shopping-**1) Buy a
vegetables and fruits 2) Any Conversation between Customer and
Vendor (At Mall/At Restaurant / At Market)**; Dialogue**

Course Outcome (COs):

At the end of the course, the students will be able to

CO1   Gain basic communication skills in French language with preliminary understanding of
grammar

CO2   Develop vocabulary required to speak about him/herself and his/her immediate environment.

CO3   Become capable of interacting in simple ways, to ask simple questions to get necessary information, to reply simple questions.

CO4   Become capable of understanding and using simple instructions in their personal, academic and professional environments.

CO5   Develop skills and intelligences to function in multi-disciplinary and cross-cultural work environment.

CO6   Practice new global trends in communication in multiple perspectives at personal, professional, and social level.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO6	-	-	-	-	-	-	3	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

- **Text book:**
    1. Complete French: All-In-One, McGraw-Hill, Amazon
    2. Best for Grammar: Easy French Step-by-Step, McGraw-Hill, Amazon
- **Reference book:**
    1. Basic French: McGraw-Hill, Amazon
    2. French Grammar for Beginners, Amazon

- **Web material:**

1. https://alison.com/course/french-language-studies-introduction
2. https://alison.com/course/basic-french-language-skills-for-everyday-life-revised-2017
3. http://www.bbc.co.uk/languages/french/
4. https://www.loecsen.com/en/learn-french
5. https://www.youtube.com/watch?v=ujDtm0hZyII

HS105.02 C: ACADEMIC SPEAKING AND PRESENTATION SKILLS

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	30/15	--	30/15	02
Marks	--	100	--	100	

Pre-requisite courses:

- Beginner/Intermediate level language proficiency

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Foundations of Advance Communication	04
2.	Art of Conversation	06
3.	Science of Power Speaking	06
4.	Academic Speaking Application – Part I	08
5.	Academic Speaking Application – Part II	06

Total hours (Theory): --

Total hours (Practical) :30

Total hours :30

Detailed Syllabus:

1.	Foundations of Advance Communication	04 Hours	14%

Meaning and Definition of Advance Communication; Advance

Communication in Digital, Social, Mobile World; Strategies for

Advance Communication; Meaning and Concept of Academic Language; High Frequency Academic Vocabulary

| 2. | Art of Conversation | 06 Hours | 20% |

Describing people, places and things; Expressing opinions; Making suggestions; Persuading someone; Interpreting and Summarizing

| 3. | Science of Power Speaking | 06 Hours | 20% |

Phonemes, Word Stress, Pronunciation, Intonation, Pause, Register, Fluency, Prosody, Lexical Range

| 4. | Academic Speaking Application – Part I | 08 Hours | 26% |

Art of Oratory, Formal Presentation, Speech Analysis – Decoding Best Speeches

| 5. | Academic Speaking Application – Part II | 06 Hours | 20% |

Job Interview, Group Discussion, Meeting

Course Outcome (COs):

At the end of the course, the students will be able to

CO1   understand and demonstrate advance communication and academic speaking skills

CO2   demonstrate ability to communicate in diverse situations

CO3   activate and extend their linguistic and communicative competence

CO4   demonstrate the formal presentation skills

CO5   demonstrate performing ability at group discussion and personal interview

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	2	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-	-	-	-

CO3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	3	-	-	-

Recommended Study Material:

Reference book:

1. *Business Communication Today* (Thirteenth Edition) by Courtland L. Bovee, John V. Thill and Roshan Lal Raina

2. *Effective Speaking Skills* by Terry O' Brien

3. *Speak Better Write Better* by Norman Lewis

4. *Well Spoken: Teaching Speaking to All Students* by Erik Palmer

5. *Let Us Hear Them Speak : Developing Speaking – Listening Skills in English* by Jayshree Mohanraj (Publisher – Sage Publication)

6. *The craft of scientific presentations: Critical steps to succeed and critical errors to avoid*. New York: Springer by Michael Alley

7. *Presentation Skills in English* by Bob Dignen (Publisher: Orient Black Swan)

Web material:

1. TED Talk : How to speak so that people want to listen

https://www.ted.com/talks/julian_treasure_how_to_speak_so_that_people_want_to_listen?language=en

2. TED Talk: The 110 techniques of communication and public speaking

https://www.ted.com/talks/david_jp_phillips_the_110_techniques_of_communication_and_public_speaking

TEACHING SCHEME & DETAILED SYLLABUS

FOR

M.Sc. (IT) PROGRAMME
(2nd SEMESTER)

EFFECTIVE FROM
ACADEMIC YEAR 2023-24

Teaching & Examination Scheme
Master of Science in Information Technology (M.Sc.(IT)) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - II

Course Code	Course Title	Teaching Scheme			Credit	Examination Scheme						Total
		Contact Hours				Theory			Practical			
		Theory	Practical	Total		Internal		External	Internal		External	
						Case Study	Tests		Term work	Tests		
MS223-226 OCMSIT1003-1004	Elective-II	3	3	6	6	10	20	70	15	15	70	200
MS227	Web Development Using Open Source	3	3	6	6	10	20	70	15	15	70	200
MS228	Advanced Mobile Application Development	3	3	6	6	10	20	70	15	15	70	200
MS229	Modern Software Engineering	4	-	4	4	10	20	70	-	-	-	100
HS106.02 C	Academic Writing	-	2	2	2	-	-	-	30		70	100
	University Elective-I **	-	2	2	2	-		-	30		70	100
		13	13	26	26	400			500			900

Student will take any university elective offered by different institutions of university. CMPICA has decided to offer **Internet and Web Designing and Mobile Application Development** course for others.

Elective-II	
Course Code	Course Title
MS223	Game Design
MS224	Advanced Python Programming
MS225	Block Chain Programming
MS226	HTTP Web Service for Enterprise Application
OCMSIT1003	Introduction to Machine Learning
OCMSIT1004	Introduction to Industry 4.0 and Industrial Internet of Things

University Elective-I

No	Course Code	Course Name	Department/Faculty
1	EE782.01	Energy Audit and Management	Engineering
2	CE771.01	Project Management	Engineering
3	PT796.01	Fitness & Nutrition	Physiotherapy
4	MB651	Software based Statistical Analysis	Management
5	NR755	First Aid & Life Support	Nursing
6	OC733.01	Introduction to Polymer Science	Applied Science
7	MA771.01	Reliability and Risk Analysis	Mathematics
8	ME781.01	Occupational Health &Safety	Engineering
9	MA772.01	Design of Experiments	Mathematics
10	RD701.01	Introduction to Analytical Techniques	Applied Science
11	RD702.01	Introduction to Nanoscience And Technology	Applied Science
12	PH891	Community Pharmacy Ownership	Pharmacy
13	PH892	Intellectual Property Rights	Pharmacy
14	PSE55	Astrophysics ,Space and Cosmos	Applied Science
15	CA730	Internet and Web Designing	Computer Science
16	CA842.01	Mobile Application Development	Computer Science

MS223: Game Design

(200 Marks)

Contact Hours: 06

Pre-requisite: Knowledge of C++, physics and mathematics concepts

Methodology & Pedagogy: During theory lectures illustrations Graphics, animation and various concepts regarding Game Development. Emphasize will be given on some mathematical and physics concepts, Fundamental of Graphics and Graphics Programming, Vectors, Image Data,2D graphics, Collision detections, Fundamental of Game programming, Gameloop, Game Engine and many more. During Practical sessions, students will be developing Simple 2D graphics, Implement animation on that graphics, Handles Input and Output of data according to event generation. Student will develop simple 2D age using Visual C++.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	Basics of Graphics and Game	**04**	**36**
2	Important Aspects of Mathematics and Physics	**07**	
3	Graphics Programming Fundamentals	**05**	
4	Animation, Transformations and Collision Detection	**07**	
5	Actual Game Programming	**09**	
6	Game Engine Introduction	**04**	

Total Hours (Theory): 36
Total Hours (Lab): 36
Total Hours: 72

Detail Syllabus:

Unit I: Basics of Graphics and Game Hours 04

The World of Computer Graphics, Current and Future Application Areas, User-Interface Considerations, History of Games and Game Development.

Unit II: Important Aspects of Mathematics and Physics Hours 07

Vector Addition, Subtraction, Dot Product, Cross Product, Magnitude, Finding the Normal of a Vector, Projection of one vector over another vector, Matrix and operations: Matrix Addition, Subtraction, Multiplication, Transpose, and Inverse of a Matrix, Basic Trigonometry: Meaning of Sin, Cosine, and Tan functions, Cartesian coordinate system, Polar Coordinate System, Nested Coordinate Systems Physics Concepts: Speed, Velocity, Acceleration, Mass, Force, Gravity, Friction.

Unit III: Graphics Programming Fundamentals   Hours 05

Video Ram, Pixels and screen sizes, Graphics Card, Frame Buffer, Double Buffer, Screen, Refresh Rates (on LCD display units), Screen Resolutions, Vector Graphics and Raster Graphics, Image Data - How are images represented in a Bitmap file, Drawing images on a screen.

Unit IV: Animation, Transformations and Collision Detection   Hours 07

Programming Simple Animations and understanding animation frame rates, Concept of Sprites in Animation, Line Drawing Algorithm, Circle Drawing Algorithm, Transformations - Translate, Rotate, Scale, Transformation Matrix, Collision detection techniques for 2D Shapes: Circle to Circle, Rectangle to Rectangle, Circle to Line, Circle to Rectangle, Line to Line.

Unit V: Actual Game Programming   Hours 09

Application and Window Management, Input Management, File Input and Output, Audio, Programming, Game loop, Frame rate independent entity behaviors.

Unit VI: Game Engine Introduction   Hours 04

Introduction to Game Engine, Types of Game Engines, Some of the most popular Game Engines of today: Unity, Unreal, Cocos2d-X, Box2d.

Core Books:

1. Laszlo Michael, Computational Geometry and Computer Graphics in C++, Pearson Education; First edition, 2017.
2. Roger Mayne, Introduction to Windows and Graphics Programming with Visual C++.NET, World Scientific Publishing Co. Pte. Ltd., 2005.
3. John Horton, Beginning C++ Game Programming, Packt Publishing Limited, 2016.
4. Michael Dawson, Beginning C++ Through Game Programming, Cengage; 4th edition, 2014.
5. Eric Lengyel, Foundations of Game Engine Development, Volume 1: Mathematics, Terathon Software LLC; 1 edition, 2017.

Reference Books:

4. John F. Hughes, Andries van Dam, Morgan McGuire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley," Computer Graphics: Principles and Practice in C", 3rd Edition, Addison Wesley Professional, 2013
5. David Conger, Ron Little, Creating Games in C++: A Step-by-step Guide, Pearson Education, 2006.
6. Fabien Sanglard, Game Engine Black Book: Wolfenstein 3D, Create Space Independent Publishing Platform; 1 edition
7. Constantine Pozrikidis, Introduction to C++ Programming and Graphics, Springer-Verlag New York Inc.; 2007
8. James M. Van Verth, Lars M. Bishop, Essential Mathematics for Games and Interactive Applications, A K Peters/CRC Press; 3rd edition, 2015

Web References:

1. http://cplusplus.happycodings.com/computer-graphics/ [Graphics Tutorial]
2. http://cplusplus.happycodings.com/games/ [Game Tutorial]
3. https://www.geeksforgeeks.org/basic-graphic-programming-in-c/
4. https://www.thecrazyprogrammer.com/2013/04/simple-program-to-create-moving-carin.html
5. http://mytechnotrick.blogspot.com/2015/07/#
6. https://www.youtube.com/watch?v=hfBR6ULOOjw

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	**Be having basic knowledge of computer graphics**
CO2 :	Be familiar with tools and techniques used for graphics and game programming
CO3 :	Be able to perform mathematic calculation required for game programming
CO4 :	Be familiar with the various image data and shapes.
CO5 :	Be able to create animated and interactive graphics which lead to develop a game

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Basics of Graphics and Game	√				
2	Important Aspects of Mathematics and Physics		√			
3	Graphics Programming Fundamentals	√		√		

4	Animation, Transformations and Collision Detection			√		
5	Actual Game Programming				√	
6	Game Engine Introduction					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	2	-	2	1	1	-	1	1	2	3
CO2	3	2	-	2	2	-	2	1	1	-	1	1	2	1
CO3	3	1	1	3	2	-	2	1	1	-	2	2	2	1
CO4	3	2	2	2	2	1	2	3	1	2	3	3	3	2
CO5	3	3	3	2	2	1	2	3	1	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS224: Advanced Python Programming
(200 Marks)

Contact Hours: 06

Pre-requisite: Basics of Programming.

Methodology & Pedagogy: Theory sessions are required to address computational power of python through its ability to deploy programs using functional, object oriented and advance python based aspects. Practical sessions demonstrate the implementation of the concepts which are taught during the theory sessions. Case study will help the students to come out with one working module in any of the advanced python programming.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	**Fundamentals of Python**	**6**	**6**
2	**Iterable Object in Python and Function**	**7**	**6**
3	**Object oriented Programming with Python**	**5**	**6**
4	**GUI Programming using Python**	**6**	**6**
5	**Python libraries and Data collection**	**6**	**6**
6	**Use of Python to develop AI based application**	**6**	**6**

Total Hours (Theory): 36
Total Hours (Lab) :36
Total Hours:72

Detail Syllabus:
Unit I: Fundamentals of Python   **Hours 06**

Introduction to Python Program, Features of Python. Environmental setup for Python Programming, Basic program structure to write Python, Data Type, Input and Output Statements, Comment in Python, If Statement with its variation, While and For Loop.

Unit II: Iterable Object in Python and Function   **Hours 07**

List, Tuple, Set, Dictionary and custom iterable object

What are functions, calling functions, creating functions, passing functions, formal arguments, variable length arguments, default arguments, returning values from the functions, returning multiple values from the functions.

Unit III: Object oriented Programming with Python   **Hours 05**

Basics of class, object and instance. Class level attribute and instance level attribute. Constructor and other magic methods. Bound and unbound methods. Built in functions for python class and objects

Unit IV: GUI Programming using Python   **Hours 06**

Introduction, Python's GUI library: Tkinter (installing and getting started), Introduction to GUI programming, top-level window, Tk widgets: Label, Button, scale, scroll bar, text, Checkbutton, Radiobutton. Developing GUI based applications using Tkinter.

Unit V: Python libraries and Data collection   **Hours 06**

NumPy: Introduction, 2D arrays, Numpy arraya Vs. Python List.

Pandas: Introduction, importing data with pandas, Data frames and Series, pre-processing phase of data analysis, handling missing values in data, formatting data to standardize it and make it consistent, normalizing data

Unit VI: Use of Python for Model Development and Evaluation   **Hours 06**

ML: Introduction to machine learning- Supervised and Unsupervised Learning, Model development using Linear Regression, Model Visualization, Prediction and Decision Making, Model Evaluation: Over-fitting, Under-fitting and Model Selection

DIP: Introduction to digital image Processing, Basic function to import draw and display images using Python.

Core Books:

1. Wesley J. Chun : Core Python Programming, 2nd edition, Pentice Hall,2006.

2. Megnus Lie Hetland : Beginning Python from novice to professional, 2nd edition, Apress,2009.

Reference Books:

1. Mark Lutz : Programming Python, 4th Edition, O'reilly, 2011 .

2. Dusty Philips: Python 3 Object oriented Programming, PACKT publishing, 2010.

3. Steve Holden: Python Web Programming, 1st edition,2002.

Web References:

1. https://developers.google.com/edu/python/ [Google's Python class]
2. https://www.learnpython.org/ [Learnpython.org]
3. https://docs.python.org/3/tutorial/ [Python tutorial]
4. https://www.tutorialspoint.com/python/index.htm [Tutorials point]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	**Students will be able to understand scripting and programming constructs of Python.**
CO2 :	Understanding Python's iterable objects and functions.
CO3 :	Clear Understanding of the object-oriented concepts using Python.
CO4 :	Students exposed to GUI programming and Python libraries to handle data.
CO5 :	Students will learn model development using advance concepts of Machine Learning and its applications.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
1	**Fundamentals of Python**	√				
2	**Iterable Object in Python and Function**		√			
3	**Object oriented Programming with Python**			√		
4	**GUI Programming using Python**				√	
5	**Python libraries and Data collection**				√	
6	**Use of Python to develop AI based application**					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	2	2	3	2	1	1	1	1	3	2
CO2	2	3	3	3	3	2	3	2	1	1	1	1	3	2
CO3	2	3	3	3	3	2	3	3	2	1	2	1	3	2

CO4	3	3	3	3	3	3	3	3	2	2	3	2	3	2
CO5	3	3	3	3	3	3	3	3	1	2	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS225: Blockchain Programming

(200 Marks)

Contact Hours: 06

Pre-requisite:None

Methodology & Pedagogy: During the lecture sessions, the students will learn about various sub systems that work in integrated manner to make blockchain work. The teacher will introduce students to concepts of bitcoin and ethereum technologies. The students will also understand about application domains where blockchain can be applied. In the lab sessions, the students with learn to program smart contracts with solidity on ethereum platform.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	**Introduction to blockchain**	**07**	
2	**Functioning of blockchain**	**07**	
3	**Bitcoin and related concepts**	**05**	
4	**Ethereum and related concepts**	**09**	**36**
5	**Introduction to solidity programming**	**04**	
6	**Advanced concepts in solidity programming**	**04**	

Total Hours (Theory): 36

Total Hours (Lab):36

Total Hours: 72

Detail Syllabus:

Unit I: Introduction to blockchain   Hours 07

History of blockchain, Centralized, decentralized and distributed systems, Layers of blockchain, Importance of blockchain, Applications of blockchain

Unit II: Functioning of blockchain   Hours 07

Cryptographic concepts- Symmetric key cryptography, Cryptographic hash function, Asymmetric key cryptography, Byzantine general's problem, Merkel tree, Structure of block

Unit III: Bitcoin and related concepts   **Hours 05**

What is bitcoin? Working with bitcoin, Bitcoin network, Bitcoin mining, Consensus algorithms

Unit IV: Ethereum and related concepts   **Hours 09**

Design of ethereum, Ethereum blockchain, Smart contracts in ethereum, Ethereum virtual machine, Ethereum eco system

Unit V: Introduction to solidity programming   **Hours 04**

Ethereum networks, Geth, Solidity compiler, Web3 library, Metamask wallet, emix, Ganache, Structure of ethereum smart contract, datatypes in solidity

Unit VI: Advanced concepts in solidity programming   **Hours 04**

Global variables and functions, expressions and control structures, writing smart contracts in solidity

Core Books:

9. Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda: Beginning Blockchain - A Beginner's Guide to Building Blockchain Solutions: 1st Edition: APress Publication: 2018.
10. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder: Bitcoin and Cryptocurrency Technologies - A Comprehensive Introduction: 1st Edition: Princeton University Press: 2016.
11. Ritesh Modi: Solidity Programming Essentials - A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain: 1st Edition: Packt Publishing: 2018

Reference Books:

9. Fabian Schar, Aleksander Berentsen: Bitcoin, Blockchain, and Cryptoassets: 1st Edition: MIT Press: 2020
10. Kevin Solorio, Randall Kanna, David H. Hoover: Hands-On Smart Contract Development with Solidity and Ethereum From Fundamentals to Deployment: 1st Edition: O'Reilly Media: 2019

Web References:

7. https://andersbrownworth.com/cms/460/blockchain/demo [Blockchain Demo]
8. https://ethdocs.org/en/latest/introduction/what-is-ethereum.html [Ethereum Introduction]
9. https://www.youtube.com/watch?v=M576WGiDBdQ [Solidity Programming]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	The students will learn about underlying technologies of blockchain and various applications of blockchain technology.
CO2 :	The students will understand working of blockchain in detail.
CO3 :	The students will learn about how the blockchain is used to power bitcoin.

CO4 :	The students will see how ethereum utilizes blockchain.
CO5 :	The students will be able to create and deploy solidity based smart contracts on ehtereum platform.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to blockchain	√				
2	Functioning of blockchain		√			
3	Bitcoin and related concepts			√		
4	Ethereum and related concepts				√	
5	Introduction to solidity programming					√
6	Advanced concepts in solidity programming					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	3	1	2	1	2	-	-	1	1	-
CO2	3	-	2	2	2	1	1	2	1	-	-	1	2	-
CO3	2	2	3	3	3	2	2	1	2	-	-	1	2	-
CO4	3	-	3	3	3	2	3	3	1	-	1	2	3	-
CO5	3	-	3	3	3	2	3	3	2	-	2	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS226: HTTP Web Service for Enterprise Application

(200 Marks)

Contact Hours: 06

Pre-requisite: Work experience with C#, ASP.NET MVC, MSSQL, HTML, CSS, JavaScript and have some understanding of JQuery.

Methodology & Pedagogy: During theory lectures, illustrations emphasizing the need for advance features of WEB API and ASP.NET will be covered. During Practical sessions, students will require to develop Web API using concepts of .NET framework and other pre-requisite technologies, discussed during class.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	Practical
1	ASP.NET Web API - Overview	4	36
2	MVC and Web API Controller with Entity Framework	8	
3	Web API Routing	4	
4	Web API (Action Formatter and Filters)	4	
5	Backend Validation with Exception Handling	8	
6	AJAX and JQuery	8	

Total Hours (Theory): 36
Total Hours (Lab): 36
Total Hours: 72

Detail Syllabus:

Unit I: ASP.NET Web API - Overview Hours 04

Introduction to RESTFul WEB API, Characteristics of ASP.NET WEB API, versions of Web API, Difference among web service, Window Communication Foundation and WEB API, Test Web API Fiddler and Postman

Unit II: MVC and Web API Controller with Entity Framework Hours 08

Use of Web API Controller in Controller class of Web API, Functionality of Web API Controller, Difference between Web API controller and MVC controller, Action Method Naming Conventions, Action Result, MVC with WEB API, CRUD operation with Entity Framework in Web API.

Unit III: Web API Routing   **Hours 04**

Routing in Web API, Routing: Convention-based Routing and Attribute based Routing, Routing and Action Execution.

Unit IV: Web API (Action Formatter and Filters)   **Hours 04**

Data Formatter, Media Type Formatter, Web API Filter, Exception Filters: HttpResponseException, Exception Filters, Registering Exception Filters, HttpError

Unit V: Backend Validation with Exception Handling   **Hours 08**

Model Validation with annotation, Custom Exception, recognizing need of custom Exceptions, Backend validation using Custom Exception for robustness and Data Integrity.

Unit VI: AJAX and JQuery   **Hours 08**

Consume RESTFul Web API through GET, POST, PUT and DELETE. Understanding JQuery and JavaScript. JQuery usage and AJAX Request configuration and parameters understanding.

Core Books:

12. Mithun Pattankar, Malendra Hurbuns, Mastering ASP.NET Web API: Build powerful HTTP services and make the most of the ASP.NET Core Web API platform 1st Edition. – 2017.

Reference Books:

11. Jamie Kurtz, Brian Wortman , ASP.NET Web API 2: Building a REST Service from Start to Finish. - 2014

Web References:

1. https://www.tutorialspoint.com/asp.net_mvc/asp.net_mvc_web_api.htm

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Be familiar with RESTFul API and ASP .NET Web API.
CO2 :	Be able to implement ASP .NET Web API Controller and configure its Routing and implementing Entity Framework.
CO3 :	Be able to Configure actions in API Controllers, Filters and Formatters.
CO4 :	Be able provide Data Integrity with validations with Exceptions.
CO5 :	Be able to call API through testing applications and AJAX calls from 3rd Party Applications.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	ASP.NET Web API - Overview	√				
2	MVC and Web API Controller with Entity Framework		√			
3	Web API – Routing		√			
4	Web API (Action Formatter and Filters)			√		
5	Backend Validation with Exception Handling				√	
6	AJAX and JQuery					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	3	1	3	-	-	2	2	2	2	2	2	2
CO2	2	1	2	2	3	2	2	3	-	3	2	2	3	3
CO3	2	2	2	2	3	2	2	2	-	1	2	2	3	2
CO4	3	3	3	3	2	3	2	2	-	2	3	2	3	2
CO5	2	3	3	1	3	2	2	3	2	2	3	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

OCMSIT1003: Introduction to Machine Learning

Description:

This is course OCMSIT1003 – **Introduction to Machine Learning** is offered from SWAYAM as noc24_cs51 – Introduction to Machine Learning

Credit and Week:

Teaching Scheme	Week	Marks	Credit
	12	100	3

About the course:

With the increased availability of data from varied sources there has been increasing attention paid to the various data driven disciplines such as analytics and machine learning. In this course we intend to introduce some of the basic concepts of machine learning from a mathematically well motivated perspective. We will cover the different learning paradigms and some of the more popular algorithms and architectures used in each of these paradigms.

Pre-requisites:

We will assume that the students know programming for some of the assignments. If the students have done introductory courses on probability theory and linear algebra it would be helpful. We will review some of the basic topics in the first two weeks as well.

INDUSTRY SUPPORT   : Any company in the data analytics/data science/big data

domain would value this course.

Course layout:

Week 0: Probability Theory, Linear Algebra, Convex Optimization - (Recap)

Week 1: Introduction: Statistical Decision Theory - Regression, Classification, Bias Variance

Week 2: Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods,

Principal Component Regression, Partial Least squares

Week 3: Linear Classification, Logistic Regression, Linear Discriminant Analysis

Week 4: Perceptron, Support Vector Machines

Week 5: Neural Networks - Introduction, Early Models, Perceptron Learning,

Backpropagation, Initialization, Training & Validation, Parameter Estimation –

MLE, MAP, Bayesian Estimation

Week 6: Decision Trees, Regression Trees, Stopping Criterion & Pruning loss functions,

Categorical Attributes, Multiway Splits, Missing Values, Decision Trees –

Instability Evaluation Measures

Week 7: Bootstrapping & Cross Validation, Class Evaluation Measures, ROC curve, MDL,

Ensemble Methods - Bagging, Committee Machines and Stacking, Boosting

Week 8: Gradient Boosting, Random Forests, Multi-class Classification, Naive Bayes,

Bayesian Networks

Week 9: Undirected Graphical Models, HMM, Variable Elimination, Belief Propagation

Week 10: Partitional Clustering, Hierarchical Clustering, Birch Algorithm, CURE

Algorithm, Density-based Clustering

Week 11: Gaussian Mixture Models, Expectation Maximization

Week 12: Learning Theory, Introduction to Reinforcement Learning, Optional videos (RL framework, TD learning, Solution Methods, Applications)

BOOKS and REFERENCES

1. The Elements of Statistical Learning, by Trevor Hastie, Robert Tibshirani, Jerome H. Friedman (freely available online)
2. Pattern Recognition and Machine Learning, by Christopher Bishop (optional)

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75.

If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

OCMSIT1004: Introduction to Industry 4.0 and Industrial Internet of Things

Description:

This is course OCMSIT1004- **Introduction to Industry 4.0 and Industrial Internet of Things** is offered from SWAYAM as noc24_cs34: Introduction to Industry 4.0 and Industrial Internet of Things

Credit and Week:

Teaching Scheme	Week	Marks	Credit
	12	100	3

About the course:

Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are considered to be the different drivers necessary for the transformation. Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems. IIoT links the automation system with enterprise, planning and product lifecycle. This course has been organized into the following modules:

Pre-requisites:

Basic knowledge of computer and internet

INDUSTRY SUPPORT: All Industrial Sectors

Course layout:

Week 1 : Introduction: Sensing & actuation, Communication-Part I, Part II, Networking-

Part I, Part II

Week 2 : Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN ,

Production Systems, Smart and Connected Business Perspective, Smart Factories

Week 3 : Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative

Platform and Product Lifecycle Management, Augmented Reality and Virtual

Reality, Artifical Intelligence, Big Data and Advanced Analysis

Week 4 : Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes-Part I,

Part II, Industrial Sensing & Actuation, Industrial Internet Systems.

Week 5 : IIoT-Introduction, Industrial IoT: Business Model and Reference Architecture:

IIoT-Business Models-Part I, Part II, IIoT Reference Architecture-Part I, Part II.

Week 6 : Industrial IoT- Layers: IIoT Sensing-Part I, Part II, IIoT Processing-Part I, Part II,

IIoT Communication-Part I.

Week 7 : Industrial IoT- Layers: IIoT Communication-Part II, Part III, IIoT Networking-

Part I, Part II, Part III.

Week 8 : Industrial IoT: Big Data Analytics and Software Defined Networks: IIoT

Analytics - Introduction, Machine Learning and Data Science - Part I, Part II, R

and Julia Programming, Data Management with Hadoop.

Week 9 : Industrial IoT: Big Data Analytics and Software Defined Networks: SDN in IIoT-

Part I, Part II, Data Center Networks, Industrial IoT: Security and Fog Computing:

Cloud Computing in IIoT-Part I, Part II.

Week 10 : Industrial IoT: Security and Fog Computing - Fog Computing in IIoT, Security in

IIoT-Part I, Part II, Industrial IoT- Application Domains: Factories and Assembly

Line, Food Industry.

Week 11 : Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory

Management & Quality Control, Plant Safety and Security (Including AR and VR

safety applications), Facility Management.

Week 12 : Industrial IoT- Application Domains: Oil, chemical and pharmaceutical industry,

Applications of UAVs in Industries, Real case studies :
Case study - I : Milk Processing and Packaging Industries
Case study - II: Manufacturing Industries - Part I
Case study - III : Manufacturing Industries - Part II
Case study - IV : Student Projects - Part I
Case study - V : Student Projects - Part II
Case study - VI : Virtual Reality Lab
Case study - VII : Steel Technology Lab

BOOKS AND REFERENCES

1) S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press.

Availability: https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1

2) S. Misra, C. Roy, and A. Mukherjee, 2020. *Introduction to Industrial Internet of Things and Industry 4.0.* CRC Press.

Availability: https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=162735 9971&sr=8-3

3) Research Papers

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75.

If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

MS227: Web Development using Open Source
(200 Marks)

Contact Hours: 06

Pre-requisite: Basic understanding of HTML and MySQL

Methodology & Pedagogy: During theory and practical sessions, students able to install & configure PHP and prerequisite software(s). Also, student will be emphasized to develop dynamic web applications.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	Introduction to Open Source Software and PHP, Basic of PHP	**07**	**36**
2	Control Structure, Function, Array and Overview of OOP in PHP	**07**	
3	Basics of Java Script	**04**	
4	Form Handling using PHP	**05**	
5	PHP Utilities	**06**	
6	Relational Databases using PHP	**07**	

Total Hours (Theory):36
Total Hours (Lab) :36
Total Hours:72

Detail Syllabus:

Unit I: Introduction to Open Source Software and PHP, Basics of PHP   **Hours 07**

Overview of Open Source Software, Widely used Open Source Products, Development Philosophy, Open source vs. Closed Source, Open Source Technology Importance, Installation & Configuration of PHP, Introduction to PHP, Working of HTML with PHP, PHP language Basics: Lexical Structure, Data types, Variables, Expressions and Operators

Unit II : Control Structure, Function, Array and Overview of OOP in PHP   **Hours 07**

PHP language Basics: Lexical Structure, Data types, Variables, Expressions and Operators, Control and Looping statements. Functions: Function Definition, Function Parameters, Returning Values. Strings:Usages and String Functions, Arrays: Types of Arrays and its Usages, Array functions. Overview: Objects, Declaring Class, Properties, Methods, Exception Handling, Examples.

Unit III : Basics of Java Script   **Hours 04**

Introduction of JavaScript, Variables, Overview of operators, Control statements and looping statement. Overview of DOM, function declaration and calling with event

Unit IV : Form Handling using PHP   **Hours 05**

Capturing data with PHP Using HTML Form Elements, Send Form data using GET Method & POST Method, Receive Form data using $_GET, $_POST & $_REQUEST variables, Super Global Variables.

Unit V : PHP Utilities   **Hours 06**

File Uploading: Upload Single and Multiple file using PHP script, Understanding HTTP requests, Exploring and modifying HTTP responses, getting information from web server, Sending mails

Unit VI : Relational Databases using PHP   **Hours 07**

Relational Databases and SQL, Using PHP to access Databases, PHP Data Objects (PDO), CRUD operations, Handling Errors, State Management Techniques: Concept of Session, starting session, modifying session variables, Un registering and deleting session variable, Concept of Cookies

Core Books:

13. Vikram Vaswani, PHP: A Beginner's Guide: Indian Edition, First Edition, McGraw Hill, 2009
14. Matt Doyle , Beginning PHP 5.3 , Wrox , 2010
15. Ballard and Moncur, Teach Yourself Javascript in 24 Hours, Sams Publishing, 2015

Reference Books:

12. Timothy Boronczyk , Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass): Beginning PHP6, Apache, MySQL Web Development : Wrox , 2009.
13. Lynn Beighley and Michael Morrison, Head First PHP & MySQL, First Edition, O'Reilly Publication, 2009

Web References:

10. https://github.com/PHPMailer/PHPMailer [PHPMailer Code]
11. https://www.php.net/ [Official website of PHP]
12. https://www.geeksforgeeks.org/php-tutorials/ [Lecture notes of PHP]
13. https://www.w3schools.com/php/default.asp [Lecture notes of PHP]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	**Gain understanding of Open Source software and PHP.**

CO2 :	To utilize knowledge and skills for basics of PHP and functions of PHP
CO3 :	Acquire the knowledge of array and OOP in PHP.
CO4 :	Learn form handling and utilities in PHP.
CO5 :	Be able to develop dynamic web based application using PHP and MySQL with state management techniques.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
1	Introduction to Open Source Software and PHP, Basics of PHP	√				
2	Control Structure, Function, Array and Overview of OOP in PHP		√			
3	Basics of Javascript			√		
4	Form Handling using PHP				√	
5	PHP Utilities				√	
6	Relational Databases using PHP					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	-	1	-	1	2	-	-	2	-	3
CO2	3	3	3	3	-	1	-	1	1	-	-	3	-	3
CO3	3	3	3	3	-	1	-	1	1	-	-	3	-	3
CO4	3	3	3	3	-	1	-	1	1	-	-	3	-	3
CO5	3	3	3	3	2	1	1	1	2	1	1	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS228: Advanced Mobile Application Development

(200 Marks)

Contact Hours: 06

Pre-requisite: Object Oriented Programming Concepts

Methodology & Pedagogy: During theory lectures illustrations emphasizing the need for basic features of Mobile Computing and Cross Platform- the Mobile Application Development platform will be given. During Practical sessions, students will be required to develop Mobile Application using Dart language in Flutter. Student shall also develop applications with elegant user interface that deal with data storage using Firebase and state management

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	Introduction to Cross-platform advance with Flutter & Dart	**12**	**36**
2	UI Designing with Flutter	**06**	
3	State management with App creation	**04**	
4	Architecting Flutter applications and Its packages	**04**	
5	Introduction to Backend to Flutter-I	**04**	
6	Introduction to Backend to Flutter-II	**06**	

Total Hours (Theory): 36
Total Hours (Lab): 36
Total Hours: 72

Detail Syllabus:

Unit I: Introduction to Cross-platform advance with Flutter & Dart   **Hours 12**

Set up a new Flutter project using Android Studio. Widget tree, Interface design: pre-made Flutter Widgets. Image and Text Widgets. App Icons for iOS and Android. Add and load image assets to Flutter projects. Run Flutter apps on iOS Simulator, Android Emulator and physical devices.

Import Dart libraries. Variables, data types and functions in Dart, Difference between final and const in Dart.Maps, enums and the ternary operator. Functions and arguments in Dart, Flutter favors composition

vs. inheritance (customizing widgets). Functions in Dart and arrow syntax. The lists and conditionals in Dart. Classes and objects. Understand Object OrientedDart. Dart Constructors for Flutter widgets. Handling exceptions in dart. Null aware operators, The use of Dart mixins.

Unit II: UI Designing with Flutter   Hours 06

Hot Reload and Hot Restart, Use of Pubspec.yaml file, custom assets and fonts. An introduction to the Widget build(), layout widgets: Columns, Rows, Containers and Cards. Material icons, Icons class. Theme widgets. Refactoring widgets. Dart annotations and modifiers. Immutability of Stateless and Stateful Widgets. Update screen with the build(). Custom Flutter Widgets.Difference between final and const in Dart. Maps, enums and the ternary operator. Functions and arguments in Dart. Multi-screen Flutter apps, routes and the Navigator widget. Flutter favours composition vs. inheritance (customizing widgets).

Unit III: State management with App creation   Hours 04

About Stateful and Stateless Widgets, callbacks. Declarative style of UI programming, Flutter widgets react to state changes. Import Dart libraries. Variables, data types and functions in Dart. Build flexible layouts. Understand the relationship between setState(), State objects and Stateful Widgets.

Unit IV: Architecting Flutter applications and Its packages   Hours 04

Dart package manager, Flutter compatible packages. The structure of the pubspec.yaml file. Incorporate the audio players package to play sound. Functions in Dart and arrow syntax. Refactor widgets, Flutter's philosophy of UI as code. The lists and conditionals in Dart. Classes and objects. Understand Object Oriented Dart. Dart Constructors for Flutter widgets. Design patterns to structure Flutter apps. Structuring and organizing Flutter apps.

Unit V: Introduction to Backend to Flutter-I   Hours 04

Asynchronous programming in Dart and use of async/await. Stateful Widget lifecycle methods, Handling exceptions in dart. Null aware operators. Location data from both iOS and Android. Http package and live data from open APIs. Parse JSON data using the dart:convert library.

Unit VI: Firebase and State Management with Flutter-II   Hours 06

State objects via the Stateful Widget. Use the TextField Widget to take user input. Pass data backwards using the Navigator widget. Hero animations in Flutter apps. Animation controller, custom animations. The use of Dart mixins. Firebase Cloud Firestore into your Flutter apps. Authentication with Firebase Auth package.

Core Books:

1. Marco L. Napoli: Beginning Flutter: A Hands On Guide to App Development: Wrox publication: 2019.

Reference Books:

1. Eric Windmill: Flutter in Action: Edition: Manning Publication: January 2020.
2. Alessandro Biessek: Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2: Packt publication: September 2019

Web References:

1. https://docs.flutter.dev/reference/tutorials
2. https://www.tutorialspoint.com/flutter/index.htm
3. https://www.javatpoint.com/flutter
4. https://fluttertutorial.in/

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	**able to clear all object oriented programming and cross platform concepts**
CO2 :	able to learn Flutter and Dart step by step
CO3 :	able to learn the reduce the code through native app performance, animated UI with material design and least testing
CO4 :	able to use Firebase to authenticate the users and use the remote database
CO5 :	able to build engaging native mobile apps for both Android and iOS

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to cross-platform development with Flutter and Dart	√				
2	Creating UI with Flutter	√	√			
3	Building Apps with state			√		
4	Leveraging Flutter packages and structuring Flutter applications			√		

| 5 | Incorporating backend data with Flutter application | | | | | √ |
| 6 | Integrating Flutter Application with Firebase and State Management | | | | √ | √ |

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	3	2	1	3	-	1	-	1	-	-	1
CO2	3	1	3	2	3	1	2	1	1	-	1	1	1	2
CO3	3	-	3	1	3	1	1	2	1	-	1	1	1	2
CO4	3	3	3	3	3	1	1	3	1	-	2	2	3	1
CO5	3	3	3	1	3	1	1	3	1	1	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS229: Modern Software Engineering
(100 Marks)

Contact Hours: 04 hours

Pre-requisite: Analysis and design of Information Systems, Fundamental concepts of Object Oriented Programming.

Methodology & Pedagogy: During theory sessions, the focus will be given on different concepts of software engineering and related aspects such as Project management and Agile software development. The emphasis will be given on the basics of software engineering concepts and UML. Students will get exposure to various concepts of DevOps, as well as Process Improvement and Reengineering.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Theory Hours
1	**Introduction to Software Engineering**	**7**
2	**Requirement analysis and project management**	**8**
3	**Understanding UML**	**8**
4	**Agile Development: XP and SCRUM**	**9**
5	**DevOps**	**8**
6	**Software maintenance and risk management**	**8**

Total Hours (Theory): 48
Total Hours:48

Detail Syllabus:
Unit I: Introduction to Software Engineering   **Hours 07**

The Role of Software in today's era, Software Engineering: A Layered Technology/software process layers, Software Process Models, The Linear Sequential Model, The Prototyping Model, Evolutionary Process Models,Introduction to software process: Generic process framework activities, Umbrella activities.

Unit II Requirement analysis and project management   **Hours 08**

Understanding the Requirement, Requirement Modeling, Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering.

Introduction to the basic concepts of Project Scheduling, Project scheduling principles, relationships and effort distribution, Process Definition and Tailoring, Process Database and Process Capability Baseline, Effort Estimation and Scheduling, Project Management Plan, Configuration Management.

Unit III: Understanding UML   Hours 08

Introduction to UML, Structure modelling: Class Diagram and Behavioral Modelling. Under Behavioral Modelling: Use case Diagram, Interaction Diagram, Activity Diagram.

Unit IV: Agile Development   Hours 09

Introduction to Agile Software Development, Characteristics of Agile Process, Agile methods, Principles of Agile methods, Problems with Agile methods, Extreme Programming, The Four Core Values of XP.

Unit V: Overview of DevOps   Hours 08

Overview, Problem Case Definition, Benefits of Fixing Application Development Challenges, DevOps Adoption Approach through Assessment, Solution Dimensions, What is DevOps?, DevOps Importance and Benefits, DevOps Principles and Practices, 7 C's of DevOps Lifecycle for Business Agility, How to Choose Right DevOps Tools, Challenges with DevOps Implementation, Must Do Things for DevOps.

Unit VI: Software maintenance and risk management   Hours 08

Software risks, risk identification, risk projection, risk mitigation, monitoring and management.
Introduction to software maintenance, types of maintenance.
Concept of software reengineering, Business Process Reengineering(BPR), BPR life cycle, reverse engineering, Applications of Software Engineering.

Core Books:

1. Roger S.Pressman, Software Engineering- A practitioner's Approach, McGraw-Hill International Editions
2. Grady Booch, James Rambaugh, Ivar Jacobson: The Unified Modeling Language User
3. Rajib Mall, Fundamentals of software Engineering, Prentice Hall of India.

Reference Books:

1. Ian Sommerville, Software engineering, Pearson education Asia
2. Pankaj Jalote, Software Engineering – A Precise Approach Wiley
3. Merlin Dorfman (Editor), Richard H. Thayer (Editor) ,Software Engineering
4. Robert C. "Uncle Bob" Martin , Clean Architecture: A Craftsman's Guide to Software Structure and Design
5. Deepak Gaikwad, Viral Thakkar, DevOps Tools from Practitioner's ViewPoint, Wiley

Web References:

1. **https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering/Process/Methodology [Introduction to Software Engineering/Process/Methodology]**
2. https://www.uml-diagrams.org/   [UMLUnits]

3. https://nptel.ac.in/courses/106/101/106101061/ [Agile Software Development and Extreme Programming and Overview of DevOps]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	**Understanding Software Engineering Process Models**
CO2 :	Able to analyze requirements and mange project
CO3 :	Get familiar with the concepts of Unified Modeling Language
CO4 :	Understanding of the Agile software development concepts
CO5 :	Able to apply DevOps concepts and understand risk management

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Software Engineering	√				
2	Requirement analysis and project management		√			
3	Understanding UML			√		
4	Agile Development				√	
5	DevOps					√
6	Software maintenance and risk management					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	2	3	3	2	2	2	1	2	3	3

CO2	3	2	2	2	2	3	3	3	3	2	3	2	3	3
CO3	2	2	3	2	2	2	2	2	2	1	1	2	3	2
CO4	3	3	3	2	2	2	2	1	1	1	3	2	3	2
CO5	2	2	3	2	1	3	2	1	1	1	2	1	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

HS106.02 C: ACADEMIC WRITING

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	**30/15**	--	30/15	**2**
Marks	--	100	--	**100**	

Pre-requisite courses:

- An Intermediate Guide to Writing in English for University Study
  https://www.futurelearn.com/courses/english-for-study-intermediate/4/todo/62943

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Academic Writing and Research Process	05
2.	Anatomy of Academic Writing	05
3.	Key Academic Skills	05
4.	Accuracy in Academic Writing	05
5.	Using and Citing Sources of Ideas	05
6.	Contemporary Practices in Academic Writing	05

Total hours (Practical): 30

Total hours (Lab): --

Total hours :30

Detailed Syllabus:

1. Academic Writing and Research Process   5 Hours

   Introduction to Academic Writing, Academic Writing as a Part of Research, Types of Academic Writing, Features of Academic Writing, Importance of Good Academic Writing in various Academic Works

2.	Anatomy of Academic Writing	5 Hours

Academic Vocabulary, Simple and Complex Sentences, Organizing Paragraphs, The Writing Process, Adopting Academic Writing Style

3.	Key Academic Skills	5 Hours

Note – taking, Note – making, Paraphrasing, Summarizing

4.	Accuracy in Academic Writing	5 Hours

Lexical Range, Academic Language and Structures, Elements of Writing, Proof Reading, Editing, and Rewriting

5.	Using and Citing Sources of Ideas	5 Hours

Academic Texts and their Types, Intellectual Honesty in Academic Writing, Avoiding Plagiarism – Idea Theft, Degrees of Plagiarism, Types of Borrowing, Anatomy of Citations, Common Citation Styles

6.	Contemporary Practices in Academic Writing	5 Hours

Analytical Essays, Graph / Table / Process Interpretation and Description, Writing Reports and Abstract, Writing Research / Concept Papers

Course Outcome (COs):

At the end of the course, the students

CO1   Will have sound understanding of the concept and applications of academic writing

CO2   Will have acquired enough knowledge of academic writing style, strategy and approach

CO3   Will be able to demonstrate error free and effective academic writing

CO4   Will be able to demonstrate ability to work on project/report/paper writing

CO5   Will have the sound understanding of the Research and Research Methodology

CO6   Will be effectively communicating in diverse academic and professional settings.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	3	-	3	-	-	-	-	2
CO6	-	-	-	-	-	-	2	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

Text book:

1. Academic Writing for International Students, Routledge

2. Academic Writing: A Guide for Management Students and Researchers. Monipally, M.M. &Pawar, B.S. Sage. 2010. New Delhi

3. Effective Academic Writing Level - 1,2,3,4 (Second Edition) By: Alice Savage, Patricia Mayer, Masoud Shafiei, Rhonda Liss, & Jason Davis; Publisher: Oxford

Reference book:

1. Writing Your Thesis (2nd Edition) by Paul Oliver, Sage

2. Development Communication In Practice by Vilanilam V J, Sage

3. Intercultural Communication by Mingsheng Li, Patel Fay, Sage

Web material:

www.owl.perdue.edu

DETAILED SYLLABUS

FOR

M.Sc. (IT) PROGRAMME

(3rd SEMESTER)

EFFECTIVE FROM

ACADEMIC YEAR

2023-24

MS328: Advanced Game Development
(200 Marks)

Contact Hours: 07

Pre-requisite: Basics of Animation, C# Language, Mathematics and Physics concepts

Methodology & Pedagogy: During theory lectures illustrations Graphics, animation and various concepts regarding Game Development. Emphasize will be given on some mathematical and physics concepts, Fundamental of Graphics and objects creation, 3D graphics, Collision detections, Fundamental of Game programming, Game loop, Game Engine and many more. During Practical sessions, students will develop 3D games using Unity.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	**Practical**
1	Introduction to Unity for Game Development	**09**	**36**
2	Tools and Resources for Game Development	**09**	
3	Scene Designing in Gaming	**08**	
4	Interface Designing in Gaming	**07**	
5	Rendering and Walkthrough	**08**	
6	Testing and Deployment of Game	**07**	

Total Hours (Theory): 48

Total Hours (Lab): 36

Total Hours: 84

Detail Syllabus:

Unit I: Introduction to Unity for Game Development   **Hours 09**

Getting started with 3D, Coordinates, Local space versus World space, Vectors, Cameras, Polygons, edges, vertices, and meshes, Materials, textures, Shaders, Rigid Body physics, Collision detection. Essential Unity

concepts, Introduction to Assets, Scenes, Game Objects, Components, Scripts, Prefabs. The Interface: Scene window and Hierarchy, Inspector, Project and Game window.

Unit II: Tools and Resources for Game Development   **Hours 09**

The terrain editor: menu features, importing and exporting height maps, Terrain Toolset: Raise, plain and smooth the height, Paint texture, place trees, and terrain settings, creating island: use of Sun, Sea and Sand. Importing Model package. Player characters: working with inspector, Tags, Layers, Prefabs and the Inspector, Deconstructing the First Person Controller object, Parent-child issues, First Person Controller objects. Scripting basics: Variables, Functions, If Else, comments and major syntax. The FPS walker script

Unit III: Scene Designing in Gaming   **Hours 08**

Discovering Collisions, ray casting, Adding the outpost, Opening the outpost, Collision detection and creating new assets, attaching a script. Ray casting with disabling collision detection. Prefab. Collection and HUD: Creating the battery prefab. Download, import, and place, Tagging the battery, Scale, collider, and rotation, scattering batteries, Displaying the battery GUI, Creating the GUI Texture object, Positioning the GUI Texture, Scripting for GUI change, Battery collection with triggers, Restricting outpost access, Restricting access Hints for the player, Creating the fire particle systems

Unit IV: Interface Designing in Gaming   **Hours 07**

Interfaces and menus, Making the main menu, Adding the play button, Disabling Game Objects, Writing an OnGUI() script for a simple menu, Flexible positioning for GUIs, Adding UnityGUI buttons, Opening scenes with custom functions, GUI skin settings.

Decision time

Unit V: Rendering and Walkthrough   **Hours 08**

Downloading assets, Making the smoke material, Particle system settings, Ellipsoid Particle Emitter settings, Particle Animator settings, Adding audio to the volcano, Volcano testing, Coconut trails, Editing the Prefab, Trail Renderer component, Updating the prefab, Performance tweaks, Camera Clip Planes and fog, Ambient lighting Instructions scene, Adding screen text, Text Animation using Linear Interpolation (Lerp), Menu return, Island level fade-in, UnityGUI texture rendering, Game win notification.

Unit VI: Testing and Deployment of Game   **Hours 07**

Build Settings, Web Player, Player Settings, Web Player Streamed, OS X Dashboard Widget, OS X/Windows, Standalone, Building the game, adapting for web build, Texture compression and debug stripping, building standalone 266Indie versus Pro, building for the Web, adapting web player builds, Quality Settings, Player Input settings, sharing your work, Testing and finalizing: Public testing

Core Books:

1. Will Goldstone: Unity Game Development Essentials: Edition 2nd: Packt Publication: 2009.

2. Greg Lukosek, "Learning C# by Developing Games with Unity 5.*x*", 2nd Edition, Packt Publishing, 2016

3. Ashley Godbold, Simon Jackson, "Mastering Unity 2D Game Development", 2nd Edition, Packt Publishing, 2016.

4. Joe Hocking, "Unity in Action: Multiplatform game development in C#", 2nd Edition, Manning Publications, 2018

5. Sue Blackman, "Beginning 3D Game Development with Unity 4: All-in-one, multi-platform game development", 2nd Edition, Apress, 2013

Reference Books:

1. Nicolas Alejandro Borromeo: Hands-On Unity 2021, Game Development: Edition 2nd: Packt Publication: 2021.
2. Ben Tristem, Mike Geig, "Unity Game Development in 24 Hours- Sams Teach Yourself" ,2nd Edition, Paperback, December 19, 2015
3. Michelle Menard, "Game Development with Unity", Course Technology, 2013.
4. Matt Smith, Chico Queiroz, "Unity 5.x Cookbook", Packt Publishing, October 5, 2015
5. Francesco Sapio, "Unity UI Cookbook", Packt Publishing, 2015
6. P Patrick Felicia, "Unity 5 from Zero to Proficiency: A step-by-step guide to creating your first game", CreateSpace Independent Publishing Platform, February 25, 2016
7. Matt Smith, "Unity 2018 Cookbook", 3rd Edition, Packt Publishing, August 31, 2018
8. Alan Thorn, "Mastering Unity Scripting", Packt Publishing, January 29, 2015

Web References:

1. https://subscription.packtpub.com/search?query=unity
2. https://itsourcecode.com/free-projects/python-projects/mario-game-in-python-with-source-code/
3. http://learn.unity.com
4. https://unity3d.com/learn/tutorials/topics/developer-advice/how-start-your-game-development [Game Tutorial]
5. https://www.studytonight.com/game-development-in-2D/ [Game Tutorial]
6. https://msdn.microsoft.com/en-us/magazine/dn759441.aspx [Game Tutorial]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	able to gain a basic understanding of game development using Unity 3D
CO2 :	able to learn concepts such as manipulating objects, scripting, and compiling
CO3 :	able to learn graphics and visuals in game development
CO4 :	able to develop script writing for any problem and solution as game
CO5 :	able to develop full 3D game

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
1	Introduction to Unity for Game Development	√				
2	Tools and Resources for Game Development		√			
3	Scene Designing in Gaming		√			
4	Interface Designing in Gaming			√		
5	Rendering and Walkthrough				√	
6	Testing and Deployment of Game					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	2	-	2	1	1	-	1	1	2	3
CO2	3	2	-	2	2	-	2	1	1	-	1	1	2	1
CO3	3	1	1	3	2	-	2	1	1	-	2	2	2	1
CO4	3	2	2	2	2	1	2	3	1	2	3	3	3	2
CO5	3	3	3	2	2	1	2	3	1	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS 329: Data Science
(200 Marks)

Contact Hours: 06

Pre-requisite: CA845: Advanced Database Technologies

Methodology & Pedagogy: During theory lectures the emphasis will be given on the basics of data analytics and related tools and techniques. Students will be introduced to the concepts of data science, exploratory data analysis, supervised and unsupervised learning methods. Applications as well as research trends and future direction of data analytics will be discussed with the length. During the practical sessions, students will be introduced to tools of data analytics such as R and Python. Students will be given appropriate case studies of data analytics to get the real time exposure of data analytics

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Theory Hours	
		Theory	**Practical**
1	Introduction of Data Science	**06**	
2	Exploratory Data Analysis (EDA) & Modeling	**06**	
3	Supervised & Unsupervised Learning Methods	**06**	
4	Introduction to Machine Learning & Deep learnin	**06**	**36**
5	Data Visualization	**06**	
6	Applications of Data Analytics	**06**	

Total Hours (Theory): 36

Total Hours (Lab): 36

Total Hours: 72

Detail Syllabus:

Unit I : Introduction of Data Science   **Hours 06**

What is Data Science? ,Big Data and Data Science hype ,Why now? , Datafication , Current landscape of perspectives , Skill sets needed, Data Analysis cycle, Data analysis Vs Data analytics, Life cycle of data .

Unit II : Exploratory Data Analysis (EDA) & Modeling   **Hours 06**

Philosophy of EDA - The Data Science Process, Statistical Inference, Populations and samples , Statistical modeling, probability distributions. Introduction to Python & R: Specific Implementation for Data Pre-Processing, EDA & Modeling

Unit III : Supervised & Unsupervised Learning Methods   **Hours 06**

Supervised Learning: Classification Using Decision Tree and Linear Regression, Apriori Algorithm for Association Rule Mining. Unsupervised Learning: Outlier Detection Clustering, Hard & Soft Clustering.

Unit IV : Introduction to Machine Learning & Deep learning   **Hours 06**

Concept and Visualization of Machine Learning and Deep Learning, Difference between Deep & Machine Learning, Recent trends and application areas of Machine & Deep Learning.

Unit V : Data Visualization   **Hours 06**

Introduction of data visualization, Power BI, and Tableau, ggplot+ggplot2, Seaborn

Unit VI : Applications of Data Analytics   **Hours 06**

Concept of Neural Network, CNN and ACNN. Case study based learning of applications of Data Analytics.

Data Analytics in Healthcare, Academics, Bio-Informatics and CRM.

Core Books:

1. Cathy O'Neil and Rachel Schutt: Doing Data Science: Straight Talk From The Frontline, O'Reilly. 2014.

2. Jure Leskovec, Anand Rajaraman, and Jeffrey David Ullman: Mining of Massive Datasets Cambridge University Press,2nd Edition, New York, NY, USA,2014.

3. Howard B. Demuth, Mark H. Beale, Orlando De Jess, and Martin T. Hagan: Neural Network Design , paperback USA, 2nd Edition,2014.

Reference Books:

1. Walpole, R. E., Myers, R. H., Myers, S. L., & Ye, K.: Probability & statistics for engineers & scientists ,9th
    edition, Prentice Hall,2012.
2. Haykin, S. S., Haykin, S. S., Haykin, S. S., & Haykin, S. S: Neural networks and learning machines Pearson,
    Volume 3,2009.
3. Mohammed J. Zaki and Wagner Miera Jr, Data Mining and Analysis: Fundamental Concepts and Algorithms, Cambridge University Press. 2014.

Web References:

1. https://onlinecourses.nptel.ac.in/noc17_mg24/preview [Online Data Analytics Course]

2. https://www.itl.nist.gov/div898/handbook/eda/section1/eda11.htm [Exploratory Data Analysis Material]

3. https://datahoarder.io/Humble%20Bundle%20Books/Humble%20Book%20Bundle_%20Data%20Science%20presented%20by%20O_Reilly/doingdatascience.pdf [Data Science E-Book]

4. http://www.astro.altech.edu /~george/aybi199/Donalek_Classif.pdf [Supervised and unsupervised methods tutorials]

5. https://yourstory.com/2017/12/data-analytics-future-trends/ [Future Trends of Data Analytics]
6. http://www.astro.caltech.edu/~george/aybi199/Donalek_Classif.pdf [Supervised and unsupervised methods tutorials]
7. https://yourstory.com/2017/12/data-analytics-future-trends/ [Future Trends of Data Analytics]

Course Outcomes: Upon successful completion of the course, students will be to

CO1 :	**Describe what Data Science and Data Analytics are and the skill sets needed to be a data scientist.**
CO2 :	Understand significance of exploratory data analysis in statistical and visualization aspects.
CO3 :	Understand and apply data analytics techniques such as supervised, unsupervised and EDA.
CO4 :	Understand the importance of self-learning environments
CO5 :	Able to understand the recent trends and future directions of data analytics.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction of Data Analytics	√				
2	Exploratory Data Analysis using MS excel		√			
3	Supervised & Unsupervised Learning Methods			√		
4	Deep Re-enforcement Learning				√	
5	Data visualization				√	
6	Recent trends and future directions					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	1	-	-	-	2	3	1
CO2	2	2	1	1	-	1	-	-	-	-	-	2	2	1
CO3	1	3	3	2	-	1	3	-	-	-	-	2	1	1
CO4	2	1	2	2	2	1	2	-	-	-	-	2	1	2
CO5	1	1	2	3	1	-	2	-	-	-	-	3	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS330- Internet of Things

(200 Marks)

Contact Hours: 07

Pre-requisite: -

Methodology & Pedagogy: In order to achieve the objectives and goals, students will be taught the basics of IOT with its structure, layers and applications. Fundamentals controllers are introduced which can be used to implement the IOT based projects. Students will also be introduced to interface GPIO with controllers like arduino and Raspberry PI. They can also learn to develop a desktop application and mobile application which can control the device remotely.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	Practical
1	Introduction to Internet of Things	08	36
2	Things, Clouds and Connections	04	
3	Programming Internet of Things System	10	
4	Sensors and Actuators for Internet of Things System	08	
5	Designing Mobile Application and Webpage for Internet of Things System	08	
6	ESP8266, ESP32 Microcontroller and Raspberry Pi for IOT	10	

Total Hours (Theory): 48

Total Hours (Lab) :36

Total Hours:84

Detail Syllabus:

Unit I : Introduction to Internet of Things :   **Hours: 08**

Introduction - Overview of Internet of Things (IoT), The building blocks of IoT, Various technologies making up IoT ecosystem, IoT levels, IoT design methodology, The Physical Design and Logical Design of IoT, Functional blocks of IoT and Communication Models, Development Tools used in IoT.

Unit II : Things, Clouds and Connections: **Hours: 04**

Working of Controlled Systems, Real-time systems with feedback loop, different type of modes using wired and wireless methodology, the process flow of an IoT application. Introduction to various cloud platform used in IoT system such as Thingworx, Microsoft Azure, Google cloud, Thingspeak etc.

Unit III : Programming Internet of Things System: **Hours: 10**

Arduino / node MCU controller for IOT Programming, Embedded C data types, variables, constants and operators, programming using control statements, loops, string and array, Arduino IDE. Variables and Numbers, Looping Structures, Conditional Statements, Lists, Tuples and Dictionaries, Type Conversions, Function declaration, calling functions and passing values, Function Returning values. Exiting from functions.

Unit IV : Sensors and Actuators for Internet of Things System: **Hours: 08**

Interfacing with various sensors like temperature sensor, PIR sensor and ultrasonic sensor. Interfacing with servomotor, DC motor, Gas sensor.

Unit V : Designing Mobile Application and Webpage for Internet of Things System   **Hours: 08**

Basic concepts of mobile application development, designing webpage for IoT user, Connecting App / webpage with cloud and controller as per Internet of Things system levels.

Unit VI : ESP8266, ESP32 Microcontroller and Raspberry Pi for IOT   **Hours: 10**

Basics of Wireless Networking, Introduction to ESP8266 Wi-Fi Module, Various Wi-Fi library, Introduction to ESP32 microcontroller. Introduction to Raspberry Pi, Why Raspberry pi, Features of Raspberry pi, Basic set up and first boot configuration, Different uses of Raspberry pi, Different Versions of Raspberry pi.

Core Books:

1. Arshdeep Bahga, Vijay Madisetti: Internet of Things: A Hands-On Approach, VPT Publication, 2014.
2. Michael Margolis, Brian Jepson, Nicholas Robert Weldin: Arduino Cookbook: Recipes to Begin, Expand, and Enhance Your Projects , O'Reilly Media Publisher, 3rd Edition, Kindle Edition, 2020.

Reference Books:

1. M. Richardson, S. Wallace: Getting Started with Raspberry Pi, O'Reilly, 2012

2. Dr. Simon Monk: Programming the Raspberry Pi: Getting Started with Python, McGraw Hill Publication

Web References:

1. https://www.tutorialspoint.com/arduino/index.htm [Arduino Fundamentals]
2. www.tinkercad.com [Arduino Simulator]
3. https://www.youtube.com/watch?v=UUOCh0Cbty8[Raspberry Pi - How to start programming with Python]
4. https://www.raspberrypi.org/documentation/usage/python/[Step by Step Programming]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 : Understanding Concepts of IOT and Clouds

CO2 :	Learning IOT Programming
CO3 :	Using sensors and actuators in IOT Projects
CO4 :	Learning Mobile app for IOT Projects
CO5 :	Developing IOT projects using ESP8266 and ESP32 and Raspberry PI

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Internet of Things	√				
2	Things, Clouds and Connections	√				
3	Programming Internet of Things System		√			
4	Sensors and Actuators for Internet of Things System			√		
5	Designing Mobile Application and Webpage for Internet of Things System				√	
6	ESP8266, ESP32 Microcontroller and Raspberry Pi for IOT					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	2	3	-	1	1	1	1	-	2	1	1
CO2	2	3	1	2	3	-	2	1	1	-	-	2	1	1
CO3	2	3	2	2	3	-	2	1	-	-	-	3	1	1
CO4	2	1	2	2	2	-	3	2	-	-	-	3	1	2
CO5	2	1	3	2	2	-	3	-	-	-	-	3	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS331: Advanced web Designing
(200 Marks)

Contact Hours: 07

Pre-requisite: Working knowledge of HTML and JavaScript

Methodology & Pedagogy: During the theory sessions students will understands the various JavaScript frameworks and its architecture, also able to comprehend MEAN stack application concepts. During the practical sessions students will learn how to reduce the amount of code you write to build rich user interface applications, Modularizing code, retrieving data from back-end-server and manipulate it.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours	
		Theory	Practical
1	Introduction to JavaScript and JavaScript Frameworks.	06	36
2	Directives in AngularJS	10	
3	MVW-The AngularJS way	09	
4	Introduction to NodeJS	08	
5	Working with NodeJS Framework - Express	08	
6	Working with Database	07	

Total Hours (Theory): 48

Total Hours (Lab) :36

Total Hours:84

Detail Syllabus:

Unit I: Introduction to JavaScript Frameworks.   Hours 06

Introduction JavaScript and its DOM concepts, JSON Objects, JavaScript Frameworks & Libraries, MEAN.JS introduction, Architecture of MEAN.JS.

Unit II : Introduction to AngularJS   **Hours 10**

Introduction to AngularJS, Advantages of AngularJS, Data Binding in angularJS, working with Expressions in angularJS, Introduction to Directives, Directive Lifecycle, Using Angular JS built-in directives, creating a custom directive, Overview of $scope - lifecycle of $scope, $rootscope, $watch, $apply.

Unit III : MVW-The Angular JS way.   **Hours 09**

MVW Architecture: Model-View-Controller and Model-View-View-Model Architecture, Introduction to AngularJS Modules – Application module & Controller modules, Attaching Properties and functions to scope, Controller in external files, AngularJS Filters, working with Angular Forms, Form events, validating Angular forms.

Unit IV : Introduction to NodeJS   **Hours 08**

Introduction to NodeJS, Advantages of NodeJS, working with Node Package Manager, Installing Modules using NPM, Traditional web Server Model, Node.js process Model, NodeJS modules – Core Modules, Local Module, Third-party modules, Export Module in Node.js, Creating NodeJS web server.

Unit V : Introduction to ExpressJS   **Hours 08**

Introduction to ExpressJS, Advantages of ExpressJS, Installing Express.js, building your first web server, Serve Static Resources using Express.js, working with HTTP methods of ExpressJS, ExpressJS routing.

Unit VI : Working with Database   **Hours 07**

Introduction to Mongo DB, Basic operations using MongoDB, Access MongoDB in Node.js, setting up mongoose, Connecting MongoDB, Insert, update and delete document.

Core Books:

1. Jeffry Houser : "Learn With: Angular 5, Bootstrap, and NodeJS", Kindle Edition,
2. Shyam Seshadri Brad Green:"AngularJS – Up and Running, Brad Green", Second Edition, O'REILLY
3. Basarat Ali Syed: "Beginning Node.js", Apress Publication.
4. Greg Lim : "Beginning MEAN Stack (MongoDB, Express, Angular, Node.js)", kindle Edition.

Reference Books:

1. Agus Kurniawan: "AngularJS Programming by Example 2017 Edition", Kindle Edition.
2. Adam Freeman: " Pro AngularJS 2017 Edition", Apress.
3. Krasimir Tsonev: "Node.js By Example", Packt Publishing
4. Ethan Brown: "Web Development with Node and Express", O'REILLY

Web References:

1. http://www.w3schools.com/angular/default.asp [Tutorial link for AngularJS]
2. http://www.tutorialspoint.com/angularjs/ [Tutorial link for AngularJS]
3. https://www.tutorialspoint.com/angularjs/angularjs_tutorial.pdf [E-book for AngularJS]
4. http://www.tutorialsteacher.com/nodejs/nodejs-modules [Tutorial link for NodeJS]

https://www.javatpoint.com/mean-stack-tutorial [MEAN stack development]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 : Familiar with JavaScript and JavaScript frameworks.

CO2 :	Able to understand basic fundamental of AngularJS.
CO3 :	Able to implement Model-View-View Model architecture.
CO4 :	Able to create web server.
CO5 :	Able to work with database.
C06:	Able to create Single page application and MEAN stack application.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	C06
1	Introduction to JavaScript and JavaScript Frameworks	√					√
2	Introduction to AngularJS		√				√
3	MVW-The Angular JS way			√			√
4	Introduction to NodeJS			√	√		√
5	Introduction to ExpressJS			√	√		√
6	Working with Database					√	√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	1	1	2	-	-	1	1	1
CO2	-	2	2	1	3	-	1	2	-	1	-	1	1	1
CO3	2	2	3	3	3	2	2	3	2	2	2	2	3	3
CO4	-	1	3	1	3	1	2	1	1	1	-	1	2	1
CO5	1	1	3	1	3	1	2	2	-	1	-	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS332 : Software Quality Assurance and Testing
(200 Marks)

Contact Hours: 06

Pre-requisite: Software Engineering.

Methodology & Pedagogy: The theory sessions will cover the software testing concepts and practices that support the production of quality software. The practical sessions will cover the application of testing techniques at various levels of testing using manual and automated testing tools. This is

Outline of the Course:

Unit No.	Title of the Unit	Minimum Numbers of Hours	
		Theory	Practical
1	Basic concepts of Software Testing	05	
2	White Box Testing Techniques	05	
3	Black Box Testing Techniques	07	36
4	Levels of Testing	07	
5	Test Planning and Design	06	
6	Test Execution and Measurements	06	

Total Hours (Theory): 36
Total Hours(Lab): 36
Total hours : 72

Detailed Syllabus:

Unit – I: Basic concepts of Software Testing   **Hours: 05**

Introduction to testing and its importance in software development, software testing role, responsibilities and principles, concept of quality, Verification and Validation, Design test case, Introduction to Static Techniques and Dynamic test case design techniques.

Unit – II: White Box Testing Techniques   **Hours: 05**

Overview of White Box, Control flow testing: Statement Coverage Testing, Branch Coverage Testing, Path Coverage Testing, Conditional Coverage Testing
Data flow testing: Data Flow Anomaly, Overview of Dynamic Data Flow Testing, Data Flow Graph, Data Flow Terms, Data Flow Testing Criteria.

Unit – III: Black Box Testing Techniques   **Hours: 07**
Overview of Black Box: Equivalence Class Partition, Boundary Value Analysis, Pairwise Technique, Cause Effective Graph, Decision Table.

Unit – IV: Levels of Testing   **Hours: 07**
Introduction to functional and non functional testing
Functional Testing : Unit Testing, Integration Testing, System Testing, User Acceptance Testing. Sanity/Smoke Testing, Regression Test.
Non Functional Testing: Performance Testing, Scalability Testing, Interoperability Testing, Security Testing, Recovery Testing, Basic Testing.

Unit – V: Test Planning and Design   **Hours: 06**
Requirements Analysis/Design : Understand the requirements, Prepare Traceability Matrix Test Planning**:** Object, Scope of Testing, Schedule, Approach, Roles & Responsibilities, Assumptions, Risks & Mitigations, Entry & Exit Criteria, Test Automation, Deliverables. Test Cases Design**:** Write Test cases, Review Test cases, Test Cases Template, Types of Test Cases, Difference between Test Scenarios and Test Cases.
Test Environment setup: Understand the SRS, Hardware and software requirements, Test Data

Unit – VI: Test Execution and Measurements   **Hours: 06**
Test Execution: Execute test cases, Defect Tracking and Reporting: Types of Bugs, Identifying the Bugs, Bug/Defect Life Cycle, Reporting the Bugs, Severity and priority.
Test Closure: Criteria for test closure, Test summary report
Test Metrics: Test Measurements, significance of Test Metrics, Metric Life Cycle, Types of Manual Test Metrics.

Core Books:

1. Sagar Naik, Piyu Tripathy: Software Testing and Quality Assurance, Theory and Practice, Wiley, 2008.
2. Paul C. Jorgensen : Software Testing: A Craftsman's Approach, 4th Edition by , CRC press, Taylor and Francsis Group,2014
3. Roger S Pressman: Software Engineering – A Practitioner's Approach, 7th Edition, McGRAW HILL International Edition, 2010.

Reference Books:

1. Mauro Pezze, Michael Young: Software testing and Analysis- Process, Principles and Techniques, Wiley India, 2012.
2. Boris Beizer: Software Testing Techniques: 2nd Edition, Van Nostrand Reinhold, 1990.
3. Daniel Galin: Software Quality Assurance, Pearson Education,2004.
4. Ron Patton: Software Testing, Pearson Education, 2005.

Web References:

1. http://tryqa.com/what-is-software-testing [Basic of Software Testing]
2. https://www.guru99.com/functional-testing.html [Functional Testing]
3. http://www.softwaretestinggenius.com/download/bgstpadmini.pdf [Software Testing Life Cycle]

Course Outcomes: Upon successful completion of the course, the students will:

C01 :	Understand the role of testing in software development.
C02 :	Apply the test case design techniques.
C03 :	Acquire the various levels of testing.
C04 :	Document test plan and design.
C05 :	Execute test case and measure the results.

Course Outcomes Mapping :

Unit No.	Unit Name	Course Outcomes				
		C01	C02	C03	C04	C05
1	Basic concepts of Software Testing	√				
2	White Box Testing Techniques	√	√			

3	Black Box Testing Techniques	√	√			
4	Levels of Testing	√		√		
5	Test Planning and Design	√			√	
6	Test Execution and Measurements	√				√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	2	3	2	2	3	2	2	2	3	2
CO2	3	2	2	2	3	2	2	1	1	2	1	1	1	2
CO3	3	2	2	1	2	3	2	1	1	1	2	1	1	2
CO4	3	2	1	1	2	2	2	2	1	2	1	2	1	1
CO5	3	3	2	1	2	1	2	1	2	2	1	2	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

MS333: Mini Project

(400 Marks)

Contact Hours: 12

Objective:

The main objective of this mini project is to let the students apply the programming knowledge to a real-world situation/problem and exposed the students with specific programming skills and help in developing a working model in terms of application.

Course Outcomes:

C01: Student will understand the implementation of concepts of SDLC and Software Engineering.

C02: The programming concepts they learn during their academics, it will be converted in to the actual implementations.

C03: Students will be exposed to understand the requirement of proposed software and implement these requirements in terms of programming logic and methods.

C04: Students must understand the difference between a program and professional application/product/software.

C05: Students will learn different categories of applications like Desktop application, Web applications, etc.

Guidelines:

Mini Project is in house project development. Every student is required to carry out Mini Project work under the supervision of a guide provided by the placement Coordinator. The guide shall

monitor progress of the student continuously. A candidate is required to present the progress of the Mini Project work during the semester as per the schedule provided by the placement Coordinator.

Mini Project proposal should be prepared in consultation with project guide. It should clearly state the objectives and environment of proposed Mini Project to be undertaken. Project documentation must be with the respect to the project only. Project report should strictly follow the points suggested in format of project report. Placement coordinator will provide the format of project report. Student has to submit one copy of Mini Project to the institute. Each Student is required to make a copy of Mini Project in CD and submit along with Mini Project report.

Evaluation:

The project must be evaluated in two aspects:

a. Internal (100 Marks):

    i. Reporting to internal project guide

    ii. Incorporation of suggestions by project guide

    iii. Internal Project viva examination

b. External (300 Marks):

    i. Project Report Preparation & Evaluation

    ii. External Project Viva Examination

Course Code	Course Title	Teaching Scheme		Internal	End Semester Examination		Total
		Contact Hours	Credit	Continuous Evaluation	Report	Presentation & Viva	
MS333	Mini Project	12	12	100	100	200	400

Web References:

1. http://techwhirl.com/writing-software-requirements-specifications/[For effective SRS]

2. http://www.ibm.com/developerworks/websphere/library/techarticles/0306_perks/perks2.html [For best practices of Software Project Development]

3. http://www.uacg.bg/filebank/acadstaff/userfiles/publ_bg_397_SDP_activities_and_steps. pdf [Requirement analysis guidelines]

4. http://www.cs.wustl.edu/~schmidt/PDF/design-principles4.pdf[Software Design Principles and Guidelines]

5. http://www.cse.hcmut.edu.vn/~hiep/KiemthuPhanmem/Tailieuthamkhao/Effective%20So ftware%2 0Testing%20-

2050%20specific%20ways%20to%20improve%20your%20testing.pdf[ForEffective Software Testing]

6. http://www.cs.uics.edu/~jbell/CourseNotes/OO_SoftwareEngineering/SE_Project_Report _Template .pdf[For guidelines to prepare software project report]

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	3	3	3	3	2	2	2	3	2
CO2	3	3	3	2	3	3	3	3	3	2	2	2	3	2
CO3	3	3	3	2	3	3	3	3	3	2	2	2	3	2
CO4	3	3	3	2	3	3	3	3	3	2	2	2	3	2
CO5	3	3	3	2	3	3	3	3	3	2	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation

DETAILED SYLLABUS

FOR

M.Sc. (IT)
PROGRAMME(4th
SEMESTER)

EFFECTIVE FROM ACADEMIC YEAR
2023-24

Teaching and Examination Scheme

Master of Science in Information Technology (M.Sc.(IT)) Programme

(Choice Based Credit System)

Effective from Year 2023-24

Semester-IV

Course Code	Course Title	Teaching Scheme				Internal	End Semester Examination		Total
		Contact Hours			Credit	Continuous Evaluation	Report	Presentation & Viva	
		Inst.	Practical	Total					
MS403	Dissertation/ Project Work	2	28	30	30	200	200	400	800

MS403: Dissertation/Project Work

(800 Marks)

Contact Hours: 30

Objective:

The main objective of this Dissertation is to let the students apply the programming knowledge to a real-world situation/problem and exposed the students with specific programming skills and help in developing a working model in terms of application.

Course Outcomes:

C01:	Student will understand the implementation of concepts of SDLC and Software Engineering.
C02:	The programming concepts they learn during their academics, it will be converted in to the actual implementations.
C03:	Students will be exposed to understand the requirement of proposed software and implement these requirements in terms of programming logic and methods.
C04:	Students must understand the difference between a program and professional application/product/software.
C05:	Students will learn different categories of applications like Desktop application, Web applications, etc.

Smt. ChandabenMohanbhai Patel Institute of Computer Applications

Guidelines:

Dissertation is in house project development. Every student is required to carry out Dissertation work under the supervision of a guide provided by the placement Coordinator. The guide shall monitor progress of the student continuously. A candidate is required to present the progress of the Dissertation work during the semester as per the schedule provided by the placement Coordinator.

Dissertation proposal should be prepared in consultation with project guide. It should clearly state the objectives and environment of proposed Dissertation to be undertaken. Project documentation must be with the respect to the project only. Project report should strictly follow the points suggested in format of project report. Placement coordinator will provide the format of project report. Student has to submit one copy of Dissertation to the institute. Each Student is required to make a copy of Dissertation in CD and submit along with Dissertation report.

Evaluation:

The project must be evaluated in two aspects:

    a. Internal (200 Marks):

        i. Reporting to internal project guide

        ii. Incorporation of suggestions by project guide

        iii. Internal Project viva examination

    b. External (600 Marks):

        i. Project Report Preparation & Evaluation

        ii. External Project Viva Examination

Course Code	Course Title	Teaching Scheme		Internal	End Semester Examination		Total
		Contact Hours	Credit	Continuous Evaluation	Report	Presentation & Viva	
MS403	Dissertation / Project	30	30	200	200	400	800

Web References:

1. http://techwhirl.com/writing-software-requirements-specifications/[For effective SRS]

2. http://www.ibm.com/developerworks/websphere/library/techarticles/0306_perks/perks2.html [For best practices of Software Project Development]

3. http://www.uacg.bg/filebank/acadstaff/userfiles/publ_bg_397_SDP_activities_and_steps.pdf [Requirement analysis guidelines]

4. http://www.cs.wustl.edu/~schmidt/PDF/design-principles4.pdf[Software Design Principles and Guidelines]

5. http://www.cse.hcmut.edu.vn/~hiep/KiemthuPhanmem/Tailieuthamkhao/Effective%20Software%2 0Testing%20-2050%20specific%20ways%20to%20improve%20your%20testing.pdf[ForEffective Software Testing]

6. http://www.cs.uics.edu/~jbell/CourseNotes/OO_SoftwareEngineering/SE_Project_Report_Template .pdf[For guidelines to prepare software project report]

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO2	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO3	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO4	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO5	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation