Department of Information Technology,
College of Technology, Pantnagar

M. Tech. (Information Technology)

Sr. No.	Course No.	Title of the Course	Credit Hours (L-T-P)
PROGRAMME CORE COURSES (16 Credits)			
1.	TIT-514	Information Security	3(3-0-0)
2.	TIT-515	Advanced Wireless Networks	3(3-0-0)
3.	TIT-522	Data Science	3(3-0-0)
4.	TIT-523	Advanced Distributed Systems	3(3-0-0)
5.	TIT-516	Information Security Laboratory	2(0-0-2)
6.	TIT-524	Open-Source Laboratory	2(0-0-2)
			16
SEMINAR (2 Credits)			
7.	TIT-688	Master's Seminar-I	1(0-0-1)
8.	TIT-689	Master's Seminar-II	1(0-0-1)
			02
PROGRAMME ELECTIVES (19 Credits)			**19**
(Programme Electives will be taken in a chosen stream from the List of Programme Elective Courses) i. Any other PG Course of the department can be opted by the student as Program Elective if recommended by advisory committee. ii. The relevant PG course offered by the other departments of College of Technology and CBSH may also be opted as Program Elective if recommended by advisory committee. iii. Any course of 3 credits relevant to chosen stream may be taken from the MOOC courses available on SWAYAM Portal in lieu of listed programme electives. The credits of such MOOC course will be accepted and considered as credits required for program elective.			
COMMON COURSES (3 Credits)			
9.	TEC/TIP/ TIT-649	Research Methodology and IPR	2(2-0-0)
10.	BHS-611	Library and Information Services	1(0-0-1)
			03
RESEARCH (30 Credits)			
11.	TIT-690	Master's Thesis Research	**30**
		Total Credits	**70**

LIST OF PROGRAMME ELECTIVE COURSES

Sr. No.	Course No.	Course Title	Credit Hours (L-T-P)	Remarks (New/Modified/ Existing)
Stream- Information Security (Sl. No. 1 to 8)				
1.	TIT-625	Web Security & Ethical Hacking	3(3-0-0)	New
2.	TIT-626	Digital Forensics	3(3-0-0)	New
3.	TIT-629	Security Assessment and Risk Analysis	3(3-0-0)	New
4.	TIT-630	Semantic Web & Social Networks	3(3-0-0)	New
5.	TIT-631	Surveillance & Video Recording	3(3-0-0)	New
6.	TIT-632	Cloud Security	3(3-0-0)	New
7.	TIT-633	Data Analytics For Fraud Detection	3(3-0-0)	New
8.	TIT-634	Malware Analysis and Reverse Engineering	3(3-0-0)	New
Stream- Data Science (Sl. No. 9 to 16)				
9.	TIT-635	Soft Computing	3(3-0-0)	New
10.	TIT-636	Computer Vision	3(3-0-0)	New
11.	TIT-637	Human Computer Interaction	3(3-0-0)	New
12.	TIT-638	Smart Sensors and Internet of Things	3(3-0-0)	New
13.	TIT-639	Big Data Analytics	3(3-0-0)	New
14.	TIT-640	Data Preparation and Analytics	3(3-0-0)	New
15.	TIT-641	Web Analytics and Development	3(3-0-0)	New
16.	TIT-642	Knowledge Discovery	3(3-0-0)	New
Courses common for both streams				
17.	TIT-627	Machine Learning and Blockchain	3(3-0-0)	New
18.	TIT-628	Web Search & Information Retrieval	3(3-0-0)	New
19.	TIT-618	Web Technologies	2(1-0-1)	Existing
20.	TIT-619	Cyber Crime & Information War	2(2-0-0)	Existing
21.	TIT-620	Information Storage & Management	2(2-0-0)	Existing
22.	TIT-624	Advanced Data Mining & Warehousing	3(2-0-1)	Existing
23.	TIT-687	Master's Special Problem	1-2	New

Department of Information Technology
College of Technology, GBPUAT, Pantnagar

Ph. D. Programme in Information Technology

Course No.	Course Title	Credit Hours (L-T-P)
XXX-XXX	**Any courses as advised by advisory committee from the list of PG courses offered by the Department totaling to minimum 9 credits.**	**9**
Supporting Courses 6 Credits		
BHS-652	Research Methodology I	1(1-0-0)
BHS-653	Research Methodology II	3(3-0-0)
BHS-654	Research and Publication Ethics	2(2-0-0)
Seminar 2 Credits		
TIT-788	Doctoral Seminar-I	1(0-0-1)
TIT-789	Doctoral Seminar-II	1(0-0-1)
Thesis Research		
TIT-790	Ph.D. Thesis Research	**84**
	Total Credits	**101**

Total of minimum 9 credits shall be required to study from the list of PG courses with additional marginal adjustment of 1 Credit.

List of PG Courses of the Department
Department of Information Technology

Sr. No.	Course No.	Course Title	Credit Hours (L-T-P)	Remarks (New/Modified/ Existing)
1.	TIT-514	Information Security	3(3-0-0)	New
2.	TIT-515	Advanced Wireless Networks	3(3-0-0)	New
3.	TIT-522	Data Science	3(3-0-0)	New
4.	TIT-523	Advanced Distributed Systems	3(3-0-0)	New
5.	TIT-516	Information Security Laboratory	2(0-0-2)	New
6.	TIT-524	Open-Source Laboratory	2(0-0-2)	New
7.	TIT-625	Web Security & Ethical Hacking	3(3-0-0)	New
8.	TIT-626	Digital Forensics	3(3-0-0)	New
9.	TIT-629	Security Assessment and Risk Analysis	3(3-0-0)	New
10.	TIT-630	Semantic Web & Social Networks	3(3-0-0)	New
11.	TIT-631	Surveillance & Video Recording	3(3-0-0)	New
12.	TIT-632	Cloud Security	3(3-0-0)	New
13.	TIT-633	Data Analytics For Fraud Detection	3(3-0-0)	New
14.	TIT-634	Malware Analysis and Reverse Engineering	3(3-0-0)	New
15.	TIT-635	Soft Computing	3(3-0-0)	New
16.	TIT-636	Computer Vision	3(3-0-0)	New
17.	TIT-637	Human Computer Interaction	3(3-0-0)	New
18.	TIT-638	Smart Sensors and Internet of Things	3(3-0-0)	New
19.	TIT-639	Big Data Analytics	3(3-0-0)	New
20.	TIT-640	Data Preparation and Analytics	3(3-0-0)	New
21.	TIT-641	Web Analytics and Development	3(3-0-0)	New
22.	TIT-642	Knowledge Discovery	3(3-0-0)	New
23.	TIT-627	Machine Learning and Blockchain	3(3-0-0)	New
24.	TIT-628	Web Search & Information Retrieval	3(3-0-0)	New
25.	TIT-618	Web Technologies	2(1-0-1)	Existing
26.	TIT-619	Cyber Crime & Information War	2(2-0-0)	Existing
27.	TIT-620	Information Storage & Management	2(2-0-0)	Existing
28.	TIT-624	Advanced Data Mining & Warehousing	3(2-0-1)	Existing
29.	TIT-687	Master's Special Problem	1-2	New
30.	TEC/TIP/ TIT-649	Research Methodology and IPR	2(2-0-0)	New
31.	TIT-687	Master's Special Problem	1-2	New
32.	TIT-688	Master's Seminar-I	1(0-0-1)	New
33.	TIT-689	Master's Seminar-II	1(0-0-1)	New
34.	TIT-690	Master's Thesis Research	30	Credits Modified
35.	TIT-701	Advanced Information Security	3(2-0-1)	Existing
36.	TIT-702	Advances in E-Commerce Strategies	3(2-0-1)	Existing
37.	TIT-703	Modeling & Simulation	2 (1-0-1)	Existing
38.	TIT-731	Data Visualization	3(2-0-1)	New
39.	TIT-732	Natural Language Processing	3(2-0-1)	New
40.	TIT-733	Advances in Blockchain Concepts and Applications	3(2-0-1)	New
41.	TIT-734	Recent Trends in Web Technologies	3(2-0-1)	New

42.	TIT-787	Doctoral Special Problem	1-2	New
43.	TIT-788	Doctoral Seminar-I	1(0-0-1)	Existing
44.	TIT-789	Doctoral Seminar-II	1(0-0-1)	Existing
45.	TIT-790	Ph.D. Thesis Research	84	Credits Modified

DEPARTMENT OF INFORMATION TECHNOLOGY, COLLEGE OF TECHNOLOGY, PANTNAGAR

PROPOSAL OF NEW COURSES

FOR

M.TECH. (INFORMATION TECHNOLOGY)

EFFECTIVE FROM BATCH 2022, AY: 2022-23

PROPOSAL FOR A NEW COURSE 1

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Information Security** **TIT-514**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d.An Introductory survey of special area of knowledge represented by some other department e.A summarizing or integrated course f.In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Major Course for M.Tech.
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Information Security
Course No. : TIT-514
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. To understand the fundamentals of Cryptography
2. To understand various key distribution and management schemes
3. To understand how to deploy encryption techniques to secure data in transit across data networks
4. To apply algorithms used for secure transactions in real world applications

Catalogue Description

UNIT I: Security Attacks, DES
UNIT II: Cryptography
UNIT III: Digital Signatures, Authentication Protocols
UNIT IV: IP Security
UNIT V: Intruders, Viruses and Worms

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT - I** Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security. Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.	11
2	**UNIT - II** Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.	9
3	**UNIT - III** Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service. Email Security: Pretty Good Privacy (PGP) and S/MIME.	8
4	**UNIT – IV** IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).	10
5	**UNIT – V** Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.	8
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Demonstrate the knowledge of cryptography, network security concepts and applications.
2. Ability to apply security principles in system design.
3. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

Suggested Readings

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
3. Principles of Information Security, Whitman, Thomson.

Suggested e-books

1. https://catalogue.library.cern/literature/p1ds9-tbq61

2. https://www.taylorfrancis.com/books/mono/10.1201/9781420031492/practical-guide-security-engineering-information-assurance-debra-herrmann

Suggested Websites

1. https://www.geeksforgeeks.org

2. https://www.sans.org

PROPOSAL FOR A NEW COURSE 2

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Advanced Wireless Networks** **TIT-515**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Major Course for M.Tech.
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Advanced Wireless Networks
Course No. : TIT-515
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. The students should get familiar with the wireless/mobile market and the future needs and challenges.
2. To get familiar with key concepts of wireless networks, standards, technologies and their basic Operations.
3. To learn how to design and analyze various medium access.
4. To learn how to evaluate MAC and network protocols using network simulation software tools.
5. The students should get familiar with the wireless/mobile market and the future needs and challenges.

Catalogue Description

UNIT I: Introduction, Wireless Local Area Networks
UNIT II: Wireless Cellular Networks
UNIT III: WiMAX, Wireless Sensor Networks
UNIT IV: Wireless PANs
UNIT V: Security, Advanced Topics

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT –I : Introduction** Wireless Networking Trends, Key Wireless Physical Layer Concepts, Multiple Access Technologies – CDMA, FDMA, TDMA, Spread Spectrum technologies, Frequency reuse, Radio Propagation and Modelling, Challenges in Mobile Computing: Resource poorness, Bandwidth, energy etc. **Wireless Local Area Networks:** IEEE 802.11 Wireless LANs Physical & MAC layer, 802.11 MAC Modes (DCF& PCF) IEEE 802.11 standards, Architecture & protocols, Infrastructure vs. Adhoc Modes, Hidden Node & Exposed Terminal Problem, Problems, Fading Effects in Indoor and outdoor WLANs, WLAN Deployment issues	12
2	**UNIT –II :Wireless Cellular Networks** 1G and 2G, 2.5G, 3G, and 4G, Mobile Ipv4, Mobile Ipv6, TCP over Wireless Networks, Cellular architecture, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Improving coverage and capacity in cellular systems, Spread spectrum Technologies	9
3	**UNIT –III :** WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE802.22 Wireless Regional Area Networks, IEEE 802.21 Media Independent Handover Overview **Wireless Sensor Networks:** Introduction, Application, Physical, MAC layer and Network Layer, Power Management, Tiny OS Overview.	10
4	**UNIT – IV** **Wireless PANs:** Bluetooth AND Zigbee, Introduction to Wireless Sensors.	6
5	**UNIT – V Security:** Security in wireless Networks Vulnerabilities, Security techniques, Wi-Fi Security, DoS in wireless communication. **Advanced Topics** IEEE 802.11x and IEEE 802.11i standards, Introduction to Vehicular AdhocNetworks	9
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
2. Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis
3. Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
4. Design wireless networks exploring trade-offs between wire line and wireless links.
5. Develop mobile applications to solve some of the real-world problems.

Suggested Readings

1. Schiller J., Mobile Communications, Addison Wesley 2000
2. Stallings W., Wireless Communications and Networks, Pearson Education 2005
3. Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and Sons Inc 2002
4. Yi Bing Lin and ImrichChlamtac, Wireless and Mobile Network Architectures, John Wiley and Sons Inc 2000
5. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI 200

Suggested e-books

1. https://www.wiley.com/en-us/Advanced+Wireless+Networks%3A+4G+Technologies-p-9780470035412

2. https://ieeexplore.ieee.org/document/4100600

Suggested Websites

1. https://www.slideshare.net/ShashikantAthawale/advanced-wireless-technologies

2. https://www.bloomberg.com/profile/company/0966315D:TB

PROPOSAL FOR A NEW COURSE 3

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Data Science** **TIT-522**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d.An Introductory survey of special area of knowledge represented by some other department e.A summarizing or integrated course f.In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Major Course for M.Tech.
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Data Science
Course No. : TIT-522
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Provide the knowledge and expertise to become a proficient data scientist.
2. Demonstrate an understanding of statistics and machine learning concepts that are vital for data science
3. Produce Python code to statistically analyse a dataset
4. Critically evaluate data visualisations based on their design and use for communicating
5. Stories from data

Catalogue Description

UNIT I: Introduction
UNIT II: Data Storage and Management
UNIT III: Data Analysis
UNIT IV: Data Visualisation
UNIT V: Applications of Data Science
UNIT VI: Recent Trends in Various Data Collection and Analysis Techniques

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.	6
2	**UNIT – II :** Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources	7
3	**UNIT – III :** Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance,Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes	9
4	**UNIT – IV** Data visualisation: Introduction, Types of data visualisation,Data for visualisation:Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.	10
5	**UNIT – V** Applications of Data Science,Technologies for visualisation, Bokeh (Python) Advanced Topics	7
6	**UNIT - VI** Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.	7
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes
1. Explain how data is collected, managed and stored for data science
2. Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists
3. Data collection and management scripts using MongoDB
4. Design wireless networks exploring trade-offs between wire line and wireless links.

Suggested Readings
1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly
2. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

Suggested e-books
1. https://openlibrary.org/books/OL26442830M/Data_Science_at_the_Command_Line
2. https://openlibrary.org/books/OL25941419M/Data_Science_for_Business

Suggested Websites
1. https://www.simplilearn.com/tutorials/data-science-tutorial/what-is-data-science#:~:text=Data%20science%20is%20the%20domain,algorithms%20to%20build%20predictive%20models.
2. https://www.coursera.org/specializations/jhu-data-science

PROPOSAL FOR A NEW COURSE 4

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Advanced Distributed Systems** **TIT-523**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Major Course for M.Tech.
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Advanced Distributed Systems
Course No. : TIT-523
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Give an Overview of information security
2. Give an overview of Access control of relational databases

Catalogue Description

UNIT I: The Web Security
UNIT II: The Web Privacy
UNIT III: Database Security
UNIT IV: Security Re-engineering for Databases
UNIT V: Future Trends Privacy in Database Publishing

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **The Web Security** The Web Security Problem, Risk Analysis and Best Practices Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification	9
2	**UNIT – II** **The Web Privacy** The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications	9
3	**UNIT – III** **Database Security** Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems	10
4	**UNIT – IV** **Security Re-engineering for Databases** Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities	10
5	**UNIT – V** **Future Trends Privacy in Database Publishing** A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment	8
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations

5- Group Discussions

Learning Outcomes

1. Understand the Web architecture and applications
2. Understand client side and service side programming
3. Understand how common mistakes can be bypassed and exploit the application
4. Identify common application vulnerabilities

Suggested Readings

1. Web Security, Privacy and Commerce, Simson G. Arfinkel, Gene Spafford, O' Reilly.
2. Handbook on Database security applications and trends, Michael Gertz, Sushil Jajodia.

Suggested e-books

1.https://openlibrary.org/works/OL16930716W/Advanced_distributed_systems?edition=ia%3Aadvanceddistribu00ramo_334

2. https://openlibrary.org/works/OL16989286W?edition=ia%3Aadvancesdistribu00vers

Suggested Websites

1. https://courses.engr.illinois.edu/cs525/sp2018/

2. https://courses.engr.illinois.edu/cs525/sp2021/

PROPOSAL FOR A NEW COURSE 5

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Information Security Laboratory** **TIT-516**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	2(0-0-2)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Major Course for M.Tech.
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Information Security Laboratory
Course No. : TIT-516
Credit Hours : 2(0-0-2)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field

Aim of the Course

1. To implement the cryptographic algorithms.
2. To implement the security algorithms.
3. To implement cryptographic, digital signatures algorithms.

Practical Schedule

List of Experiments:	No. of Labs
1. Implementation of symmetric algorithms	4
2. Implementation of asymmetric algorithms	4
3. Implementation of stenography	1
4. Authenticating the given signature using MD5 hash algorithm.	2
5. Implementation of Diffie-Hellman algorithm	2
6. Implementation of substitution ciphers	4
7. Implementation of transposition ciphers	4
8. Implementation of Digital Signatures	2
9. Implementation of Kerberos cryptosystem	2
10. Firewall implementation and testing.	2
11. Implementation of a trusted secure web transaction.	2
12. Case study of Internet Security Protocols	2
Lab Final	1
TOTAL	**32**

Teaching Methods

1- Laboratory Experiments
2- Problem Solving
3- Assignments
4- Presentations
5- Laboratory File

Learning Outcomes

1. Understand the Security Protocols
2. Understand security programming
3. Understand passing of messages securely
4. Practical hands on experiences on cryptography related fields

Suggested Readings

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
3. Principles of Information Security, Whitman, Thomson.

Suggested e-books

1. https://catalogue.library.cern/literature/p1ds9-tbq61
2. https://www.taylorfrancis.com/books/mono/10.1201/9781420031492/practical-guide-security-engineering-information-assurance-debra-herrmann

Suggested Websites

1. https://www.geeksforgeeks.org
2. https://www.sans.org

PROPOSAL FOR A NEW COURSE 6

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Open Source Laboratory** **TIT-524**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	2(0-0-2)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Major Course for M.Tech.
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Er. Subodh Prasad and Er. Govind Verma
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Open Source Laboratory
Course No. : TIT-524
Credit Hours : 2(0-0-2)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. To implement the cryptographic algorithms.
2. To implement the security algorithms.
3. To implement cryptographic, digital signatures algorithms.

Practical Schedule

List of Experiments:	No. of Labs
1. Basic Linux Commands And Package Management System	2
2. Kernel Configuration, Compilation And Installation	2
3. Virtualization Environment	1
4. Compiling From Source- Make, Ant	2
5. Samba Installation And Configuration	2
6. Set Up The Complete Network Interface	2
7. GUI programming	3
8. Programs using scripting and server side languages	2
9. Web Server with database	3
10. Programs in PYTHON	3
11. PYTHON with database	2
12. Programs in Java/.NET	3
13. Study of NoSQL	2
14. Study of Big Data and Hadoop	2
Lab Final	1

Teaching Methods

1- Laboratory Experiments
2- Problem Solving
3- Assignments
4- Presentations
5- Laboratory File

Learning Outcomes

1. Understand open source systems
2. Understand programming of open source systems
3. Understand various open source programming languages
4. Understand database connectivity of various languages

Suggested Readings

1. https://www.synopsys.com/glossary/what-is-open-source-software.html
2. https://www.redhat.com/en/topics/open-source/what-is-open-source

Suggested e-books

1.https://openlibrary.org/works/OL8637406W/Open_source?edition=ia%3Aopensourcetechno0000deek
2.https://openlibrary.org/works/OL17075731W/Open_sources?edition=ia%3Aisbn_978156592582

Suggested Websites

1. https://www.geeksforgeeks.org
2. https://www.businessinsider.in/tech/how-to/what-is-open-source-software-understanding-the-non-proprietary-software-that-allows-you-to-modify-its-code/articleshow/86309284.cms

PROPOSAL FOR A NEW COURSE 7

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Master's Seminar-I** **TIT-688**
4.	Catalogue Description	To prepare the students for reviewing the scientific literature and arranging it in a systematic manner for presenting before expert audience of the concerned field
5.	To be offered	Once in a academic Year
6.	Credits	1(0-0-1)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field and is recommended by AICTE Model Curriculum
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Compulsory Course for M.Tech.
15.	Syllabus	Recent Topics of the concerned field
16.	Basic Textbook for the proposed course	
17.	References	Journals related to topic of assigned seminar
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

PROPOSAL FOR A NEW COURSE *8*

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Master's Seminar-II** **TIT-689**
4.	Catalogue Description	To prepare the students for reviewing the scientific literature and arranging it in a systematic manner for presenting before expert audience of the concerned field
5.	To be offered	Once in a academic Year
6.	Credits	1(0-0-1)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field and is recommended by AICTE Model Curriculum
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Compulsory Course for M.Tech.
15.	Syllabus	Recent Topics of the concerned field
16.	Basic Textbook for the proposed course	
17.	References	Journals related to topic of assigned seminar
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

PROPOSAL FOR A NEW COURSE 9

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Research Methodology and IPR** **TEC/TIP/TIT-649**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	2(2-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Compulsory Common Course for M.Tech.
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Research Methodology and IPR
Course No. : TIT-649
Credit Hours : 2(2-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics

Catalogue Description

UNIT I: Research Problem
UNIT II: Effective Literature Studies Approaches
UNIT III: Nature of Intellectual Property
UNIT IV: Patent Rights

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Meaning of research problem, Sources of research problem, Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations	9
2	**UNIT – II** Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, Developing a Research Proposal, presentation and assessment by a review committee	7
3	**UNIT – III** Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under Patent Cooperation Treaty (PCT).	8
4	**UNIT – IV** Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. Administration of Patent System. IPR in academic research environment. Traditional knowledge, Case Studies	6
5	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

2. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
3. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Suggested Readings

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students' "
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.
6. Niebel, "Product Design", McGraw Hill, 1974.
7. Asimov, "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Suggested e-books

1. https://www.jntuk.edu.in/wp-content/uploads/2020/01/M.tech-research-methodology-and-ipr.pdf

2. https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf

Suggested Websites

1. https://iare.ac.in/sites/default/files/MTECH-CAD.CAM-R18-RM-IP-NOTES.pdf

2. https://edcaution.blogspot.com/2020/03/research-methodology-and-ipr-rm-ipr_28.html

PROPOSAL FOR A NEW COURSE 10

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Master's Special Problem** **TIT-687**
4.	Catalogue Description	To prepare the students for recent advancements in the field of Information Technology
5.	To be offered	Once in a academic Year
6.	Credits	1-2
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Modification of Course
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Compulsory Course for M.Tech.
15.	Syllabus	Recent Topics of the concerned field
16.	Basic Textbook for the proposed course	
17.	References	Journals and recent advances related to Information Technology
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

DEPARTMENT OF INFORMATION TECHNOLOGY,

COLLEGE OF TECHNOLOGY, PANTNAGAR

PROPOSAL OF NEW COURSES

FOR P.G. COURSES OF THE DEPARTMENT

APPLICABLE FOR

M.TECH. (INFORMATION TECHNOLOGY)

&

Ph.D. (INFORMATION TECHNOLOGY)

EFFECTIVE FROM BATCH 2022, AY: 2022-23

PROPOSAL FOR A NEW COURSE 11

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Web Security & Ethical Hacking** **TIT-625**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Web Security & Ethical Hacking
Course No. : TIT-625
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Introduces the concepts of Web Security and Ethical Hacking and gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security and practically apply some of the tools.

Catalogue Description

UNIT I: Introduction
UNIT II: Introduction to Ethical Hacking, Ethics, and Legality
UNIT III: Foot printing and Social Engineering
UNIT IV: Scanning and Enumeration
UNIT V: Trojans, Backdoors, Viruses, and Worms

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Introduction – A web security forensic lesson, Web languages, Introduction to different web attacks. Overview of N-tier web applications, Web Servers: Apache, IIS, Database Servers. Review of computer security, Public Key cryptography, RSA. Review of Cryptography basics, On-line shipping, Payment Gateways. Web Hacking basics HTTP & HTTPS URL, Web Under the Cover Overview of Java security, Reading the HTML source, Applet security, Servlets security. Symmetric and Asymmetric encryptions, Network Security basics, Firewalls & IDS, Digital certificates, Hashing, Message digest, Digital Signatures	8
2	**UNIT – II** **Introduction to Ethical Hacking, Ethics, and Legality** Ethical Hacking Terminology, Different Types of Hacking Technologies, Different Phases Involved in Ethical Hacking and Stages of Ethical Hacking: Passive and Active Reconnaissance, Scanning, Gaining Access, Maintaining Access, Covering Tracks, Hacktivism, Types of Hacker Classes, Skills Required to Become an Ethical Hacker, Vulnerability Research, Ways to Conduct Ethical Hacking, Creating a Security Evaluation Plan, Types of Ethical Hacks, Testing Types, Ethical Hacking Report	8
3	**UNIT – III** **Footprinting and Social Engineering** Footprinting , Information Gathering Methodology, Competitive Intelligence, DNS numeration whois and ARIN Lookups, Types of DNS Records, Traceroute, E-Mail Tracking ,Web Spiders , Social Engineering, Common Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.	9
4	**UNIT – IV** **Scanning and Enumeration** Scanning, types of Scanning , CEH Scanning Methodology ,Ping Sweep Techniques, Nmap Command Switches, SYN, Stealth, XMAS, NULL, IDLE and FIN Scans, TCP, Communication Flag Types, War-Dialing Techniques, Banner Grabbing and OS Fingerprinting Techniques, Proxy Servers, Anonymizers , HTTP Tunneling Techniques, IP Spoofing Techniques, Enumeration, Null Sessions, SNMP Enumeration, Windows 2000 DNS Zone Transfer, Steps Involved in Performing Enumeration **System Hacking** Understanding Password-Cracking Techniques, Understanding the Lan Manager Hash Cracking Windows 2000 Passwords, Redirecting the SMB Logon to the Attacker SMB Redirection, SMB Relay MITM Attacks and Countermeasures NetBIOS DoS Attacks,	11

	Password-Cracking Countermeasures, Understanding Different Types of Passwords Passive Online Attacks, Active Online Attacks, Offline Attacks Nonelectronic Attacks, Understanding Keyloggers and Other Spyware Technologies Understand Escalating Privileges, Executing Applications, Buffer Overflows, Understanding Rootkits Planting Rootkits on Windows 2000 and XP Machines, Rootkit Embedded TCP/IP Stack Rootkit Countermeasures, Understanding How to Hide Files, NTFS File Streaming NTFS Stream Countermeasures, Understanding Steganography Technologies, Understanding How to Cover Your Tracks and Erase Evidence, Disabling Auditing, Clearing the Event Log	
5	**UNIT – V** **Trojans, Backdoors, Viruses, and Worms** Trojans and Backdoors, Overt and Covert Channels, Types of Trojans, ReverseConnecting Trojans, NetcatTrojan ,Indications of a Trojan Attack, Wrapping, Trojan Construction Kit and Trojan Makers , Countermeasure Techniques in Preventing Trojans, Trojan-Evading Techniques, System File Verification Sub objective to Trojan Countermeasures Viruses and Worms, Difference between a Virus and a Worm,Types of Viruses, Understand Antivirus Evasion Techniques,Understand Virus Detection Methods **Sniffers** Protocols Susceptible to Sniffing, Active and Passive Sniffing, ARP Poisoning, Ethereal Capture and Display Filters,MAC Flooding, DNS Spoofing Techniques, Sniffing Countermeasures Denial of Service and Session Hijacking Denial of Service, Types of DoS Attacks, DDoS Attacks, BOTs/BOTNETs, "Smurf" Attack, "SYN" Flooding,DoS/DDoS Countermeasures, Session Hijacking, Spoofing vs.Hijacking, Types of Session Hijacking, Sequence Prediction, Steps in Performing Session Hijacking, Prevention of Session Hijacking	10
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. Understand the core concepts related to malware, hardware and software vulnerabilities and their causes.
2. Understand ethics behind hacking and vulnerability disclosure.
3. Appreciate the Cyber Laws and impact of hacking.
4. Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

Suggested Readings

1. Web Hacking: Attacks and Defense, Stuart McClure, Saumil,Shreeraj Shah, Pearson Education, 2003, rp2007.
2. Web Security, Privacy & Commerce, Simson Garfinkel, SPD, O`Reilly, 2002.
3. Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Gray Hat Hacking: The Ethical Hackers Handbook, TMH Edition
4. Jon Erickson, Hacking: The Art of Exploitation, SPD.

Suggested e-books

1. Top 10 Web Vulnerability Scanners http://sectools.org/web-scanners.html

2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition

3. Certified Ethical Hacker: Michael Gregg, Pearson Education

Suggested Websites

1. The World Wide Web Security FAQ: http://www.w3.org/Security/faq/

2. The OpenSSL project (SDKs for free download): hhtp://www.openssl.org/

PROPOSAL FOR A NEW COURSE 12

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Digital Forensics** **TIT-626**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Digital Forensics
Course No. : TIT-626
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Provides an in-depth study of the rapidly changing and fascinating field of computerforensics.
2. Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
3. Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools.
4. E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensic.

Catalogue Description

UNIT I: Digital Forensics Science, Computer Crime
UNIT II: Cyber Crime Scene Analysis
UNIT III: Evidence Management & Presentation
UNIT IV: Computer Forensics
UNIT V: Mobile Forensics
UNIT VI: Recent Trends

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Digital Forensics Science:** Forensics science, computer forensics, and digital forensics. **Computer Crime:** Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics	9
2	**UNIT – II** **Cyber Crime Scene Analysis:** Discuss the various court orders etc., methods tosearch and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.	8
3	**UNIT – III** **Evidence Management & Presentation:** Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.	8
4	**UNIT – IV** **Computer Forensics:** Prepare a case, Begin an investigation, Understandcomputer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case. **Network Forensics:** Open-source security tools for network forensic analysis, requirements for preservation of network data.	9
5	**UNIT – V** **Mobile Forensics:** Mobile forensics techniques, mobile forensics tools. **Legal Aspects of Digital Forensics:** IT Act 2000, amendment of IT Act 2008.	8
6	**UNIT – VI** Recent trends in mobile forensic technique and methods to search and seizure electronic evidence.	4
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. Understand relevant legislation and codes of ethics.
2. Computer forensics and digital detective and various processes, policies and procedures.
3. E-discovery, guidelines and standards, E-evidence, tools and environment.
4. Email and web forensics and network forensics.

Suggested Readings

1. John Sammons, The Basics of Digital Forensics, Elsevier.
2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications.
3. Computer Forensics and Investigations by Phillips, Nelson, Steuart, CENGAGE Learning.
4. .Computer Forensics, computer crime Investigations by John –R Vacca Fire wall Media, New Delhi.

Suggested e-books

1. https://www.routledge.com/Digital-Forensics-Explained/Gogolin/p/book/9780367503437

2. https://www.amazon.in/Basics-Digital-Forensics-Getting-Started/dp/1597496618

Suggested Websites

1. https://www.interpol.int/en/How-we-work/Innovation/Digital-forensics#:~:text=Digital%20forensics%20is%20a%20branch,crucial%20for%20law%20enforcement%20investigations.

2. https://www.eccouncil.org/what-is-digital-forensics/

PROPOSAL FOR A NEW COURSE 13

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Machine Learning and Blockchain** **TIT-627**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr.Ratnesh Prasad Srivastava
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Machine Learning and Blockchain
Course No. : TIT-627
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. The students should get familiar with the machine learning/Blockchain concepts and the future needs and challenges.
2. To get familiar with key concepts of machine learning, models and their uses in the real time applications.
3. To learn how to design a model to take decision and prediction purpose.
4. To learn how to design a blockchain as distributed immutable and transparent database.
5. This course provides the students with opportunity to learn Advances in Machine Learning and Blockchain.
6. It provides the student to know the advance concepts of Machine Learning and Blockchain practices, Decision making, predicting results from test data, reliability and quality applications that help in industry to make a theoretical and conceptual advancement of this subject knowledge of students.

Catalogue Description

UNIT I: Introduction
UNIT II: Data Cleaning and Encodings
UNIT III: Regression
UNIT IV: Classification Algorithms
UNIT V: Clustering Algorithm
UNIT VI: Neural Network and Deep Learning
UNIT VII: Blockchain

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Introduction:** Introduction to Machine Learning, Descriptive Analysis, Predictive Analysis and Prescriptive Analysis, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Statistical Decision Theory, Bias – Variance	6
2	**UNIT – II** **Data Cleaning and Encodings:** Outliers Detection, Stop Word Removal, Feature Selection, Guassian Mixture Models, Hidden Markov Models	6
3	**UNIT – III** **Regression:** Linear Regression, Multivariate Regression, Norms, Principal Components Regression, Logistic Regression, Gradient Descent and optimizers, Mean Square Error, Overfitting, Underfitting, Gradient Boosting	7
4	**UNIT – IV** **Classification Algorithms :**Linear Classification, Linear Discriminant Analysis, Separating Hyperplane Approaches - Perceptron Learning, Support Vector Machines, SVM Kernels, Random Forests, Naive Bayes, Bayesian Networks, Multiclass Classification	8
5	**UNIT – V** **Clustering Algorithm:** Partitional Clustering, K Means Clustering, Hierarchical Clustering, Density Based Clustering	5
6	**UNIT – VI** **Neural Network and Deep Learning:** Artificial Neural network- Early Models and Backpropagation, Artificial Neural Networks - Training, Initialization and Validation, Deep learning- AutoEncoders, Descriptor, Descriminators	8
7	**UNIT – VII** **Blockchain:** Introduction, Private, Public and Permissioned Blockchain, Consensus, Miners and Merkle Tree	6
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. Demonstrate advanced knowledge of Machine Learning and its practices in various domains of applications.
2. Be able to design Regression, Classification and clustering models.
3. Demonstrate knowledge of database distribution, data set cleaning for analyzing data.
4. Be able to understand concepts of blockchain for implementation of trustless based system such as supply chain management.
5. Develop Machine Learning and blockchain based application to solve some of the real-world problems.

Suggested Readings

1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education, 2022.
2. Trevor Hastie, Robert Tibshirani, and Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", 2nd Ed., Springer, 2022.
3. Yaser Abu Mostafa, Malik Magdon-Ismail, and Hsuan-Tien Lin, "Learning from Data: A Short Course", AMLBook, 2021.
4. Tiana Laurence, "Blockchain for Dummies", 2nd Ed., Learning Made Easy, 2021.
5. Melanie Swan, "Blockchain: Blueprint For a New Economy", First Ed., O'reilly, 2021.

Suggested e-books

1. https://openlibrary.org/books/OL27212411M/Blockchain_revolution

2. https://www.amazon.in/Blockchain-Big-Data-Machine-Learning-ebook/dp/B08HJQ21PG

Suggested Websites

1. https://analyticsindiamag.com/how-machine-learning-can-be-used-with-blockchain-technology/

2. https://www.saviantconsulting.com/blog/blockchain-machine-learning-disrupting-major-industries.aspx

PROPOSAL FOR A NEW COURSE 14

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Web Search & Information Retrieval** **TIT-628**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr.Shriprakash Dwivedi
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Web Search & Information Retrieval
Course No. : TIT-628
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. To introduce the concept of web search engine.
2. To analyse and evaluate the information retrieval systems. It provides the students to know the tools and techniques to do research in the area related to information retrieval and text mining.

Catalogue Description

UNIT I: Introduction
UNIT II: Overview of information retrieval systems
UNIT III: Information retrieval models and implementation
UNIT IV: Probabilistic and language models for information retrieval
UNIT V: Text classification and clustering

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Introduction** Background and history, web search basics, web characteristics, web graph, the search user experience, web crawling, crawler architecture, index size and estimation, web as a graph, PageRank computation, Markov chain, link analysis**.**	8
2	**UNIT – II** **Overview of information retrieval systems:** An example information retrieval problem, boolean retrieval, the extended boolean model versus ranked retrieval, the term vocabulary and posting lists, document delineation, character sequence decoding, determining the vocabulary of terms, tokenization, normalization, dictionaries and tolerant retrieval, search structures for dictionaries, index construction and index compression.	10
3	**UNIT – III** **Information retrieval models and implementation:** Vector space models, term weighting, scoring, learning weights, the optimal weight, term frequency and weighting, inverse document frequency, dot products, queries as vectors, computing vector scores, document and query weighting schemes, computing scores in a complete search systems, efficient scoring and ranking, components of an information retrieval systems, information retrieval system evaluation, relevance feedback and query expansion.	10
4	**UNIT – IV** **Probabilistic and language models for information retrieval:** Basic probability theory, ranking principle, the binary independence model, deriving a ranking functions for query terms, probabilistic approaches to relevance feedback, Bayesian network approaches, types of language models, the query likelihood model, estimating the query generation probability, extended language modeling approaches.	9
5	**UNIT – V** **Text classification and clustering:** The text classification problem, naive Bayes text classification, vector space classification, support vector machines, machine learning methods in information retrieval, clustering in information retrieval.	9
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. To identify basic theories and analysis tools as they apply to information retrieval.
2. To develop understanding of problems and potentials of current IR systems.
3. To learn and appreciate different retrieval algorithms and systems.
4. To apply various indexing, matching, organizing, and evaluating methods to IR problem.
5. To become aware of current experimental and theoretical IR research.

Suggested Readings

1. Christopher D. Manning, P. Raghavan, H. Schutze, "An Introduction to Information Retrieval", Cambridge University Press, 2009
2. S. Buettcher, C. L. Clarke, G. V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", MIT Press, 2010.
3. C. X. Zhai, "Statistical Language Models for Information Retrieval", Morgan & Claypool Publishers, 2008.

Suggested e-books

1. C. D. Manning, P. Raghavan and H. Schutze, Introduction to Information Retrieval, Cambridge University Press, 2008 (available at http: nlp.stanford.edu IR-book).

2. Chakrabarti, S. (2002). Mining the web: Mining the Web: Discovering knowledge from hypertext data. Morgan-kaufman.

3. B. Croft, D. Metzler, T. Strohman, Search Engines: Information Retrieval in Practice, Addison-Wesley, 2009 (available at http://ciir.cs.umass.edu).

Suggested Websites

1. https://www.dsi.unive.it/~dm/New_Slides/8_info-retrieval.pdf

2. https://sites.cs.ucsb.edu/~tyang/class/293S17/slides/Topic1SearchIntroSimple.pdf

PROPOSAL FOR A NEW COURSE 15

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Security Assessment and Risk Analysis** **TIT-629**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Security Assessment and Risk Analysis
Course No. : TIT-629
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Describe the concepts of risk management
2. Define and differentiate various Contingency Planning components.
3. Integrate the IRP, DRP, and BCP plans into a coherent strategy to support sustained organizational operations.
4. Define and be able to discuss incident response options, and design an Incident Response Plan for sustained organizational operations.

Catalogue Description

UNIT I: Security Basics
UNIT II: Threats to and Vulnerabilities of Systems
UNIT III: Security Planning
UNIT IV: Policies and Procedures
UNIT V: Operations Security (OPSEC)
UNIT VI: Case Study

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Security Basics:** Information Security (INFOSEC) Overview: critical information characteristics - availability information states - processing security countermeasures education, training and awareness, critical information characteristics - confidentiality critical information characteristics - integrity, information states - storage, information states - transmission, security countermeasures policy, procedures and practices, threats, vulnerabilities.	8
2	**UNIT – II** **Threats to and Vulnerabilities of Systems:** definition of terms (e.g., threats, vulnerabilities, risk), major categories of threats (e.g., fraud, Hostile Intelligence Service (HOIS), malicious logic, hackers, environmental and technological hazards, disgruntled employees, careless employees, HUMINT, and monitoring), threat impact areas, Countermeasures: assessments (e.g., surveys, inspections). **Concepts of Risk Management:** consequences (e.g., corrective action, risk assessment), cost/benefit analysis of controls, implementation of cost effective controls, monitoring the efficiency and effectiveness of controls (e.g., unauthorized or inadvertent disclosure of information), threat and vulnerability assessment	10
3	**UNIT – III** **Security Planning:** directives and procedures for policy mechanism, Risk Management: acceptance of risk (accreditation), corrective actions information identification, risk analysis and/or vulnerability assessment components, risk analysis results evaluation, roles and responsibilities of all the players in the risk analysis process, Contingency Planning/Disaster Recovery: agency response procedures and continuity of operations, contingency plan components, determination of backup requirements, development of plans for recovery actions after a disruptive event, development of procedures for offsite processing, emergency destruction procedures, guidelines for determining critical and essential workload, team member responsibilities in responding to an emergency situation.	9
4	**UNIT – IV** **Policies and Procedures:** Physical Security Measures: alarms, building	8

	construction, cabling, communications centre, environmental controls (humidity and air conditioning), filtered power, physical access control systems (key cards, locks and alarms) Personnel Security Practices and Procedures: access authorization/verification (need to know), contractors, employee clearances, position sensitivity, security training and awareness, systems maintenance personnel, Administrative Security Procedural Controls: attribution, copyright protection and licensing , Auditing and Monitoring: conducting security reviews, effectiveness of security programs, investigation of security breaches, privacy review of accountability controls, review of audit trails and logs	
5	**UNIT – V** **Operations Security (OPSEC):** OPSEC surveys/OPSEC planning INFOSEC: computer security - audit, cryptography encryption (e.g., point to point network, link), cryptography key management (to include electronic key), cryptography strength (e.g., complexity, secrecy, characteristics of the key)	8
6	**UNIT – VI** Case study of threat and vulnerability assessment	3
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. Understand of contingency strategies including data backup and recovery and alternate site selection for business resumption planning.
2. Skilled to be able to describe the escalation process from incident to disaster in case of security disaster.
3. Capable of Designing a Disaster Recovery Plan for sustained organizational operations.
4. Capable of Designing a Business Continuity Plan for sustained organizational operations.

Suggested Readings

1. Principles of Incident Response and Disaster Recovery, Whitman &Mattord, Course Technology ISBN: 141883663X.
2. (Web Link) http://www.cnss.gov/Assets/pdf/nstissi_4011.pdf.

Suggested e-books

1. https://www.elsevier.com/books/security-risk-assessment/white/978-0-12-800221-6

2. https://www.amazon.in/Information-Security-Risk-Assessment-Toolkit-book/dp/B00A0HFA3K

Suggested Websites

1. https://www.sciencedirect.com/science/article/pii/S0167404819302469

2. https://www.synopsys.com/glossary/what-is-security-risk-assessment.html

PROPOSAL FOR A NEW COURSE 16

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Semantic Web & Social Networks** **TIT-630**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Er. Subodh Prasad and Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Semantic Web & Social Networks
Course No. : TIT-630
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. This course addresses the issues needed to realize the vision of the Semantic Web through the use of intelligent Agents.
2. To understand semantic web.
3. To understand the role of ontology and inference engines in semantic web.

Catalogue Description

UNIT I: Web Intelligence
UNIT II: Machine Intelligence
UNIT III: Knowledge Representation for the Semantic Web
UNIT IV: Ontology Engineering
UNIT V: Semantic Web Applications, Services and Technology
UNIT VI: Social Network Analysis and Semantic Web

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Web Intelligence** Thinking and Intelligent Web Applications, The Information Age , The World Wide Web, Limitations of Todays Web, The Next Generation Web	6
2	**UNIT – II** **Machine Intelligence** Machine Intelligence, Artifical Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.	7
3	**UNIT – III** **Knowledge Representation for the Semantic Web** Ontologies and their role in the semantic web, Ontologies Languages for the SemanticWeb-Resource Description Framework(RDF)/RDF Schema, Ontology WebLanguage(OWL),UML,XML/XML Schema.	7
4	**UNIT – IV** **Ontology Engineering** Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.	9
5	**UNIT – V** **Semantic Web Applications, Services and Technology** Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,	9
6	**UNIT – VI** **Social Network Analysis and Semantic Web** What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis - Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web	8

	Applications with social network features.	
7	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. Demonstrate knowledge and be able to explain the three different "named" generations of the web.
2. Demonstrate the ability to participate materially in projects that develop programs relating to Web applications and the analysis of Web data.
3. be able to understand and analyze key Web applications including search engines and social networking sites.
4. be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web

Suggested Readings

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience,2008.
2. Social Networks and the Semantic Web,Peter Mika, Springer, 2007.

Suggested e-books:

1. Semantic Web Technologies,Trends and Research in Ontology Based Systems, J.Davies,Rudi Studer,Paul Warren, John Wiley & Sons
2. Programming the Semantic Web, T. Segaran, C.Evans, J.Taylor, O'Reilly, SPD.
3. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group).
4. A Semantic Web Primer,G.Antoniou and V.Harmelen,PHI.

Suggested Websites

1. https://www.amazon.in/Social-Networks-Semantic-Web-Beyond/dp/0387710000/ref=sr_1_1_sspa?crid=VPX7Y58I72QY&keywords=Semantic+Web+%26+Social+Networks&qid=1651812094&s=digital-text&sprefix=semantic+web+%26+social+networks%2Cdigital-text%2C732&sr=1-1-spons&psc=1&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUEyNllEMjFBUDBSMkpZJmVuY3J5cHRlZElkPUEwNzI2ODY5VDlXNFBLUDdXWlROJmVuY3J5cHRlZEFkSWQ9QTA0NTM0OTkzUFVLRU5ESEtDMjk5JndpZGdldE5hbWU9c3BfYXRmJmFjdGlvbj1jbGlja1JlZGlyZWN0JmRvTm90TG9nQ2xpY2s9dHJ1ZQ==

2. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

PROPOSAL FOR A NEW COURSE 17

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Surveillance & Video Recording** **TIT-631**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Er. Subodh Prasad and Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Surveillance & Video Recording
Course No. : TIT-631
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Students will understand the basics of Surveillance.
2. Students will get insight into video recording and related methods.

Catalogue Description

UNIT I: Introduction
UNIT II: Tracking & Video Analysis
UNIT III: Overlapped Block Motion and Compensation Methods
UNIT IV: Segmentation for Layered Video Representation
UNIT V: Action Representation Approaches

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Introduction:** Video Analytics. Computer Vision: Challenges- Spatial Domain Processing - Frequency Domain Processing-Background Modeling-Shadow Detection-Eigen Faces - Object Detection -Local Features-Mean Shift: Clustering, Tracking - Object Tracking using Active Contours	8
2	**UNIT – II** **Tracking & Video Analysis:** Tracking and Motion Understanding - Kalman filters, condensation, particle, Bayesian filters, hidden Markov models, change detection and model-based tracking- Motion estimation and Compensation-Block Matching Method, Hierarchical Block Matching	9
3	**UNIT – III** Overlapped Block Motion and compensation, Pel-Recursive Motion Estimation, Mesh Based Method, Optical Flow Method - Motion Segmentation -Thresholding for Change Detection, Estimation of Model parameters - Optical Flow Segmentation-Modified Hough Transform Method	10
4	**UNIT – IV** Segmentation for Layered Video Representation-Bayesian Segmentation - Simultaneous Estimation and Segmentation-Motion Field Model - Action Recognition - Low Level Image Processing for Action Recognition: Segmentation and Extraction, Local Binary Pattern, Structure from Motion	10
5	**UNIT – V** **Action Representation Approaches:** Classification of Various Dimensions of Representation, View Invariant Methods, Gesture Recognition and Analysis, Action Segmentation. **Case Study:** Face Detection and Recognition, Natural Scene Videos, Crowd Analysis, Video Surveillance, Traffic Monitoring, Intelligent Transport System.	9
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts

3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Understand the algorithms available for performing analysis on video data and address the challenges
2. Understand the approaches for identifying and tracking objects and person with motion-based algorithms.
3. Understand the algorithms available for searching and matching in video content.
4. Analyze approaches for action representation and recognition.
5. Identify, Analyze and apply algorithms for developing solutions for real world problems.

Suggested Readings

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2011.
2. Yao Wang, JornOstermann and Ya-Qin Zhang, "Video Processing and Communications", Prentice Hall, 2001.
3. A. MuratTekalp, "Digital Video Processing", Pearson, 1995
4. Thierry Bouwmans, FatihPorikli, Benjamin Hoferlin and Antoine Vacavant, "Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation", CRC Press, Taylor and Francis Group, 2014.
5. Md. Atiqur RahmanAhad, "Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding", Atlantis Press, 2011

Suggested e-books

1. https://www.amazon.in/IP-Video-Surveillance-Essential-Guide-ebook/dp/B007VAYHPG
2. https://www.amazon.in/Digital-Surveillance-Security-Anthony-Caputo-ebook/dp/B00JEZ1P6K

Suggested Websites

1. https://www.businessnewsdaily.com/9067-choosing-a-surveillance-system.html
2. https://www.videosurveillance.com/tech/nvr-and-dvr.asp

PROPOSAL FOR A NEW COURSE 18

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Cloud Security** **TIT-632**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Er. Subodh Prasad and Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Cloud Security
Course No. : TIT-632
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Understand the fundamentals of cloud computing.
2. Understand the requirements for an application to be deployed in a cloud.
3. Become knowledgeable in the methods to secure cloud.

Catalogue Description

UNIT I: Cloud Computing Fundamentals
UNIT II: Cloud Applications
UNIT III: Securing The Cloud
UNIT IV: Virtualization Security
UNIT V: Cloud Security Management

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Cloud Computing Fundamentals:** Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture.	10
2	**UNIT – II** **Cloud Applications:** Technologies and the processes required when deploying web services- Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages- Development environments for service development; Amazon, Azure, Google App.	8
3	**UNIT – III** **Securing The Cloud**: Security Concepts - Confidentiality, privacy, integrity, authentication, nonrepudiation, availability, access control, defence in depth, least privilege- how these concepts apply in the cloud and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud.	10
4	**UNIT – IV** **Virtualization Security**: Multi-tenancy Issues: Isolation of users/VMs from each other- How the cloud provider can provide this- Virtualization System Security Issues: e.g. ESX and ESXi Security, ESX file system security- storage considerations, backup and recovery- Virtualization System Vulnerabilities.	9
5	**UNIT – V** **Cloud Security Management:** Security management in the cloud - security management standards- SaaS, PaaS, IaaS availability management- access control- Data security and storage in cloud.	9
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes:

1. Identify security aspects of each cloud model.
2. Develop a risk-management strategy for moving to the Cloud.
3. Implement a public cloud instance using a public cloud service provider.
4. Apply trust-based security model to different layer.

Suggested Readings

1. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition [ISBN: 978- 0521137355], 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", Tata McGraw-Hill Osborne Media; 1 edition 22, [ISBN: 0071626948], 2009.
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy: An EnterprisePerspective on Risks and Compliance", O'Reilly Media; 1 edition, [ISBN: 0596802765], 2009.
4. Ronald L. Krutz, Russell Dean Vines, "Cloud Security", Wiley [ISBN: 0470589876],2010.

Suggested e-books

1. https://www.amazon.in/Certified-Cloud-Security-Professional-Official-ebook/dp/B082LNLYHM/ref=sr_1_2_sspa?crid=2HL8HZTCXBVGF&keywords=Cloud+Security&qid=1651813325&s=digital-text&sprefix=cloud+security+%2Cdigital-text%2C454&sr=1-2-spons&psc=1&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUEyUUZFVkI4TlNHQVQ5JmVuY3J5cHRlZElkPUEwNDc4NTc1Mk8ySjBSUVFVNFhZNiZlbmNyeXB0ZWRBZElkPUEwNzI2NDcxMVJVMTJFNlJJWFQzRiZ3aWRnZXROYW1lPXNwX2F0ZiZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=

2. https://www.amazon.in/Cloud-Security-Comprehensive-Secure-Computing-ebook/dp/B0041N3GW6/ref=sr_1_1_sspa?crid=2HL8HZTCXBVGF&keywords=Cloud+Security&qid=1651813325&s=digital-text&sprefix=cloud+security+%2Cdigital-text%2C454&sr=1-1-spons&psc=1&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUEyUUZFVkI4TlNHQVQ5JmVuY3J5cHRlZElkPUEwNDc4NTc1Mk8ySjBSUVFVNFhZNiZlbmNyeXB0ZWRBZElkPUEwODAyMzE0M1U0OEpBMzFCSU9KMSZ3aWRnZXROYW1lPXNwX2F0ZiZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=

Suggested Websites

1. https://www.checkpoint.com/cyber-hub/cloud-security/what-is-cloud-security/
2. https://www.ibm.com/topics/cloud-security

PROPOSAL FOR A NEW COURSE 19

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Data Analytics for Fraud Detection** **TIT-633**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Er. Subodh Prasad and Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Data Analytics for Fraud Detection
Course No. : TIT-633
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Discuss the overall process of how data analytics is applied
2. Discuss how data analytics can be used to better address and identify risks
3. Help mitigate risks from fraud and waste for our clients and organizations

Catalogue Description

UNIT I: Introduction
UNIT II: The Data Analysis Cycle
UNIT III: Data Analytical Tests
UNIT IV: Advanced Data Analytical Tests Correlation
UNIT V: Payroll Fraud

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Introduction: Defining Fraud, Anomalies versus, Fraud, Types of Fraud, Assess the Risk of Fraud, Fraud Detection, Recognizing Fraud, Data Mining versus Data Analysis and Analytics, Data Analytical Software, Anomalies versus Fraud within Data, Fraudulent Data Inclusions and Deletions	10
2	**UNIT – II** The Data Analysis Cycle, Evaluation and Analysis, Obtaining Data Files, Performing the Audit, File Format Types, Preparation for Data Analysis, Arranging and Organizing Data, Statistics and Sampling, Descriptive Statistics, Inferential Statistics	10
3	**UNIT – III** Data Analytical Tests, Benford's Law, Number Duplication Test , Z-Score, Relative Size Factor Test, Same-Same-Same Test , Same-Same-Different Test	9
4	**UNIT – IV** Advanced Data Analytical Tests Correlation, Trend Analysis, , GEL-1 and GEL-2 , Skimming and Cash Larceny, Billing schemes : and Data Familiarization, , Benford's Law Tests, Relative Size Factor Test , Match Employee Address to Supplier data	9
5	**UNIT – V** Payroll Fraud, Expense Reimbursement Schemes, Register disbursement schemes	8
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes:

1. Formulate reasons for using data analysis to detect fraud.
2. Explain characteristics and components of the data and assess its completeness.
3. Identify known fraud symptoms and use digital analysis to identify unknown fraud symptoms.

4. Automate the detection process.
5. Verify results and understand how to prosecute fraud

Suggested Readings

1. Fraud and Fraud Detection: A Data Analytics Approach by Sunder Gee, Wiley.

Suggested e-books

1.https://books.google.co.in/books?hl=en&lr=&id=JvY8BQAAQBAJ&oi=fnd&pg=PA101&dq=Data+Analytics+for+Fraud+Detection&ots=V9Lz2Neqb&sig=TmXOJCrKhWmcmDzrJPX0UOZKGpE#v=onepage&q=Data%20Analytics%20for%20Fraud%20Detection&f=false

2. https://www.amazon.in/Analytics-Descriptive-Predictive-Network-Techniques-ebook/dp/B012WA66SK

Suggested Websites

1. https://www.nsktglobal.com/how-data-analytics-can-help-in-fraud-detection-

2. https://idea.caseware.com/blog/the-truth-behind-detecting-fraud-using-data-analytics

PROPOSAL FOR A NEW COURSE 20

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Malware Analysis and Reverse Engineering** **TIT-634**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Malware Analysis and Reverse Engineering
Course No. : TIT-634
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. The objective of this course is to provide an insight to fundamentals of malware analysis which includes analysis of JIT compilers for malware detection in legitimate code. DNS filtering and reverse engineering is included.

Catalogue Description

UNIT I: Fundamentals of Malware Analysis
UNIT II: Malware Forensics
UNIT III: Malware and Kernel Debugging
UNIT IV: Memory Forensics and Volatility
UNIT V: Researching and Mapping Source Domains/IPs
UNIT VI: Case Study

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Fundamentals of Malware Analysis (MA), Reverse Engineering Malware (REM) Methodology, Brief Overview of Malware analysis lab setup and configuration, Introduction to key MA tools and techniques, Behavioral Analysis vs. Code Analysis, Resources for Reverse-Engineering Malware (REM) Understanding Malware Threats, Malware indicators, Malware Classification, Examining ClamAVSignatures, Creating Custom ClamAV Databases, Using YARA to Detect Malware Capabilities, Creating a Controlled and Isolated Laboratory, Introduction to MA Sandboxes, Ubuntu, Zeltser'sREMnux, SANS SIFT, Sandbox Setup and Configuration New Course Form, Routing TCP/IP Connections, Capturing and Analyzing Network Traffic, Internet simulation using INetSim, Using Deep Freeze to Preserve Physical Systems, Using FOG for Cloning and Imaging Disks, Using MySQL Database to Automate FOG Tasks, Introduction to Python ,Introduction to x86 Intel assembly language, Scanners: Virus Total, Jotti, and NoVirus Thanks, Analyzers: Threat Expert, CWSandbox, Anubis, Joebox, Dynamic Analysis Tools: Process Monitor, Regshot, HandleDiff, Analysis Automation Tools: Virtual Box, VM Ware, Python , Other Analysis Tools.	12
2	**UNIT – II** **Malware Forensics** Using TSK for Network and Host Discoveries, Using Microsoft Offline API to Registry Discoveries , Identifying Packers using PEiD, Registry Forensics with Reg Ripper Plu-gins:, Bypassing Poison Ivy's Locked Files, Bypassing Conficker's File System ACL Restrictions, Detecting Rogue PKI Certificates.	7
3	**UNIT – III** **Malware and Kernel Debugging** Opening and Attaching to Processes, Configuration of JIT Debugger for Shellcode Analysis, Controlling Program Execution, Setting and Catching Breakpoints, Debugging with Python Scripts and Py Commands, DLL Export Enumeration, Execution, and Debugging, Debugging a VMware Workstation Guest (on Windows), Debugging a Parallels Guest (on Mac OS X). Introduction to WinDbg Commands and Controls, Detecting Rootkits with WinDbgScripts, Kernel Debugging with IDA Pro.	9
4	**UNIT – IV** **Memory Forensics and Volatility** Memory Dumping with MoonSols Windows Memory Toolkit, Accessing VM Memory Files Overview of Volatility, Investigating Processes in Memory Dumps, Code Injection and	7

	Extraction, Detecting and Capturing Suspicious Loaded DLLs, Finding Artifacts in Process Memory, Identifying Injected Code with Malfind and YARA.	
5	**UNIT – V** **Researching and Mapping Source Domains/IPs** Using WHOIS to Research Domains, DNS Hostname Resolution, Querying Passive DNS, Checking DNS Records, Reverse IP Search New Course Form, Creating Static Maps, Creating Interactive Maps.	7
6	**UNIT – VI** Case study of Finding Artifacts in Process Memory, Identifying InjectedCode with Malfind and YARA	4
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes:

1. To understand the concept of malware and reverse engineering.
2. Implement tools and techniques of malware analysis

Suggested Readings

1. Michael Sikorski, Andrew Honig "Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software" publisher Williampollock

Suggested e-books

1. https://www.amazon.in/Practical-Malware-Analysis-Hands-Dissecting-ebook/dp/B007ED2XDS

2. https://www.amazon.in/Malware-Analysis-Detection-Engineering-Comprehensive-ebook/dp/B08JVBFHR8

Suggested Websites

1. https://www.udemy.com/course/malware-analysis-and-reverse-engineering/

2. https://www.sans.org/cyber-security-courses/reverse-engineering-malware-malware-analysis-tools-techniques/

PROPOSAL FOR A NEW COURSE 21

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Soft Computing** **TIT-635**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Soft Computing
Course No. : TIT-635
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
2. To implement soft computing based solutions for real-world problems
3. To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
4. To provide students and hand-on experience on MATLAB to implement various strategies.

Catalogue Description

UNIT I: Introduction to Soft Computing and Neural Networks
UNIT II: Fuzzy Logic
UNIT III: Neural Networks
UNIT IV: Genetic Algorithms
UNIT V: Matlab/Python Lib
UNIT VI: Recent Trends in Deep Learning

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS** Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics	7
2	**UNIT – II** **FUZZY LOGIC** Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.	8
3	**UNIT – III** **NEURAL NETWORKS** Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks	9
4	**UNIT – IV** **GENETIC ALGORITHMS** Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.	5
5	**UNIT – V** **MATLAB/PYTHON LIB** Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic	12
6	**UNIT – VI** Recent Trends in Deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.	5
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems
3. Apply genetic algorithms to combinatorial optimization problems
4. Evaluate and compare solutions by various soft computing approaches for a given problem

Suggested Readings

1. Jyh: Shing Roger Jang, Chuen: Tsai Sun, Eiji Mizutani, Neuro: Fuzzy and Soft Computing, Prentice: Hall of India, 2003.61

2. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, 19961

3. MATLAB Toolkit Manual

Suggested e-books

1. https://www.amazon.in/Introduction-Soft-Computing-Rajdev-Tiwari-ebook/dp/B007GFX3II

2. https://books.google.co.in/books/about/Soft_Computing.html?id=IkajJC9iGxMC&redir_esc=y

Suggested Websites

1. https://www.journals.elsevier.com/applied-soft-computing

2. https://www.springer.com/journal/500

PROPOSAL FOR A NEW COURSE 22

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Computer Vision** **TIT-636**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Computer Vision
Course No. : TIT-636
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Be familiar with both the theoretical and practical aspects of computing with images.
2. Have described the foundation of image formation, measurement, and analysis. Model Curriculum of Engineering & Technology PG Courses [Volume-I] [106]
3. Understand the geometric relationships between 2D images and the 3D world.
4. Grasp the principles of state-of-the-art deep neural networks.

Catalogue Description

UNIT I: Overview
UNIT II: Edge Processing
UNIT III: Feature Extraction
UNIT IV: Pattern Analysis
UNIT V: Recent Trends

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis	8
2	**UNIT – II** Edge detection, Edge detection performance, Hough transform, corner detection	9
3	**UNIT – III** Segmentation, Morphological filtering, Fourier transform	8
4	**UNIT – IV** Feature extraction, shape, histogram, color, spectral, texture, using CVIP tools, Feature analysis, feature vectors, distance /similarity measures, data preprocessing	9
5	**UNIT – V** Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians Classification: Discriminant Function, Supervised, Un-supervised, Semi supervised Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods.	8
6	**UNIT – VI** Recent trends in Activity Recognition, computational photography, Biometrics.	4
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Developed the practical skills necessary to build computer vision applications.
2. To have gained exposure to object and scene recognition and categorization from images.

Suggested Readings

1. Computer Vision: Algorithms and Applications by Richard Szeliski.
2. Deep Learning, by Goodfellow, Bengio, and Courville.
3. Dictionary of Computer Vision and Image Processing, by Fisher et al.

Suggested e-books

1. https://www.e-booksdirectory.com/details.php?ebook=10885

2. https://www.e-booksdirectory.com/details.php?ebook=8654

Suggested Websites

1. https://www.packtpub.com/in/data/computer-vision

2. https://www.ibm.com/in-en/topics/computer-vision#:~:text=Computer%20vision%20is%20a%20field,recommendations%20based%20on%20that%20information.

PROPOSAL FOR A NEW COURSE 23

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Human Computer Interaction** **TIT-637**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Human Computer Interaction
Course No. : TIT-637
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Learn the foundations of Human Computer Interaction
2. Be familiar with the design technologies for individuals and persons with disabilities
3. Be aware of mobile Human Computer interaction.
4. Learn the guidelines for user interface.

Catalogue Description

UNIT I: Human and Computer Devices
UNIT II: Interactive Design Basics
UNIT III: Cognitive Models
UNIT IV: Mobile Ecosystem
UNIT V: Designing Web Interfaces
UNIT VI: Recent Trends

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms	9
2	**UNIT – II** Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.	11
3	**UNIT – III** Cognitive models –Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW	8
4	**UNIT – IV** Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.	8
5	**UNIT – V** Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.	7
6	**UNIT – VI** Recent Trends: Speech Recognition and Translation, Multimodal System	3
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Understand the structure of models and theories of human computer interaction and vision
2. Design an interactive web interface on the basis of models studied.

Suggested Readings

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)
2. Brian Fling, "Mobile Design and Development", First Edition , OReilly Media Inc., 2009 (UNIT - IV)67
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, OReilly, 2009.(UNIT-V)

Suggested e-books

1. https://www.amazon.in/HUMAN-COMPUTER-INTERACTION-K-MEENA-ebook/dp/B00TQQ9N7U

2. https://www.elsevier.com/books/fundamentals-of-human-computer-interaction/monk/978-0-12-504582-7

Suggested Websites

1. https://www.interaction-design.org/literature/topics/human-computer-interaction

2. https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction

PROPOSAL FOR A NEW COURSE 24

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Smart Sensors and Internet of Things** **TIT-638**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Smart Sensors and Internet of Things
Course No. : TIT-638
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field

Aim of the Course

1. Able to understand the application areas of IOT
2. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
3. Able to understand building blocks of Internet of Things and characteristics

Catalogue Description

UNIT I: Environmental Parameters Measurement and Monitoring
UNIT II: Sensors
UNIT III: Important Characteristics of Sensors
UNIT IV: Architecture of Smart Sensors
UNIT V: Electronic Circuit for Smart Sensors
UNIT VI: Recent Trends

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Environmental Parameters Measurement and Monitoring: Why measurement and monitoring are important, effects of adverse parameters for the living being for IOT	7
2	**UNIT – II** Sensors: Working Principles: Different types; Selection of Sensors for Practical Applications Introduction of Different Types of Sensors such as Capacitive, Resistive, Surface Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas etc	8
3	**UNIT – III** Important Characteristics of Sensors: Determination of the Characteristics Fractional order element: Constant Phase Impedance for sensing applications such as humidity, water quality, milk quality Impedance Spectroscopy: Equivalent circuit of Sensors and Modelling of Sensors Importance and Adoption of Smart Sensors	10
4	**UNIT – IV** Architecture of Smart Sensors: Important components, their features Fabrication of Sensor and Smart Sensor: Electrode fabrication: Screen printing, Photolithography, Electroplating Sensing film deposition: Physical and chemical Vapor, Anodization, Sol-gel	9
5	**UNIT – V** Interface Electronic Circuit for Smart Sensors and Challenges for Interfacing the Smart Sensor, Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor	7
6	**UNIT – VI** Recent trends in smart sensor for day to day life, evolving sensors and their architecture.	5
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Understand the vision of IoT from a global context.
2. Determine the Market perspective of IoT.
3. Use of Devices, Gateways and Data Management in IoT.
4. Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.
5. Building state of the art architecture in IoT.

Suggested Readings

1. Yasuura, H., Kyung, C.-M., Liu, Y., Lin, Y.-L., Smart Sensors at the IoT Frontier, Springer International Publishing
2. Kyung, C.-M., Yasuura, H., Liu, Y., Lin, Y.-L., Smart Sensors and Systems, Springer International Publishing.

Suggested e-books

1. https://www.amazon.in/Smart-Sensors-Industrial-Internet-Things-ebook/dp/B08VN5G8ST

2. https://www.amazon.in/Smart-Sensors-at-IoT-Frontier-ebook/dp/B071LTRSPJ

Suggested Websites

1.
https://scholar.google.co.in/scholar?q=Smart+Sensors+and+Internet+of+Things&hl=en&as_sdt=0&as_vis=1&oi=scholart

2.
https://www.techbriefs.com/component/content/article/tb/pub/features/articles/33212#:~:text=Internet%20of%20Things%20(IoT)%20applications,%2C%20cloud%2Dbased%20computing%20resource.

PROPOSAL FOR A NEW COURSE 25

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Big Data Analytics** **TIT-639**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Big Data Analytics
Course No. : TIT-639
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Understand big data for business intelligence. Learn business case studies for big data analytics. Understand nosql big data management. Perform map-reduce analytics using Hadoop and related tool

Catalogue Description

UNIT I: Introduction to Big Data
UNIT II: Introduction to NoSQL
UNIT III: Data Format
UNIT IV: Map Reduce workflows
UNIT V: Hbase
UNIT VI: Pig, Grunt, Pig Data Model

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics	7
2	**UNIT – II** Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master-slave replication, peerpeer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing map-reduce calculations	7
3	**UNIT – III** Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based data structure	9
4	**UNIT – IV** Map Reduce workflows, unit tests with MRUnit, test data and local tests, anatomy of Map Reduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output format	10
5	**UNIT – V** Hbase, data model and implementations, Hbase clients, Hbase examples, praxis.Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration.	7
6	**UNIT – VI** Pig, Grunt, pig data model, Pig Latin, developing and testing Pig Latin scripts. Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries.	6
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures

2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Describe big data and use cases from selected business domains
2. Explain NoSQL big data management
3. Install, configure, and run Hadoop and HDFS
4. Perform map-reduce analytics using Hadoop
5. Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

Suggested Readings

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging
2. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
3. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of
4. Polyglot Persistence", Addison-Wesley Professional, 2012.
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
6. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
7. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
8. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
9. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
10. Alan Gates, "Programming Pig", O'Reilley, 2011.

Suggested e-books

1. https://www.amazon.in/Big-Data-Analytics-Rajkamal-ebook/dp/B07TZSWGLC
2. https://www.amazon.in/BIG-DATA-ANALYTICS-Parag-Kulkarni-ebook/dp/B01IK4XLF8

Suggested Websites

1. https://www.ibm.com/analytics/big-data-analytics
2. https://www.techtarget.com/searchbusinessanalytics/definition/big-data-analytics

PROPOSAL FOR A NEW COURSE 26

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Data Preparation and Analytics** **TIT-640**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Data Preparation and Analytics
Course No. : TIT-640
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. To prepare the data for analysis and develop meaningful Data Visualizations

Catalogue Description

UNIT I: Data Gathering and Preparation
UNIT II: Data Cleaning
UNIT III: Exploratory Analysis
UNIT IV: Visualization

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** **Data Gathering and Preparation** Data formats, parsing and transformation, Scalability and real-time issues	9
2	**UNIT – II** **Data Cleaning** Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation	10
3	**UNIT – III** **Exploratory Analysis** Descriptive and comparative statistics, Clustering and association, Hypothesis generation	12
4	**UNIT – IV** **Visualization** Designing visualizations, Time series, Geolocated data, Correlations and connections, Hierarchies and networks, interactivity	15
5	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcome

1. Able to extract the data for performing the Analysis.

Suggested Readings

1. Making sense of Data : A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt

Suggested e-books

1. https://www.amazon.in/Data-Preparation-Analytics-Using-Press-ebook/dp/B00WNDHQ1S

2. https://www.amazon.in/Preparing-Data-Analysis-Robert-Carver-ebook/dp/B0716771XT

Suggested Websites

1. https://www.actian.com/blog/data-integration/the-six-steps-essential-for-data-preparation-and-analysis/

2. https://www.talend.com/resources/what-is-data-preparation/

PROPOSAL FOR A NEW COURSE 27

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Web Analytics and Development** **TIT-641**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Web Analytics and Development
Course No. : TIT-641
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. The course explores use of social network analysis to understand growing connectivity and complexity in the world ranging from small groups to WWW.

Catalogue Description

UNIT I: Introduction
UNIT II: Web Analytics Tools
UNIT III: Web Search and Retrieval
UNIT IV: Making Connection
UNIT V: Robustness Social Involvements

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Introduction – Social network and Web data and methods, Graph and Matrices, Basic measures for individuals and networks, Information Visualization	10
2	**UNIT – II** Web Analytics tools: Click Stream Analysis, A/B testing, Online Surveys	8
3	**UNIT – III** Web Search and Retrieval: Search Engine Optimization, Web Crawling and indexing, Ranking Algorithms, Web traffic models	9
4	**UNIT – IV** Making Connection: Link Analysis, Random Graphs and Network evolution, Social Connects: Affiliation and identity	10
5	**UNIT – V** Connection: Connection Search, Collapse, Robustness Social involvements and diffusion of innovation	9
6	**Prefinals**	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Become familiar with core research communities, publications, focused on web and social media analytics and research questions engaged in.

Suggested Readings

1. Hansen, Derek, Ben Sheiderman, Marc Smith. 2011. Analyzing Social Media Networks with NodeXL: Insights from a Connected World. Morgan Kaufmann, 304.
2. Avinash Kaushik. 2009. Web Analytics 2.0: The Art of Online Accountability.

3. Easley, D. & Kleinberg, J. (2010). Networks, Crowds, and Markets: Reasoning About a Highly Connected World. New York: Cambridge University Press. http://www.cs.cornell.edu/home/kleinber/networks-book/
4. Wasserman, S. & Faust, K. (1994). Social network analysis: Methods and applications. New York: Cambridge University Press. Monge, P. R. & Cont.

Suggested e-books

1. https://www.amazon.in/Actionable-Web-Analytics-Business-Decisions-ebook/dp/B0030II24K

2. https://www.amazon.in/Web-Analytics-Hour-Avinash-Kaushik/dp/0470130652

Suggested Websites

1. https://www.techtarget.com/searchbusinessanalytics/definition/Web-analytics#:~:text=Web%20analytics%20is%20the%20process,as%20webpages%2C%20images%20and%20videos.

2. https://en.wikipedia.org/wiki/Web_analytics

PROPOSAL FOR A NEW COURSE 28

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Knowledge Discovery** **TIT-642**
4.	Catalogue Description	Attached
5.	To be offered	Once in a academic Year
6.	Credits	3(3-0-0)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time :	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for P.G. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria and Er. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Knowledge Discovery
Course No. : TIT-642
Credit Hours : 3(3-0-0)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Conduct case studies on real data mining examples

Catalogue Description

UNIT I: Introduction KDD and Data Mining
UNIT II: Knowledge Representation
UNIT III: Decision Trees
UNIT IV: Classification Rules
UNIT V: Numeric Predictions
UNIT V: Artificial Neural Networks

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Introduction KDD and Data Mining - Data Mining and Machine Learning, Machine Learning and Statistics, Generalization as Search,Data Mining and Ethics	7
2	**UNIT – II** Knowledge Representation - Decision Tables, Decision Trees, Classification Rules, Association Rules, Rules involving Relations, Trees for Numeric Predictions, Neural Networks, Clusters	9
3	**UNIT – III** Decision Trees - Divide and Conquer, Calculating Information, Entropy, Pruning, Estimating Error Rates, The C4.5 Algorithm Evaluation of Learned Results- Training and Testing, Predicting Performance, Cross-Validation	8
4	**UNIT – IV** Classification Rules - Inferring Rudimentary Rules, Covering Algorithms for Rule Construction, Probability Measure for Rule Evaluation, Association Rules, Item Sets, Rule Efficiency	8
5	**UNIT – V** Numeric Predictions - Linear Models for Classification and Numeric Predictions, Numeric Predictions with Regression Trees, Evaluating Numeric Predictions	7
6	**UNIT – VI** Artificial Neural Networks – Perceptrons, Multilayer Networks, The Backpropagation Algorithm Clustering - Iterative Distance-based Clustering, Incremental Clustering, The EM Algorithm	7
	Prefinals	2
	Total	**48**

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes

1. Students will be able to have knowledge of various knowledge representation methods.

Suggested Readings

1. Data mining and knowledge discovery handbook by Maimon, oded(et al.)
2. Data Cleansing : A Prelude to knowledge Discovery

Suggested e-books

1. https://www.gale.com/ebooks/9781599045306/mathematical-methods-for-knowledge-discovery-and-data-mining

2. https://www.amazon.in/Knowledge-Discovery-Databases-Information-Processing-ebook/dp/B000VHVT1Q

Suggested Websites

1. https://www.tutorialspoint.com/data_mining/dm_knowledge_discovery.htm

2. https://www.techopedia.com/definition/25827/knowledge-discovery-in-databases-kdd

DEPARTMENT OF INFORMATION TECHNOLOGY, COLLEGE OF TECHNOLOGY, PANTNAGAR

SYLLABUS OF EXISTING

COURSES FOR

M.TECH. (INFORMATION TECHNOLOGY)

Department of Information Technology

Course Title : Web Technologies
Course No. : TIT-618
Credit Hours : 2(1-0-1)

Catalogue Description:
XML TECHNOLOGIES, WEB SERVICES TECHNOLOGIES, ebXML, J2EE AND WEB SERVICES, XML AND CONTENT MANAGEMENT

Syllabus:

Topics	Lectures
XML TECHNOLOGIES: XML fundamentals, XML Schema, DTD, Basics of Xlink ,Xpointer , Xpath , XSL ,XSLT, XML on the Web. Document Object Model, concepts and API.	1-3
WEB SERVICES TECHNOLOGIES: Introduction to SOAP, Relation to XML RPC, SOAP Transport WSDL, Endpoint UDDI, The UDDI data structures, Introduction to .NET, web service architecture.	4-8
ebXML Collaboration Protocol Profile and Agreement (CPP and CPA) ,Business modeling , Registry ,XML with JSP /Servlet , XML and Messaging services (JMS) ,Transactions , XML and Databases.	9-11
J2EE AND WEB SERVICES Enterprise Web services (J2EE and Web services) , The Web application framework , S2ML (Secure Services Markup Language) , XAML (Transaction Authority Markup Language), J2ME and Web Services.	12-14
XML AND CONTENT MANAGEMENT Semantic Web , Role of Meta data in web content , Resource Description Framework, Architecture of semantic web, content Management workflow, XLANG, WSFL.	15-16

Practical:

Software Application Development	Practical
Web Site Design And Implementation Of Any Systems With Reference To Various Web Technologies. 1) Website Designs 2) Web Portal Design 3) Content Analysis Of Websites	1-16

*** Practical Laboratory will be 2-3 hours as per AICTE/ICAR norms**

Text Books:
1. Harold and Means, "XML in a Nutshell", O'Reilly Publishers, Orlando, 2004
2. Ron Schmelzer et al. "XML and Web Services", Pearson Education, New Delhi,2002

References:
1. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, New Delhi, 2004.
2. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, New Delhi, 2002

Department of Information Technology

Course Title : Cyber Crime & Information War
Course No. : TIT-619
Credit Hours : 2(2-0-0)

Catalogue Description:

Cyber terrorism, Cyber Crime, Cyber Law, Cyber Security, Cyber disaster, Disaster Recovery, Information warfare, Risk Assessment.

Syllabus:

Topics	**Lectur**
Concept of Information Society, Knowledge Society, Cyber Space, Digital Economy, Critical Information Infrastructure, Internet as Global Information Infrastructure.	1-6
Cyber Terrorism, Terrorist Atrocities, The Role of IT by Terrorist, Characteristic of Cyber Terrorism, Factors of Cyber terrorism, Real Examples of Cyber Terrorism.	7-14
Cyber crime, Types of cyber crime: Hacking, Virus, Worm, Trojan Horse, mall ware,Current Cyber Attack methods, Criminal threats to IT infrastructure, Web security, Basic cyber forensics, Internal Penetration, Cyber crime and Law, Cyber Jurisdiction, Indian IT ACT.	15-21
Fundamental Concepts of Information Security, Information warfare, Levels of Information war, Cost of Information Warfare, Cyber disaster, disaster planning, disaster planning, Company Wide disaster planning, and Business Impact analysis.	22-28
Threat, Vulnerability and Risk, best practices in security policies, Formulate a security Policy and identify security policy categories, Fundamental Concepts of Risk Analysis,Risk analysis Factors, Risk Analysis: An ongoing process, analyzing economic impacts, Risk Minimization.	29-32

Text Books:

1. Walter Laqueur, Yohana Alexander, “The terrorism Reader: A historical methodology”.
2. “Cyber Terrorism and information warfare: Threats and responses” By Yohana Alexander & Michael S. Swethan.

References:

1. “International Terrorism: National Regional and Global Perspective.”

Department of Information Technology

Course Title : Information Storage & Management
Course No. : TIT-620
Credit Hours : 2(2-0-0)

Catalogue Description:

Complexity of Information Management, Storage Systems Architecture, Introduction to Networked Storage, Information Availability, Managing and Monitoring.

Syllabus:

Topics	**Lectur**
Complexity of Information Management: Proliferation of Data, Data Center Evolution, Managing Complexity, I/O and the five pillars of technology, Storage Infrastructure, Evolution of Storage	1-6
Storage Systems Architecture: Modern Storage Systems, Storage Systems, Intelligent Disk Subsystems , Physical Disks , Back End ,Cache ,Front End , Host Environment	7-14
Introduction to Networked Storage: Storage Networking Overview, Direct Attached Storage, Storage Area Networks, Case study – Applying SAN concepts, Network Attached Storage, Case study – Applying NAS concepts, IP SAN, CAS, Hybrid Network Storage Based Solutions/ Emerging Technologies, Case study – Applying SAN, NAS, IP SAN concepts .	15-21
Introduction to Information Availability: Business Continuity Overview, Data Availability, Business Continuity – Local, Case study – Applying local information availability strategies, Business Continuity – Remote, Case study – Applying remote information availability strategies, Disaster Recovery	22-28
Managing and Monitoring: Monitoring in the Data Center, Case study – Monitoring exercise, Management in the Data Center.	29-32

Text Books:

1. Marc Farley Osborne, "Building Storage Networks", Tata McGrawHill, 2001
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata Mcgraw Hill, 2003

References:

1. NIIT, "Introduction to Information Security Risk Management" , Prentice-Hall of India, 2000

Department of Information Technology

Course Title : Advanced Data mining & Warehousing
Course No. : TIT-624
Credit Hours : 3(2-0-1)

Catalogue Description:
Foundation; Data Warehousing; Business Analysis; Data Mining; Data visualization & Overall Perspective.

Syllabus

Topics	**Lectur**
Foundation: Introduction to DATA Warehousing. Client/Server Computing model & Data Warehousing. Parallel processors & Cluster Systems. Distributed DBMS implementations. Client/Server RDBMS Solutions	1-6
Data Warehousing: Data Warehousing Components. Building a Data Warehouse. Mapping the Data Warehousing to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, cleanup & Transformation Tools. Metadata.	7-14
Business Analysis: Reporting & Query Tools & Applications. On line Analytical Processing (OLAP). Patterns & Models. Statistics. Artificial Intelligence. Introduction to Data Mining, Decision Trees.	15-21
Neural Networks. Nearest Neighbor & Clustering. Genetic Algorithms. Rule Induction. Selecting & Using the Right Technique.	22-28
Data visualization & Overall Perspective. Data Visualization. Putting it All Together.	29-32

Practical

Advanced Data mining and Warehousing	**Practic**
Project Development Based On Data Mining And Warehousing: Distributed Dbms Implementations, Building A Data Warehouse/ Metadata, Study Of Data Extraction Cleanup & Transformation Tools, Perform Data Extraction Cleanup & Transformation, On Line Analytical Processing (Olap) Implementation, Implementation Of Nearest Neighbor & Clustering Technique	1-16

Text Books: 1. W.H Inmon"Building the data warehouse" John Wiley & Sons Publication.
2. Jimali Han and Micheline Kamber " Data mining concepts and techniques " Addison Wesley Publication.

References: 1. Sam Anhory and Dennis Murray "Data warehousing in the real world " O' Wiley Publication

DEPARTMENT OF INFORMATION TECHNOLOGY,

COLLEGE OF TECHNOLOGY, PANTNAGAR

PROPOSAL OF NEW COURSES

FOR P.G. COURSES OF THE DEPARTMENT

APPLICABLE FOR

Ph.D. (INFORMATION TECHNOLOGY)

EFFECTIVE FROM BATCH 2022, AY: 2022-23

PROPOSAL FOR A NEW COURSE 29

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(a) Title of the Course: (b) Course No.	**Data Visualization** **TIT-731**
4.	Catalogue Description	To prepare the students for recent advancements in the field of Information Technology
5.	To be offered	Once in a academic Year
6.	Credits	3(2-0-1)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for Ph.D. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. Ratnesh Prasad Srivastava and Dr. Subodh Prasad
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Data Visualization
Course No. : TIT-731
Credit Hours : 3(2-0-1)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Understanding of real time data visualization techniques

Catalogue Description

UNIT I: Introduction to Data Visualization and Basic Statistics
UNIT II: Visualization Techniques and Tools
UNIT III: Visual Analytics
UNIT IV: Diverse Types of Visual Analysis
UNIT V: Visualization Dashboard Creations

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Overview of data visualization - Data Abstraction -Analysis: Four Levels for Validation- Task Abstraction - Analysis: Four Levels for Validation, Basic Graphics: line, bar, box, histogram plots, Trellis, Scatter plots, Basic Statistics: mean median, mode, percentile, quartile, Frequency Distribution, Histogram Analysis, Data: Distribution, Types of Data Distribution, Hypothesis Testing.	8
2	**UNIT – II** Scalar and point techniques Color maps Contouring Height Plots - Vector visualization techniques Vector properties Vector Glyphs Vector Color Coding Stream Objects, Introduction to data visualization tools- Tableau – Visualization using Python.	7
3	**UNIT – III** Visual Variables- Networks and Trees - Map Color and Other Channels- Manipulate View, Arrange Tables Geo Spatial data Reduce Items and Attributes.	5
4	**UNIT – IV** Time-Series data visualization Text data visualization Multivariate data visualization and case studies.	6
5	**UNIT – V** Dashboard creation using visualization tools for the use cases: Finance- marketing- insurance healthcare etc., and Recent Trends.	4
	Prefinals	2
	Total	**32**

Practical Schedule

List of Experiments:	No. of Labs
1. Basic Data Abstraction Techniques	2
2. Use of Python for Data Visualization	2
3. Various Plotting Techniques	1
4. Geo Spatial Data Mapping	2
5. Time Series Data Analysis	2
6. Text Data Visualization Techniques	2
7. Multivariate Data Analysis	2
8. Case Studies	2
Lab Final	1
Total	16

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

a. Students will be able to have knowledge of various Data Visualization methods.

Suggested Readings

1. Tamara Munzer, "Visualization Analysis and Design", CRC Press, 2nd edition, 2014
2. AlexandruTelea, "Data Visualization Principles and Practice", CRC Press, 2nd edition, 2014.
3. Paul J. Deitel, Harvey Deitel, "Java SE8 for Programmers (Deitel Developer Series)", 3rd Edition, 2014.
4. Y. Daniel Liang, "Introduction to Java programming-comprehensive version", Pearson ltd., 10th Edition, 2015

Suggested References

1. **Paul Deitel Harvey Deitel ; "Java, How to Program", Prentice Hall; 9th edition , 2011.**
2. **Cay Horstmann, "BIG JAVA", John Wiley Sons, 4th edition, 2009**
3. **Nicholas S. Williams, "Professional Java for Web Applications", Wrox Press, 1st edition, 2014.**

PROPOSAL FOR A NEW COURSE 30

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(c) Title of the Course: (d) Course No.	**Natural Language Processing** **TIT-732**
4.	Catalogue Description	To prepare the students for recent advancements in the field of Information Technology
5.	To be offered	Once in a academic Year
6.	Credits	3(2-0-1)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: h. Pre- requisite i. Is the course a pre-requisite of any course? j. An Introductory survey of special area of knowledge represented by the department k. An Introductory survey of special area of knowledge represented by some other department l. A summarizing or integrated course m. In your judgment does this course overlap to a considerable extent with any other course n. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for Ph.D. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. Subodh Prasad and Dr. Ratnesh Prasad Srivastava
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Natural Language Processing
Course No. : TIT-732
Credit Hours : 3(2-0-1)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Understanding of Natural Language Processing techniques

Catalogue Description

UNIT I: Introduction to NLP
UNIT II: Language Modeling and Part of Speech Tagging
UNIT III: Words and Word Forms
UNIT IV: Text Analysis, Summarization and Extraction
UNIT V: Machine Translation

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** What is NLP? Why NLP is Difficult? History of NLP, Advantages of NLP, Disadvantages of NLP, Components of NLP, Applications of NLP, How to build an NLP pipeline? Phases of NLP, NLP APIs, NLP Libraries.	8
2	**UNIT – II** Unigram Language Model, Bigram, Trigram, N-gram, Advanced smoothing for language modeling, Empirical Comparison of Smoothing Techniques, Applications of Language Modeling, Natural Language Generation, Parts of Speech Tagging, Morphology, Named Entity Recognition	7
3	**UNIT – III** Bag of words, skip-gram, Continuous Bag-Of-Words, Embedding representations for words Lexical Semantics, Word Sense Disambiguation, Knowledge Based and Supervised Word Sense Disambiguation	5
4	**UNIT – IV** Sentiment Mining, Text Classification, Text Summarization, Information Extraction, Named Entity Recognition, Relation Extraction, Question Answering in Multilingual Setting; NLP in Information Retrieval, Cross-Lingual IR	6
5	**UNIT – V** Need of MT, Problems of Machine Translation, MT Approaches, Direct Machine Translations, Rule-Based Machine Translation, Knowledge Based MT System, Statistical Machine Translation (SMT), Parameter learning in SMT (IBM models) using EM), Encoder-decoder architecture, Neural Machine Translation	4
	Prefinals	2
	Total	**32**

Practical Schedule

List of Experiments:	No. of Labs
1. Setup for programming environments suitable for NLP	2
2. Parts of speech, tagging and morphological analysis	3
3. Bag of words model and embedding representation	2
4. Sentiment Analysis and Text Classification	2
5. Machine Translation Techniques	2
6. Statistical Method of encoder Decoder for SMT	2
7. Rule-Based Machine Translation	2
Lab Final	1

Total	16

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4-Presentations

5-Group Discussions

Learning Outcomes

a. Students will be able to have knowledge of various NLP methods.

Suggested Readings and References

1. Speech and Language Processing: AnIntroduction to Natural Language Processing, Computational Linguistics and Speech Recognition Jurafsky, David, and James H. Martin, PEARSON

2. Foundations of Statistical Natural Language Processing, Manning, Christopher D., and Hinrich Schütze,
Cambridge, MA: MIT Press

3. Natural Language Understanding, James Allen. The Benjamin/Cummings Publishing Company Inc..

4. Natural Language Processing with Python – Analyzing Text with the Natural Language ToolkitSteven Bird, Ewan Klein, and Edward Loper.

PROPOSAL FOR A NEW COURSE 31

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(e) Title of the Course: (f) Course No.	**Advances in Blockchain Concepts and Applications** **TIT-733**
4.	Catalogue Description	To prepare the students for recent advancements in the field of Information Technology
5.	To be offered	Once in a academic Year
6.	Credits	3(2-0-1)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: o. Pre- requisite p. Is the course a pre-requisite of any course? q. An Introductory survey of special area of knowledge represented by the department r. An Introductory survey of special area of knowledge represented by some other department s. A summarizing or integrated course t. In your judgment does this course overlap to a considerable extent with any other course u. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for Ph.D. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. Subodh Prasad and Dr. Ratnesh Prasad Srivastava
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Advances in Blockchain Concepts and Applications
Course No. : TIT-733
Credit Hours : 3(2-0-1)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

1. Understanding of Natural Language Processing techniques

Catalogue Description

UNIT I: Introduction of Blockchain
UNIT II: Bitcoin and Cryptocurrency
UNIT III: Introduction to Eherium
UNIT IV: Introduction to Hyperledger
UNIT V: Solidity Programming and Blockchain Applications

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** Blockchain Introduction, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.	4
2	**UNIT – II** Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Blockchain Technology On Cryptocurrency.	7
3	**UNIT – III** What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts.	5
4	**UNIT – IV** Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer.	6
5	**UNIT – V** Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address) Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain	8
	Prefinals	2
	Total	**32**

Practical Schedule

List of Experiments:	No. of Labs
1. Setup for Blockchain applications : Virtual Environment	3
2. Etherium Installation and Smart Contracts	3
3. Mining in Blockchain	3
4. Nodes and Data security using various Algorithms	2
5. Hyper ledger setup for enterprise applications	2
6. Demonstration and working of Blockchain Applications	2
Lab Final	1

Total	16

Teaching Methods

1- Lectures
2- Handouts
3- Assignments
4- Presentations
5- Group Discussions

Learning Outcomes
A student who successfully fulfills the course requirements will be able to:

1. Understand and explore the working of Blockchain technology (Understanding)
2. Analyze the working of Smart Contracts (Analyze)
3. Understand and analyze the working of Hyperledger (Analyze).
4. Apply the learning of solidity and de-centralized apps on Ethereum (Apply).

Suggested Readings and References

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
2. Antonopoulos and G. Wood, Mastering Ethereum.
3. D. Drescher, Blockchain Basics. Apress, 2017.
4. https://onlinecourses.nptel.ac.in/noc22_cs44/preview
5. https://onlinecourses.nptel.ac.in/noc20_cs01/preview

PROPOSAL FOR A NEW COURSE 32

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(g) Title of the Course: (h) Course No.	**Recent Trends in Web Technologies** **TIT-734**
4.	Catalogue Description	To prepare the students for recent advancements in the field of Information Technology
5.	To be offered	Once in a academic Year
6.	Credits	3(2-0-1)
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: v. Pre- requisite w. Is the course a pre-requisite of any course? x. An Introductory survey of special area of knowledge represented by the department y. An Introductory survey of special area of knowledge represented by some other department z. A summarizing or integrated course aa. In your judgment does this course overlap to a considerable extent with any other course bb. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for Ph.D. Programme
15.	Syllabus	Attached
16.	Basic Textbook for the proposed course	Attached
17.	References	Attached
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. Subodh Prasad and Dr. Ratnesh Prasad Srivastava
21.	Approved By	P.G. Faculty

Department of Information Technology

Course Title : Recent Trends in Web Technologies
Course No. : TIT-734
Credit Hours : 3(2-0-1)
Prerequisite : Nil
Why this Course? : Presently no such course is being offered by the Department which provides exposure in the concerned field.

Aim of the Course

To enable students to develop a complete web application from the scratch that includes Front-end, Backend and Data-exchange technologies. To build strong foundations (ex: OOPS) in entry level students thereby making them job ready as per industry requirements. To enable students to learn new technologies related to web development by applying foundation paradigms. At the end of the course students will become an industry-ready engineer who can be readily deployed in a project.

Catalogue Description

UNIT I: Understanding of Internet

UNIT II: Fundamental of Web Design

UNIT III: Client side Scripting

UNIT IV: Server side Programming

UNIT V: MVC and MVT Frameworks

Lecture Schedule

Sl. No.	Course Details	No. of Lectures
1	**UNIT – I** www, client-server, DNS, IP Protocol, HTTP, URL, Browser working principal, Web Hosting,W3C standard, Cloud Development	4
2	**UNIT – II** Fundamental of Web Design HTML: Introduction, Editor(VS Code/ Sublime), Element, Attribute, Head, Heading,Paragraph, Style, Formatting, Quotation, Comment, Color, CSS, Link, Image, Table, List,Block & Inline, Iframe. CSS: Introduction, Selector, External-Internal-Inline CSS, Comments, Color, Background,Border, Margin, Padding, Height, Width, Box model, Outline, Text, Font, Icon, Link, List, Tables.	7
3	**UNIT – III** Client side Scripting: Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. JQUERY, Simple AJAX applications.	5
4	**UNIT – IV** Server side Programming: Introduction to PHP, Servlet, JSP, JSF, Session Management, Deployment Descriptor, MVC architecture. Built in JSP objects. Servlet, JSP and JSF life cycle. Database Connectivity (JDBC/ODBC). Object Relational Mapping (ORM) Concepts. XML, XHTML, XSD.	6
5	**UNIT – V** Website development and deployment for MVT Framework, Flask, Node.js, Angular.js, Mongo DB.	8
	Prefinals	2
	Total	**32**

Practical Schedule

List of Experiments:	No. of Labs

1. Setup preparation for Client Side and Server side software development with Database installation	3
2. Front End development using HTML and CSS	3
3. Java script and JQuery demontstration	2
4. Servlet and JSP Programmes	2
5. XML, XHTML and JSF based application development	2
6. Demonstration of using Node.js, Angular.js, Flask and other Mongo DB for web development and deployment.	3
Lab Final	1
Total	16

Teaching Methods

1- Lectures

2- Handouts

3- Assignments

4- Presentations

5- Group Discussions

Learning Outcomes

A student who successfully fulfills the course requirements will be able to:

1. Create web pages using PHP /Servlet, JSP, JSF, Flask etc.
2. Identify the difference between the HTML PHP and XML documents.
3. Analyze the difference between and Front end and Back end development.
4. Understand the concept of JAVA SCRIPTS and JQuery.
5. Design web application using MVC and MVT architecture.
6. Apply JDBC and ODBC and ORM technologies to create database connectivity and session management.

Suggested Readings

1. The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developerby Chris Northwood, November 2018, Apress, ISBN: 9781484241523
2. JavaScript: The Definitive Guide by David Flanagan, Seventh Edition, Orielly
3. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
4. Java Server Pages – Hans Bergsten, SPD O'Reilly 3
5. Programming world wide web, R.W. Sebesta. Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

Suggested References

1. **https://nptel.ac.in/courses/106106156**
2. **https://onlinecourses.swayam2.ac.in/ugc19_lb05/preview**
3. **https://swayam.gov.in/NPTEL**

PROPOSAL FOR A NEW COURSE 33

1.	College	College of Post Graduate Studies
2.	Department	Information Technology, College of Technology
3.	(i) Title of the Course: (j) Course No.	**Doctoral Special Problem** **TIT-787**
4.	Catalogue Description	To prepare the students for recent advancements in the field of Information Technology
5.	To be offered	Once in a academic Year
6.	Credits	1-2
7.	Is this new course	Yes
8.	Curricular purpose of the courses	To give knowledge in the field to the students.
9.	General education purpose : a. General education b. Opportunity for Student research c. Department specialization d. Outgrowth of instructors research programme past or present e. Why should the educational purpose of the course not be achieved by modification of a course now being given? Please specify	 Yes Yes Yes Yes Yes Presently no such course is being offered by the Department which provides exposure in the concerned field.
10.	Relation to other courses: a. Pre- requisite b. Is the course a pre-requisite of any course? c. An Introductory survey of special area of knowledge represented by the department d. An Introductory survey of special area of knowledge represented by some other department e. A summarizing or integrated course f. In your judgment does this course overlap to a considerable extent with any other course g. A further development of courses	 Nil No Yes No No No No
11.	What are the urgent reasons why this course(s) should be offered at the present time	Due to proposed Syllabus to be mandatory Implemented
12.	The course(s) will not replace any existing courses :	New Course
13.	The course(s) will not require additional staff over and above :	Not required
14.	What is the exact place of this course(s) in the development of the educational programme of your department:	Course for Ph.D. Programme
15.	Syllabus	Recent Topics of the concerned field
16.	Basic Textbook for the proposed course	
17.	References	Journals and recent advances related to Information Technology
18.	Classroom, laboratory and other facilities :	Yes
19.	Would the introduction of this course(s) require additional staff	No
20.	Prepared By	Dr. H.L. Mandoria
21.	Approved By	P.G. Faculty

***** NOTE: The new courses proposed is subject to the approval of Academic Council**

SYLLABUS OF EXISTING COURSES

FOR P.G. COURSES OF THE DEPARTMENT

APPLICABLE FOR

Ph.D. (INFORMATION TECHNOLOGY)

Department of Information Technology

Course Title : Advanced Information Security
Course No. : TIT-701
Credit Hours : 3(2-0-1)

Catalogue Description: Computer security, threats, attacks, Intrusion detection, audit records, Data compression, Dictionary, Security Policies, Information Security: Issues and Solutions.

Syllabus:

Topics	Lectures
Module I Computer security, threats, attacks, computer criminals, defense methods, information and network policies, cryptography, symmetric and public-key encryption, uses of encryption. Program security, secure programs, viruses and other malicious code, control against program threats.	1-6
Module II Intrusion detection, audit records, statistical, rule-based and distributed intrusion detection, responses to intrusion detection, honey pots, password management, malicious software, viruses and related threats, virus countermeasures.	7-14
Module III Data compression, Dictionary Methods, Image Compression, Transform based techniques, Wavelet Methods, adaptive techniques,Video compression, Audio Compression, Fractal techniques.	15-21
Module IV Information Security Policies: About and why Policies are Important –When policies should be developed – How Policy should be developed - Policy needs – Identify what and from whom it is being protected – Data security consideration – Backups, Archival storage and disposal of data - Intellectual Property rights and Policies – Incident Response and Forensics - Management Responsibilities – Role of Information Security Department – Security Management and Law Enforcement – Security awareness training and support .	22-28
Module V Information Security: Issues and Solutions, Evolution of cryptography and cryptographic protocols, relationship with mathematical developments. Vulnerability, Threat, Risk Assessments and Managements. Critical Assets**.**	29-32

Practical wise

	Practicals
1. Case study Project on Threats, attacks, computer criminals, defense methods 2. Case study on malicious software, viruses and related threats, virus Counter measures. 3. Research Case Study on Data compression algorithms. 4. Research Case Study on Encryption- Cryptography and Authentication Concepts. 5. Case Study on Information Security Policies. 6. Case study on real life cyber crime – Source Code Theft, Online Fraud, Investigating USB hacking. 7. Implementation and Security of Firewalls 8. Implementation of Computer Emergency Response Team (CERT) 9. Case Study of RISK Intelligence 10. Real time case Studies on cyber laws	1-16

References:

1. Harold Tipton, Micki Krause "Information Security Management Handbook," 5th Edition, Auerbach/CRC Press
2. M E Kabay,Seymour Bosworth "Computer Security Handbook" 4th Edition., John Wiley.
3. David Solomon, Data compression: the complete reference, 2nd edition, Springer-verlag, New York.
4. Stephen Welstead, Fractal and wavelet Image Compression techniques, PHI, NewDelhi-1.
5. Stallings W. ":Cryptography and Network Security Principles and Practice", 3/e,Pearson Education Asia.

Department of Information Technology

Course Title : Advances in E-Commerce Strategies
Course No. : TIT-702
Credit Hours : 3(2-0-1)

Catalogue Description: Introduction: E-commerce, Inter-organizational transaction, Electronic payment Systems, E-commerce Security Issues & Solutions, Electronic banking & market

Syllabus:

Lecture Wise

Topics	Lectures
Module I E-commerce: features-need & essential requirements-Parties to E-commerce transactions-environment-E-commerce & trade Cycle.- Internet concepts- Private network- Public network (VPN)- Intranet & its applications- Extranet,Value Chain-Competitive Advantage-Business strategies	1-6
Module II E-commerce**:**Inter-organizational transaction- Purchasing online-After sales online- internet trading relationship-B2B- EDI & its impact on Business-B2C- Intra-organizational E-commerce– Supply chain management.E-business solution matrix- electronic Customer Relationship Management & it's strategies- Strategies for web auctions- virtual communications & web portals- E-shopping.	7-14
Module III Electronic payment Systems: Digital Payment Requirements- Digital Tokenbased Electronic Payment Systems Classification of New Payment Systems-Properties of E-cash- Cheque Payment Systems on internet- Risk and Electronic Payment Systems- Designing Electronic Payment System- Digital Signature.	15-21
Module IV Electronic banking & Electronic market: ATMs- EFT- MFT- EMT- FTT- steps for online financial transaction- components & security of E-banking.: Strategies for internet marketing - sales and promotion-5 P's to internet marketing- Online advertising mechanism- Electronic financial marketing.	22-28
Module V E-commerce Security Issues & Solutions: Security and Threats- Encryption- Cryptography and Authentication, Ethics	29-32

Practical wise

	Practicals
1. Project on E-commerce,environment-E-commerce & trade Cycle & its Security 2. Project on Integrating Payment Gateways, Project on Mobile Payments 3. Designing Electronic Payment System- Digital Signature. 4. Designing Encryption- Cryptography and Authentication Concepts (Traditional & Biometric Based Authentication System) 5. Case Study on Electronic banking and market to mitigate the frauds 6. Case study on Supply chain management's,business solution matrix 7. Real time case Studies on cyber laws	1-16

References:

1.Whiteley David "E-commerce: Strategy- Technologies and Applications"- Tata McGraw Hill- New Delhi.
2. Kalakota- Ravi & Whinston Andrew B."Frontiers of Electronic Commerce"Addison-Wesley- Massachusetts.
3. West land- J. Christopher & Clark- Theodore H.K- "Global Electronic Commerce Theory and Case Studies"
4. Amor Daniel-"The E-business(R) Evolution (Living and working in an interconnected world) " Prentice Hall
5. Bajaj Kamlesh k & Nag Debjani"E-commerce (The cutting Edge of Business)" Tata McGraw Hill Publ.Delhi.
6. Schneider Gary P. & Perry James T. "Electronic Commerce" Thomson Learning Australia
7. Chakrabarti R & Kardile Vikas"The Asian Manager's Handbook of Ecommerce"Tata McGraw Hill Publ. Delhi.
8. Greenstein- Marilyn & Todd M Feinman- "Electronic Commerce: Security- Risk Management and Control"- Tata McGraw Hill Publications- New Delhi.

Department of Information Technology

Course Title : Modeling & Simulation
Course No. : TIT-703
Credit Hours : 2(1-0-1)

Catalogue Description: Introduction to Modeling and simulation concepts, application domains, and tools, Model development, simulation execution, and experimentation, Heterogeneous modeling and verification & validation

Lecture Wise

Topics	Lectures
Module I : Fundamental simulation modeling concepts and frameworks, application domains, and tools , role in engineering design and scientific discovery, types of simulations, general principles, softwares	1-3
Module II: System-theoretic model development principles and methods ,Component-based simulation and modeling tools	4-6
Module III : Mathematical and statistical models, discrete distributions, continuous distributions, Poisson processes, empirical distributions, Random number generation, types of pseudo-random number generators, texts of random number generators, Random variable generation	7-10
Module IV :Simulation protocol concepts, designs, and implementations , Simulation experimentation and analysis, Network system simulation modeling ,Multi-resolution, multi-aspect modeling ,Parallel simulation modeling concepts and methods	11-14
Module V: Heterogeneous modeling and verification & validation Simulation model verification and validation , Model composability and simulation interoperability	15-16

Practical wise

	Practicals
1. Mathematical and statistical models, discrete distributions. 2. Computer Modeling. 3. Parallel simulation modeling. 4. Heterogeneous modeling and verification. 5. Network system simulation. 6. Model composability and simulation.	1-16

References:

1. Jerry Banks, John Carson, Barry L. Nelson, David Nicol *"Discrete-Event System Simulation*"(4th edition), Prentice Hall
2. Volker Grimm, Steven F. Railsback, *"Individual-based Modeling and Ecology"* Princeton University Press,
3. Bellomo, Nicola " Modeling and Simulation in Science, Engineering and Technology"
4. Bernard P. Zeigler, Herbert Praehofer, Tag Gon Kim "Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems" Academic Press
5. Lawrence , Woods "Modeling and Simulation of Dynamic Systems" Prentice Hall
6. Shailendra Jain "Modeling and Simulation using MATLAB-Simulink " Wiley-India