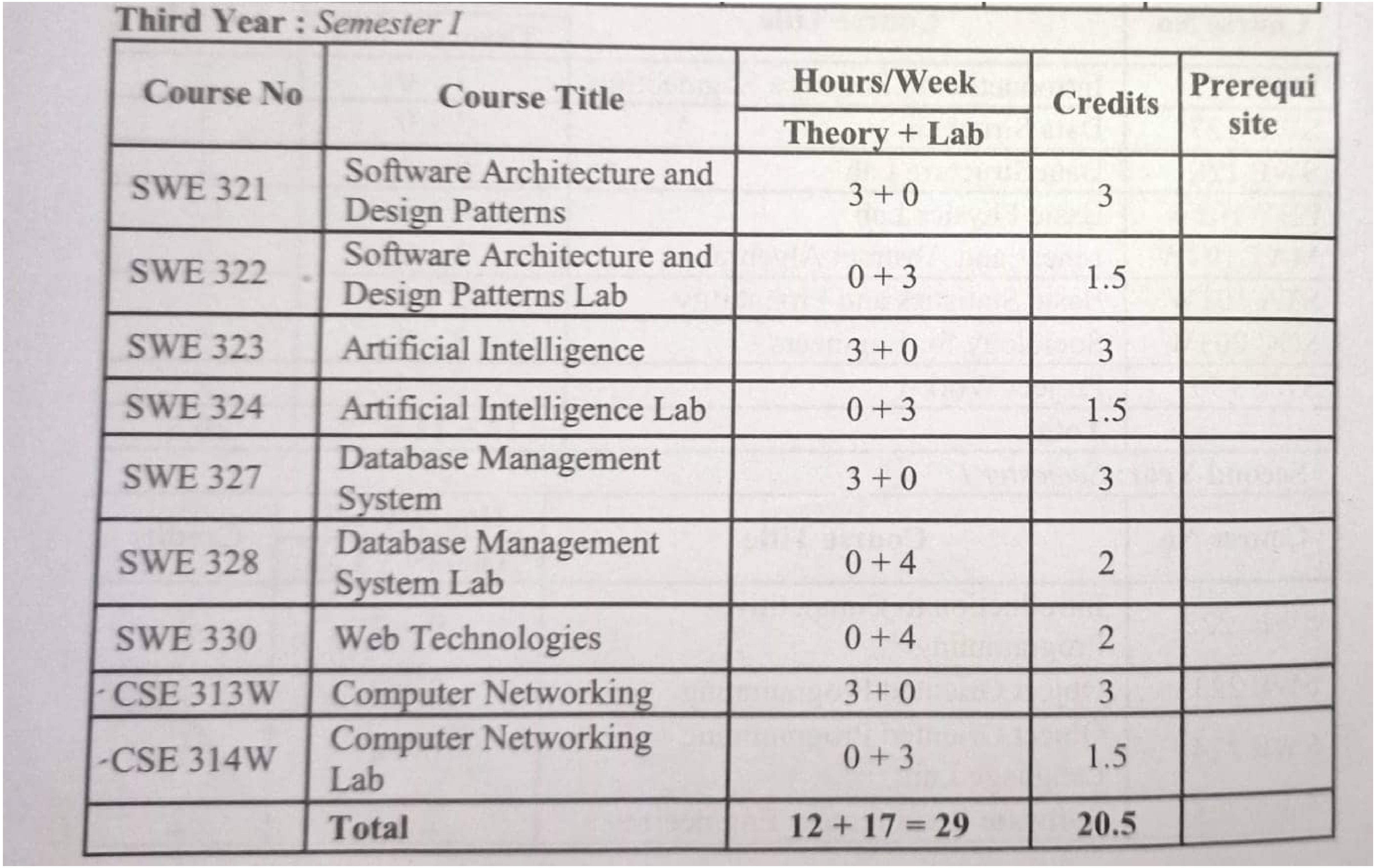


Third Year : *Semester I*

Course No	Course Title	Hours/Week	Credits	Prerequisite
		Theory + Lab		
SWE 321	Software Architecture and Design Patterns	3 + 0	3	
SWE 322	Software Architecture and Design Patterns Lab	0 + 3	1.5	
SWE 323	Artificial Intelligence	3 + 0	3	
SWE 324	Artificial Intelligence Lab	0 + 3	1.5	
SWE 327	Database Management System	3 + 0	3	
SWE 328	Database Management System Lab	0 + 4	2	
SWE 330	Web Technologies	0 + 4	2	
CSE 313W	Computer Networking	3 + 0	3	
CSE 314W	Computer Networking Lab	0 + 3	1.5	
	Total	**12 + 17 = 29**	**20.5**	

SWE 321 SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

3 Hours/Week, 3 Credits

This course teaches the principles and concepts involved in the analysis and design of large software,systems,Express the analysis and design of an application using UML,Specify functional semantics of an application using OCL,Specify and evaluate software architectures,Select and use appropriate architectural styles,Understand and apply object-oriented design techniques,Select and use appropriate software design patterns,Understand and perform a design review.

Text:

1. Gamma, Erich. Design patterns: elements of reusable object-oriented software. Pearson Education, 1995.

Reference:

1. Baldwin, Carliss Y. and Kim B. Clark, Design Rules, Vol. 1: The Power of
2. Modularity,The MIT Press, March 15, 2000.
3. Taylor, R. N., N. Medvidovic, and E. M. Dashofy.,Software Architecture: Foundations, Theory, and Practice,Wiley, January 9, 2009.
4. Qian, Kai, Ziang Fu, Lixin Tao, Chong-Wei Xu, and Jorge L. Di'az-Herrera,
5. Software Architecture and Design Illuminated, Jones and Bartlett, 2010.

SWE 322 SOFTWARE ARCHITECTURE AND DESIGN PATTERNS LAB

3 Hours/Week, 1.5. Credits

Practical implementation of various distributed algorithms and models based on SWE 321 based on tools and technique.

SWE 323 ARTIFICIAL INTELLIGENCE

3 Hours/Week, 3 Credits

What is Artificial Intelligence: The AI problems, The underlying assumption, What is an AI technique. **Problems, Problem spaces and Search:** Defining the problem as a state space search, Production system, Problem characteristics. **Heuristics Search Techniques:** Generate and Test, Hill climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis. **Knowledge Representation Issues:** Representation and Mappings, Approaches to knowledge Representation, Issues in Knowledge representation. **Using Predicate logic:** Representing simple facts in logic, Representing Instance and Isa relationships, Computable functions and Predicates, Resolution. **Representing Knowledge using Rules:** Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching. **Game playing:** Overview, The Mimimax Search Procedure, Adding Alpha-Beta cutoffs, Additional refinements, iterative Deepening, **Planning:** Overview, An example Domain: The Blocks

World, Components of a planning system, Goal stack planning, **Understanding:** What is Understanding, What makes Understanding hard, Understanding as constraint satisfaction. **natural Language Processing:** Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing. **Expert systems:** representing and using domain knowledge, Expert system shells explanation, Knowledge Acquisition. **AI Programming Language**: Python, Prolog, LISP

Text:

Artificial Intelligence: a modern approach (2nd edition), Russell, S. and P. Norvig, Prentice Hall, 2003

SWE 324 ARTIFICIAL INTELLIGENCE LAB

3 Hours/Week, 1.5 Credits

Students will have to understand the functionalities of intelligent agents and how the agents will solve general problems. Students have to use a high-level language (Python, Prolog, LISP) to solve the following problems:**Backtracking:** State space, Constraint satisfaction, Branch and bound. Example: 8-queen, 8- puzzle, Crypt-arithmetic. **BFS and production:** Water jugs problem, The missionaries and cannibal problem. **Heuristic and recursion:** Tic-tac-toe, Simple bock world, Goal stack planning, The tower of Hanoi. **Question answering:** The monkey and bananas problem.

SWE327 DATABASE MANAGEMENT SYSTEM

3 Hours/Week, 3.0 Credits

Introduction: Purpose of Database Systems, Data Abstraction, Data Models, Instances and Schemes, Data Independence, Data Definition Language, Data Manipulation Language, Database Manager, Database administrator, Database Users, Overall System Structure, Advantages and Disadvantage of a Database Systems. *Data Mining and analysis, Database Architecture, History of Database Systems*. **Relationship Entity-Model:** Entities and Entity Sets, Relationships and Relationship Sets, Attributes, *Composite and Multivalued Attributes,* Mapping Constraints, Keys, Entity-Relationship Diagram, Reducing of E-R Diagram to Tables, Generalization, *Attribute Inheritance*, Aggregation, *Alternative E-R Notatios*, Design of an E-R Database Scheme. **Relational Model:** Structure of Relational Database, *Fundamental Relational Algebra Operations*, The Tuple Relational Calculus, The Domain Relational Calculus, Modifying the Database.**Relational Commercial Language:** *SQL, Basic structure of SQL Queries, Query-by-Example, Quel., Nested Sub queries, Complex queries, Integrity Constraints, Authorization, Dynamic SQL, Recursive Queries.***Relational Database Design:** Pitfalls in Relational Database Design, *Functional Dependency Theory*, Normalization using Functional Dependencies, Normalization using Multivalued Dependencies, Normalization using join Dependencies, *Database Design Process*.**File And System Structure:** Overall System Structure, Physical Storage Media, File Organization, *RAID*, Organization of Records into Blocks, Sequential Files, Mapping Relational Data to Files, Data Dictionary Storage, Buffer

Management. **Indexing And Hashing:** Basic Concepts, *Ordered Indices,* B+ -Tree Index Files, B-Tree Index Files, Static and Dynamic Hash Function, Comparison of Indexing and Hashing, Index Definition in SQL, Multiple Key Access.**Query Processing *and Optimization*:** Query Interpretation, Equivalence of Expressions, Estimation of Query-Processing Cost, Estimation of Costs of Access Using Indices, Join Strategies, Join Strategies for parallel Processing, Structure of the query Optimizer, *Transformation of Relational Expression.* **Concurrency Control:** Schedules, Testing for Serializability, Lock-Based Protocols, Timestamp-Based Protocols, Validation Techniques, Multiple Granularity, Multiversion Schemes, Insert and Delete Operations, *Deadlock Handling.* **Distributed Database:** Structure of Distributed Databases, Trade-off in Distributing the Database, Design of Distributed Database, Transparancy and Autonomy, Distributed Query Processing, Recovery in Distributed Systems, Commit Protocols, Concurrency Control.**Data Mining and Information Retrieval:** *Data analysis and OLAP, Data Warehouse, Data Mining, Relevance Ranking Using Terms, Relevance Ranking Using Hyperlink, Synonyms, Homonyms, Ontology, Indexing of Document, Measuring Retrieval Efficiencies, Information Retrieval and Structured Data.*

Text:

1. Database System Concepts – Abraham Silberschratz, Henry K. Korth, S. Sudarshan

References:

1. Fundamentals of Database Systems - Benjamin/Cummings
2. Database Principles, Programming, Performance - Morgan Kaufmann
3. A First Course in Database Systems - Prentice Hall
4. 4.Database Management Systems, McGraw Hill

SWE328 DATABASE MANAGEMENT SYSTEM LAB

3 Hours/Week, 1.5 Credits

Introduction: What is database, MySQL , Oracle , SQL, Datatypes, SQL / PLSQL, Oracle Software Installation, User Type, Creating User , Granting.**Basic Parts of Speech in SQL:** Creating Newspaper Table, Select Command (Where , order by), Creating View, Getting Text Information & Changing it, Concatenation, Cut & paste string(RPAD , LPAD , TRIM , LTRIM , RTRIM, LOWER , UPPER , INIT, LENGTH , SUBSTR , INSTR , SOUNDEX).**Playing The Numbers:** Addition , Subtraction , Multiplication , Division, NVL , ABS , Floor , MOD , Power , SQRT , EXR , LN , LOG , ROUND, AVG , MAX , MIN , COUNT , SUM, Distinct, SUBQUERY FOR MAX,MIN.**Grouping things together:** Group By , Having, Order By, Views Renaming Columns with Aliases.**When one query depends upon another:** Union, Intersect, Minus, Not in , Not Exists.**Changing Data** : INSERT,UPDATE,MERGE,DELETE, ROLLBACK , AUTOCOMMIT , COMMIT, SAVEPOINTS, MULTI TABLE INSERT, DELETE, UPDATE, MERGE.**Creating And Altering tables & views:** Altering table, Dropping table, Creating view, Creating a table from a table.**By What Authority:** Creating User, Granting User, Password Management.**An Introduction to PL/SQL**: Implement few problems using PL/SQL (eg Prime Number, Factorial, Calculating Area of

Circle, etc).**An Introduction to Trigger and Procedure:** Implement few problems using Trigger and Procedures.**An Introduction to Indexing:** Implement indexing using a large database and observe the difference of Indexed and Non-Indexed database.

SWE 330 WEB TECHNOLOGIES

4 Hours/Week, 2 Credits

Introduction to Web Engineering, Requirements Engineering and Modeling Web Applications, Web Application Architectures, Technologies and Tools for Web Applications, Testing and Maintenance of Web Applications, Usability and Performance o Web Applications, Security of Web Applications, The Semantic Web.

Understandig the Web application: Web Engineering introduces a structured methodology utilized in software engineering to Web development projects. The course addresses the concepts, methods, technologies, and techniques of developing Web sites that collect, organize and expose information resources. Topics covered include requirements engineering for Web applications, design methods and technologies, interface design, usability of web applications, accessibility, testing, metrics, operation and maintenance of Web applications, security, and project management. Specific technologies covered in this course include client-side (XHTML, JavaScript, and CSS) and server-side (Perl and PHP). Using the described concepts students should be able to understand the Web engineering concepts behind the frameworks of Joomla, Drupal, Wordpress. **Server-side technology:** LAMP, Web application frameworks (example: Silverlight, Adobe Flex), Web 2.0 and Web APIs. **Front-end technology:** HTML, XHTML, XML. CSS styling, layout, selector, Document object model and JavaScript. **Client-Programming:** Web APIs with JavaScript (example: Google Ajax API). **MVC:** Understanding Model, view and controller Model. **Understanding Web APIs:** REST, XML, JSON, RSS Parsing. **JavaScript Exercise:** The goal of this assignment is to allow you to explore and use as many of JavaScript's objects, methods, and properties as possible in a small assignment. Some functions must be written from scratch. Other functions, appropriately attributed, may be downloaded from the web and used as a part of the system or as the basis for your own functions. **PHP Exercise:** Build a set of PHP scripts that perform some dynamic server side functionality. **Understanding plug-ins:** Develop a Firefox extension.

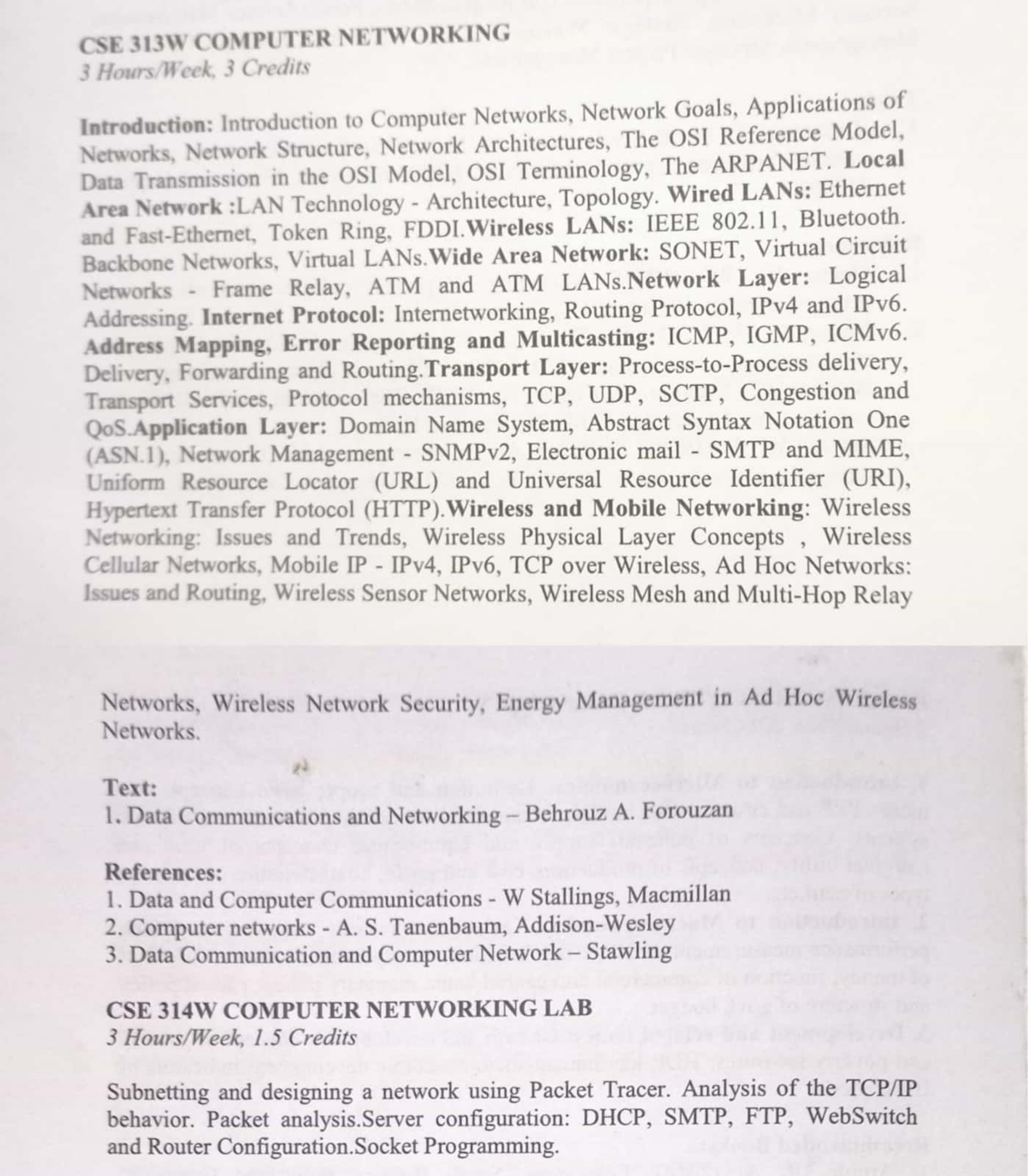
Text:

1. Web Engineering: The Discipline of Systematic Development of Web Applications Editors: Gerti Kappel, Birgit Pröll, Siegfried Reich, Werner Retschitzegger
2. Web Engineering: A Practioner's Approach, Roger Pressman, David Lowe

Reference:

MIT Open Course Materials for the course Software Engineering for Web Applications

MIT Open Course Materials for the course Database, Internet, and Systems Integration Technologies



CSE 313W COMPUTER NETWORKING

3 Hours/Week, 3 Credits

Introduction: Introduction to Computer Networks, Network Goals, Applications of Networks, Network Structure, Network Architectures, The OSI Reference Model, Data Transmission in the OSI Model, OSI Terminology, The ARPANET. **Local Area Network :**LAN Technology - Architecture, Topology. **Wired LANs:** Ethernet and Fast-Ethernet, Token Ring, FDDI.**Wireless LANs:** IEEE 802.11, Bluetooth. Backbone Networks, Virtual LANs.**Wide Area Network:** SONET, Virtual Circuit Networks - Frame Relay, ATM and ATM LANs.**Network Layer:** Logical Addressing. **Internet Protocol:** Internetworking, Routing Protocol, IPv4 and IPv6. **Address Mapping, Error Reporting and Multicasting:** ICMP, IGMP, ICMv6. Delivery, Forwarding and Routing.**Transport Layer:** Process-to-Process delivery, Transport Services, Protocol mechanisms, TCP, UDP, SCTP, Congestion and QoS.**Application Layer:** Domain Name System, Abstract Syntax Notation One (ASN.1), Network Management - SNMPv2, Electronic mail - SMTP and MIME, Uniform Resource Locator (URL) and Universal Resource Identifier (URI), Hypertext Transfer Protocol (HTTP).**Wireless and Mobile Networking**: Wireless Networking: Issues and Trends, Wireless Physical Layer Concepts , Wireless Cellular Networks, Mobile IP - IPv4, IPv6, TCP over Wireless, Ad Hoc Networks: Issues and Routing, Wireless Sensor Networks, Wireless Mesh and Multi-Hop Relay Networks, Wireless Network Security, Energy Management in Ad Hoc Wireless Networks.

Text:

1. Data Communications and Networking – Behrouz A. Forouzan

References:

1. Data and Computer Communications - W Stallings, Macmillan
2. Computer networks - A. S. Tanenbaum, Addison-Wesley
3. Data Communication and Computer Network – Stawling

CSE 314W COMPUTER NETWORKING LAB

3 Hours/Week, 1.5 Credits

Subnetting and designing a network using Packet Tracer. Analysis of the TCP/IP behavior. Packet analysis.Server configuration: DHCP, SMTP, FTP, WebSwitch and Router Configuration.Socket Programming.