Elective: Advanced Switching and Routing for Enterprise Networks

	Theory	Practical	Total
Sessional	25	25	50
Final	50	-	50
Total	75	25	100

Course Objectives:

To provide knowledge about Network Planning and Design
To provide knowledge about Routing and Packet Forwarding
To provide knowledge about LAN Switching and WAN Services.

Network Fundamentals **10 hrs**

Living in a Network Centric World, Communication over the network, Protocol Layers, Addressing the Network, Planning and Configuring the Network.

1. Routing and Packet Forwarding **15 hrs**

Introduction to Routing and Packet Forwarding, Static Routing, Introduction to Dynamic Routing Protocols, Distance Vector Routing Protocol, RIP V1, VLSM and CIDR, RIP V2, EIGRP, Link State Routing, OSPF, BGP, Virtual Private Networks, Layer 3 Switching and Routing

2. LAN Switching and Wireless **10 hrs**

Introduction to LAN Design, Basic Switch Concepts and Configurations, Virtual LAN, VTP, Spanning Tree Protocol, Inter VLAN Routing, Wireless Concepts and Configurations.

3. Accessing the WAN **10 hrs**

Introduction to WAN, PPP , Frame Relay, Network Security, Access Control Lists, Virtual Private Networks, IPV6 Addressing Services, Network Troubleshooting, AAA

Laboratory

All Labs will be done in Packet Tracer and Cisco 1700 series router and Cisco 2950 Catalyst Switch.

Text Book:

1. James F. Kurose, Keith W.Ross, “Computer Networking, A top down approach featuring the Internet “

Reference Books

2. A S Tanenbaum, “Computer Networks “
3. Behrouz A Forouzan, “Data Communications and Networking “
4. Todd Lammle, “Cisco Certified Network Associate Study Guide “

Course Title : Next Generation Wireless and Mobile Communication Technology
Course Code : Elective
Credit : 3
Class Load : 3 hours
Evaluation :

	Theory	Practical	Total
Sessional	25	25	50
Final	50	-	50
Total	75	25	100

Course Objective:
The objective of this course covering basic principle of next generation wireless and mobile communication technologies

1. **Introduction** **(3 Hrs)**
   History and Background of 3G, Standardization, Spectrum for 3G, Driving Forces for 3G Evolution, 3G Evolution: Radio Access Network Evolution Approaches and Evolved Core Network (SAE)

2. **Higher Data Rates in Wireless Communication** **(2 Hrs)**
   Fundamental constraints, Higher Data Rates within Limited Bandwidth: higher order modulation and power control, Wider Bandwidth Including Multicarrier Transmission.

3. **MIMO (Multiple Input Multiple Output)** **(5 Hrs)**
   Multiple Antenna Configurations, Benefits of Multi Antenna Techniques, Transmit Antenna Diversity and Transmitter Side Beam Forming, Mode of Operation: Spatial Diversity and Spatial Multiplexing, Capacity Analysis of MIMO System for Different Fading Channels, Diversity Gain, Array Gain and Interference Reduction

4. **OFDM (Orthogonal Frequency Division Multiplexing) transmission** **(6 Hrs)**
   Multicarrier System Fundamentals; Evolution of OFDM, Basic Principles of OFDM, DFT, FFT, Cyclic-Prefix Insertion and OFDM Demodulation, OFDM Implementation Using IFFT/FFT Processing, Frequency Domain Model of OFDM Transmission, Selection of Basic OFDM Parameters: subcarrier spacing, number of subcarrier and cyclic prefixes length and Variation in instantaneous transmission power, OFDM as a User Multiplexing and Multiple Access Schemes

5. **LTE and SAE** **(6 Hrs)**
   Introduction and Design Target, Radio Access: an Overview, LTE Radio Interface Architecture, LTE Access Procedures and System Evolution Architecture

6. **IEEE 802.11** **(5 Hrs)**
   Introduction, Organization of WLAN according to IEEE 802.11, Layers, IEEE 802.11 MAC, MAC Synchronization, Power Saving and Roaming

7. **Ad-hoc Networks** **(4 Hrs)**
   Mobile ad-Hoc Network (MANET), Routing in Ad-hoc Network, Constraint and Design Issue, MAC Layer and Network Layer

8. **IEEE 802.16** **(5 Hrs)**
   Introduction, Spectrum, Bandwidth Option and Duplexing Arrangements, Scalable OFDMA , Multi Antenna Technology and Fractional Frequency Reuse, Network Access Technologies, Protocol Layers and Routing, QoS Handling and Mobility Management, Mobile Broadband Wireless Access (IEEE 802.20)

9. **Cognitive Radio Network** **(4 Hrs)**
   Introduction, Cognitive Radio Technology, Cognitive MAC Protocols, Future Trends

10. **Self Organization in Mobile Network** **(5 Hrs)**
    Introduction, Definition and General Properties, Motivation and Drivers, Functionality: Self-configuration, self-optimization, self-healing and self- repair, SON Architecture, Research Challenges on SON

Laboratory:

Five experiments (including study, analysis, computer simulation and modeling) on the basic principles of next generation mobile and wireless communication technologies based on the recent released research paper related to this topic as decided by the course instructor.

Text Book:

1. Eric Dahlman, Stefan Parkvall, John Skold and Per Beming, 3G Evolution :HSPA and LTE for Mobile Broad band.

Reference:

1. Theodore S. Rappaport, Wireless Communications: Principles and Practice, Second Edition, 2006.

2. Jochen Schiller, Mobile Communications, Addison Wesley Longman, 2003

3. Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen , Multicarrier Digital Communications: Theory and Application of OFDM.

4. L. Hanzo, W.T. Webb, T. Keller, Signal and Multicarrier Quadrature Amplitude Modulation: Principles and Application for Personal Communication, WLANS and Broadcasting.

5. A. Toskala et al, "UTRAN Long-Term Evolution," Chapter 16 in Holma/ Toskala: WCDMA for UMTS, Wiley 2007

6. E. Dahlman et al, "3G Evolution, HSPA and LTE for Mobile Broadband," Elsevier Journal, 2007

7. 3rd Generation Partnership Project Long Term Evolution (LTE), official website: http://www.3gpp.org/Highlights/LTE/LTE.htm

Prepared by: Mr. Pradip Paudyal

Course Title: **Semantic Web Technologies and Applications**

Course Code: Elective

Duration: One Semester

Class Load: 3 – 0 – 1

Pre-requisite: Knowledge of Database and AI is preferable

Evaluation:

	Theory	Practical	Total
Sessional	25	15	40
Final	60	-	60
Total	85	15	100

Course Objectives:

- To introduce the field of Semantic Web technologies
- To provide knowledge about structured information representation
- To provide knowledge of Ontologies and knowledge representation standards
- To provide knowledge of social semantic web and Linked Open Data
- To introduce application areas of Semantic Web technologies

Course Contents:

1. **Introduction** **(5 hrs)**

   Background and vision, Foundations of the Semantic Web, Semantic Web Layer Cake, Knowledge sharing, AI and the Semantic Web

2. **Information representation, structured data and semantics** **(9 hrs)**

   XML, DTD, XML schema, XSLT, Metadata standards, Dublin core, Information representation in the Semantic Web (RDF, RDFS, RDF/XML, n-triples, turtle, RDFa, Microformats, eRDF, HTML5, GRDDL), Querying the Semantic Web: SPARQL

3. **Ontologies** **(8 hrs)**

   Introduction, Ontology classification - Top level ontologies and domain ontologies, Lightweight and heavyweight ontologies, Knowledge representation and reasoning -

Description Logic, OWL, Rules – SWRL, Ontology engineering methodologies, Ontology learning, Ontology alignment

4. **The Social Semantic Web** **(8 hrs)**

   Social web and web 2.0, Creation of Semantic Web data, Semantic annotation, Social semantic web tools and applications, Tags and ontologies, Social web and emergent semantics, Semantic interoperability and integration

5. **Linked Open Data** **(8 hrs)**

   Linked data principles, Linked data publishing, Linked Open Data (LOD), LOD cloud, Linked Data applications.

6. **Semantic Web in the industry and Web 3.0** **(7 hrs)**

   Case studies, Application areas: knowledge management, data integration, enterprise applications, e-government, multimedia etc., Recent developments and open research problems

Lab sessions: Lab sessions may be conducted for learning to use XML tools (XML spy, etc), Semantic Web frameworks (Jena, ARC, etc), Ontology creation (Protégé, etc). A project work would also be included.

Reference Books:

1. *A Semantic Web Primer*. MIT Press, 2004. Grigoris Antoniou and Frank van Harmelen
2. Handouts, W3C specifications and online materials
3. *Spinning the Semantic Web - Bringing the World Wide Web to Its Full Potential*. MIT Press, 2002, Dieter Fensel, James A. Hendler, Henry Lieberman, and Wolfgang Wahlster (Eds.)
4. *Semantic Web for the Working Ontologist*. 2008. Dean Allemang and Jim Hendler.
5. *The Social Semantic Web*. Springer, 2009. John G. Breslin, Alexandre Passant and Stefan Decker.
6. *Linked Data: Evolving the Web into a Global Data Space*. Morgan & Claypool, 2011. Tom Heath and Christian Bizer.
7. *Semantic Web for Business: Cases and Applications*. IGI, 2008. Roberto Garcia.
8. *XML Bible*. Hungry Minds. New York, 2001. Elliotte Rusty Harold.

Course Title: Geographical Information System (GIS)

Course Code: Elective

Duration: One Semester

Class Load: 3 – 0 – 1

Pre-requisite: No pre-requisite

Evaluation:

	Theory	Practical	Total
Sessional	40	20	60
Final	40	-	40
Total	80	20	100

Course Objectives:

By the end of the course, students will be able to:

- Identify, locate, and acquire spatial data pertinent to projects in their field of interest, as well as find major gaps in or problems with existing information.
- Evaluate fitness for use of the existing data sources for use in a project.
- Understand the data creation process and create simple data sets and/or add to existing data
- Perform basic spatial analyses (attribute and spatial queries, buffering, overlays) as well as linking these methods together in a more complex analytical model.
- Create high-quality maps
- Automate available GIS tools using programming language

1. Introduction [2]
   - 1.1. Definition of GIS
   - 1.2. Brief history of GIS
   - 1.3. Components of GIS
   - 1.4. Applications of GIS
   - 1.5. GIS related technologies

2. GIS data model [3]
   - 2.1. Spatial and non-spatial data
   - 2.2. Spatial data types
     - 2.2.1. Vector data
     - 2.2.2. Raster data
     - 2.2.3. Triagulated Irregular Network (TIN)
   - 2.3. Advantages and disadvantages of vector and raster data models
   - 2.4. Contextual use of GIS data models
   - 2.5. Spatial data collection methods
     - 2.5.1. Existing data eg. Paper maps
     - 2.5.2. Traditional / modern surveying
     - 2.5.3. Remote sensing and Photogrammetry
     - 2.5.4. Clearing house

3. Geometric aspect of mapping [8]
   - 3.1. Introduction
   - 3.2. Coordinate systems
     - 3.2.1. 2D geographic coordinates/Rectangular Coordinates
     - 3.2.2. 3D geographic coordinates/Geographical Coordinates
     - 3.2.3. Geocentric coordinates
     - 3.2.4. 2D Cartesian coordinates

3.2.5. 2D polar coordinates
3.3. Reference surfaces
3.3.1. The Geoid
3.3.2. The ellipsoid
3.3.3. The sphere
3.3.4. Local and global ellipsoids
3.3.5. The local and global horizontal datums
3.4. Map projections
3.4.1. Map projection definition
3.4.2. Classification of map projections
3.4.2.1. Class
3.4.2.2. point of secancy
3.4.2.3. aspect
3.4.2.4. distortion property
3.4.3. Scale distortions on a map
3.4.4. Choosing a map projection
3.4.5. Universal Tranverse Mercator (UTM) projection
3.5. Coordinate transformations
3.5.1. Changing map projection
3.5.2. Datum transformations
3.5.2.1. Datum transformations via geocentric coordinates
3.5.2.2. Datum transformations via geographic coordinates
3.5.3. Conversions from geographic to geocentric coordinates and vice versa
3.5.4. 2D Cartesian coordinate transformations

4. Data quality [5]
4.1. Concept and definition of data quality
4.1.1. The scope of geographic data quality
4.1.2. Accuracy, precision, error and uncertainty
4.1.3. Sources of error in geographic data
4.2. Components of geographic data quality
4.2.1. Lineage
4.2.2. Positional accuracy
4.2.3. Attribute accuracy
4.2.4. Logical consistency
4.2.5. Completeness
4.2.6. Temporal accuracy
4.2.7. Semantic accuracy
4.3. Assessment of data quality
4.3.1. Evaluation of positional accuracy
4.3.2. Evaluation of attribute accuracy
4.4. Managing spatial data errors
4.4.1. Quality assurance and quality control
4.4.2. Error propagation and error management
4.4.3. Sensitivity analysis
4.4.4. Data quality reporting

5. Database and data exploration [5]
5.1. Reason for using a Database management system (DBMS)
5.2. Relational DBMS
5.3. Querying RDBMS
5.3.1. Attribute data query
5.3.2. Spatial data query
5.3.3. Combining attribute and spatial data query

6. Vector data Analysis [5]

6.1. Buffering: constant and variable size
6.2. Overlay
    6.2.1. Feature type and Overlay
    6.2.2. Overlay methods
    6.2.3. Error propagation
6.3. Pattern analysis
    6.3.1. Nearest Neighbour analysis
    6.3.2. Spatial autocorrelation
6.4. Map manipulation

7. Raster data analysis [5]
    7.1. Resampling
    7.2. Reclassifying / changing cell value
    7.3. Map algebra
    7.4. Surface analysis: Slope, aspect, contour etc
    7.5. Neighbourhood analysis: Filtering, Aggregation, Proximity
    7.6. Path analysis
    7.7. Suitability analysis

8. Data presentation and Cartography [7]
    8.1. GIS and maps
        8.1.1. The function of maps
        8.1.2. The nature of maps
            8.1.2.1. Map definition
            8.1.2.2. Map scale
            8.1.2.3. Dimensions
        8.1.3. Map types
            8.1.3.1. topographic
            8.1.3.2. thematic
    8.2. Map visualization
        8.2.1. The visualization process
        8.2.2. Visualization strategy
        8.2.3. Map Projection Systems
    8.3. The cartographic toolbox
        8.3.1. Types of data Nominal, Ordinal, Interval, Ratio data
    8.4. Mapping of Data
    8.5. Map cosmetics
        8.5.1. Map elements
        8.5.2. Use of text on the map
        8.5.3. Visual hierarchy
    8.6. Map dissemination

9. GIS automation [5]
    9.1. Introduction and importance of automation
    9.2. Introduction to Python
    9.3. ArcGIS automation with Python

Practical Exercise:
Practical exercise will cover the above chapters and will be performed in ArcGIS software. The individual practical sessions will have the following topics:

SN	Topics
1	Introduction to ArcGIS
2	Introduction to ArcGIS
3	Projection System
4	Vector Data Structure
5	Digitization & topology
6	Database and attribute query
7	Spatial query
8	Vector Analysis
9	Raster Structure
10	Raster Analysis
11	Visualization
12	Data Output

References:

1. Otto Huisman and Rolf A. De By; Principles of Geographic Information Systems: An introductory text book. ITC publication, The Netherlands, 2009.
2. C. P. Lo and Albert K. W. Yeung; Concepts and Techniques of Geographic Information Systems. PHI publication, 2005.
3. Kang-tsung Chang; Introduction to Geographic Information Systems. Tata McGraw-Hill publication, 2006.
4. Paul Bolstad; GIS Fundamentals. 3rd Edition. Eider Press, White Bear Lake Minnesota, 2007. ISBN 978-0971764729.

Course Title: **Internet Programming**
Course Code:
Administration:
Duration: **One Semester**
Class Load: **4.5 Hrs. per week (Theory: 3 Hrs, Practical: 1.5 Hrs)**
Pre-requisite: **Core Java**
Evaluation:

	Theory	Practical	Total
Sessional			
Final			
Total			

Course Objective:

- Main objective of this course is to provide the necessary Internet programming concept using Servlet, JSP, JavaBean and Enterprise JavaBean
- After completing this course the student will be able to develop enterprise level web application, which can meet the today's demand in enterprise application.

Course Contents:

1. **Servlet** **(13 hrs)**

Web Applications, Servlets and HTTP Servlets, Filters, Security, Internationalization, Servlet Life Cycle, Requests, Responses and Headers, HTTP Response Codes, GET and POST, Initial Web Application Parameters, Coding an HttpServlet, Deploying a Servlet, Understand Servlet Deployment, Web Application Deployment Descriptor Structure, Servlet Configuration, Client/Server Servlet Programming, HttpServletRequest and HttpServletResponse, Response Redirection, Auto-Refresh/Wait Pages, Form Data and Parameters, Request Delegation and Request Scope, ServletContext, Servlet Session Tracking, Session Creation, Putting and getting from HttpSession, Session Tracking Techniques:Using Cookies, URL Rewriting, Hidden Form Fields, Authentication in Servlets

2. **JavaBean** **(8 hrs)**

JavaBeans Component Model, What Makes a Class a Bean, Bean Development Environments Using the Sun BeanBox, Creating a JavaBean class, Exploring JavaBean Property Types: Indexed Properties, Bound Properties, Constrained Properties, Adding Custom Event Types Creating a JavaBean class with Events, Using the BeanInfo Classes

3. **Java Server Pages** **(12 hrs)**

JSP 2.0 Specification: JSP, JavaBeans, Custom Tags and JSP Fragments, JSP Life Cycle, The Difference Between Servlets and JSP, JSP Syntax and Semantics, Elements and Template Data, Scripting Elements, Scriptlets, Expressions, Declarations, Directives, Header and Footer, Application-Wide Headers and Footers, JavaBean Actions, Tag File Actions, JSP in XML

Syntax, XML Rules, JSP Documents, JSP 2.0 Expression Language, JSP 2.0 File Inclusions, Model View Controller Architecture

4. Enterprise JavaBean (12 hrs)

Enterprise JavaBeans, EJB Vs JAVA BEANS, EJB Vs CORBA, EJB Architecture Roles, EJB Container Framework, EJBs Architecture, Layering in Enterprise JavaBeans, EJB Containers: Support for Transactions, Support for Management of Multiple Instances, Support for Persistence, Support of Security, Enterprise Beans: Session Beans, Entity Beans, Lifecycle of Session Bean, Characteristics of Entity Beans, Developing an Entity Bean, Example for Bean Managed Persistence, Life cycle of Entity Bean, Overview of WebLogic Enterprise JavaBeans, EJB and persistence, EJB and transactions

Acknowledgements, References and Suggested Readings:

1) Armstrong, E., Ball, J. et al. The J2EE™ 1.4 Tutorial.
2) Bergsten, H. (2000). Java Server Pages, First Edition. O'Reilly.
3) Farley, J. Java Distributed Computing. O'Reilly.
4) Harold, E. and Means, W.S. XML in a Nutshell. O'Reilly.
5) Hunter, J. and Crawford, W. (1998). Java Servlet Programming, First edition. O'Reilly.
6) McLaughlin, B. Java and XML. O'Reilly.
7) Neimeyer, P. and Knudsen, J. Learning Java (formerly Exploring Java). O'Reilly.
8) “The Complete Reference J2EE"" by James Keogh.
9) “Java2 Enterprise Edition 1.4 (J2EE1.4) Bible"" by James Migovern

Web Sites:

1) Go through Sun Java™ System Application Server Platform Edition 8 Developer’s Guide at http://docs.sun.com/db/doc/817-6087 for information about developer features of the Application Server.
2) Go through Sun Java™ System Application Server Platform Edition 8 Administration Guide at http://docs.sun.com/db/doc/817-6088 for information about administering the Application Server.
3) Oracle, JDeveloper http://www.oracle.com/java/
A development environment for Java-based database applications with support for JSP-based user interfaces.
4) VisualAge for Java (IBM), http://www-4.ibm.com/software/ad/vajava/
An IDE with support for servlet and JSP debugging as well as a wizard for generation of template code. Available for Windows and Linux.
5) Tomcat (Apache Software Foundation), http://jakarta.apache.org
Tomcat is the official reference implementation for the Servlet and JSP specifications, developed as an open source product in the Apache Jakarta project.

Course Title : **UNIX Shell Programming**
Course Code : ELE xxx.3
Semester: First/Second/Third/Fourth
Credit : 3
Class Load : 3 hours
Evaluation :

	Theory	Practical	Total
Sessional	60	-	40
Final	40	-	40
Total	100	-	100

Course Objective:

The objective of this course is to provide students with the knowledge of the UNIX/Linux operating system and shell programming. The course covers in detail basic commands, the vi editor, the file structure, the shell environment and shell scripts.

Course Contents:

1. **Introduction to UNIX/Linux** **(6 hrs)**
   Basic commands, Using the vi text editor, Working with files and directories, Filename substitution and wild cards, Creating a shell script, Standard I/O & error, Pipes and redirection: |, >, <, &

2. **Shell Programming Basics** **(9 hrs)**
   Login shell, Shell's responsibilities, Extracting data from files, Regular expressions

3. **Writing Shell Programs** **(9 hrs)**
   Variables, Built-in integer arithmetic, Use of quotes and backslash, Background command, Use of arguments

4. **Conditions** **(6 hrs)**
   Decisions, If structure and testing, Case, Null command, && and ||,

5. **Looping** **(9 hrs)**
   For loops, While and Until Loops, Stopping loops, Getting options

6. **Printing, Formatting and Setting Environment** **(6 hrs)**
   Using read and printf, local and exported variables, path and profile

References:

1. Stephen G. Kochan and Patrick H. Wood, UNIX Shell Programming, Hayden Books ISBN: 0-672-32490-3
2. Harley Hahn, Harley Hahn's Guide to Unix and Linux, McGraw-Hill ISBN: 978-0-07-313361-2
3. E. Quigley, UNIX Shells by Example, (2nd ed), Prentice Hall, 2000.
4. A. Robbins, O'Reilly,UNIX in a Nutshell, 1999.

Course Title: **Compiler Design**
Course Code:
Administration:
Duration: One Semester
Class Load: 3 Hrs. per Week (Theory: 3 Hrs.)
Pre-requisite: Formal Language and Automata Theory
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objective:

- Main objective of this course is to provide the models, theory, and algorithms associated with a compiler that can be applied to a wide range of problems in software design and software development.

- After completing this course, students will be familiar with the problems that are most commonly encountered in designing a language processor, regardless of the source language or target machine.

Course Contents:

1. **Introduction** **(5 hrs)**
   Language processor, The structure of a Compiler (Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Symbol-Table Management), The Grouping of Phases into Passes, Compiler-Construction Tools, Applications of Compiler Technology,

2. **Lexical Analysis** **(8 hrs)**
   The Role of the Lexical Analyzer, Tokens, Patterns, and Lexemes, Input Buffering, Specification of Tokens, Regular Expressions, DFA and NFA, From Regular Expressions to Automata, Optimization of DFA-Based Pattern Matchers (Computing unliable, firstpos, and lastpos, Computing followpos) Converting a Regular Expression Directly to a DFA, Minimizing the Number of States of a DFA, The Lexical-Analyzer Generator Lex (Structure of Lex Programs, Conflict Resolution in Lex, The Lookahead Operator)

3. **Syntax Analysis** **(12 hrs)**
   The Role of the Parser, Representative Grammars, Context-Free Grammars, Eliminating Ambiguity, Elimination of Left Recursion, Left Factoring, Top-Down Parsing (Recursive-Descent Parsing, FIRST and FOLLOW, LL(1) Grammars, Nonrecursive Predictive Parsing), Bottom-Up Parsing (Reductions, Shift-Reduce Parsing, Conflicts During Shift-Reduce Parsing), Introduction to LR Parsing: Simple LR (The LR-Parsing Algorithm), More Powerful LR Parsers (Canonical LR(1) Items, Constructing LR(1) Sets of Items, Canonical LR(1) Parsing Tables, Constructing LALR Parsing Tables), The Parser Generator **Yacc**

4. **Syntax-Directed Translation** **(8 hrs)**
   Syntax-Directed definitions, Inherited and Synthesized Attributes , Dependency Graphs, S-Attributed Definitions, L-Attributed Definitions, Applications of Syntax-Directed Translation,

Syntax-Directed Translation Schemes, Parser-Stack Implementation of Postfix SDT's, SDT's for L-Attributed Definitions, , top-down and bottom-up evaluation, Type checking

5. Intermediate-Code Generation (4 hrs)

Variants of Syntax Trees, Intermediate languages, three address code, Types and Declarations, Translation of Expressions, Back patching, Intermediate Code for Procedures

6. Code Generation and Optimization (8 hrs)

Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Optimal Code Generation for Expressions, Dynamic Programming Code-Generation, Machine-Independent Optimizations

Reference Books:

1. Compilers Principles, Techniques, & Tools Second Edition - Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson Education.