SCHEME AND SYLLABI FOR

SEVENTH SEMESTER

OF

BACHELOR OF

TECHNOLOGY IN
COMPUTER SCIENCE AND ENGINEERING

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

Semester VII		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
CS09 701	Wireless Networks and Mobile Communication Systems	2	1		30	70	3	3
CS09 702	Design and Analysis of Algorithms	4	1		30	70	3	5
CS09 703	Internet Technology	2	1		30	70	3	3
CS09 704	Cryptography and Network Security	3	1		30	70	3	4
CS09 705	Elective II	3	1		30	70	3	4
CS09 706	Elective III	3	1		30	70	3	4
CS09 707(P)	***Compiler Lab***			3	50	50	3	2
CS09 708(P)	***Network Programming Lab***			3	50	50	3	2
CS09 709(P)	***Project***			1				1
Total		**17**	**6**	**7**				**28**
Total Marks								

CS09 701: Wireless Networks and Mobile Communication Systems

Teaching scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week

Objectives

- *This introductory course is intended to introduce the basics of wireless and mobile networks in the context of the recent trends in this area and their proliferation in day to day life. Local Area Network (LAN), Wide area Network (WAN) and Inter networking are dealt with.*

Pre-requisites: *Knowledge of Data communication, Computer networks, and Operating systems*

Module I (12 hours)
Introduction: PCS Architecture, Cellular Telephony - popular cellular telephony networks, Cordless telephony, Third generation Wireless systems
Mobility Management: Handoff, Roaming Management, Handoff Management - Detection and Assignment, Radio Link Transfer, Types of Handoff

Module II (12 hours)
Network signaling: Signal system 7, Interconnection and message routing, Mobility Management using TCAP, PCN/PSTN call control using ISUP, Intersystem Handoff and authentication in IS-41, PACS Network signaling, Cellular Digital Packet Data Architecture, CDPD Air interface, Radio Resource Allocation

Module III (8 hours)
GSM Overview, GSM Network signaling, GSM Mobility Management, GSM Short Message Service, Mobile Number portability

Module IV (7 hours)
General Packet Radio Service: Functional Groups, Architecture, GPRS Network nodes and Interfaces, Introductory ideas about WAP

Text Books

1. Yi-Bang Lin and Imrich Chlamtac, *Wireless and Mobile Architectures*, Wiley Student Edition, 2008.

Reference Books

1. William Stallings, *Wireless Communications and Networks*, Prentice Hall, 2004
2. Schiller J., *Mobile Communications*, Addison Wesley
3. Ivan Stojmenovic(Ed), *Handbook of Wireless Networks and Mobile Computing*, John Wiley and sons, Inc, 2nd Edn, 2007.
4. Vijay K.Garg, *Wireless Communications and Networking*, Morgan Kaufmann Publishers / Elsevier, 2009.

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

CS09 702: Design and Analysis of Algorithms

Teaching scheme **Credits:** 5
4 hours lecture and 1 hour tutorial per week

Objectives

- *To provide a sound basis of algorithm design and analysis techniques.*
- *To introduce the various computing models and their capabilities with respect to computing.*

Module I (16 hours)
Analysis: RAM Model - Cost estimation based on key operations - big Oh - big omega - little Oh - omega and theta notations - recurrence analysis - Master's Theorem - Solution to recurrence relations with full history probabilistic analysis - linearity of expectations - Worst and Average case analysis of Quick Sort -Merge Sort - Heap Sort - Binary Search - Hashing Algorithms - lower bound proofs for the above problems -amortized analysis - aggregate - accounting and potential methods - Analysis of Knuth - Morris-Pratt algorithm - Amortised weight balanced trees - Red-Black Trees.

Module II (16 hours)
Design: Divide and Conquer - Strassen's algorithm, o(n) median finding algorithm - Dynamic programming - Matrix Chain Multiplication - Optimal polygon triangulation - Optimal Binary Search trees - Floyd-Warshall algorithm - CYK algorithm - Greedy-Huffman coding - Knapsack, Kruskal's and Prim's algorithms for MST – backtracking - branch and bound - traveling Salesman Problem - Matroids and theoretical foundations of Greedy algorithms.

Module III (15 hours)
Complexity: Complexity classes - P, NP, Co-NP, NP Hard and NP Complete problems - Cook's theorem(Proof not expected) - NP- Completeness reductions for clique - Vertex Cover - Subset Sum -Hamiltonian Cycle - TSP - integer programming - approximation algorithms - Vertex Cover - TSP-Set covering and subset sum - Bin packing - Graph coloring.

Module IV (18 hours)
Probabilistic algorithms: Pseudo random number generation methods - Monte Carlo algorithms - Probablistic counting - Verifying matrix multiplication - Primality testing - Miller Rabin Test - integer Facorisation - Pollard's rho heuristic - amplification of stochastic advantage - application to cryptography - interactive proof systems - les vegas algorithms - Randomized selection and sorting - Randomized solution for eight queen problem -Universal Hashing - Dixon's integer factorization algorithm.

Text Books

1. Corman T.H, Lieserson C.E & Rivest R.L, *Introduction to Algorithms*, Prentice Hall India, Modules I, II and III.
2. Motwani R. & Raghavan P, *Randomized Algorithms*, Cambridge University Press, Module IV

Reference Books

1. Basse S., *Computer Algorithms: Introduction to Design And Analysis*, Addison Wesley
2. Manber U., *Introduction to Algorithms: A Creative Approach*, Addison Wesley
3. Aho V., Hopcroft J.E. & Ullman J.D., *The Design And Analysis of Computer Algorithms*, Addison Wesley
4. Kenneth A Berman, Jerome L. Paul, *Fundamentals of sequential and parallel algorithms*, Vidya Vikas Publications

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

CS09 703 : Internet Technology

Teaching scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week

Objectives

- *To introduce the algorithms and protocols implemented to have human interaction with internet with an emphasis on application layer and multimedia networking.*
- *To introduces the techniques and methods of E-Commerce. .*

Module I (10 hours)
Principles of Application Layer Protocols - The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS-The Internet's Directory Service - Socket Programming with TCP, Socket Programming with UDP, Building a Simple Web Server, Content Distribution.

Module II (10 hours)
Multimedia networking- Multimedia Networking Applications, Streaming Stored Audio and Video - Making the Best of the Best-Effort Service: An Internet Phone Example - Protocols for Real-Time Interactive Applications - Beyond Best-Effort - Scheduling and Policing Mechanisms - Integrated Services - RSVP - Differentiated Services.

Module III (9 hours)
Network Security - Principles of Cryptography, Authentication, Integrity, Key Distribution and Certification - Access Control: Firewalls, Attacks and Countermeasures - Security in Many Layers: Case Studies.

Module IV (10 hours)
E-commerce- Modes of E-commerce, Security needs in E-commerce environment - E-commerce payment systems, credit cards, E-commerce transactions, digital payments in B2C arena, B2B payment systems, B2B - E-commerce and Supply Chain Management, Evolution, Procurement process & Supply Chain Management, Trends in Supply Chain Management and collaborative commerce, Net Marketers - characteristics, types, e-distributors, e-procurement.

Text Books

1. Kurose J.F. & Ross K.W, *Computer Networking: A Top -Down Approach Featuring the Internet*, Pearson Education
2. Kenneth C. Laudon, Carol Guercio Traver, *E-Commerce-Business, Technology, Society*, Pearson Education.

Reference Books

1. Nalin K. Sharda, *Multimedia Information Networking*, Prentice Hall of India.
2. Douglas E. Comer, *Computer Networks and Internets with Internet Applications*, Pearson Education
3. Stallings, *Computer Networking with Internet Protocols*, Pearson Education Asia.
4. Goncalves M., *Firewalls: A Complete Guide*, Tata McGraw Hill.
5. Kalakota R. & Whinston A.B., *Frontiers of Electronic Commerce*, Addison Wesley.
6. Schneider G.P. & Perry J.T., *Electronic Commerce, Course Technology*, McGraw Hill, New Delhi, 2003.

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

CS09 704 : Cryptography and Network Security

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To introduce the principles and practices of cryptography and network security*
- *To discuss algorithms and schemes to handle the security issues*
- *To introduce web security*

Module I (14 hours)

Introduction: Security basics – Aspects of network security – Attacks – Different types - Security attacks -Security services and mechanisms. Cryptography: Basic Encryption & Decryption – Classical techniques - Transposition & substitution ciphers –Caesar substitution – Polyalphabetic substitutions – Symmetric key algorithms – Fiestel Networks – Confusion - Diffusion - DES Algorithm – Strength of DES – Comparison & important features of modern symmetric key algorithms

Module II (13 hours)

Public key cryptosystems – The RSA Algorithm – Diffice Hellman key exchange – comparison of RSA & DES – Elliptic Curve Cryptography – Number Theory Concepts

Module III (13 hours)

Hash Functions – Digest Functions – Digital Signatures – Authentication protocols. – Network & Application Security: Kerberos – X509 Authentication service – Electronic mail security – Pretty Good privacy –S/MIME – secure Electronic Transactions.

Module IV (12 hours)

IP security – architecture – features – Web security – Socket layer and transport layer security – Secure electronic transactions – Firewalls

Text Books

1. William Stallings, *Network Security Essentials Applications & Standards*, Pearson Education Asia.

Reference Books

1. Schneier B., *Applied Cryptography: Protocols, Algorithms, and Source Code in C*, John Wiley
2. Wenbo Mao , *Modern cryptography - Theory and Practice*, Pearson Education Asia
3. Niven & Zuckerman H.S., *An Introduction to The Theory of Numbers*, John Wiley
4. Pfleeger C.P., Pfleeger S.L., *Security in Computing*, Pearson Education (Singapore) Pvt. Ltd.
5. Michel E. Whiteman, Herbert J.Mattord, *Principles of Information Security*, Thomson, Vikas Publishing House.

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

CS09 707(P) : Compiler Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To familiarize the design of all phases of compilers up to a stage of intermediate code generation.*
- *To enable the students to design and implement modern compilers for any environment.*

Lab 1,2 : Generation of lexical analyzer using tools such as LEX.

Lab 3,4 : Generation of parser using tools such as YACC.

Lab 5,6 : Creation of Symbol tables.

Lab 7,8 : Creation of type checker.

Lab 9,10 : Generation of intermediate code.

Reference Books

1. Sethi R., *Programming Languages: Concepts and Constructs*, Addison Wesley
2. Appleby D. & Vandekopple J.J., *Programming Languages: Paradigm and Practice*, Tata McGraw Hill
3. Luger & Stubblefield, *Artificial Intelligence*, Addison Wesley
4. Samuel A. Rebelsky. *Experiments in Java*. Pearson Education.

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

Semester End Examination *(Maximum Marks-50)*

70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

CS09 708 (P) : Network Programming Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To teach the working of various networking protocols*

Lab 1 : Implementation of PC to PC file transfer using serial port and MODEM.

Lab 2,3 : Software Simulation of IEEE 802.3, 802.4 and 802.5 protocols.

Lab.4,5 : Software Simulation of Medium Access Control protocols –
1) GoBackN,
2) Selective Repeat and
3) Sliding Window.

Lab 6 : Implementation of a subset of Simple Mail Transfer Protocol using UDP.

Lab 7,8 : Implementation of a subset of File Transfer Protocol using TCP/IP

Lab 9 : Implementation of "finger" utility using Remote Procedure Call (RPC)

Lab.10 : Generation and processing of HTML forms using CGI.

Reference Books

1. S Richard S.W., *Unix Network Programming*, Prentice Hall India
2. Comer D.E., *Internetworking with TCP/IP*, Vol. 1,2 & 3, Prentice Hall India
3. Campione et. al M., *The Java Tutorial Continued*, Addison Wesley

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

CS09 709 (P) : Project

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To judge the capacity of the students in converting the theoretical knowledge into practical systems/investigative analysis.*

Project work is for duration of two semesters and is expected to be completed in the eighth semester. Each student group consisting of not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project may be implemented using software, hardware, or a combination of both. The project work may be undertaken in computer science engineering or allied areas like -

OS platforms: Relevant to the current state of the art with support for networked environment, distributed computing and development of multi-platform applications, Internet technologies: Architectural concepts, XML, Scripting languages, Middleware (Component) technologies, Front end / GUI: Code development or development based on tools, RDBMS/Back End: Relevant to current state with database connectivity to different platforms, Languages: Qt, Glade or any similar 4GLs, Scripting languages and C & C-Linux (under GNU gcc) etc, Universal network applications development platforms such as JAVA, OS internals: Device drivers, RPC, Threads, Socket programming etc.,Networking: Mechanisms, protocols, security etc., Embedded systems: RTOS, Embedded hardware with software for an application,Code optimization, security etc.

Project evaluation committee consisting of the guide and three/four faculty members specialised in biomedical/electronics/ computer science/instrumentation engg. (Please write areas of specialisations relevant to the concerned branch concerned) will perform the screening and evaluation of the projects.

Each project group should submit project synopsis within three weeks from start of seventh semester. Project evaluation committee shall study the feasibility of each project work before giving consent. Literature survey is to be completed in the seventh semester.

Students should execute the project work using the facilities of the institute. However, external projects can be taken up in reputed industries, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work and there must be an internal guide for such projects.

Each student has to submit an interim report of the project at the end of the 7th semester. Members of the group will present the project details and progress of the project before the committee at the end of the 7th semester.

50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

Internal Continuous Assessment

20% - Technical relevance of the project	:
40% - Literature survey and data collection	
20% - Progress of the project and presentation	:
10% - Report	
10% - Regularity in the class	