# SCHEME OF INSTRUCTION & EXAMINATION

**B.E. IV YEAR (COMPUTER SCIENCE & ENGINEERING)**

Proposed scheme and syllabus with effect from the Academic year 2014-2015

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### SEMESTER - I

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Syllabus Ref. No.</th>
<th>SUBJECT</th>
<th>Scheme of Instruction</th>
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<th>Credits</th>
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**PRACTICALS**

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**TOTAL**

|        |        |        | 20 | 9   | 475 | 200 | 28  |

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### Elective-II

- CS 405 UE  Mobile Computing
- CS 406 UE  Advanced Computer Architecture
- CS 407 UE  Information Retrieval Systems
- BM 406 UE  Medical Instrumentation
- EC 423 UE  VLSI Technology
- EE 405 UE  Optimization Techniques
- ME 408 UE  Entrepreneurship
- ME 412 UE  Finite Element Analysis

*Grade: S/A/B/C/D/E
### Service Courses Offered to Other Departments

**Semester - I**

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<th>SL. No.</th>
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<td>Database Systems (Elective-II)</td>
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OBJECT ORIENTED ANALYSIS AND DESIGN

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 marks
Credits 4

Course Objectives:
- To train the students to solve problems using the notion of objects
- To learn the different phases in object-oriented analysis and design using UML
- To expose the students to the unified software development process

Course Outcomes:
- Students will be able to learn the concepts of object orientation and object oriented programming systems
- Ability to draw valid use-case diagrams, activity diagrams, component diagrams and deployment diagrams.
- Students will be able to learn the unified software process, organizing along time and content, role activity, workflow, content, environment and project management, requirements.
- Students will be able to opted and flourished object oriented system development and rational rose projects and explored to placement/higher education in that direction.

UNIT-I
UML Introduction: Modeling Concepts. Building Blocks of UML
Structural Modeling: Classes, Relationships, Common Mechanics, Class Diagrams, Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, and Packages.

UNIT-II
Behavioral Modeling: Interactions, Use cases, Use case diagrams, Interaction diagrams, Activity diagrams, Events and Signals, State machines, Processes and threads, Time and space, and State chart diagrams.

UNIT-III

UNIT-IV
Unified Software Process: Fundamentals, Structures, Organizing along time and content, Role, Activity, Workflow, and Content

UNIT-V

Suggested Reading:
CS 402 UE

COMPILER CONSTRUCTION

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 marks
Credits 4

Course Objectives:
- To learn about Lexical Analyzer and Parser Generator tools.
- To learn how to build symbol tables and generate intermediate code.
- To become familiar with compiler optimization technology

Course Outcomes:
- Students will be in a position to develop the compiler for given programming language
- Students will learn all the intricate points and concepts which will help to understand other allied subjects.
- Students will be in a position to design more efficient compiler for the given compiler language.

UNIT – I
Introduction: Compilers, The translation process, Data structures and issues in compiler structure, Bootstrapping and Porting.
Scanning: The scanning process, Regular expressions, Finite Automata, Regular expressions to DFA’s, use of LEX to generate scanner.

UNIT – II
Top Down Parsing: Recursive descent parsing, LL (1) parsing, First and follow sets, Recursive descent parser, and Error recovery in top down parsers.

UNIT – III
Bottom-up Parsing: Overview, LR (0) items and LR (0) Parsing, SLR (1) Parsing, general LR(1) and LALR(1) parsing, YACC, and Error recovery in bottom-up parsers.

UNIT – IV
Semantic Analysis: Attributes and attribute grammars, Algorithms for attribute computation, Symbol table, Data types and Type checking.
Runtime Environments: Memory organization during program execution, Fully static runtime environments, Stack-based runtime environments, Dynamic memory, and Parameter parsing mechanisms.

UNIT – V

Suggested Reading:
DISTRIBUTED SYSTEMS

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks
Credits 4

Course Objectives:
- To acquire an understanding of the issues in distributed systems
- To study architectures and working of distributed file systems
- To expose the students to distributed transaction management, security issues and replication

Course Outcomes:
- Students would be able to describe the problems and challenges associated with principles of distributed systems.
- Students will be able to evaluate the effectiveness and shortcomings of different solutions.
- Students can implement small scale distributed systems and can actually learn the solutions by doing.

UNIT-I
Introduction: Goals and Types of Distributed Systems

UNIT-II
Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, and Attribute-Based Naming.
Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of Nodes, and Election Algorithms.

UNIT-III

UNIT-IV

UNIT-V
Map-Reduce: Example, Scaling, programming model, Apache Hadoop, Amazon Elastic Map Reduce, Mapreduce.net, Pig and Hive.
Suggested Reading:
INFORMATION SECURITY

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks
Credits 4

Course Objectives:
- To learn legal and technical issues in building secure information systems
- To provide an understanding of network security
- To expose the students to security standards and practices

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

UNIT-V

Suggested Reading:
MOBILE COMPUTING  
(ELECTIVE-II)

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 marks
Credits 4

Course Objectives:

- To introduce basics of wireless voice and data communication technologies
- To build working knowledge on various telephone and satellite networks
- To study the working principles of wireless LANs and standards
- To study principles of adhoc networks and routing
- To gain knowledge on integration of mobile networks into Internet
- To build skills in working with wireless application protocols to develop mobile applications.

Course Outcomes:

Students shall be able to

- Implement Adhoc Network Routing protocols.
- Mini based project based on tracking, localization and routing in wireless networks.
- Implement file transfer, access and authentication based applications for mobile computing.

UNIT I

UNIT II

UNIT III

UNIT IV
Mobile IP, Dynamic Host Configuration Protocol, Routing in MANETs: DSDV, DSR, AODV and ZRP. MANETS vs VANETs.

UNIT V
Traditional TCP – classical TCP improvements – WAP, and WAP 2.0.
Mobile Transaction models, File Systems and Mobility Management

Suggested Reading:
1. Jochen H. Schiller, “Mobile Communications”, Addison Wesley, Second Edition, 2003(Unit I Chap 1,2 &3- Unit II chap 4,5 &6-Unit III Chap 7.Unit IV Chap 8- Unit V Chap 9&10.)
2. William Stallings, *Wireless Communications and Networks*, PHI/Pearson Education, 2002 (Unit I Chapter 7 & 10, Unit II Chap 9)
ADVANCED COMPUTER ARCHITECTURE  
(ELECTIVE-II)

Instruction 4 Periods per week  
Duration of University Examination 3 Hours  
University Examination 75 Marks  
Sessional 25 marks  
Credits 4

Course Objectives:  
- To provide concepts on performance measurement of processor architectures.  
- To provide knowledge about the need of parallel processing.  
- To provide basics about parallelism techniques implemented in uniprocessor technologies.  
- To gain knowledge of state-of-the art technologies like superscalar and vector processor.  
- To gain knowledge of multiprocessor and multi-core technologies.

Course Outcomes:  
- Ability to acquire skills to measure the performance of various processor architectures.  
- Ability to apply parallel processing techniques.  
- Ability to gain knowledge on parallelism techniques implemented in uniprocessor technologies.  
- Ability to understand the state-of-the art technologies like superscalar and vector processor.  
- Ability to gain knowledge on multiprocessor and multi-core technologies.

UNIT-I  
Measuring Performance and cost: Performance measurement, Enhancements to Uniprocessor models, Benchmarks, Basic model of advanced computer architectures.

UNIT-II  
Pipelining and superscalar techniques: Basic pipelining, data and control hazards, Dynamic instruction scheduling, Branch prediction techniques, Performance evaluation, Case study- Sun Microsystems - Microprocessor.

UNIT-III  
Array Processors: Parallel array processor model, and Memory organization  
Interconnection networks: performance measures, static and dynamic topologies

UNIT-IV  
Multiprocessors and Multi computers: Multiprocessor models, Shared-memory and Distributed memory architectures, Memory organization, Cache Coherence and Synchronization Mechanisms, Parallel computer, and Performance models.

UNIT-V  
Suggested Reading:
INFORMATION RETRIEVAL SYSTEMS
(ELECTIVE-II)

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 marks
Credits 4

Course Objectives:
- To understand indexing and querying in information retrieval systems
- To learn the different models for information retrieval
- To expose the students to text classification and clustering
- To learn about web searching

Course Outcomes:
On completion of the course the students will be able to
- Understand the algorithms and techniques for information retrieval (document indexing and retrieval, query processing)
- Quantitatively evaluate information retrieval systems
- Classify and cluster documents
- Understand the practical aspects of information retrieval such as those in web search engines.

UNIT-I
Boolean Retrieval: An example information, Building an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval.

The term vocabulary and postings lists: Document delineation and character sequence decoding, determining the vocabulary of terms, Faster postings list intersection via skip pointers, Positional postings, and Phrase queries.

Dictionaries and tolerant retrieval: Search structures for dictionaries, Wildcard queries, Spelling correction.

Index construction: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes.

UNIT-II
Index compression: Statistical properties of terms in information retrieval, Dictionary compression, Postings file compression.

Scoring, term weighting and the vector space model: Parametric and zone indexes, Term frequency and weighting, The vector space model for scoring, and Variant tf-idf functions.

Computing scores in a complete search system: Efficient scoring and ranking, Components of an information retrieval system, Vector space scoring and query operator interaction.


UNIT-III
Relevance feedback and query expansion: Relevance feedback and pseudo relevance feedback, Global methods for query reformulation.


Language models for information retrieval: Language models, The query likelihood model.

UNIT IV

Vector space classification: Document representations and measures of relatedness in vector spaces, Rocchio classification, k-nearest neighbor, Linear versus nonlinear classifiers.

Flat clustering: Clustering in information retrieval, Problem statement, Evaluation of clustering, k-means.

Hierarchical clustering: Hierarchical agglomerative clustering, Single-link and complete-link clustering, Group-average agglomerative clustering, Centroid clustering, Divisive clustering.

UNIT V

Web search basics: Background and history, Web characteristics, Advertising as the economic model, The search user experience, Index size and estimation, Near-duplicates and shingling.

Web crawling and Indexes: Overview, Crawling, Distributing indexes, Connectivity servers.

Link analysis: The Web as a graph, Page Rank, Hubs and Authorities.

Suggested Reading:

BM 406 UE

MEDICAL INSTRUMENTATION
(ELECTIVE-II for CE/CSE/ECE/EEE/ME)

Instruction 4 Periods per week
Duration of University Examination 3 Hours
University Examination 75 Marks
Sessional 25 Marks
Credits 4

Course Objectives:
- To understand the operation, application, and underlying physiological principles associated with a variety of diagnostic, therapeutic and analytical medical devices used routinely in hospitals.
- To know the basic electrical and electronic components and circuit behavior.
- To understand applicable codes, standards, and the intrinsic hazards associated with many of these devices.

UNIT I
Origin of bio-potentials – ECG, EEG, EMG, EOG, ENG, ERG, EGG.
Bio-potential Electrodes: Half cell potential, Offset voltage, Types of External, internal and Microelectrodes.
Biosensors – Enzyme-based biosensors, immuno sensors, microbial sensors.

UNIT II
Medical display devices and recorders, Basic requirements for the display and recording of biopotentials signals.
PMMC writing systems, General features of ink-jet, thermo-sensitive and optical recorders, Oscilloscopes – Medical, multi-beam & non-fade display systems.

UNIT III
Analytical Instrumentation, Methods of Chemical analysis, Absorption Photometry, Emission Photometry, Fluorometry, chromatography for blood gas analysis, Colorimeters, Spectrophotometers, electrophoresis, auto analyzer.

UNIT IV
ECG: Block diagram & circuits, electrode placement, lead configuration, Types of ECG recorders, Blood pressure measurement: Direct and indirect methods, Blood flow measurement: Electromagnetic & Ultrasonic techniques. Heart sounds: Origin, and phonocardiography.

UNIT V
ECG: Block diagram & circuits, electrode placement, Evoked potentials and their measurement. EMG-Block diagram & circuits, electrode placement, Nerve conduction velocity determination, EMG stimulators.

Suggested Reading:
**VLSI TECHNOLOGY**
(ELECTIVE-II for BME/CSE/EEE/ME)

Instruction: 4 Periods per week
Duration of University Examination: 3 Hours
University Examination: 75 Marks
Sessional: 25 Marks
Credits: 4

**Course Objectives:**
- To provide a perspective on CMOS and BiCMOS technologies.
- To learn Layout Design of Digital Circuits.
- To understand Sub-system Design elaborately.
- To expose Process technology.

**UNIT I**
Metal Oxide Semiconductor (MOS) VLSI Technology, Basic MOS Transistors, Enhancement mode Transistor action. Depletion mode Transistor action nMOS fabrication process, CMOS fabrication process, CMOS & Bi CMOS Technologies, MOS & Bi CMOS Transistor Models, and MOS inverter characteristics.

**UNIT II**

**UNIT III**
Subsystem Design: Subsystem design Principles, Arithmetic circuits in CMOS, Read Only Memory (ROM), Basic Cells of Static Random Access Memory (SRAM) and Dynamic Random Access Memory (DRAM), SRAM & DRAM Arrays, and Field Programmable Gate Arrays.

**UNIT IV**
Process Technology-I: Crystal growth, wafer fabrication and Basic Properties, Model of Simulation: Czochralski Crystal Growth, Dopant Incorporation during CZ Crystal Growth, Epitax, Oxidation and Lithography and Etching.

**UNIT V**
Process Technology-II: Polysilicon Film Deposition, Diffusion, Ion implantation, Implants in Real Silicon- the Role of the Crystal Structure, Manufacturing Methods and Equipment, Metallization VLSI Process Integration-CMOS IC technology.

**Suggested Reading:**
OPTIMIZATION TECHNIQUES
(ELECTIVE-II for CSE/ECE/ME/CE)

Instruction  4 Periods per week
Duration     3 Hours
University Examination  75 Marks
Sessional  25 Marks
Credits  4

UNIT I

UNIT II
Linear Programming: Standard form, Formulation of the LPP, Solution of simultaneous equations by pivotal condensation, Graphical methods, Simplex algorithm, Big M method, Two phase Simplex method, Duality principle, Dual simplex method.

UNIT III

UNIT IV
Gradient Method: Steepest descent, conjugate gradient and Quasi-Newton methods, Fletcher-Reeves method of conjugate gradients.

UNIT V

Suggested Reading:
ENTREPRENEURSHIP
(ELECTIVE-II for CSE/ECE/EE/CE)

Instruction: 4 Periods per week
Duration of University Examination: 3 Hours
University Examination: 75 Marks
Sessional: 25 marks
Credits: 4

Course Objectives:
- To motivate students to take up entrepreneurship in future
- To learn nuances of starting an enterprise & project management
- To understand the design principles of solar energy systems, their utilization and performance evaluation
- To understand the behavioral aspects of entrepreneurs and time management

UNIT-I
Indian Industrial Environment – Competence; Opportunities and Challenges, Entrepreneurship and Economic growth, Small Scale Industry in India, Objectives, Linkage among small, medium and heavy industries. Types of enterprises.

UNIT-II
Identification and characteristics of entrepreneurs, Emergence of First generation entrepreneurs, environmental influence and women entrepreneurs. Conception and evaluation of ideas, their sources and decision making. Choice of Technology – Collaborative interaction for Technology development.

UNIT-III
Identification and characteristics of entrepreneurs, Emergence of First generation entrepreneurs, environmental influence and women entrepreneurs. Conception and evaluation of ideas, their sources and decision making. Choice of Technology – Collaborative interaction for Technology development.

UNIT-IV
Project Management during construction phase, project organization, project planning and control using CPM-PERT techniques. Humana aspects of project management. Assessment of tax burden.

UNIT-V

Suggested Reading:
FINITE ELEMENT ANALYSIS
(ELECTIVE-II for CSE/CE/ECE/EEE/BME)

Instruction 4 Periods per week
Duration 3 Hours
University Examination 75 Marks
Sessional 25 Marks
Credits 4

Course Objectives:
- To understand the theory and application of the finite element method for analyzing structural systems
- To learn approximation theory for structural problems as the basis for finite element methods
- To learn formulations for a variety of elements in one, two, and three dimensions. Implementations of element formulations will be examined using MATLAB.
- To understand modeling and analysis of structures using planar, solid, and plate elements

UNIT-I
Introduction to Finite Element Method, solution method using FEM, descretisation, Boundary conditions, load application, types of elements comparison, Stress and Equilibrium, Boundary conditions. Strain-Displacement relations. Stress-strain relations.
One Dimensionla problems: Finite element modeling, coordinates and shape functions.

UNIT-II
Analysis of trusses and frames: Element stiffness matrix for a truss member. Analysis of plane truss with number of unknowns not exceeding two at each node. Analysis of frames with two translations and a rotational degree of freedom at each node.
Analysis of Beams: Element stiffness matrix for two nodded, two degrees of freedom per node beam element.

UNIT-III
Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions.
Finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements.

UNIT-IV
Two dimensional four nodded isoparametric elements and numerical integration.
Steady state heat transfer analysis: One dimensional analysis of a fin and two dimensional analysis of thin palate. Analysis of uniform shaft subjected to torsion.

UNIT-V
Dynamic Analysis: Formulation of finite element mode, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam.
Time dependent field problems: Application to one dimensional heat flow in a rod. Finite element formation to three dimensional problems in stress analysis. Types of elements used.
Convergence requirements and geometric isotropy. Local, natural and global coordinates. Introduction to Finite Element Analysis Software.
Suggested Reading:
OBJECT ORIENTED ANALYSIS & DESIGN LAB

AND

COMPILER CONSTRUCTION LAB

Course Objective: To expose the students to industry practices and team work.

OBJECT ORIENTED ANALYSIS & DESIGN LAB: Exercises must be taken from 1 to 6

COMPILER CONSTRUCTION LAB: Exercises must be taken from 7 to 12

1. System Definition
   a) Requirements Management
   b) Data Modeling

2. Software Development
   a) Application & Web modeling
   b) Configuration Management
   c) Unit Testing

3. Content Management

4. System Testing
   a) Functional Testing
   b) Reliability Testing
   c) Performance Testing
   d) Defect & Change Tracking

5. Change Management
   a) Configuration Management
   b) Requirement Management
   c) System Documentation

6. Project Management

7. Scanner program using LEX

8. SLR Parser table generation

9. LR Parser table generation

10. Parser Generation using YACC

11-12. Program on Code generation & Code Optimization
DISTRIBUTED SYSTEMS LAB

Instruction 3 periods per week
Duration 3 Hours
University Examination 50 Marks
Sessional 25 Marks
Credits 2

Course Objective: To enable the students familiar with computer networks and distributed environment.

Course Outcomes:

- Effectively utilize the concepts learnt in theory
- Basic knowledge of using concepts of distributed systems in an integrated approach
- Improved appreciation of the current advances in distributed systems

1. Implementation FTP Client
2. Implementation of Name Server
3. Implementation of Chat Server
4. Understanding of working of NFS (Includes exercises on Configuration of NFS)
5. Implementation of Bulletin Board.
6. Implement a Word count application which counts the number of occurrences of each word in a large collection of documents Using Map Reduce model.
7. Develop an application (small game- like scrabble, Tic-Tac-Toe) using Android SDK.
CS 433 UE  

With effect from the academic year 2014-2015

PROJECT SEMINAR

Instruction 3 Periods per week
Sessional 25 marks
Credits 2

Course Objectives:
- To train and provide hands-on experience in analysis, design, and programming of information systems by means of case studies and projects.
- To expose the students to industry practices and team work.
- To provide training in soft skills and also train them in presenting seminars and technical report writing.

The department can initiate the project allotment procedure at the end of III year 2nd semester and finalize it in the first two weeks of IV year 1st semester.

First 4 weeks of IV year 1st semester will be spent on special lectures by faculty members, research scholars, post graduate students of the department and invited lectures by engineers from industries and R&D institutions.

The objective of these preliminary talks will be to expose the students to real life practical problems and methodology to solve the technical problems.

Seminar schedule will be prepared by the coordinator for all the students from the 5th week to the last week of the semester which should be strictly adhered to.

Each student will be required to:
1. Submit a one page synopsis before the seminar for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the talk.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items stated above.

The seminar presentation should include the following components of the project:

*Problem definition and specification
*Literature survey, familiarity with research journals
*Broad knowledge of available techniques to solve a particular problem.
*Planning of the work, preparation of bar (activity) charts
*Presentation- oral and written.
SI 400

With effect from the academic year 2014-2015

SUMMER INTERNSHIP

Credits 2

Course Objectives:

- To train and provide hands-on experience in analysis, design, and programming of information systems by means of case studies and projects.
- To expose the students to industry practices and team work.
- To provide training in soft skills and also train them in presenting seminars and technical report writing.

Summer Internship is introduced as part of the curricula of encouraging students to work on problems of interest to industries. A batch of three students will be attached to a person from the Computer Industry/Software Companies/R&D Organization for a period of 8 weeks. This will be during the summer vacation following the completion of the III year Course. One faculty coordinator will also be attached to the group of 3 students to monitor the progress and to interact with the industry co-ordinate (person from industry).

After the completion of the project, student will submit a brief technical report on the project executed and present the work through a seminar talk to be organized by the Department. Award of sessionals are to be based on the performance of the students, to be judged by a committee constituted by the department. One faculty member will co-ordinate the overall activity of Industry Attachment Program.
SERVICE COURSES OFFERED TO OTHER DEPARTMENTS

DATABASE SYSTEMS
(ELECTIVE-II for BME/ ECE/ EE/ ME)

Instruction 4 Periods per week
Duration 3 Hours
University Examination 75 Marks
Sessional 25 marks
Credits 4

Course Objectives:
- To understand the basic concept of DBMS
- To learn to design, develop and query the database
- To learn database administration and transaction processing

UNIT-I
Data and Data Management: Role of Data and Databases
Database and Database Management System: Key Database concepts-Basic Database Models-Database Components
Data Modeling: Database Design-Relational Database Models- Relationships-Comparing Data Models

UNIT-II
SQL language: SQL features-command basics-SELECT Fundamentals-Operators and Functions-DDL Commands-DML Commands.
Data Access and Manipulation: SELECT statement Advanced Syntax-Joins and Sub Queries.
SQL Procedures: SQL procedures and Functions-Triggers.

UNIT-III
Designing a Database: Designing Relational Tables-Comparing Relational Designs-Normalizing Data.
Implementing a Database: Physical Design and Implementation- Adjusting Design to the Real World-Implementing Database Objects.

UNIT-IV
Database Administration: Need for Administration-Administration Responsibilities-Management Task.

UNIT-V

Suggested Reading: