



Central University of Himachal Pradesh

(Established under Central Universities Act 2009)

PO BOX: 21, DHARAMSHALA, DISTRICT KANGRA – 176215, HIMACHAL PRADESH

Website: www.cuhimachal.ac.in

Course Code: CSI419

Course Name: Compiler Design

Credit Equivalent: 04 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Course Objectives: The course is designed

- To learn how a compiler works.
- To use of formal attributed grammars for specifying the syntax and semantics of programming languages.
- To Working knowledge of the major phases of compilation, particularly lexical analysis, parsing, semantic analysis, and code generation.

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

1. Mid Term Examination: 25%
2. End Term Examination: 50%
3. Continuous Internal Assessment: 25%
 - i) Assignments 5%
 - ii) Class participation 5%
 - iii) Class tests 10%
 - iv) Quiz 5%

Course Contents:

Unit-I Introduction to Compiler & Lexical Analysis (08 hours)

Introduction of Compiler, Major data Structure in compiler, BOOT Strapping, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering , Specification & Recognition of Tokens, LEX.

Unit-II Syntax Analysis (9 hours)

Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR,LALR, LR).

Unit-III Syntax Directed Translation & Intermediate Code Generation (09 hours)

Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements.

Unit-IV Type Checking & Run Time Environment (07 hours)

Type checking: type system, specification of simple type checker.

Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation, and Symbol table.

Unit -V Code Optimization & Code Generation (07 hours)

Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations, peephole optimization.

Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks.

Prescribed Text Book:

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools, Pearson Education

Suggested Additional Reading:

1. Raghavan, Compiler Design, TMH Pub.
2. Louden. Compiler Construction: Principles and Practice, Cengage Learning
3. A. C. Holub. Compiler Design in C, Prentice-Hall Inc., 1993.
4. Mak, writing compiler & Interpreters, Willey Pub.

LECTURE PLAN

Lectures	Topics	Prescribed Text Book
Lecture-1	Introduction to Compiler & Lexical Analysis: Introduction of Compiler	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-2	Major data Structure in compiler	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-3	BOOT Strapping.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-4	Compiler structure: analysis-synthesis model of compilation.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-5	Various phases of a compiler.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-6	Lexical analysis: Input buffering , Specification	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-7	Recognition of Tokens	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-8	LEX & related numerical	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-9	Syntax Analysis: Introduction of Syntax analysis, CFGs	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-10	Classification of Parsing, Top down parsing	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-11	Brute force approach, recursive descent parsing	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-12	Predictive parsing, prerequisites of predictive parsing, Non ambiguity of CFG	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-13	Non Left Recursion, Left Factoring.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-14	Bottom up parsing,	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-15	Operator precedence parsing,	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-16	LR parsers- SLR Parsing	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-17	LR & LALR Parsing	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-18	Syntax Directed Translation & Intermediate Code Generation: Syntax directed definitions	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-19	Construction of Syntax trees	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-20	Bottom up evaluation of S-attributed definition	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-21	L-attribute definition,	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-22	Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation,	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools

Lecture-23	Analysis of Syntax directed definition.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-24	Intermediate code generation: Declarations, Assignment statements,	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-25	Intermediate code generation: Boolean expressions, Case statements.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-26	Intermediate code generation: looping statements, Array statements.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-27	Type Checking & Run Time Environment Introduction of Type checking	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-28	type systems	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-29	Specification of simple type checker.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-30	Run time Environment: storage organization	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-31	Storage allocation strategies	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-32	Parameter passing	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-33	Dynamic storage allocation and Symbol table.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-34	Code Optimization & Code Generation: Introduction to Code optimization, Sources of optimization of basic blocks.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-35	Loops in flow graphs, dead code elimination	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-36	Loop optimization, Introduction to global data flow analysis, Code Improving transformations,	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-37	Peephole optimization.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-38	Code Generation: Issues in the design of code generator	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-39	Basic block and flow graphs,	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools
Lecture-40	Register allocation and assignment, DAG representation of basic blocks.	A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools



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PO BOX: 21, DHARAMSHALA, DISTRICT KANGRA – 176215, HIMACHAL PRADESH

Course Code: CSI 429

Course Name: IT Tools for Smart Work

Credit Equivalent: 2 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Course Objectives: The main objective of this course is

- To impart knowledge of various tools, techniques and technologies that facilitates smart work.
- To make learns aware of various apps, websites that help them to handle their routine chores more efficiently.
- To help students to have knowledge of extending such tools and develop their own tools.

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

4. Mid Term Examination: 25%
5. End Term Examination: 50%
6. Continuous Internal Assessment: 25%
 - i) Assignment/Surprise test/Seminar 20%
 - ii) Class participation 5%

Course Contents

Unit 1: E-learning –what is learning, why e-learning, concept and definition, e-learning basics, types of e-learning, computer based learning, internet based learning, completely online mode, the use of e-learning in education, advantages and disadvantages of e-learning, e-learning components, e-learning content, E-learning model-ADDIE model, MERRILL's principles of Instruction (MPI), GAGNE's nine events of instruction, E-Tutoring, E-Coaching, E-Mentoring, collaborative learning, virtual classroom, e-learning in India.

Unit 2: E-learning Tools and Technologies: Communication Tools: E-mail, Instant Messaging (IM), Chat, Blogging, Collaboration Tools: Wiki, Social Bookmarking, Social Networking sites, Web Conferencing, Content Creation Tools/Authoring Tools: Adapt, Learning Activity Management System (LAMS), Xerte, eXeLearning, Delivery and Distribution Tools: EPUB, Podcasting, Audio/Video streaming, Massive Open Online Course (MOOC), Flipped Learning, WebQuest, Learning Management System (LMS), Learning Content Management System (LCMS), E-learning Standards.

Unit-3: IT tools for smart work in education: ePathshala, National Mission on Education through ICT (NME-ICT), epgpathshala, Youtube, National Program on Technology Enhanced Learning (NPTEL), education apps for India, IT tool for data mining, Big data analysis, IT tools for academic research.

Unit-4: IT tools for smart work in professional life: Search engine, best search engines of world, search engine optimization, search engine optimization tools, email, best email servers of world, Video conferencing, examples of best video conference apps, Collaboration tools for remote teams, cloud storage services, tools for hard drive space analysis, time management apps, e marketing, online marketing tools.

Unit-5: IT tools for smart work in personal life: Money saving tools, tools for productivity enhancement, tools for creative time saving, quick tools for everyday task, video calling apps, social media sites, Note taking tools, Lecturer capture and recording tools, drawing tools, presentation tools.

Prescribed text book:

1. Hardy Bower," From Distance Education to E-Learning: Lessons Along the Way", John Wiley & Sons
2. Hossen Najan," Distance Education and E Learning", Lambert academic publishing.
3. Jiawei Han, Micheline Kamber, Jian Pei Professor," Data Mining: Concepts and Techniques", The Morgan Kaufmann Series

Suggested Additional Reading:

- 1-<https://www.dreamgrow.com/top-15-most-popular-social-networking-sites/>
- 2-<https://zapier.com/blog/best-note-taking-apps/>
- 3-<https://neilpatel.com/blog/10-online-marketing-tools-you-need-when-starting-a-business/>
- 4-<http://epathshala.nic.in/>
- 5-<http://epgp.inflibnet.ac.in/>
- 6-<http://indiatoday.intoday.in/education/story/free-education/1/850896.html>
- 7-<https://indianceo.in/apps/top-10-education-apps-india/>

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PO Box: 21, Dharmshala, District Kangra, Himachal Pradesh- 176215

Course Code: CSI 503

Course Name: Java Programming

Credits Equivalent: 4

Course Objectives: After completing this course the students will be able to:

Course Contents

Unit-1

Overview of Java, Data types, variables and arrays, Operators, Control Statements, Introducing classes, declaring objects, Introducing methods, constructors, Parameterized constructors, This keyword, Garbage collection

Unit-2

Overloading methods, Using objects as parameters, Returning objects, Introducing access control, Understanding static, Introducing final, Exploring the string class, Using command line arguments

Unit-3

Inheritance basics, Using super, Creating a multilevel hierarchy, Method overriding, dynamic method dispatch, Using abstract classes, Using final with inheritance

Unit-4

Packages, Access protection, Importing packages, Interfaces

Exception handling, Uncaught exceptions, Using try and catch, Multiple catch clauses, throw, finally.

Unit-5

Java thread Model, The main thread, Creating multiple threads, Thread priorities, Using multithreading.

Prescribed Texts:

1. Herbert Schildt, "The Complete Reference JAVA2", TMH
2. Balagurusamy E, "Programming in JAVA", TMH
3. Mark Wutica, "Java Enterprise Edition", QUE
4. Steven Holzner, "Java2 Black book", dreamtech



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www.cuhimachal.ac.in

Course Code: CSI 506

Course Name: E Governance, E learning & E Business

Credits Equivalent: 4 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual/ group work; obligatory/ optional work placement; literature survey/ library work; data collection/ field work; writing of papers/ projects/dissertation/thesis; seminars, etc.)

Course Objectives:

- The course objective is to understand fundamentals and applicability of Information and Communication Technology (ICT) in various fields such as Governance, Learning and Business.
- The course also provides introduction and detailed study of E Governance, E learning and E Business.
- The recent trends and developments in the fields of E Governance, E learning and E Business will be demonstrated to the students.

Attendance Requirements: Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Evaluation Criteria:

1. Mid Term Examination: 25%
2. End Term Examination: 50%
3. Continuous Internal Assessment: 25%
 - Assignments: 15%
 - Class Participation: 5%
 - Class Attendance : 5%

Contents

UNIT 1

E-Governance: Introduction, E-Governance & E-Government, Need for e-Governance, Measures, work plan and infrastructure for E-Governance, Scope,(types) of e-Governance, Objectives of e-Governance, Evolution of e-Governance, UN e-Government Survey, Phases of e-Governance, e-Governance Project Development Lifecycle, Software Development Lifecycle vs e-Governance Lifecycle. E Governance: international scenario, Challenges in e-Governance.

UNIT II

E-Governance: Strategies for e-Governance in India, National e-Governance Plan, Mission Mode Projects conceptualized under NeGP: Central Government Category, State Government Category, Integrated Services Category, Components of NeGP: The Institutional Structure, The common Support Infrastructure, The Mission Mode Projects, Recent Initiatives in e-Governance in India: Government to citizen (G2c) initiatives, Government to business (G2B) initiatives, Government to Government (G2G) initiatives

UNIT III

E-Learning: what is learning, why e-learning, concept and definition, e-learning basics, types of e-learning, computer based learning, internet based learning, completely online mode, the use of e-learning in education, advantages and disadvantages of e-learning, e-learning model-ADDIE model, MERRILL's principles of Instruction (MPI),GAGNE's nine events of instruction, e-learning components, e-learning content, E-Tutoring, E-Coaching, E-Mentoring, collaborative learning, virtual classroom, e-learning in India.

UNIT IV

E-Business: Introduction, Global Online Retail Spending: Statistics and Trends, E-business & E-commerce, E-business environment, E-marketplaces, E-business markets, Technical ingredients of e-business, Electronic business infrastructure, Potential benefits of E-business, Basic E-Commerce Strategies, E-business Types & Categories, Phases of e-Business Development, E-business technology, Technology Issues in Internet Commerce, E-commerce Security,M-Commerce,E-marketing.

UNIT IV

E-Business: E-Business models: Storefront Model-Shopping-cart Technology, Online Shopping Malls, Auction Model, Portal Model, Dynamic Pricing Models: Name-Your-Price Model,

Comparison Pricing Model, Demand-Sensitive Pricing model, Offering Free Products and Services, Online Trading and Learning Models, Bartering model, framework for analyzing e-business models, Organizational culture and e-business, Organizational structure and e-business, Managing applications systems for e-business, Management skills for e-business, The performance of e-business, The future of e-business.

Prescribed text book:

4. C. S. R. PRABHU ,”E-GOVERNANCE : CONCEPTS & CASE STUDIES”, 2/E, PHI Learning
5. Hossen Najan,” Distance Education and E Learning”, Lambert academic publishing.
6. Ravi Kalakota and Marcia Robinson,” E-Business 2.0: Roadmap For Success”, Pearson Education;

Reference Books:

- Srinivasa H. Rajeshwari ,”E-Governance in India Concepts and Cases”, AP Lambert Academic Publishing
- Hardy Bower,” From Distance Education to E-Learning: Lessons Along the Way”, John Wiley & Sons
- Parag Kulkarni, Sunita Jahirabadkar, Pradip Chande, “E Business “,Oxford University Press



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PO BOX: 21, DHARAMSHALA, DISTRICT KANGRA – 176215, HIMACHAL PRADESH

Website: www.cuhimachal.ac.in

Course Code: CSI449

Course Name: LAB- PC package

Credit Equivalent: 02 Credits (One credit is equivalent to 10 hours of lectures / organised classroom activity / contact hours; 5 hours of laboratory work / practical / field work / Tutorial / teacher-led activity and 15 hours of other workload such as independent individual / group work; obligatory / optional work placement; literature survey / library work; data collection / field work; writing of papers / projects / dissertation / thesis; seminars, etc.)

Attendance Requirement:

Students are expected to attend all lectures in order to be able to fully benefit from the course. A minimum of 75% attendance is a must failing which a student may not be permitted to appear in examination.

Course Contents:

Unit-I:

(10 Hours)

Word Processing Concepts: Definition, Benefits, Facilities & Features in general. Office tool: Word processing using MS-WORD, File handling, Editing, Formatting, spell checking.

Unit-II:

(10 Hours)

Mail merge, Table handling & Insertion, importing, exporting & object linking embedding, printing operation. Spreadsheet: features, uses & benefits in general.

Unit-III:

(10 Hours)

Spread sheet: Entering data & selecting cells, editing worksheet data, formatting worksheet, creating Formulae, function & charts /graphs, multi operation, data base management.

Unit-IV:

(10 Hours)

Presentation Tools: features, uses & benefits in general. MS Power Point: Creating & saving presentation templates & view (slide view, notes view, outline view, slide show) Formatting text, slides & graphs, animations, slides transition, multi operation.

Prescribed Text Book:

- MS OFFICE XP COMPLETE BPB PUBLICATION
- JOE HABRAKEN, MICROSOFT OFFICE 2000, 8 IN 1, BY, PRENTICE HALL OF INDIA
- I.T .TOOLS AND APPLICATIONS, BY A. MANSOOR, PRAGYA PUBLICATIONS, MATURA