

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech Computer Science and Engineering		
Course Title	PRINCIPLES OF COMPILER DESIGN		
Course Code	CSPC41	No. of Credits	3
Course Code of Pre-requisite subject(s)	CSPC28		
Session	July 2019	Section (if, applicable)	A/ B
Name of Faculty	Rajeswari Sridhar	Department	Computer Science and Engineering
Email	srajeswari@nitt.edu	Telephone No.	
Name of Course Coordinator(s) (if, applicable)	----		
E-mail		Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
2015			
COURSE OBJECTIVES			
<ul style="list-style-type: none"> To introduce the major concept areas of language translation and compiler design To enrich the knowledge in various phases of compiler and its use To provide practical programming skills necessary for constructing a compiler 			
COURSE OUTCOMES (CO)			
Course Outcomes		Aligned Programme Outcomes (PO)	
1. Ability to apply the knowledge of LEX tool & YACC tool to develop a scanner & parser		PO ₁ , PO ₃ , PO ₅ , PO ₆	
2. Ability to design and develop software system for backend of the compiler		PO ₁ , PO ₃ , PO ₄ , PO ₅ , PO ₆	
3. Ability to comprehend and adapt to new tools and technologies in compiler design		PO ₁ , PO ₃ , PO ₅ , PO ₆	

COURSE PLAN – PART II**COURSE OVERVIEW**

A compiler is a system software that translates the code written in one language to some other language without altering the meaning of the program. A compiler should also produce the target code which is efficient and optimized.

Compiler design principles provide an in-depth view of translation from a source (high-level) language to target (low-level typically assembly) language followed by optimization. The compiler involves six phases namely, lexical, syntax, semantic analysis as front end, and intermediate code generation, code generation and optimization as back-end. This course discusses these six phases of the compiler in detail by providing appropriate algorithms and methodologies at all phases.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	22/07/2019 to 26/07/2019 1 hour	Unit 1: Introduction to compiler and analysis of the source program	Lecture
2	22/07/2019 to 26/07/2019 2 hours	Phases of the compiler – problems, Grouping of phases, Cousins of the compiler	Lecture <i>Chalk and Talk</i>
3	29/07/2019 to 02/08/2019 1 hour	Grouping of phases and Compiler construction tools	Lecture <i>Chalk and Talk</i>
4	29/07/2019 to 02/08/2019 2 hours	Lexical analysis – Specification and Recognition of tokens, Review of NFA, DFA, Regular expression (assignment problems)	Lecture <i>Chalk and Talk</i>
5	05/08/2019 to 09/08/2019 1 hour	Input Buffering, Sentinels – algorithm and problems	Lecture <i>Chalk and Talk</i>
6	05/08/2019 to 09/08/2019 2 hours	Lexical Analyser generator – Introduction to LEX tool and sample programs, programming assignments	Lecture <i>Chalk and Talk</i>
7	12/08/2019 to 16/08/2019 1 hour	Unit 2: Role of the parser, Context free grammar, examples, parsing – top down and bottom up	Lecture <i>Chalk and Talk</i>

8	12/08/2019 16/08/2019 1 hours	to	Top down parsing – Recursive descent parser – need, LL(1) parsers, first(), (assignment problems)	Lecture <i>Chalk and Talk</i>
9	19/08/2019 23/08/2019 2 hours	to	follow(), parsing table, problems. Problems in top down parsing, Bottom up – shift reduce parser, pre-requisites for operator precedence parser	Lecture <i>Chalk and Talk</i>
10	19/08/2019 23/08/2019 1 hour 26/08/2019 30/08/2019 1 hour	to to	Operator precedence parser, leading, trailing, parsing table, problems (assignment problems)	Lecture <i>Chalk and Talk</i>
11	26/08/2019 30/08/2019 1 hour	to	SLR parser, LR(0) items construction	Lecture <i>Chalk and Talk</i>
12	26/08/2019 30/08/2019 1 hour	to	SLR parsing table construction, parsing algorithm, problems (assignment problems)	Lecture <i>Chalk and Talk</i>
12	02/09/2019 06/09/2019 1 hour	to	CALR parser, LR(1) items construction, Parsing table construction	Lecture <i>Chalk and Talk</i>
13	02/09/2019 06/09/2019 1 hour	to	CALR parsing, LALR parser – modification to CALR parsing (assignment problems)	Lecture <i>Chalk and Talk</i>
14	09/09/2019 13/09/2019 1 hour	to	Parser generator – YACC, Programming assignments	Lecture <i>Chalk and Talk</i>
15	09/09/2019 to 13/09/2019 1 hour		Cycle Test 1	Written
16	16/09/2019 to 20/09/2019 1 hour		Unit 3: Types of Intermediate code, Intermediate representation, Quadruples, Triples, Indirect triples	Lecture <i>Chalk and Talk and Power point presentation</i>
17	16/09/2019 to 20/09/2019 1 hour		SDD for Declarations, assignment statements	Lecture <i>Chalk and Talk and Power point presentation</i>

18	16/09/2019 to 1 20/09/2019 1 hours 23/09/2019 to 27/09/2019	SDT for Arrays, Case statements	Lecture <i>Chalk and Talk and Power point presentation</i>
19	23/09/2019 to 27/09/2019 2 hours	SDT for Boolean expressions, loops, Backpatching	Lecture <i>Chalk and Talk and Power point presentation</i>
20	30/09/2019 to 04/10/2019 2 hours	Backpatching contd., procedure calls (assignment problems)	Lecture <i>Chalk and Talk and Power point presentation</i>
21	07/10/2019 to 11/10/2019 2 hours	Unit 4: Sources of optimization, optimization of basic blocks, DAG representation of basic blocks	Lecture <i>Chalk and Talk</i>
22	07/10/2019 to 11/10/2019 1 hour	Run time environments, Source language issues, storage organization	Lecture <i>Chalk and Talk</i>
23	14/10/2019 to 18/10/2019 1 hour	Storage allocation strategies, parameter passing	Lecture <i>Chalk and Talk</i>
24	14/10/2019 to 18/10/2019 2 hours	Error recovery strategies	Lecture <i>Chalk and Talk</i>
25	14/10/2019 to 18/10/2019 2 hours	Introduction to global data flow analysis	Lecture <i>Chalk and Talk</i>
26	21/10/2019 to 25/10/2019 1 hour	Cycle Test 2	Written
27	21/10/2019 to 25/10/2019 2 hour	Unit 5: Issues in the design of code generator, target machine, flow graphs	Lecture <i>Chalk and Talk and Power point presentation</i>
28	28/10/2019 to 01/11/2019 1 hour	Next-use information, register allocation methods	Lecture <i>Chalk and Talk and Power point presentation</i>
29	28/10/2019 to 01/11/2019 2 hours	Simple code generator – address descriptor, register descriptor, example, problems	Lecture <i>Chalk and Talk</i>

30	04/11/2019 to 08/11/2019 2 hours	DAG based code generator (assignment problems)	Lecture <i>Chalk and Talk</i>
31	04/11/2019 to 08/11/2019 1 hour	Peep hole optimization	Lecture <i>Chalk and Talk</i>
32	11/11/2019 to 15/11/2019 1 hour	Data flow graphs	Lecture <i>Chalk and Talk</i>
32	11/11/2019 to 15/11/2019 2 hours	Programming assessment – Programming using LEX / YACC	Programming

Text Books

1. Alfred V. Aho, Jeffrey D Ullman, “Compilers: Principles, Techniques and Tools”, Pearson Education Asia, 2012
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS Publications, 2005
3. Dhamdhare, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2008

Reference books

1. Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003
2. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003
3. HenkAlblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001
4. Kenneth C. Loudon, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	09/09/2019 to 13/09/2019 1 hour	1 hour	15
2	Cycle Test 1	21/10/2019 to 25/10/2019	1 hour	15
3	Programming Assessment	11/11/2019 to 15/11/2019	2 hours	15
4	Programming Assignments	ONE	5 hours as homework	10
5	Assignment Problems	Periodically for Units 1, 2, 3	3 to 4 hours	5

CPA	Compensation Assessment*	After completion of Cycle Test 2	1 hour	15
6	Final Assessment *	End of November	3 hrs	40

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

- 1. Students' feedback through class committee meetings**
- 2. Feedbacks are collected before final examination through MIS or any other standard format followed by the institute**
- 3. Students, through their Class Representatives, may give their feedback at any time to the course faculty which will be duly addressed.**

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

Email, in-person – after 4.00 pm.

COMPENSATION ASSESSMENT POLICY

1. One compensation assessment will be given after completion of Cycle Test 1 and 2 for the students those who are absent for any assessment due to genuine reason.
2. Compensatory assessments would cover the syllabus of Cycle tests 1 & 2
3. Prior permission and required document must be submitted for absence.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

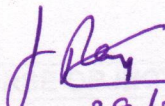
- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

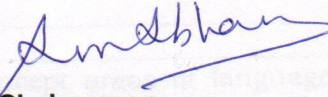
The above policy against academic dishonesty shall be applicable for all the programmes


ADDITIONAL INFORMATION

1. The Course Coordinator is available for consultation during the time intimated to the students then and there.
2. Relative grading adhering to the instructions from the office of the Dean (Academic) will be adopted for the course.

FOR APPROVAL


29/7/19
Course Faculty _____


CC-Chairperson _____


31/7/19
HOD _____