Compilers: CS31003

Autumn Semester: 2011 - 2012

Instructor: Goutam Biswas

Department: Computer Science and Engineering

Compilers Laboratory: CS39003

Class, Test & Marks Distribution

- Expected number of theory classes: 39, laboratory classes: 13.
- *Class Test & Assignments* - 24th Aug., 2011 (class test) - **20** marks
- *Mid-Sem. Exam.* - 23rd Sept., 2011 - **30** marks
- *End-Sem. Exam.* - $18^t h$ Nov., 2011 - **50** marks
- *Attendance* - Institute Rule

Class Timings

Class Room No. CS-119

Day	*Time*
Monday	09:30 to 10:25
Wednesday	07:30 to 08:25 (extra)
Wednesday	08:30 to 09:25
Thursday	09:30 to 10:25

Syllabus - Compiles (CS31003)

The aim is to learn the basic design and implementation of a simple compiler for a small imperative language. It is also essential to learn the underlying theories.

Syllabus - Compiles (CS31003)

- Introduction: Phases of compilation and overview.
- Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).
- Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) gram-mars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)

Syllabus - Compiles (CS31003)

- Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.
- Symbol Table: Its structure, symbol attributes and management
- Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope.
- Intermediate Code Generation: Translation of different language features, different types of intermediate forms.

Syllabus - Compiles (CS31003)

- Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc.
- Register allocation and target code generation
- Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.

Instructor

Name	Tel. No.	email
Goutam Biswas	281910 (o)	goutam@cse.iitkgp.ernet.in
	277399 (r) 81014 57316 (m)	goutamamartya@gmail.com

- Coordinates: *Department of Computer Science and Engineering, 1st Floor, Room No. 207.*
- Web Page: `http://cse.iitkgp.ac.in/~goutam/`

Teaching Assistant (TA)

Name	Tel. No.	email
Bhanu Kishore Diddi	7501463408	`bhanukishore22@···`
Manaal Faruqui	9932900944	`manaalfar@···`
Soma Saha	9231737881	`buria_soma@yahoo···`
Avijit Das	9831290675	`avijit.nits@···`
Anshul Gupta	9735451554	`anshulluhsna@···`
Gaurab Basu	9432274087	`basugaurab88@···`

`cse···` ≡ `cse.iitkgp.ernet.in`, @··· ≡ `gmail.com`, `yahoo···` ≡ `yahoo.co.in`

Text Books

- Compilers *Principles, Techniques, and Tools*, by A. V. Aho, Monica S. Lam, R. Sethi, & J. D. Ullman, 2nd ed., ISBN 978-81317-2101-8, Pearson Ed., 2008(text book)
- Engineering a Compiler, by Keith D. Cooper & Linda Troczon, (2nd ed.) ISBN 81-8147-369-8, Morgan Kaufmann, Elsevier, 2004 (1st reference)
- Programming Language Pragmatics, by Michael L. Scott, ISBN 81-312-0737-4, Morgan Kaufmann, Elsevier, 2006
- Compiler design, by Santanu Chattopadhyay, ISBN 81-203-2725-X, PHI, 2005

Text Books

- Advanced Compiler Design and Implementation by, *Steven S. Muchnick*, ISBN 981-4066-24-9, Morgan Kaufmann, Elsevier, 2000
- Optimizing Compilers for Modern Architectures, by Randy Allen & Ken Kennedy, ISBN 81-8147-366-3, Morgan Kaufmann, Elsevier, 2002
- Modern Compiler Implementation in C, by Andrew W. Appel, ISBN 81-7596-071-X, CUP
- Practice and Principles of Compiler Building with C, by Henk Alblas & Albert Nymeyer, ISBN 81-203-1362-3, PHI

Text Books

- Introduction to Compiling Techniques *A first course using ANSI C, Lex and Yacc*, by J. P. Bennett, ISBN 0-07-053073-4, TMH
- lex & yacc by, *John R levine, Tony Mason & Doug Brown*, ISBN 81-7366-062-X, SPD - O'Reilly
- Principles of Compiler Design, by *V Raghavan*, ISBN: 978-0-07-014471-2, McGraw Hill.