

University of Nicosia, Cyprus COMP-421¹ Compiler Design Fall 2012

Course Code	Course Title	ECTS Credits
COMP-421	Compiler Design	6
Department	Semester	Prerequisites
Computer Science	Fall	$COMP-211^2$, $COMP-321^3$
Type of Course	Field	Language of Instruction
Required	Computer Science	English
Level of Course	Year of Study	Lecturer
1 st Cycle	4 th	Dr Ioanna Dionysiou
Mode of Delivery	Work Placement	Co-requisites
Face-to-face	N/A	None
Course Days/Times	Course Venue	Student Consultation Hours
Section 1		M/W 10:00 - 11:00
M, W 11:00 – 12:30	YELLOW	Tu 9:00-12:00
		Appointments
Telephone	E-mail	Office
22841736	dionysiou.i@unic.ac.cy	B217

Objectives of the Course:

The main objectives of the course are to:

- Introduce the compilation phases
- Introduce the application of regular expressions in lexical scanners
- Introduce parsing (concrete and abstract syntax, abstract syntax trees) and application of context-free grammars in recursive-descent parsing and bottom-up parsing
- Discuss declarations and types
- Introduce run-time environments
- Discuss intermediate code representations and code generation principles

Learning Outcomes:

After completion of the course students are expected to:

• Understand the various stages of the basic language translation process (lexical, parsing, code generation, optimization) and machine-dependent vs. machine-

¹ Old course code was COMP-375

² Old course code was COMP-301

³ The new prerequisite will be in effect next academic year

independent aspect of translation

- Recognize the underlying formal models such as finite state automata and their connection to language definition through regular expressions and grammars
- Be able to use parsing techniques, including LL(1) and LR parsers
- Be able to translate statements into three-address code
- Identify the properties of a variable and discuss type incompatibility
- Understand static vs. dynamic storage allocation and the usage of activation records to manage program modules and their data.
- Given an intermediate representation, along with symbol table information, be able to produce a semantically equivalent target program
- Design and implement a simple language translator using automated tools, such lexical and parser generators lexx/yacc

Course Contents:

- Overview of Compilation
- Lexical Analysis, including regular expressions, finite automata (NFA, DFA), implementation of lexer using automated tools
- Syntax Analysis, including context-free grammars, top-down parsing, bottom-up parsing, implementation of a parser using automated tools
- Syntax-directed translation
- Type Systems
- Intermediate representations (graphical and linear)
- Code optimization and generation

Teaching Methods:

Lectures, in-class problem solving sessions

Assessment Methods:

Final Exam (1)	60%
Mid-Term Exam (2)	30%
Programming Project	10%

Required Textbooks:

Authors	Title	Publisher	Year	ISBN
Alfred V. Aho,	Compilers: Principles,	Pearson	2007	0321486811
Monica Lam, Ravi	Techniques, and Tools	Education,		
Sethi, and Jeffrey	(2nd edition)	Inc		
D. Ullman				

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Keith Cooper and Linda	Engineering a	Morgan	2003	155860698X
Torczon	Compiler	Kaufmann		

John Levine, Tony Mason,	Lex and Yacc	O'Reilly	1992	1565920007
and Doug Brown	(2nd edition)	Press		

Attendance Regulations:

"The University believes that faculty members make a significant contribution to the development of students and, as a result, a student who is not consistent in class attendance is missing a major part of the educational experience. Students are therefore strongly encouraged to maintain regular class attendance. Being late to class may be recorded as absence. Absence is also recorded for laboratory or practical sessions as well as for other required work such as trips. Furthermore, if a course has a percentage of the in-course assessment dedicated to student participation, student absences may result in a low mark in that component.

International students are required by law to attend classes regularly.

A student who has not been attending regularly, has not presented himself to the Final Examination and, has not completed the major part of his in-course assessment, will be given a "W" by the lecturer when final grades are submitted after the examination period". (2.18.1. Attendance Policy)

You are responsible for all information during lecture time.

Course Policies:

- Classroom Courtesy: You should refrain from activities, which can be distracting either to the instructor or to other students. For example, your mobile phones must be switched off during the class.
- Exams: You must attend all examinations. Makeup exams will only be given under exceptional circumstances and the official procedure for makeup exams will be enforced as dictated by the university. The final exam is comprehensive.
- Assessment Criteria: You will be evaluated based on the quality of your submitted work. Description of the project, as well as its evaluation criteria, will be provided throughout the course. This course will include a number of in-class exercises, which do not count towards your final grade. However, they will be very beneficial in understanding various concepts presented during lectures.
- Submitting Project and Late Policy: The project is due on its assigned date. Failure to meet a deadline will result in deduction of points, 50% per day.
- Academic Honesty: All work for this course is individual, unless explicitly specified by the instructor. You are encouraged to get help during my office hours. Please familiarize yourself with the university's policy on academic honesty. Plagiarism and cheating is a serious offence, which leads to severe punishment.

Letter Grade	Meaning	Numerical Grade	Grade Points
A	Excellent	93-100	4.0
A-		90-92	3.7
B +	Very Good	87-89	3.3
В		83-86	3.0
<i>B</i> -		80-82	2.7
<i>C</i> +	Good	77-79	2.3
С		73-76	2.0
С-		70-72	1.7
D +	Poor but Acceptable	67-69	1.3
D		63-66	1.0
<i>D</i> -		60-62	0.7
F	Failure	0-59	0.0

Grading Policy:

Schedule of Lectures and Assessment:

We will tentatively cover the course objectives as shown below. The midterm exams will be scheduled during the 6th week and 11th week of classes (<u>these dates may change</u>). The schedule in this course is subject to change at the instructor's discretion.

Week	Topic	Reading
Week 1	Introduction to Compilers	ALSU07 Ch.1
Week 2	Introduction to Compilers	ALSU07 Ch.2
Week 3	Lexical Analysis	ALSU07 Ch.3
Week 4	Lexical Analysis	ALSU07 Ch.3
Week 5	Lexical Analysis	ALSU07 Ch.3
Week 6	Syntax Analysis	ALSU07 Ch.4
Week 7	Syntax Analysis	ALSU07 Ch.4
Week 8	Syntax Analysis	ALSU07 Ch.4
Week 9	Syntax-directed Translation	ALSU07 Ch.5
Week 10	Intermediate Code Generation	ALSU07 Ch.6
Week 11	Run-Tine Environment	ALSU07 Ch.7
Week 12	Code Generation	ALSU07 Ch.8, 9, 10
Week 13	Code Generation	ALSU07 Ch.9, 9, 10