**Course Specification**

(**CS 419 Compilers** )

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| --- | --- |
| *University:* | Helwan University |
| *Faculty:* | Faculty of Computers & Information |
| *Department:* | ***Computer science*** |

**1. Course Data**

|  |  |
| --- | --- |
| **Code:** | **CS 419** |
| **Course title:** | Compilers |
| **Level:** | 2 |
| **Specialization:** | Computer Science |
| **Credit hours:** | 3 hours |
| **Number of learning units (hours):** | (3) theoretical 2) practical |

**2. Course Objective**

Acquaint the students with principles and practices of compilers, the phases of compiler construction including lexical analysis, parsing and code generation along with related concepts such as regular expressions, finite automata and grammars

**3. Intended Learning Outcomes:**

**A- Knowledge and Understanding:**

A12. Demonstrate the basics of Computer Components.

A17. Represent essential knowledge of Translators Design.

* **Intellectual Skills**

B9. Design and implement Programming methods.

B21. Design and analyze Problems.

B24. Represent Data structures.

* **Professional and Practical Skills**

C4. Lead a team and Work in a team.

C6. Present effectively in a Seminar.

* **General and Transferable Skills**

D4. Follow Analytical Thinking.

D13. Practice Designing skills in software projects.

D14. Practice Engineering skills for software development.

**4. Course contents**

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **No. of hours** | **Lecture** | **Tutorial/ Practical** |
| **Introduction**  A brief History  Programs related to compilers.  The translation process  Major data structures of a compiler. | 15 | 5 | 5 |
| **Scanning** | 3 | 1 | 1 |
| **Definition**  **Regular expressions**  Rules and syntax  Representing a language as a regular expression | 6 | 6 | 6 |
| **Finite automata**  Definition and types  Converting from regular expressions DFA | 6 | 6 | 6 |
| **Parsing**  Grammars  Parse Trees  Ambiguity  BNF and EBNF notations  Parsing Methods | 15 | 5 | 5 |

**Mapping contents to ILOs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Topic | Intended Learning Outcomes (ILOs) | | | |
| Knowledge and understanding | Intellectual Skills | Professional and practical skills | General and Transferable skills |
| **Introduction**. | A12 | B9 | None | None |
| **Scanning** | A17 | B9,B21 | C6 | D4 |
| **Definition**  **Regular expressions** | A17 | B24 | C4 | D4,D13 |
| **Finite automata** | A17 | B21,B24 | C4 | D4,D14 |
| **Parsing** | A17 |  | C6 | D4,D13,D14 |

**5. Teaching and Learning Methods**

Class Lectures

Highly lab-based courses

**6. Teaching and Learning Methods for students with limited capability**

Using data show

e-learning management tools

**7. Students Evaluation**

**a) Used Methods**

Lab exam

Assignments

Lab work

Programming projects

**b) Time**

Assessment 1: Test 1 Week 4

Assessment 2: Test 2 Week 7

Assessment 3: Midterm Exam Week 10

Assessment 4: Practical Exam Week 14

Assessment 5: final written exam Week 16

**c) Grades Distribution**

Written examinations 70% (50% Final and 20% midterm)

Project Presentation 20%

Semester Work & Assignments 10%

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Total 100 %

Any formative only assessments

**List of Books and References**

**a) Notes**

Course Notes

- Handouts

**b) Mandatory Books**

Kenneth Louden, Compiler Construction: Principles and Practice, Boston, PWS publishing company, 1997.

**c) Suggested Books**

- Alfred V. Aho, Ravi Sethi, and Jeffrey D. Ullman, *Compilers - Principles, Techniques and Tools*, Addison-Wesley Publishing Company, Reading, Massachusetts, 1986.

- Andrew W. Appel and Jens Palsberg, *Modern Compiler Implementation in Java*, Cambridge University Press, second edition, 2002.

- Dick Grune, Henri E. Bal, Ceriel J. H. Jacobs, and Koen G. Langendoen.   
*Modern Compiler Design*, Wiley, 2000.

- Henk Alblas and Albert Nymeyer, *Practice and Principles of Compiler Building with C*, Prentice Hall, 1996.

**d) Other publications**

<http://linuxgazette.net/issue41/lopes/lopes.html>

<http://www.thefreecountry.com/programming/javatools.shtml>

<http://www.scifac.ru.ac.za/resourcekit/html/links.htm>

<http://www.softpanorama.org/Algorithms/compilers.shtml>

**Course Coordinator:**  **Dr. Amal Aboutabl**

**Chairman of the Department:** Prof. dr. Iraqy Khalifa