



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF SCIENCES
COMPUTER SCIENCE PROGRAM

CC342 – COMPUTING THEORY

I. GENERAL INFORMATION

CODE	: CC342 Computing Theory
SEMESTER	: 6
CREDITS	: 4
HOURS PER WEEK	: 6 (Theory – Laboratory)
PREREQUISITES	: CC301 Parallel Algorithms CC361 Operating Systems
CONDITION	: Mandatory

II. COURSE DESCRIPTION

It shows that the Computation is a science, in particular a branch of the mathematics that centers its interest in the study and formal definition of the computers.

III. LEARNING UNITS

1. Introduction to theory of computing

- I: Automata, computability and complexity.
- II: Mathematical notions of theory of computing.

2. TC Sets

3. TC Functions and relationships

4. Chains and languages

- I: Mathematical induction.

5. Regular languages

- I: Finite automata: a) Finite deterministic automata b) Finite nonterministic automata.
- II: Regular expressions.
- III: Non-regular languages.

6. Context free languages

- I: Context free grammars.
- II: Derivation trees.
- III: Normal Chomsky forms.
- IV: Normal Greibach forms.
- V: Elimination of left common factors.
- VI: Elimination of left recursivity.
- VII: Elimination of ambiguity.
- VIII: PushDown automata.
- IX: Non-regular language.

7. Turing machine

- I: Formal definition of Turing machine.
- II: Modular construction of the Turing machine.
- III: Languages accepted by Turing machine.
- IV Variants of Turing machine.
- V: Hilbert problems.

8. Decibility

- I: Decible Languages.
- II: The Halting problems.
- III: Logical theories of decibility.

9. Reducibility

- I: Unsolvable problems in the language theory.
- II: A simple problem that is unsolvable.
- III: Computable functions.
- IV: Turing reducibility.

IV. BIBLIOGRAPHY

- Hopcroft, J.E.; Motwani, R. i Ullman, J.D. Introducció a Automata Theory, Languages, and Computation. 2Da ed. Addison-Wesley, 2001.
- M.Kelley, Dean Automata and Formal Languages (Hi ha trad. a l'espanyol de la mateixa editorial), Prentice Hall, 1995.
- Sipser. "*Introducció to the Theory of Computation*". PWS, 1997.
- Brookshear J "Teoría de la Computación," Addison Wesley, 1993.
- J. Glenn Brookshear Teoría de la Computación : lenguajes formales, autómatas y complejidad, Addison-Wesley Iberoamericana, 1993.
- Joaquim Gabarró Valles Informatica classica : automatas gramatiques, indecidibilitat, parallelisme masivo, 1995.
- Jozef Gruska Foundations of computing, International Thomson Computer Press, 1997.

- Efim Kinber, Carl Smith Theory of computing: A gentle Introduction, Prentice-Hall, 2001.
- Dexter C. Kozen. Automata and computability, Springer-Verlag,, 1997.
- Harry R. Lewis, Christos H. Papadimitriou Elements of the theory of computation, Prentice-Hall,, 1998.
- Dan A. Simovici, Richard L. Tenney Theory of formal languages with applications, World Scientific, 1999.
- Joan Vancells i Flotats Teoría d'autòmats i llenguatges formals I, Universitat Oberta de Catalunya, 2000.
- Derik Wood Theory of computation, Harper & Row, 1987.
- Rafel Cases, Lluís Màrquez Llenguatges, gramàtiques i autòmats : curs bàsic, Edicions UPC, 2003.
- John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman Introduction to automata theory, languages, and computation, Pearson Education International, 2003.
- Dean Kelley Automata and formal languages: an Introduction, Prentice Hall, 1995.
- Maria Serna [et al.] Els Límits de la Computación: indecidibilitat i NP-completesa, Edicions UPC, 2001.
- Michael Sipser Introducció to the theory of computation, Thomson Course Technology, 2006.
- <http://www.uade.edu.ar/PlanesYProgramas/VerContenido.aspx?Id=54&CodMateria=104567>
- http://www.ort.edu.uy/index.php?cookie_setted=true&id=AAAHAB&cdpto=62
- <http://biblioteca2.icesi.edu.co/cgi-olub?session=99143311&infile=details.glu&luid=7178&rs=204013&hitno=8>
- <http://www.fib.upc.edu/es/infoAca/estudis/assignatures/TC.html>
- http://ceidis.ula.ve/cursos/pgcomp/teo_comp/cont1.html
- http://www.ehu.es/p200-content/es/contenidos/asignatura/fut_16337infor302_226_2_x/es_16337/es_fileasig_16337.html