

CS 6260-01 Computational Complexity
Winter 2006
MWF 1:20–2:30 p.m.
Sc S 105

Instructor: William R. Nico

Office: WA 775

Phone: (510)885-3386 (or leave messages at dept. office: (510)885-3414)

E-mail: nico@csueastbay.edu (On the mcs system just “nico” will work.)

Web: www.mcs.csueastbay.edu/~nico

Office hours: MWF 9:30–10:00 a.m., MW 3:00–4:00 p.m., or by appointment.

Text: M. Sipser, *Introduction to the Theory of Computation*, PWS Publishing Co., 1997.

Recommended: M. Garey and D. Johnson, *Computers and Intractability: A Guide to the Theory of NP-Completeness*, W. H. Freeman, San Francisco, 1979.

Recommended: E. Reiter and C. M. Johnson, *The Limits of Computation*, (notes available locally).

This course will survey the theory of computational complexity and, in particular, of NP-completeness. This material is contained in chapters 7–10 of the Sipser book and in chapters 1–7 of the “classic” Garey and Johnson book. A certain amount of background material and material regarding decidability is in earlier chapters of the Sipser book or the Reiter/Johnson notes, and such material which is not covered in lecture is available there for self-study.

The course will begin with the introduction of basic results about Turing machines and decidability. The heart of the course is the treatment of the concepts of *reducibility* and of *NP-completeness* and closely related complexity classes. Additional complexity classes, e.g., the polynomial hierarchy, circuit complexity, random complexity classes, will be covered as time allows. Treatment of approximate solutions of NP-complete problems will receive similar coverage.

Students will be expected to be able to understand and create proofs of complexity results. They will also be expected to write these in a clear and convincing manner. They may on occasion be required to present their results orally to the class.

Grading: The course grade will be computed roughly as follows. (The date of the midterm is subject to change. Any change will be announced in class.)

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| 1. Written homework | 15% |
| 2. Midterm (Monday, February 6) | 35% |
| 3. Final exam (Wednesday, March 15, 2:00–3:50 p.m.) | 50% |

Late homework will *not* be accepted. Homework is to be turned in at the *beginning* of class on the due date. Homework is to represent *individual* efforts! Any work not your own, e.g., results obtained from reference sources, should receive appropriate bibliographic *citations*. *Plagiarism* will be subject to appropriate penalties.

Written work: Any written work submitted for the course, *including in-class tests*, must be done in *ink!*

Make-up policy: Make-up tests will be considered only in *unusual* circumstances, and then only if arrangements have been made in *advance*.