Technische Universität München
Department of Computer Science
Chair for Efficient Algorithms
Prof. Dr. Sami Khuri

WS 1999/2000
Information 1
November 2, 1999

Efficient Algorithms and Data Structures

Information about the Course

LECTURE:
Tuesday and Thursday 10:15–11:45, lecture hall 1100
WWW: `http://wwwmayr.in.tum.de/lehre/1999WS/ea/`

PROFESSOR:
Sami Khuri, Room S2240, Tel.: x-25783, Office hour: Tuesday 15:00–16:00
E-mail: `khuri@in.tum.de`

ASSISTANT:
Thomas Erlebach, Room S2239, Tel.: x-28495, Office hour: Friday 13:00–14:00
E-mail: `erlebach@in.tum.de`

SECRETARY:
Mrs Schmidt, Room S2223, Tel.: x-22681
E-mail: `schmiann@in.tum.de`

EXERCISE SESSIONS:
Wednesday 12:15–13:45, lecture hall N1095, starting on the 10th of November
Students who want to participate in the exercises please send an e-mail to
`erlebach@in.tum.de`
and give your data in the following format:
`Name::Firstname::Gender::Matrikelnr.::Major::DateOfBirth::E-Mail`
Examples: (for Major ("Hauptfach"), 2 is "Informatik" and 1 is "Mathematik")
Miller::Jennifer::f::7654321::2::01.01.1971::miller@in.tum.de
Myers::Jeff::m::1234567::2::24.12.1970::jm@fancy.stuff.gov

The course will focus on fundamental concepts in the theory of algorithms. The design and analysis of efficient data structures and sequential algorithms will be discussed. The second part of the course will be taught in the Summer 2000 semester.

In order to get a course certificate ("Schein"), students are required to pass the exam at the end of the semester. They will be admitted to take the exam only if they achieve at least 40% of the available credits in the problem sets (homework assignments).

The problem sets will be distributed during the lecture on Tuesdays. Students must hand in their solutions (which can be in English or in German) during the lecture on the following Tuesday (one week later), and sample solutions will be presented in the exercise session on the day after that (Wednesday).

References

[1] Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman. *The Design and Analysis of Computer Algorithms.* Addison-Wesley, 1974. The classic text, but it lacks topics in network flows and linear programming, as well as more recent algorithms.

[2] Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman. *Data Structures and Algorithms.* Addison-Wesley, 1983. Revised and more elementary version of the first six chapters of *The Design and Analysis of Computer Algorithms.*

[3] Sara Baase. *Computer Algorithms: Introduction to Design and Analysis.* Addison-Wesley, second edition, 1988. General reference, although the exposition is sometimes terse or sketchy.

[4] Jon Bentley. *Programming Pearls.* Addison-Wesley, 1986. Applications of algorithm design techniques to software engineering.

[5] Jon Bentley. *More Programming Pearls.* Addison-Wesley, 1988. More applications of algorithm design techniques to software engineering.

[6] Gilles Brassard and Paul Bratley. *Algorithmics: Theory and Practice.* Prentice-Hall, 1988. Good examples and problems. Focus on methods rather than specific problems.

[7] Thomas H. Cormen, Charles E. Leiserson, and Ronald L. Rivest. *Introduction to Algorithms.* MIT Press, Cambridge, 1990. Covers traditional material and modern developments. Its strength lies in its encyclopaedic range, clear exposition, and rigorous analysis.

[8] Shimon Even. *Graph Algorithms.* Computer Science Press, 1979. Broad treatment of graph algorithms, including network flow and planarity.

[9] Michael R. Garey and David S. Johnson. *Computers and Intractability. A Guide to the Theory of $\mathcal{NP}$-Completeness.* W.H. Freeman and Company, 1979. Reference book devoted to NP-completeness. The second half contains an extensive list of NP-complete problems and references to algorithms in the literature for polynomial-time special cases.

[10] Ellis Horowitz and Sartaj Sahni. *Fundamentals of Computer Algorithms.* Computer Science Press, 1978. Good on data structures, dynamic programming, and branch-and-bound algorithms.

[11] Donald E. Knuth. *The Art of Computer Programming.* Addison-Wesley, 1973–1998. Encyclopaedic work in three volumes: (1) Fundamental Algorithms, (2) Seminumerical Algorithms, and (3) Sorting and Searching.

[12] Dexter C. Kozen. *The Design and Analysis of Algorithms.* Springer-Verlag, 1991. Lecture notes, mainly on advanced topics. Has homework exercises with complete solutions.

[13] C.L. Liu. *Introduction to Combinatorial Mathematics.* McGraw-Hill, 1968. Combinatorial mathematics relevant to computer science. Excellent problems.

[14] C.L. Liu. *Elements of Discrete Mathematics.* McGraw-Hill, 1985. Updated text of the 1968 version. Good on recurrence relations.

[15] Udi Manber. *Introduction to Algorithms. A Creative Approach.* Addison-Wesley, 1989. Elementary text with an emphasis on creativity.

[16] Kurt Mehlhorn. *Data Structures and Algorithms.* Springer-Verlag, 1984. Three volumes: (1) Sorting and Searching, (2) Graph Algorithms and NP-Completeness, and (3) Multi-dimensional Searching and Computational Geometry. Lecture notes on basic and advanced topics.

[17] T. Ottmann and P. Widmayer. *Algorithmen und Datenstrukturen.* B.I. Wissenschaftsverlag, Mannheim, 1990. In German. Covers a wide range of topics, contains problems.

[18] Christos H. Papadimitriou and Kenneth Steiglitz. *Combinatorial Optimization: Algorithms and Complexity.* Prentice-Hall, 1982. Linear programming and its variants.

[19] E.M. Reingold, J. Nievergelt, and N. Deo. *Combinatorial Algorithms: Theory and Practice.* Prentice-Hall, 1977. Good on recurrence relations and binary search trees.

[20] Robert Sedgewick. *Algorithms.* Addison-Wesley, second edition, 1988. Elementary text with an excellent breadth of topics. Light on analysis, but lots of figures.

[21] Steven S. Skiena. *The Algorithm Design Manual.* Springer-Verlag, 1998. Good introductory textbook. Stresses design over analysis. Contains excellent pointers to resources.

[22] D.R. Stinson. *An Introduction to the Design and Analysis of Algorithms.* Charles Babbage Research Centre, Manitoba, Canada, 1987. Good introductory textbook with interesting problem sets.

[23] Robert Endre Tarjan. *Data Structures and Network Algorithms.* Society for Industrial and Applied Mathematics, 1983. Advanced book with tons of good stuff.