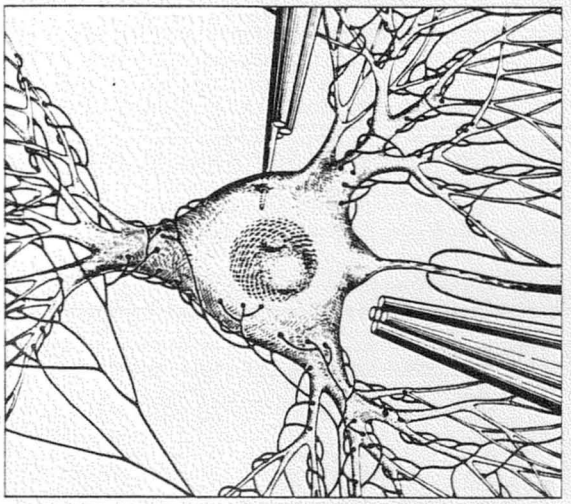
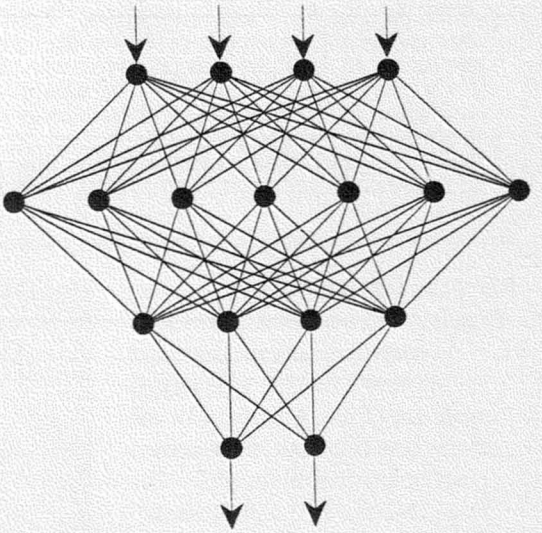
INTRODUCTION TO ARTIFICIAL NEURAL SYSTEMS

a video shortcourse

- *An introductory course on the rapidly developing technology of artificial neural networks*
- *For those interested in emerging signal processing and pattern recognition algorithms and architectures, and for those involved in charting new industrial directions*
- *You will learn about the neurological basis for artificial neural networks, current and potential applications, and implementation of neural networks in various technologies.*





- ***Participants Comments:***

"INSTRUCTORS ARE EXCELLENT!", "... INFORMED", "... OBVIOUSLY KNOWLEDGABLE AND ENTHUSIASTIC","... RELAXED, APPROACHABLE".
"GOOD THEORETIC AND EXPERIENCE BASE."
"OVERALL, (THIS COURSE WAS) VERY USEFUL."

General Information

Researchers in computing and signal processing have long been intrigued by the computational and fault tolerant properties of the brain. There has recently been a surge of interest in processing architectures which are based loosely on biological neural networks. These artificial neural networks have been implemented successfully both electronically and optically.

Students of this course will learn the theoretical underpinnings of artificial neural networks and will be presented with the most relevant recent research results. Case studies of the suitability of neural network architectures for several different applications will also be discussed. Interdisciplinary contributions to recent results in artificial neural network research will be stressed.

Applications of artificial neural networks include signal classification, image recognition, speech recognition and optimization. Electronic, optical and hybrid implementations of neural networks are discussed.

Course Contents:

1. Introduction *2.* Preliminaries *3.* Applications to Combinatorial Search Problems *4.* Associative Memories *5.* Content Addressable Memories *6.* Discussion of Course Simulator *7.* Neural Network Performance *8.* Introduction to Learning *9.* Learning Algorithms and Some Applications 10. Introduction to Adaptive Resonance Theory 11. Silicon Neural Network Implementation 12. Optical Neural Network Implementation 13. Current Research Interests in Neural Nets

Course Materials:

- Six VHS Cassettes of lectures & copies of the lecture notes.
- An extensive forty-page bibliography of artificial neural network publications.
- A floppy disk including:
  - a neural network simulator for MS-DOS.
  - an ASC file of the bibliography.

- Copies of the following papers are also included: *"Neural networks for solving combinatorial search problems: a tutorial", "Geometrical interpretation of Hopfield's content addressable memory neural network", "Synchronous versus asynchronous behaviour of Hopfield's content addressable memory", "A performance analysis of associative memories with nonlinearities in the correlation domain", "Homogeneous and layered alternating projection neural networks", "Optical processor architectures for alternating projection neural networks"and "An artificial neural network for spatio-temporal bipolar patterns".*

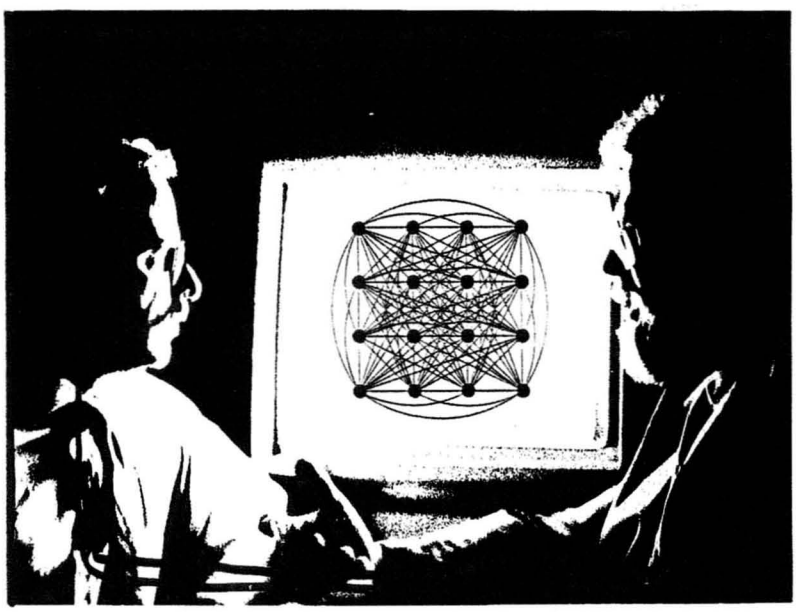
Instructors:

Les E. Atlas is an Associate Professor of Electrical Engineering at the University of Washington. His research interests include speech processing, auditory system processing and real time signal processor design. Dr. Atlas was recently involved in the restoration of voice transmissions from Korean Air flight 007. His work in neural networks is supported by a National Science Foundation Presidential Young Investigator's Award and, more recently, by the Washington Technology Center.

Robert J. Marks II is a Professor in the Department of Electrical Engineering at the University of Washington, Seattle. Prof. Marks is Chair of *the IEEE Circuits & Systems Society Technical Committee on Neural Systems & Applications* and has served as Chairman pro tem and Secretary of the *IEEE Neural Networks Committee.* This committee is responsible for coordination of the annual *International Conference on Neural Networks* which is the largest attended conference in the world on the topic. In 1984, he was presented with an *IEEE Centennial Medal.* He is a Senior Member of IEEE. He was a co-founder and first President of the *Puget Sound Section of the Optical Society of America* and was recently elected that organization's first honorary member. Dr. Marks has over eighty archival journal and proceedings publications in the areas of detection theory, signal recovery, optical computing and artificial neural processing. His research in artificial neural networks is in the areas of algorithmic development and optical & electronic implementation.

Purchase Information:

Cost (six videocassettes, simulator software, course notes, and reprints): $1250. One month rentals are $500. A preview of the course (the first tape in the series) can be purchased for $75. The price (and the first videocassette) will be deducted if the course is purchased at a later date. Contact Joan O'Brien, Televised Instruction in Engineering Director, University of Washington, FH-10, Seattle, Washington 98195 or phone (206) 545-2242. Please include check or purchase order made out to College of Engineering, University of Washington.



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