

The American University

College of Arts and Sciences

Department of Computer Science and Information Systems

Fall 2001

CSIS-550 The History of Computing

Tuesday, 5:30 to 8:00,

Thomas J. Bergin, PhD

Office: Clark Hall 118 (202)885-3863 tbergin@american.edu

Office Hours: Monday and Tuesday, 2 to 5 PM

DESCRIPTION AND PURPOSE

This course examines the evolution of computers and information systems, from the abacus to the microcomputer. Students will examine the evolution of computing machinery, software, programming languages, and be introduced to important men and women in the history of computing. Class discussions will put the development of computing into an historical context.

COURSE OBJECTIVES

1. To gain an understanding of how computing and information hardware and software evolved, and the "great ideas" in this evolution.

2. To study some of the major technological milestones and examine the lives of some of the more significant men and women in the history of information and computing.
3. To put the evolution of computers in historical context.
4. To gain some experience doing historical research.
5. To provide a basis for assessing the future of computing and information systems based on a fuller understanding of the past.

METHOD OF INSTRUCTION

As appropriate for a CSIS elective, most classes will be a mixture of lecture, videos, class discussions, and hands on activities. Class members should read assignments before each lecture; the reading of additional material is strongly encouraged. Outside speakers will be invited to discuss their experiences; Students are strongly recommended to visit the Smithsonian's **Information Age** exhibit.

Additional material is at www.computinghistorymuseum.org. Students are encouraged to explore this site.

COURSE REQUIREMENTS:

Note: all projects must be submitted in paper and machine form so that they can be put on the course/Sloan Research web page.

Biography Paper: will examine the life and contributions of a significant person in the evolution of computing, such as

Charles Babbage, Ada Augusta Byron, Herman Hollerith, Alan Turing, etc.

Papers may focus on people active in the 1950s and 1960s when you can find them! Papers should focus on an individual's contributions, and/or the process of invention/discovery/service.

Note: an excellent starting point is Robert Slater, *Portraits in Silicon*, The MIT Press, 1987. See also: J.A.N. Lee, *Computer Pioneers*, IEEE Computer Society Press, 1995.

Period Papers: will examine an assigned set of years (such as 1974 to 1976) in the periodical literature and identify the major activities in the computing *industry* for each year. Minimum research should encompass *Datamation* and *Computerworld*; a research summary will be presented to the class. A new section of the Computing History Museum's Web Site will be devoted to a time line of computing based on the literature; student projects will contribute to this effort.

Technology Project (GRADUATE STUDENTS ONLY): will examine a significant technological development, such as processors, mass storage, operating systems, computer languages, etc. Papers will trace the development from its origins to the present. Students may also trace a specific application within an organization active in using a computer before 1980. **Topics must be approved by the instructor**, and will be presented to the class.

Proposals must identify (a) the topic, (b) the methodology to be used, (c) your research schedule, (d) sources already consulted (with appropriate comments), (e) additional sources or activities planned, and (f) the relevance of the topic to the history of computing (why it is of interest to you and the class)

GRADING:

	U/G	Grad
Midterm Examination (take home)	40%	20%
Biography project	30%	15%
Period paper & presentation	30%	15%

Technology project

n/a 50%

NOTE: late materials will be penalized a letter grade for each class period that they are late.

REQUIRED READING:

Michael Williams, *A History of Computing Technology*, Second Edition, IEEE Computer Society, 1997

Additional readings are in a binder, on reserve in Bender Library

RECOMMENDED READINGS: (professor has multiple copies)

William Aspray, et al, *Computing Before Computers*, Iowa State University Press, 1990 (*supplied on loan, by request*)

Thomas J. Bergin, ed., *50 Years of Army Computing: From ENIAC to MSRC*, September 2000, ARL SR-93

Paul Ceruzzi, *Reckoners, The Prehistory of the Digital Computer, from Relays to the Stored Program Concept, 1935-1945*, Greenwood Press, 1983 (*supplied on loan, by request*)

Clark Mollenhoff, *Atanasoff, Forgotten Father of the Computer*, Iowa State University Press, 1988 (*supplied on loan, by request*)

Jamie Parker Pearson, ed., *Digital At Work, Snapshots from the first thirty five years*, Digital Equipment Corporation, 1992 (*supplied on loan, by request*)

IEEE Annals of the History of Computing

The Annals the principal scholarly publication in computing history. Everyone should spend some time exploring the Annals. Please note that ***Dr. Bergin is the Editor-in-Chief of the Annals.***

What constitutes history is relative! This is nowhere more obvious than when one looks at old issues of Datamation, Infosystems, Computerworld, or other periodicals and journals. Although there are articles labeled "history of computing" which would be of interest to a student in this class, there are also articles of historical significance, i.e., written long enough ago to provide insight into what things were like at that time. Indeed, almost everything in a 1960s, 1970s, or 1980s periodical has historical significance! In addition, the advertising of the period provides significant insight into what was new in hardware and software at the time. The same can be said about articles discussing "new" hardware, software, and applications!

students are strongly encouraged to view the PBS video series: ***The Machine That Changed the World***, which is available in the non-print media section of the library. Additional videos will be found on the [web site](#).

WRITING QUALITY:

Written materials will be judged with respect to writing quality as well as technical accuracy. Papers are expected to meet or exceed accepted undergraduate writing standards.

Questions on the use of outside materials should be referred to the instructor. Students are encouraged to acquire and use a "writer's guide" during the course, such as Turabian's *A Manual for Writers of Term Papers, Theses, and Dissertations*.

PLAGIARISM:

Plagiarism is defined as taking the language, ideas, or thoughts of another, and representing them as your own. If you use someone's ideas, cite them; if you use someone's words, clearly mark them as a quotation. Plagiarism includes using another's computer programs and procedures. All instances of plagiarism will be reported to the Dean of the College of Arts and Sciences for appropriate action.

CLASS SCHEDULE:

8/28 Introduction and "Numeration"

An explanation of the purpose and focus of the course, discussion of the syllabus and requirements; the concepts of numbers and numeration.

Reading: Williams: Preface, 1

9/4 The Preconditions for Computing

A discussion of the major counting, computing, and record keeping antecedents of modern computers: abacus, logarithms, slide rule, and Napier's bones as well as the efforts of Schickard, Pascal, and Leibnitz.

Reading: Williams: 2 & 3 (to 3.6)

Gardner: "The Soul of an Old Machine," *Discover*, May 1985.

Lab: creating and using the slide rule

9/11 Charles Babbage; Analog Computers

An examination of the machines of Charles Babbage, and the development of sophisticated analog computing devices.

Readings: Williams: 4 & 5 *Museum: figure wheel*

9/18 Joseph Jacquard and Herman Hollerith

An examination of the development of punched cards, electronic accounting machines and the start of an industry.

Reading: Biles, et al, "Herman Hollerith: Inventor, Manager, Entrepreneur --A Centennial Remembrance," *Journal of Management*, Vol. 15, No. 4, 1989

Keith Reid-Green, "The History of Census Tabulation," *Scientific American*, February 1989.

Lab: interpreting punched cards *Museum: IBM 029 Key Punch*

9/25 Office Appliances and the Mechanical Office

An examination of the evolution of commercial adding machines and typewriters, as well as their information-bearing cousins: the teletype, telephone and the wireless!

Lab: early adding, calculating, and typing devices.

Note: the lab will be in Clark 100 (pending schedule).

Video: (if time available) The Telephone (PBS)

Reading: Williams, Chapter 3.6

10/2 Relay Calculators and Mechanical Monstrosities

An examination of the work of Stibitz, Zuse, Aiken, and IBM. A discussion of early efforts to use mechanical devices.

Reading: Williams: 5, 6; Slater: Zuse, Aiken

Video: *Computer Pioneers and Pioneer Computers*, TCM#1

10/9 Fall Break

10/16 Electronic Calculators

A discussion of the work of John Atanasoff at Iowa State, and Mauchly and Eckert at the University of Pennsylvania.

Reading: Williams: 7

Video: *The Machine that Changed the World: "Giant Brains"*

Graduate Students: Research Proposal is DUE

10/23 Early Stored Program Computers: EDVAC, EDSAC, Whirlwind,

IAS, the Defense Calculator (IBM 650)

The evolution of the stored program concept and the computers of the Azeroth@ generation.

Reading: Williams: 8

Video: *Computer Pioneers and Pioneer Computers*, TCM#2

Graduate Students must discuss research projects during office hours or by making other arrangements.

10/30 "Mainframe" Computers: Birth of an Industry

The development of the commercial computer industry, early machines and the early entrepreneurs.

Readings: Williams, Chapters 8 & 9

Video: *Machine that....: "Inventing the Future"*

Biography papers DUE

11/6 The Transistor and "Mini"-computers

This lecture will focus on the growth of the Digital Equipment Corporation and the PDP line of minicomputers as an example of the "minicomputer era".

Readings: Pearson, *Digital At Work*

Video: Transistorized (PBS, Digital Equipment Corporation)

11/13 The Growth of the Information Industry

Class members will present their period reports, identifying major contributions and contributors to the growth of the computer industry. (Estimated time: 10 minutes each)

NOTE: written Period Reports are DUE (paper and diskette)

Video (if time permits): Big Dream, Small Screen (PBS)

11/20 The Growth of the Information Industry (continued)

Video (if time permits): Big Dream, Small Screen (PBS)

Graduate research DRAFT papers are DUE

11/27 Microcomputers, Microcomputers, Microcomputers!!!

Since most class members are familiar with microcomputers, we will watch a lengthy video on their evolution and the growth of the industry.

Video: *Triumph of the Nerds: An Irreverant History of the PC Industry*, 3 parts.

12/4 The Internet and the World Wide Web

Video: *Nerds 2.01, A Brief History of the Internet* (3 parts)

12/11 Fall Study Days: no classes

NOTE: RESEARCH PAPERS ARE DUE (paper and diskette)

12/18 Final Exam Period: Presentation of Graduate Research

Supplemental Reading List

Charles Bashe, Lyle Johnson, John Palmer, Emerson Pugh,

IBM's Early Computers, The MIT Press, 1986.

C. Gordon Bell, J. Craig Mudge, John E. McNamara, *Computer Engineering: A DEC View of Hardware Systems Design*, Digital Press, 1978.

Thomas Bergin and Richard Gibson, *History of Programming Languages*, ACM Press, 1996

J. David Bolter, *Turing's Man, Western Culture in the Computer Age*, The University of North Carolina Press, 1984.

Freiberger and Swaine, *Fire in the Valley: The Making of the Personal Computer*, Osborne/McGraw-Hill, 1984.

Herman H. Goldstine, *The Computer, from Pascal to von Neumann*, Princeton University Press, 1972. (2nd ed. 1996?)

Tracy Kidder, *The Soul of a New Machine*, Atlantic-Little Brown, 1981.

Susan Lammers, *Programmers at Work*, Microsoft Press, 1986.

James L. McKenney, *Waves of Change, Business Evolution through Information Technology*, Harvard Business School Press, 1995.

N. Metropolis, J. Howlett, Gian-Carlo Rota, *A History of Computing in the Twentieth Century*, Academic Press, 1980.

Emerson W. Pugh, *Memories That Shaped an Industry, Decisions Leading to IBM System/360*, The MIT Press, 1984.

Kent C. Redmond, Thomas M. Smith, *Project Whirlwind, The History of a Pioneer Computer*, Digital Press, 1980.

Nancy Stern, *From ENIAC to UNIVAC: An Appraisal of the*

Eckert-Mauchly Computers, Digital Press, 1981.

Richard L. Wexelblat, *History of Programming Languages*, Academic Press, 1981.

Maurice Wilkes, *Memoirs of a Computer Pioneer*, The MIT Press, 1985.