A

RESEARCH and EDUCATION

RESUME

March 1983

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EDUCATION AND RESEARCH
IN
COMPUTER SCIENCE

A
Resume

KANSAS STATE UNIVERSITY

Kansas State University, Manhattan, Kansas, is the oldest land-grant college in the United States. It has grown from 52 students enrolled on September 2, 1863 to more than 19,000 full-time students in 1983 to become one of the major educational institutions in America. K-State is fully accredited by the North Central Association of Colleges.

Launched primarily as an agricultural school, K-State has evolved into an important scientific and cultural University. Its primary thrust is still in the field of Agricultural Education and Research and KSU is known internationally for its contributions to crop and animal science and to agricultural economics and engineering. The University is also renowned for its contributions to the applied sciences and the majority of KSU students seek degrees in the disciplines of the applied sciences.

The University awards degrees of Bachelor of Arts, Science, Architecture and Music; Master of Arts, Science, Business Administration, Landscape Architecture, Music and Regional/Community Planning; and Doctor of Philosophy in 33 fields of study including Doctor of Veterinary Medicine. There are 61 academic departments on the campus and a Division of Continuing Education extends the University's educational services to more than 10,000 off-campus students. The KSU Agricultural Experiment Station conducts research on more than 7,000 acres of crop and grass lands in support of the University's training and research programs. In cooperation with the Atomic Energy Commission, the University operates one of the major facilities for accelerating atomic particles. The Nuclear Engineering Department operates a TRIGA MKII nuclear reactor.

The 153-acre campus is located at Manhattan, Kansas, a city of 30,000 people. The city is located 120 miles west of Kansas City, Missouri, on the Kansas River, and 14 miles from the historic military reservation of Fort Riley. Access to Manhattan may be by Air Midwest and Capitol Air Lines out of Kansas City International Airport or by car, Interstate Highway 70, 8 miles south of the city. Popular motels are located in the city and provide national standard and deluxe accommodations for visitors.

DEPARTMENT OF COMPUTER SCIENCE

The Computer Science Department, College of Arts and Sciences is in its second decade of service to the University. Since 1972, the department has offered a degree of Doctor of Philosophy. In support of that offering, the department has become increasingly active in Computer Science research and has built a dynamic research facility of hardware and people. Teaching, however, remains the department's primary objective and a full undergraduate computer science curriculum is offered to the University students. In addition, the department provides a number of off-campus courses to both undergraduate and graduate students at a number of locations. Off-campus teaching includes Old Trooper University at Ft. Riley, Kansas, and Command and General Staff College at Ft. Leavenworth, Kansas. A summer Computer Science graduate program brings 70 Western Electric professionals to campus each summer.

The department has 13 full-time faculty (12 with Ph.D.), and 3 part-time faculty joint with the University Computing Center, and 45 graduate assistants. In addition, 15 faculty at the University of Kansas are adjunct in the Ph.D. program. Currently, there are 600+ undergraduate majors, 150 Master's Degree students and 10 Ph.D. students enrolled on campus. At Ft. Leavenworth, there are some 10 additional Master of Science students enrolled in the joint KSU-CGSC program.

The Ph.D. program in Computer Science is offered jointly by KSU and the University of Kansas at Lawrence, Kansas. Although each University awards the Ph.D. degree to its respective students, the joint arrangement makes the facilities, hardware, and personnel of both institutions available to students. In line with the founding philosophy of land-grant colleges, the thrust of effort at K-State is toward applied computer sciences. The thrust at the University of Kansas is toward formal theory of computer science. Accordingly, the research at KSU has been oriented towards practical and applied computing systems.

RESEARCH
COMPUTER SCIENCE DEPARTMENT, KSU

DR. VIRGIL WALLENTINE, PROFESSOR AND HEAD

Overview

The department supports faculty research and development activities as central to a strong graduate program. Faculty specialties include language and compiler design, operating systems techniques, computer architecture, software engineering, artificial intelligence, data management systems, computer graphics, expert systems, and computer systems simulation and evaluation. The department offers a strong graduate emphasis in the area of software engineering which includes the design, management and documentation of large software projects. Recent emphasis has centered on computer networks, network interfaces, network operating systems, and distributed computing software. This emphasis is in reaction to the expanding use of minicomputers and microcomputers in information processing systems and the proliferation of software problems attendant thereto.

Research is conducted primarily by faculty members assisted by graduate students. Significant research is done by Ph.D. candidates under supervision of the faculty. Facilities available in support of research include the University Computing Center, the Department Computer Laboratory, the University of Kansas Computing Facility and the University library.

The department's capabilities to support research are growing each year. The scope of capabilities is best illustrated by this partial list of graduate courses currently offered:

Artificial Intelligence
Computer Graphics and Image Processing
Computer Networks
Computer Systems Simulation
Data Base Management Systems
Expert Systems
Microcomputer Programming and Applications
Minicomputer Systems
Office Automation
Operating Systems
Software Engineering
Theory of Parsing
Translator Design

Extramural Funding

The Department of Computer Science has an established program of support from private industry and the Federal Government dating back to 1974. Since 1977, the extramural support for research in the Department totals more than one million dollars. Projects for the Federal

Government include portable operating systems for small systems, quality control in software engineering, computer network software, and data base management systems. Projects from private industry include network operating systems, compiler construction, high-level language computer architecture, data base management machine architecture, computer network performance evaluation, and distributed processing.

Current Research Directions

Research in the Department of Computer Science is aimed at providing computer systems and applications which are state-of-the-art in support of human problem solving and in utilization of high technology hardware. These areas include distributed systems architecture, office automation, fifth-generation systems, computer programming languages, and computer education for rural America. Some of the projects currently underway are listed below.

Work in the area of distributed processing systems includes a network operating system and its distributed programming environment under the direction of Dr. Wallentine. Dr. Paul Fisher is directing research into parallel processing of conventional programming languages on concurrent architectures. Dr. Fisher is also working in the areas of structuring and moving data bases and understanding information systems. Dr. Beth Unger is directing research into an integrated data-object approach to distributed data management systems. Dr. Richard McBride is conducting research into formal models of computer network protocols and distributed processing algorithms.

Work in office automation includes the research of Dr. Richard McBride who is working on "forms" as the basic entity that is represented in the computer and on the screen for work in the office of the future. Office automation research at KSU also encapsulates use of the CODASYL Common Operating System Command Lanugage as an intermediate level implementation tool in the office of the future. This work is being jointly carried out by Drs. Wallentine and McBride.

Work on fifth-generation computing systems includes the development of an expert planning system capable of general application. The first application of this system will be in a student advising and laboratory instructional environment. This work and other artificial intelligence research, under the direction of Dr. Hartley and Clifford Stark, includes topics such as theorem proving, knowledge representation, and natural language. A second thrust in fifth-generation systems is being directed by Dr. William Hankley and Dr. David Gustafson. This work is concerned with programming language oriented editors which are applied to very sophisticated program development systems. Components of this system include user-oriented tools, program generators, assertion-checkers, and style-checkers which give immediate feedback to the user. Research into user-oriented graphics, software metrics and software testing for fifth-generation software is also being conducted by Drs. Hankley and Gustafson.

Work in programming languages is a central element of any computer science department and all faculty participate in this area. Several specific projects that are currently underway include naturally concurrent languages under Dr. Unger, portability of systems languages (and thus the systems implemented in them) such as Pascal, Simula, and Euclid under the direction of Dr. Wallentine and Dr. Bates, design of concurrent programming languages conducted by Dr. Bates, languages for expert systems under Dr. Hartley and Cliff Stark, user-oriented terminal languages under Dr. Hankley and Dr. Gustafson, and forms editing languages under Dr. McBride.

Computer education for rural America is as important in Kansas as it is across the country. Dr. Roger Terry is an investigator on a grant through the Kellogg Foundation which is attempting to provide the agricultural industry of Kansas with computer education and state-of-the-art business software.

COMPUTING RESOURCES AT KANSAS STATE UNIVERSITY

Computing resources at K-State include the University Computing Center, the Computer Science Department's Computing Laboratory, the University Data Processing Center, remote terminal processing to the facilities of the University of Kansas, and minicomputers located within the Departments of Electrical Engineering, Physics, and Chemistry. Almost from their date of conception, computers have been integral to the applied sciences teaching and research at K-State. Digital computer capabilities have been available at the University since March 1956. The University Computing Center was established in 1957 with an IBM 650 computer. The University's computing facilities have kept pace with the dynamic capabilities of the computing industry.

The Computing Laboratory in the Department of Computer Science

The Computing Laboratory is a facility of the Department of Computer Science and supports research and graduate instructional requirements. The principal facilities of the Lab are minicomputers. The computers can operate individually, in a network and in a link to the NATIONAL 6130 in the Computing Center. The facility permits the investigation and teaching of computer network techniques and the teaching and investigation of computer software in a relatively inexpensive but highly capable hardware environment. The hardware includes:

2 Motorola 68000 systems running UNIX	2	Meg bytes
3 Perkin-Elmer 32 bit systems running UNIX	2.5	Meg bytes
1 PDP 11/34 running UNIX	256K	bytes
3 IBM PCs running VISION operating system	1	Meg bytes
1 APPLE II	64K	bytes
1 ATARI 800	64K	bytes
1 Chromatics	64K	bytes
2 Western Digital Pascal Microengines	256K	bytes
1 Tandem Non-stop II (4 MBytes dual processor)		

The peripheral equipment includes:

50 CRT terminals
1 Stand alone graphics computer
1 Portable printing terminal, T1700
4 Magnetic tape units
1 Color graphics printer
3 Line printers
3 Letter quality printers
5 Graphics printers
Disk subsystems totaling 700 megabytes

The software systems available in the Computer Science Computing Laboratory include:

Pascal
Concurrent Pascal and a concurrent symbolic debugger

UCSD Pascal
Euclid
Concurrent Euclid
FORTRAN
UNIX System V
Berkley UNIX
Simula
BASIC
GKS color graphics
LISP
LOGO
Network software
CSNET
Office automation software
CPM/86
INGRESS data base management
Various micro-processor operating systems
Numerous micro- and minicomputer application programs

The Computing Center

The Computing Center is a service department of the University for the support of the research and instructional needs of the faculty, staff, and students. The principal facility is a NATIONAL 6130 with 8 megabytes of main core and 1,500 megabytes of associated direct access storage. Users can access the computer through a combination of batch service, local terminals and several remote typewriter and card reading terminals.

Operating systems include:

OS/MFT	VM/370

Interactive systems

APL	CMS

Languages

ALGOL-60	LISP 1.5	SPITBOL	RPG II
BAL	PL/1	WATBOL	WPASCAL
COBOL	PL/C	WATFIV	WBASIC
FORTRAN	SNOBOL4	PASCAL	

Applications

BMD	GPSS	SPSS
CSMP	MPS/360	SAS
FORMAC	NEATER2	SURFACE2

DBMS

Total
IDMS
S2000

Other University Facilities

The other facilities at K-State include several NOVA computers and a VAX in the Department of Electrical Engineering, and several PDP minicomputers in the Departments of Physics, Chemistry, Psychology, Biochemistry, Ag Engineering and Chemical Engineering. The computers support computing requirements of these departments and can support computer science needs on an infrequent basis. The University Data Processing Center operates an IBM 4341 to support the University administrative data requirements. This facility is available to support computer science needs on an infrequent basis.

Remote Facilities

Through dial-up telephone service, the University of Kansas main computer is available. The main computer is a Honeywell DPS 3/E with 768K (words) of memory. The full set of the common high-level languages is available to KSU users as are numerous application program packages.

Revised 4/83

KANSAS STATE UNIVERSITY

GUIDE TO REQUIREMENTS

FOR

MAJORS IN COMPUTER SCIENCE & INFORMATION SYSTEMS

To major in computer science or information systems you must meet the general requirements of the University, the requirements of the College of Arts and Sciences, and the requirements of the Department of Computer Science (all of which are listed in the General Catalog). The requirements for the BS and BA degrees are outlined on the sample curriculum guide check sheets. An up-to-date copy of the curriculum guide should be kept in your folder in the CS office for use during advising. Please update your guide form when you pick up your enrollment permit and take the updated version with you when you see your advisor. Please return it to the CS office - Fairchild 121 after you have been advised!

Figure 1.

CS MAJOR REQUIREMENTS

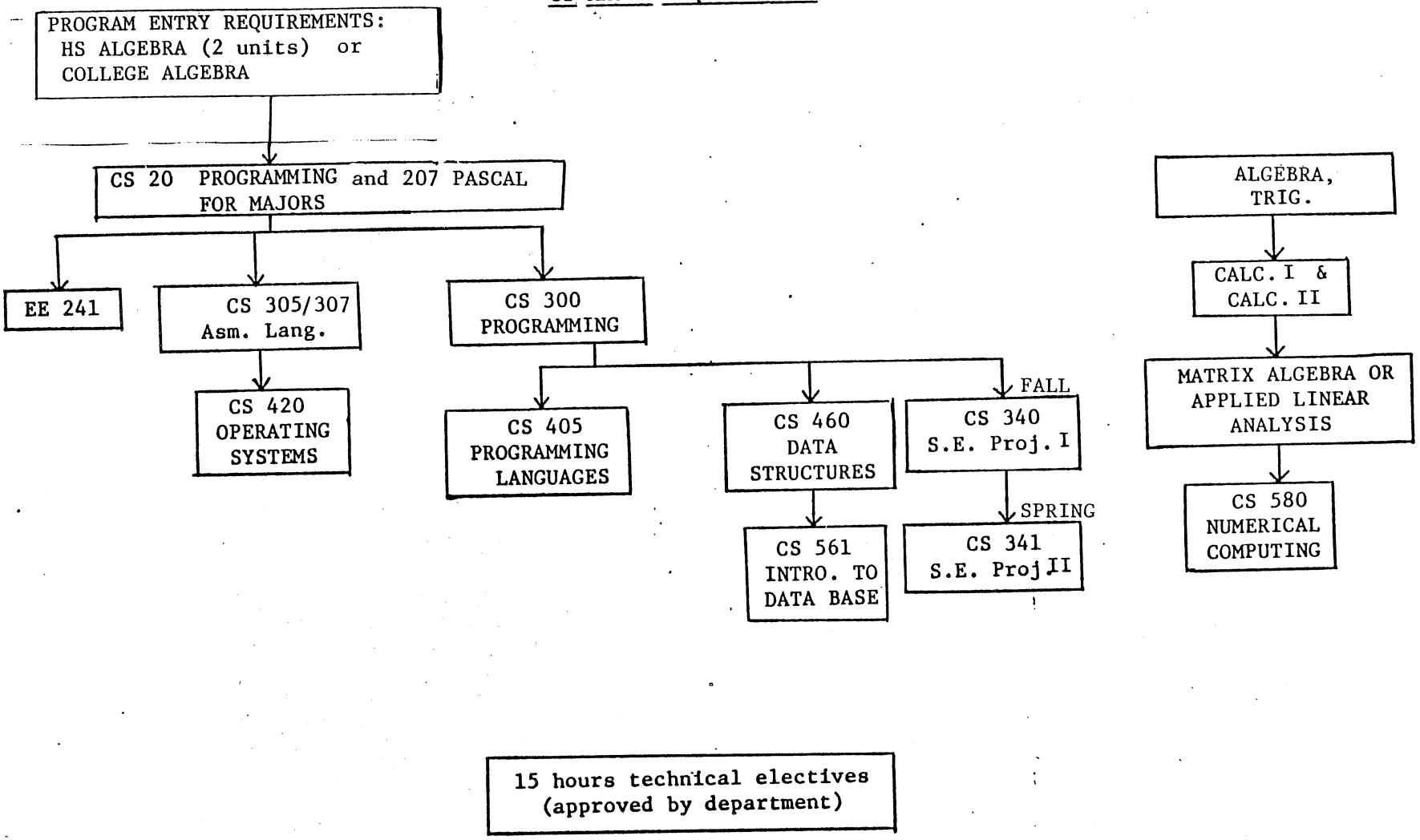
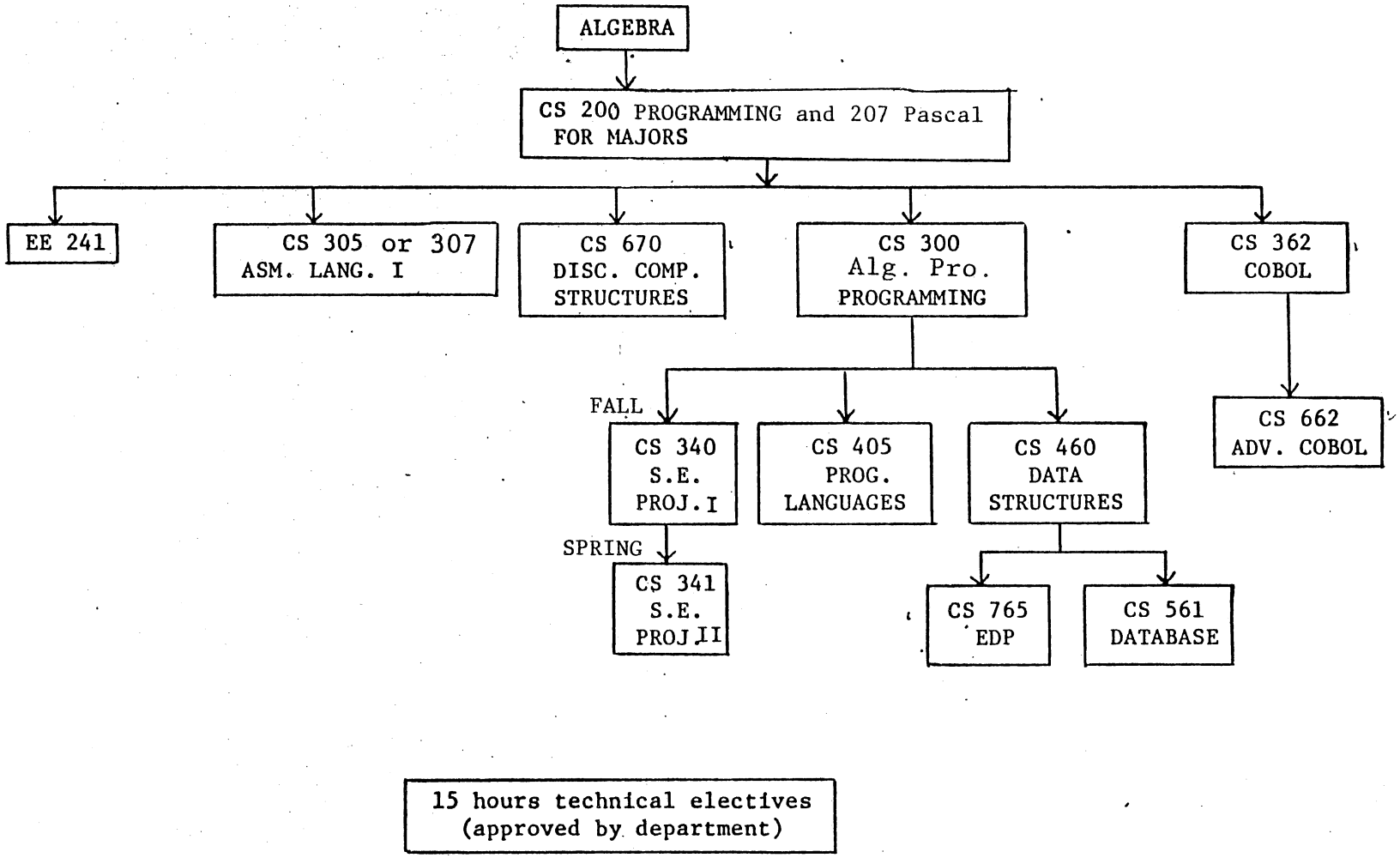


Figure 2.
INFORMATION SYSTEMS REQUIREMENTS



Name _____

Address _____

Entrance date _____ S.S. # _____

KANSAS STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

CURRICULUM AND GRADUATION REQUIREMENT GUIDE

BACHELOR OF SCIENCE DEGREE

Effective Date: August 1981

Curriculum _____

TRANSFER CREDITS PRESENTED

College or University	Sem. Hrs.

Credit which has been transferred to KSU but not definitely assigned at this time:

Only ½ of the hours required for a KSU degree can be applied from a two-year college.

GRADUATION REQUIREMENTS	
TOTAL hours required	120
KSU graded hours attempted	
Overall KSU G.P.A.	
KSU hours of F	
KSU graded hrs. applied	
KSU non-graded hrs. applied	
Transfer credit hrs. applied	
REMAINING HOURS	

ELECTIVES

REMEMBER--You must file an Application for Graduation Clearance with your Dean's Office during the first 4 weeks of the semester in which you expect to graduate.

If you do not graduate as scheduled you must submit a new Application for Graduation Clearance for a subsequent semester.

You must earn a grade point average of at least 2.0 on all KSU resident graded hours applied toward your degree.

If you have any questions concerning any of the requirements, see your advisor or Dean.

DATE _____

MAJOR

COMPUTER SCIENCE (CS)
INFORMATION SYSTEMS (IS)

Courses for CS degree:		
(CS) Anal.Geom.& Calc.I	M220	4
(CS) Anal.Geom.& Calc.II	M221	4
(CS) App. Matrix Theory	M551	3
or		
(CS) Elem.of Appl.Lin.Anal.	M224	3
(CS) Numerical Comp.	580	3

Courses for BOTH majors:		
Fund. of Comp. Prog.	200	2
PASCAL	207	2
Intro. to Comp. Eng.	241	3
Algorithmic Proc.	300	3
Comp. Org. & Prog. I	305/307	3
Software Eng. Proj. I	340	2
Software Eng. Proj. II	341	2
Intro. to Prog. Lang.	405	3
Oper. Systems I	420	3
Data Structures	460	3
Intro. Data Mgmt. Sys.	561	3

Courses for IS degree:		
(IS) Int. Bus. Prog.	362	3
(IS) Bus. Data Pro.	662	3
(IS) Dis. Structures	670	3
(IS) Sys. Analysis	765	3

Plus 15 hours technical electives approved by advisor.

BASIC REQUIREMENTS

SEE CURRENT LISTING FOR COURSES THAT FULFILL REQUIREMENTS.

	Sem. Hrs.
English Comp I	(3)
English Comp II	(3)
Oral Communications	(2-3)
Concepts PE	(1)
Humanities: 4 courses	(11)
1. Fine Arts	
2. Philosophy	
3. Western Heritage	
4. Literary or Rhetorical Arts	
Social Sciences: 4 courses	(12)
1.	
2.	
3.	
4.	
Natural Sciences: 4 courses	(14)
1. Life Science with Lab	
2. Physical Science with Lab	
3. Life or Physical Science	
4. Course with prerequisite in same department.	
Quantitative: Select 1, 2 or 3	
1. Three courses (9) from mathematics, statistics, computer science, philosophy:	
2. One of the following courses: Gen. Physics I, Quantitative Anal. in Geog., Methods of Social Research, Intermediate Quant. Meth. (Soc)	
And its Level II prerequisite:	
3. One Level III course, or two Level II courses.	
International Overlay: 1 course	

Name _____

Address _____

Entrance date _____ S.S. # _____

KANSAS STATE UNIVERSITY

College of Arts and Sciences

CURRICULUM AND GRADUATION REQUIREMENT GUIDE

BACHELOR OF ARTS DEGREE

Effective Date: August 1981

Curriculum _____

TRANSFER CREDITS PRESENTED

College or University	Sem. Hrs.	Credit which has been transferred to KSU but not definitely assigned at this time:

Only ½ of the hours required for a KSU degree can be applied from a two-year college.

GRADUATION REQUIREMENTS	
TOTAL hours required	120
KSU graded hours attempted	
Overall KSU G.P.A.	
KSU hours of F	
KSU graded hrs. applied	
KSU non-graded hrs. applied	
Transfer credit hrs. applied	
REMAINING HOURS	

ELECTIVES

REMEMBER—You must file an Application for Graduation Clearance with your Dean's Office during the first 4 weeks of the semester in which you expect to graduate.

If you do not graduate as scheduled you must submit a new Application for Graduation Clearance for a subsequent semester.

You must earn a grade point average of at least 2.0 on all KSU resident graded hours applied toward your degree.

If you have any questions concerning any of the requirements, see your advisor or Dean.

DATE _____

COMPUTER SCIENCE (CS) INFORMATION SYSTEMS (IS)

Courses for CS degree:		
(CS) Anal.Geom.& Calc.I	M220	4
(CS) Anal.Geom.& Calc.II	M221	4
(CS) App. Matrix Theory	M551	3
or		
(CS) Elem.of Appl.Lin.Anal.	M224	3
(CS) Numerical Comp.	580	3
Courses for BOTH majors:		
Fund. of Comp. Prog.	200	2
PASCAL	207	2
Intro. to Comp. Eng.	241	3
Algorithmic Proc.	300	3
Comp. Org. & Prog. I	305/307	3
Software Eng. Proj. I	340	2
Software Eng. Proj. II	341	2
Intro. to Prog. Lang.	405	3
Oper. Systems I	420	3
Data Structures	460	3
Intro. Data Mgmt. Sys.	561	3
Courses for IS degree:		
(IS) Int. Bus. Prog.	362	3
(IS) Bus. Data Pro.	662	3
(IS) Dis. Structures	670	3
(IS) Sys. Analysis	765	3

Plus 15 hours technical electives approved by advisor.

BASIC REQUIREMENTS

SEE CURRENT LISTING FOR COURSES THAT FULFIL REQUIREMENTS.

	Sem. Hrs.
English Comp I	(3)
English Comp II	(3)
Oral Communications	(2-3)
Concepts PE	(1)
Foreign Language: 4 courses	(15)
1.	
2.	
3.	
4.	
Math: 1 course	(3)
Humanities: 4 courses	(12)
1. Fine Arts	
2. Philosophy	
3. Western Heritage	
4. Literary or Rhetorical Arts	
Social Sciences: 4 courses	(12)
1.	
2.	
3.	
4.	
Natural Sciences: 3 courses	(11)
1. Life Science with Lab	
2. Physical Science with Lab	
3. Life or Physical Science	
International Overlay: 1 course	

LIST OF COURSES THAT FULFILL DEGREE REQUIREMENTS

AS OF JANUARY 1983

English Composition I and II
Oral Communications I (or Argumentation and Debate, or Public Speaking as recommended by Department of Speech)
Concepts of Physical Education

Humanities: 4 courses 11 hours minimum

Up to 2 courses from a single department may be used to fulfill the distribution requirements set forth in this section. They may be used at the same time to count toward the major. No course may be used to satisfy more than one specific requirement in this section. Only courses taken for 2 or more credit hours satisfy these requirements, and courses in excess of 5 credit hours count as 2 courses.

1. Fine Arts:
   - Art technique courses 200-799 or art history courses
   - Dance technique courses 323, 324, 325, 326
   - History of Dance 459
   - Music Styles I 175, and II 176
   - Music history and literature 200-799
   - Applied music 252-799
   - Theater 260-799
   - Dance as an Art Form 205

2. Philosophy — any course except:
   Intro. Formal Logic 110, Symbolic Logic I 220, Comparative Religion 310, Symbolic Logic II 510

3. Western Heritage
   - History courses in Greco-Roman, Western European or North American fields (refer to 5-81memo)
   - Women's Studies, Intro. 105 & Sr. Seminar 405
   - Humanities (English)
     Classical Cultures 230, Medieval & Renaissance 231, Baroque & Enlightenment 233, Modern 234
   - Modern Languages
     French Civilization 514, German Civilization 530, Spanish Civilization 565, Hispanic-American Civilization 566
   - Constitutional Law (Political Science)
     Defendant's Rights 713, Constitutional Law I 714, Constitutional Law II 715, Discrimination & the Law 716, Pro-Seminar in Political Science 799
   - Political Thought
     Intro. 301, Classical to 16th Century 761, Since 16th Century 763, American 767, Modern 771, Religion 775, Development of Social Thought (Sociology) 709

4. Literary or Rhetorical Arts
   - Literature or Creative Writing courses offered by English Department except Fiction into Film 220 and Literature & Film 520 (refer to 5-81 memo)
   - Modern Languages — literature courses including literature in translation offered by the Department (refer to 5-81 memo)
   - Speech
     Intro. to Oral Rhetorical Study 330, Seminar in General Semantics 720, History of American Public Address 725, Rhetorical Theory and Criticism 730, Medieval & Renaissance Rhetoric 731, Modern Rhetoric 732
   - Theater
     Playwriting 562, Early American 764, Greek 770, Roman, Medieval & Baroque 771, Romantic 772, Modern European 773, Avant-Garde 774, Slavic 776,

BS Degree only: Two courses in one foreign language will satisfy the requirements of 3 and 4.

Social Sciences: 4 courses from 3 disciplines
12 hours minimum

Up to 2 courses from a single department may be used to fulfill the distribution requirements set forth in this section. They may be used at the same time to count toward the major.

One course must be 500-799 level or carry a prerequisite in the same department.

At least 3 of the 4 courses must be from the following:
Psychology, Sociology, Cultural Anthropology (including Archaeology), Economics, Political Science, History, Geography (except Environmental I 220 and II 221)

The 4th course must be from 1 of the above or from the following:
- Women's Studies, Intro. 105 and Senior Sem. 405
- Physical Education
  Soc. Dimensions 340 or Motor Dev. & Learning 320
- Linguistics (Speech) except:
  Manual Communications 400,
  General Phonetics 681
- Speech
  Analysis of Experimental Research Literature in Speech 320, Nonverbal Communication 622, Communication Research Methods 721, Sem. in Persuasion 726
- Journalism & Mass Communications
  Survey of Mass Media 235, Black Press in America 645, History of Journalism 660, Law of Mass Communications 665, The Mass Communicator: Ethics & Issues 685
- Radio & Television
  History of Broadcasting 660 or Radio-Television Criticism 675

Natural Sciences: BS Degree = 4 courses 14 hrs. minimum
BA Degree = 3 courses 11 hrs. minimum

Courses that fulfill this requirement may be used at the same time to count toward the major. No course may be used to satisfy more than one specific requirement in this section. Only courses taken for 2 or more credit hours satisfy these requirements, and courses in excess of five credit hours count as two courses.

1. A Life Science with Lab
2. A Physical Science with Lab
3. A Life or Physical Science

   Life Sciences: Biology, Biochemistry, Paleobiology I (Geology) 580, Paleobiology II (Geology) 581, Paleoecology 704, Intro. Physical Anthropology 280, 281, Fossil Man and Human Evolution 688, Primatology 691, Osteology 694, Osteology Lab 695

   Physical Sciences: Physics, Chemistry, Environmental Geography I 220 and II 221 only, Geology except for Paleobiology I 580 and II 581, Paleoecology 704

4. BS Degree only: One course (3 credit hour minimum) with a prerequisite in the same department chosen from the following: Life or Physical Sciences listed in #3, Biochemistry courses with a chemistry prerequisite, Physical Education — Kinesiology 330, Physiology of Exercise 335, Psychology — Fundamentals of Perception & Sensation 480, Comparative Psychology 616.

List of courses continued on other side.

Quantitative and Abstract Formal Reasoning: BS only
Courses used for this requirement may also satisfy any major requirement for which it qualifies.

Select one of the following three options:

1. Three courses from:
   Mathematics, Statistics, Computer Science 200-799, Philosophy -- Intro. Formal Logic 110, Symbolic Logic I 220, Symbolic Logic II 510 only

   It is not necessary to take all 3 courses from a single department.

2. One of the following pairs:
   General Physics I 113 and Trigonometry 150
   Quantitative Analysis in Geography 700 and Stat. I level course
   Methods in Social Research 520 and Stat. I level course
   Intermediate Quantitative Methods 725 and Stat. I level course
   Measurement and Evaluation in PE 710 and Stat. I level course

3. Level II: 2 courses
   Mathematics -- Elementary Cryptanalysis 120, College Algebra & Trig. 125, Plane Trig. 150, Precalculus Mathematics 170, General Calculus & Linear Algebra 205
   Statistics -- Elements of Stat. 320, Elementary Statistics for the Social Sciences 330, Biometrics I 340, Business & Econ. Stat. I 350, Statistical Methods for Social Sciences 702, Statistical Methods for Natural Sciences 703
   Philosophy -- Symbolic Logic II 510
   Computer Science -- Fundamentals of Computer Programming 200 and one of the following: Fortran 201, PL/1 202, APL 203, Basic 206, Pascal 207, Fortran/Engg. 211

   -- OR --

   Level III: 1 course
   Mathematics -- Technical Calculus I 210, Analytic Geometry & Calculus I 220, Analytic Geometry & Calculus I-S 225
   Statistics -- Biometrics II 341, Business & Econ. Stat. II 351, Analysis of Variance & Covariance 704, Regression & Correlation Analyses 705
   Philosophy -- Topics in Metalogic 701
   Computer Science -- Algorithmic Processes 300, Computer Organization & Programming I 305

Foreign Language: 4 courses 15 hours BA Degree only
One of the foreign language sequences offered by the Department of Modern Languages or equivalent competency.

Mathematics: 1 course 3 hours BA Degree only
100-799 level course offered by the Department of Mathematics, or any other course for which there is a mathematical prerequisite. Any course used to satisfy this requirement cannot be used to satisfy any other general education requirement.

International Overlay:
This course may also satisfy a requirement in the major, social sciences, or humanities. The 4th course in a single foreign language sequence (other than Latin) will satisfy this requirement.

Anthropology
Intro. Cultural 200, Intro. Cultural Honors 201, Civilizations of South Asia I 505, Civilizations of South Asia II 506, Folk Cultures 507, Male & Female 508, Cultural Ecology & Economy 511, Political Organization in Folk & Nonliterate Cultures 512, Black Cultures of the Americas 536, Cultures of India & Pakistan 545, Culture and Personality 604, Religon in Culture 618, Indians of North America 630, Indian Cultures of South America 634, Precolumbian Civilizations of Mexico & Guatemala 673

Economics
Civilizations of South Asia I 505, Civilizations of South Asia II 506, Capitalism & Socialism 636, International Trade 681, Underdeveloped Countries 682

Geography
World Regional 100, Latin America 620, Europe 640, Soviet Union 650, Australia & New Zealand 670, Hunger 710, World Population Patterns 715

History
Russian Culture & Civilization 250, American Ethnic Roots 321, Gandhi & Indian Revolution 350, History of Hinduism 504, Civilizations of South Asia I 505, Civilizations of South Asia II 506, South Asian History I 507, South Asian History II 508, World War II 514, U.S. & World Affairs 1776--Present 543, U.S. & Soviet Relations since 1917 544, War in 20th Century 545, Colonial Hispanic America 561, Modern Mexico 562, European Diplomatic History to Napoleon 576, European Diplomatic History since Napoleon 577, Russia to 1801 591, Topics Russian History 593, Topics in Non-Western History 598, Russian Revolutions & Soviet System 564

Journalism & Mass Communications
International Communications 670

Management
International Business (Bus. Adm.) 690

Marketing
International Marketing (Bus. Adm.) 644

Modern Languages
Russian Culture & Civ. 250, Russian Lit. in Translation: 19th Century 504, Russian Lit. Translation: Soviet Period 508, Religious Lit. of South Asia 509, Survey Russian Lit. 552

Philosophy
Comparative Religion 310

Political Science
World Politics 333, Civilizations of South Asia I 505, Civilizations of South Asia II 506, Contemporary Chinese Politics 511, Interdependence in International Politics 542, Politics of Developing Nations 545, Latin American Politics 722, South Asian Political Systems 723, Mid. East Political Systems 724, Southeast Asian Political Systems 725, African Political Systems 726, Soviet Political Systems 727, Comparative Security Establishments 728, Admin. in Developing Nations 729, International Relations 741, International Conflict 742, American Foreign Policy 743, International Politics Europe 745, International Law 747, International Defense Strategies 749, International Organization 751, International Politics South Asia 752, International Politics Mid. East 753

Sociology
Civilizations of South Asia I 505, Civilizations of South Asia II 506, Society & Change South Asia 742

TECHNICAL ELECTIVES

The "technical" electives must be a coherent, related set of courses - they sould "hang together" in some way. (However, they do NOT have to be technical in the sense of being hard or scientific or mathematic in nature!) They should be approved by your advisor, who will sign your curriculum guide form after you list the technical electives. They can be all elective computer science courses or they can include courses from related departments (most commonly business, engineering, math and statistics). Sample groups of "technical" elective courses are listed below. Remember, these are just suggestions. You can put together your own technical electives.

Some students plan a strong "minor" area or even a dual major with some other department. Career opportunities are generally favorable for an individual who is knowledgeable in some application field and who can deal with the use of computers in that field.

On the other hand, if you intend to work with computer systems as opposed to applications, you should take several of the core computer science electives. (These are also the core of our MS program.) A strong program of computer science electives will put you in excellent stead for either a career or advance graduate work.

An elementary probability/statistics course is not required, but it is highly recommended for almost any program.

If you intend to do graduate study in computer science, you should take CS 670, Discrete Structures. For study at the PhD level, many schools require a reading knowledge of at least one foreign language. However, K-State does not have this requirement.

AREAS OF TECHNICAL ELECTIVES: (EXAMPLES)

1. Business Electives

   286 306 Operating Systems Laboratory

   286 662 Business Data Processing (COBOL II)

   286 765 EDP Systems Analysis

   305 260 Fundamentals of Accounting

   305 270 Managerial Cost Controls

   (or any course required for a BS in Business)

2. Computer Software Electives (also the core of the MS program)

   286 740 Introduction to Software Engineering

   286 700 Translator Design I

   286 720 Operating Systems II

   286 760 Information Organization and Retrieval

3. Scientific Computing Electives

   245 222 Analytic Geometry and Calculus III

   245 240 Series and Differential Equations

   286 780 Numerical Solution of Ordinary Differential Equations

   286 785 Numerical Solution of Partial Differential Equations

   550 571 Introduction to Operations Research II

   286 710 Computer Simulation Experiments

4. Mini/Micro Computer Systems

   286 658 Microcomputer Programming and Applications

   286 750 Computer Architecture Experiments

   EE 641 Design of Digital Systems

   EE 643 Computer Logic Laboratory

5. Other Areas for Technical Elective Courses

--- dual degree with Electrical Engineering

--- dual degree with Business

--- dual degree with Mathematics

6. Miscellaneous Computer Science Electives

(These do not constitute a "coherent" set of technical electives, but they can be combined with electives from other areas.)

286 670 Discrete Computational Structures (recommended for persons entering graduate studies in Computer Science)

286 690 Implementation Projects (special projects by arrangement with some faculty member)

286 710 Computer Simulation

286 725 Computer Networks

286 736 Computer Graphics

286 735 Artifical Intelligence

PAUL S. FISHER
Professor
Department of Computer Science
Kansas State University
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Education:

1963	BA	Mathematics	University of Utah
1964	MA	Mathematics	University of Utah
1969	PhD	Computer Science	Arizona State University

Teaching and Interests:
Languages and Language Implementation
Data Base Management System
Computer Architecture
Distributed Processing
Networking
Distributed Data Base Management Systems
Special Purpose--Functional Architecture
Automatic Generation of Data Base Systems and Application Software

Grants:
1. NSF Regional Conference 1970
2. Applicability of the Extensible Programming System (EPS) to General Software Problems 1975
3. Research into and Development of a Low Cost Hardware Monitor 1974-1975
4. Hardware Error Detection and Fault Isolation by Software 1974-1975
5. Reliable Software Workshop 1974-1975
6. Back-end Mini-Computers: Usability and Feasibility 1974-1975
7. Portability Issues for Mini-Computers using IDMS, A Data Base Management System 1975
8. Heterogeneous Mini-Computer Network with Distrbuted Data Base Resources 1976-1977
9. Software Portability Issues 1976-1977
10. Investigation of Mini Networks 1978
11. Communication Techniques 1976
12. A Back-end DBMS Communication System 1976-1977
13. Data, Its Internal and External Form 1976-1977
14. A Network Processing System 1978
15. Automatic Generation of Data Base System 1980
16. Full Screen Editor: An Experiment in Machine Independent Software 1981

Publications (papers and reports):

Fisher, P. S., "A Mini Operating System," ACM-SIGPLAN Symposium, Pedagogic Languages with Small Computers, January 6-7, 1972.

McDonough, V., P. S. Fisher, R. Weinberg, "Use of Computer Simulation for Designing a Dual-Processing, Time-Sharing, Mini-Computer System," ACM-SIGPLAN Symposium, Pedagogic Languages with Small Computers, January 6-7, 1972.

Ahmed, N., P. S. Fisher, "Study of Algorithmic Properties of Chebyshev Coefficients," International Journal of Computer Mathematics, Vol. 2, 1970, pp. 307-317.

Ahmed, N., P. S. Fisher, R. R. Rao, "On a Criteria for Data Compression and Binary Fourier Representation," presented Midwest Symposium on Circuit Theory, May 7-8, 1970.

Fisher, P. S., E. E. Kohlbecker, "A Generalized Fibonacci Sequence," Fibonacci Quarterly, Vol. 10, 1972, pp. 337-344.

Skidmore, E. L., P. S. Fisher, N. P. Woodruff, "Wind Erosion Equation: Computer Solution and Application," Soil Science Society of America Proceedings, Vol. 34, No. 5, November-December 1975.

Fisher, P. S., W. J. Hankley, V. E. Wallentine, "Separation of Introductory Programming and Language Instruction," 4th ACM-SIGCSE Annual Conference, February 1973.

Cassing, D., P. S. Fisher, R. Janes, "A Software Virtual Memory System for a Mini-Computer," Second Annual Computer Conference, Austin, Texas, November 1973.

Fisher, P. S., "Virtual Memory: A New Horizon for Mini Computers," 9th IEEE Computer Society International Conference, Washington, D. C., September 1974.

Hankley, W., P. S. Fisher, "A Vertical Assertion Facility," Third Annual Computer Conference, Austin, Texas, November 1974.

Maryanski, F. J., P. S. Fisher, "A Mini Computer Distributed Data Base Management System," NBS-IEEE Trends and Applications Symposium: Micro and Mini Systems, May 1976, pp. 113-117.

Maryanski, F. J., P. S. Fisher, and V. E. Wallentine, "Evaluation of Conversion to a Back-End DBMS, ACM National Conference, October 1976, pp. 293-297.

Maryanski, F. J., P. S. Fisher, "Rollback and Recovery in Distributed Data Base Management Systems," Proc. ACM Annual Conference, October 1977.

Maryanski, F. J., P. S. Fisher, V. E. Wallentine, M. A. Calhoun, "Distributed Data Base Management Using Mini Computers," INFOTECH State of the Art Report Minis Versus Main Frames, 1978.

Slonim, J., P. S. Fisher, "Survey of Mini Data Base Management System in 1977," Proceedings First Symposium on Small Systems, ACM, New York, August 1978.

Slonim, J., E. A. Unger, P. S. Fisher, "Data Base Management System Environments Present and Future," ACM SIGSMALL 79 Second Annual Symposium on Small Systems, October 1979, Dallas, TX.

Maryanski, F. J., P. S. Fisher, R. Housh, D. Schmidt, "A Prototype Distributed DBMS," Proceedings of 12th Hawaii International Conference in Systems Sciences, January 1979.

Fisher, P. S., J. Slonim, D. A. Schmidt, "Consideration for Determining the Degree of Centralization or De-centralization in the Computing Environment," Information and Management, Vol. 2, No. 1, February 1979.

Maryanski, F. J., P. S. Fisher, V. E. Wallentine, "Data Access in Distributed Data Base Management Systems," Information and Management, Vol. 2, No. 6, December 1979.

Su, S. Y. W., H. Chang, G. Copeland, P. S. Fisher, E. Lowenthal, S. Shuster, "Data Base Machines and Some Issues on DBMS Standards," Proceedings NCC, Vol. 49, May 1980, also published in Tutorial: Data Base Management in the 80's, J. A. Larson, H. A. Freeman, IEEE Publishers, 1981.

Fisher, P. S., J. Slonim, "Software Engineering: An Example of Misuse," Software Practice and Experience. Vol. II, No. 6, June 1981.

Fisher, P. S., P. Hollist, J. Slonim, "A Design Methodology for Distributed Data Bases," Proceedings IEEE COMPCON 80, Washington D.C., September 1980.

Slonim, J., D. Copeland, L. MacRae, P. S. Fisher, "Information in Medicine: Past, Present and Future," Proceedings Fourteenth Annual Hawaii Conference on Systems Sciences, January 1981.

Fisher, P. S., J. Slonim, "Enterprise Structure as Influenced by Hardware Topology," Proceedings MIMI'AD1, Mexico, May 1981.

Jacob Slonim, F. J. Maryanski, P. S. Fisher, and L. J. Macrae, "Sequential vs. Concurrent Processing: A Throughput Model," Information Systems, Vol. 6, No. 4, December 1981.

Case, J., P. S. Fisher, "Factoring F.I. Sequences," submitted for publication.

Fisher, P. S., I. Marschik, "Biometrics: A Support Tool to Measure Human Factors in System Development and Operations," Proceedings Second Symposium on Microcomputer and Microprocessor Applications, Budapest, Hungary, Oct. 6, 1981.

Butler, E., P. S. Fisher, "Computers and Data: The Hospital Information System," Proceedings Fifteenth Annual Hawaii Conference on Systems Sciences, January 1982.

Fisher, P. S., "A Data Base Design Technique For Centralized or Distributed Topologies", Computer Communications to appear in 1982.

Han, M. J., P. S. Fisher, "The Problem of Data Structure on a Heterogeneous Environment", Advances in Distributed Data Base Systems Management, Vol. II., Heyden Publishing Co., 1981.

Slonim, J., R. A. McBride, P. S. Fisher, E. A. Unger, "A Quantitative Analysis of Information Processing in Centralized and Distributed Architectures", Advances in Distributed Processing, Vol. II, Heyden Publishing Co., 1982.

Unger, E., P. Fisher, J. Slonim, "Evolving to Distributed Database Environments," Computer Communications, Vol. 5, No. 1, February 1982.

Research Interests:

There are two problems in which I am presently interested. The problems deal with movement and utilization of information and the understanding of that information. In the first case, I am working with information in the distributed environments. The objective is to develop a procedure which permits the movement of systems in a family of possible environments. For example, a data base consists of data of three essential forms: modifiable, non-modifiable, and derivable. Clearly, every data base must contain all modifiable and non-modifiable data. However, the inclusion of derivable data is optional. This type of data then comprises a range or family of equivalent data bases, and I am developing a framework for moving the data base and the corresponding applications over this range in an automatic fashion.

The second problem is, as indicated, dealing with understanding information. For example, a typewriter which types from verbal input is a case in point. This area borders upon AI, mathematics and information processing. We are well along into this area using a mathematical framework for describing such problems. It is called a pre-algebra for finitely inductive sequences. This class of sequences can be used to describe all regular phenomena. The typewriter is such a phenomenon.

Both of these areas are couched in larger areas of interest, especially the data base problem. Hence, I am interested in problems in several distributed processing and data bases, especially those with irregular internal structures, such as text data bases, networks, communication and associated languages for such systems.

DR. WILLIAM J. HANKLEY
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Education:

1962	BS	Electrical Engineering	Northwestern Univ.
1964	MS	EE (Information Science)	Northwestern Univ.
1967	PhD	EE (Computer Science)	Ohio State Univ.

Teaching and Interests:
Programming languages
Compiler design
Software engineering
Computer graphics
Operating systems
Semantics of languages
Real-time software

Publications (papers and reports):

(* denotes document report for funded project)

W. Hankley, J. Tou, "Note on Control of Multiple Input Discrete Systems", IEEE Transactions on Automatic Control, Vol. AC-12,4, August 1967, pp. 469-470.

W. Hankley, J. Tou, "Automatic Fingerprint Interpretation and Classification via Contextual Analysis and Topological Coding", in Pictorial Pattern Recognition, Thompson Book Co., Washington, D.C., 1968, pp. 411-456.

W. Hankley, "Fingerprint Classification for Automated Processing", Proceedings, Carnahan Conference on Electronic Crime Countermeasures, Univ. Kentucky, 1968, pp. 70-82. Also presented at 1968 WESCON.

W. Hankley, H. Merrill, "A Pattern Recoginition Technique for System Error Analysis", IEEE Transactions on Reliability, Special Issue Vol. R20, 3, August 1971, pp. 148-153.

P. Abergglen, W. Faris, W. Hankley, "Design of a Real-Time Central Data Acquisition and Analysis System", Proceedings of the IEEE, Special Issue, Vol. 58, 1, January 1970, pp. 38-48. Reprinted in J. Schoeffler, R. Temple (Eds), Minicomputers: Hardware, Software, and Applications, IEEE Press, New York, 1972.

W. Hankley, N. Miller, "Characterization of Pulse Waveforms for Classification", (Abstract) IEEE Symposium on Feature Extraction and Selection, New York, 1971.

F. Templeton, W. Hankley, "Dynamic Control of a Process with Discrete and Continuous Decision Variables", in Techniques for Decision Making in the Mineral Industry, Canadian Institute of Mining and Metallurgy, Montreal, Quebec, 1971.

T. Carey, W. Hankley, "Empirical Modeling of Occurrences of Severe Weather Events", Proceedings, Conference on Environmental Engineering, Society of Engineering Science, Washington, D.C., 1971, pp. 83-108.

P. Fisher, W. Hankley, V. Wallentine, "Separation of Introductory Programming and Language Instruction", ACM SIGSCE Bulletin, Vol. 5, 1, February 1973.

W. Hankley, V. Wallentine, "Programming Language Design for a Spectrum of Users", Proceedings 7th Annual Conference on the Interface of Computer Science and Statistics, Iowa State University, October 1973.

W. Hankley, P. Fisher, "Top Down Refinement of Assertions", Proceedings Third Texas Conference on Computing Systems, November, 1974.

W. Hankley, V. Wallentine, "Color Graphics for Remote Teaching", Proceeding 1980 SIGGRAPH Conference SIGGRAPH, Vol. 14, 3, 1980.

W. Hankley, "Language Structure for Reusable Software", submitted to Communications of the ACM, submitted November 1980.

W. Hankley, V. Wallentine, "Discrete Simulation with a Concurrent Language Base", Proceedings 1981 Summer Computer Simulation Conference, July 1981, pp. 12.

V. Wallentine, W. Hankley, "Modeling and Simulation of the Performance of Distributed Data Management Systems", in P. Fisher, E. Unger (Editors), Advances in Distributed Process Management, Haydon and Sons, 1981, pp. 39.

W. Hankley, G. Lyon, M. Zelkowitz, "Representation of Programs for Interactive Development", in preparation 1981-82.

All available from Computer Science Department, Kansas State University, Manhattan, KS 66506, except as noted.

*W. Hankley, "Source-Environment Models for SO2 Concentration", Kennecott Copper Corp., Salt Lake City, Utah, 1971.

G. Anderson, W. Hankley, Users Guide, Computer Science Graphics Package, 100 pp., 1974. (Used as class reference.)

*CS 75-01, P. Fisher, W. Hankley, J. McCall, Steps Toward Reliable Software: Proceedings of a Workshop, 90 pp., January 1975.

*CS 75-02, J. Carrow, P. Fisher, W. Hankley, J. McCall, Steps Toward Reliable Software: A Workshop on Structured Programming, Proceedings of a Workshop, 147 pp., February 1975.

*CS 75-03, I. Sagie, A. Gonen, W. Hankley, EPS II -- An Extension of ML/I: Users Primer and Guide to Applications, 115 pp., July 1975.

CS 76-18, W. Hankley, J. Rawlinson, Sequential PASCAL Supplement for FORTRAN Programmers: A Primer of Slides, 161 pp., December 1976.

*W. Hankley, Design of the MIMICS Message System, 98 pp., 1977.

*CS 77-01, V. Wallentine, W. Hankley, G. Anderson, M. Calhoun, F. Maryanski, Progress Report on Functionally Distributed Computer Systems Development: Software and Systems Structure, 142 pp., December 1976.

CS 77-12, P. Fisher, W. Hankley, F. Maryanski, Porting Software to Multiple Minis: A DBMS Case Study, 23, pp., December 1976.

D. Snyder, W. Hankley, Conversion of the Computer Science Graphics Package to PASCAL, 75 pp., 1977. (Used as class reference.)

*CS 79-05, V. Wallentine, W. Hankley, R. McBride, SIMMON -- A Concurrent Pascal Based Simulation System, 52 pp., 1979.

*CS 79-02, W. Hankley, V. Wallentine, A. Skidmore, NEISIM -- Network Simulation System, 50 pp., 1979.

Current Research Interests:

Work on interactive systems for personal computers, including:

- development of a personal computing system for Chinese children using phonetic characters as the keying system.

- design of a portable "graphics-structured-Basic-like" language for personal computer with character graphics, pixel graphics, and moving object graphics (like sprites or player/missiles).

- development of instructional games for programming concepts compatible with PASCAL (somewhat like Karel the robot, but less robot and more gamelike).

- study of future architectures for personal computers, particularly the use of multiple processor for control of concurrent interactive activities.

Future Research Interests (joint with D. Gustafson):

We are studying possible future generations of software development systems. Such systems would be in the form of interactive user-friendly tools which provide aid for creation of programs. Potential keys for creation of programs include reuse of existing modules, specifications using assertions which are more descriptive than the current type information, using patterns from previous

programs, and at least partial creation of programs from specifications of input and output data structures. Initially, we are viewing such operations in the context of "smart" editing environment.

DR. ELIZABETH A. UNGER
Professor
Department of Computer Science
Kansas State University
Manhattan, Kansas 66506
Office Tel. (913) 532-6350

Education:

1961	B.S.	Mechanical Engineering	Michigan State Univ.
1963	M.S.	Mathematics	Michigan State Univ.
1978	Ph.D.	Computer Science	University of Kansas

Teaching and Interests:

1. Research Interests
   a) Programming Languages
   b) Information Retrieval Systems of Behavioral Science
   c) Computer Libraries
2. Courses Taught
   a) Data Base Management at B.S., M.S. and Ph.D. levels
   b) Programming Languages at B.S. and Ph.D. levels
   c) Computational Structures at Ph.D. level
   d) Data Structures at B.S. level
   e) Introductory Computer Science and Computer Literacy
   f) Distributed Systems at M.S. and Ph.D. levels
   g) Computing Service Center Mangagement at M.S. level
   h) Numerical Analysis at B.S. level

Publications (papers and reports):

Cipra, L. E., E. A. Unger, O. W. Bidwell, "A Computer Program to 'Key-out' World Soils," Soil Science, September 1969.

Danskin, D. G., E. A. Unger, C. E. Kennedy, "Adapting the Computer for Narrative Material: A progress Report," Journal of Counseling Psychology, 17, pp. 63-66, 1970.

Unger, E. A., T. J. Swanson, M. H. Miller, "Planning for the Expansion of Computing Capabilities," 3rd Texas Conference on Computer Systems, Austin, Texas, 1974.

Unger, E. A., N. Ahmed, "An Instructionally Acceptable Cost Effective Approach to a General Introductory Computer Science Course," Bulletin of the ACM Special Interest Group in Computer Science Education, May 1976.

Sego, J., E. A. Unger, "The Computer to Your Rescue," Journal of Home Economics, September 1977.

Schweppe, E. J., E. A. Unger, "A CONCURRENT MODEL: Fundamental," Proceedings 1st European Conference on Parallel and Distributed Systems, February 1979.

Slonim, J., E. A. Unger, P. S. Fisher, "Data Base Management System Environment Present and Future," ACM Sigsmall, 1979.

Unger, E. A., R. A. McBride, J. Slonim, F. J. Maryanski, "Design for the Integration of a DBMS into a Network Environment," in Proceedings of Sixth Data Communications Symposium, IEEE, 1979.

Maryanski, F. J., E. A. Unger, "A Major in Information Systems," Special Issue on Computer Systems Education, IEEE, 1979.

Unger, E. A., P. S. Fisher, R. A. McBride, J. Slonim, "Design for Integration of a DBMS into a Network Environment," Computer Society Tutorial on Distributed Processing, IEEE, March 1980.

Unger, E. A., E. J. Schweppe, "A Concurrency Method: Definition," Proceedings of ACM Computer Science Conference, Feb. 1981.

Schweppe, E. J., E. A. Unger, "A Concurrency Method: Examples," Proceedings of ACM Computer Science Conference, Feb. 1981.

Unger, E. A., P. S. Fisher, "Evolving to Distributed Data Base Environments," Computer Communications, Vol. 5, No. 1, 1982.

Engler, Verlyn, E. A. Unger, and Bryan Schurle, "The Potential for Microcomputer Use in Agriculture," Kansas Agricultural Experiment Station, Contribution member 81-412-A (also presented to the Agricultural Economics Annual Meeting, August 1981).

Unger, E. A., W. T. Cottrell, P. A. Viglicci, "Management Issues on a Geographically Distributed Network," in Advances in Distributed Processing, Vol. 2, Heyden Pub. Co., 1983.

Slonim, J., R. A. McBride, P. S. Fisher, E. A. Unger, "A Throughput Model," in Advances in Distributed Processing, Vol. 2, Heyden Pub. Co., 1983.

McBride, R. A., J. Slonim, L. J. MacRae, E. A. Unger, "Mediator: An Approach for Providing a Global User View in a Distributed Information Environment", in Advances in Distributed Processing Management, Vol. 2, Heyden Pub. Co., 1983.

Aikens, W. A., E. A. Unger, "System Resiliency in a Mobile Network", in Advances in Distributed Processing Management, Vol. 2, Heyden Pub. Co., 1983.

Mata Toledo, R. A., E. A. Unger, "Another Look at Motivating Data Processing Professionals", (submitted to Datamation, Oct. 1982).

Fox, Richard A., E. A. Unger, "Selecting a Database Management System," in Advances in Database Management, Vol. 2, Heyden Publishing Company, 1983.

Slonim, J., R. A. McBride, P. S. Fisher, E. A. Unger, "A Quantitative Analysis of Information Processing in Centralized and Distributed Architectures," in Advances in Distributed Processing, Vol. 2, Heyden Publishing Company, 1983.

Slonim, J., L. J. MacRae, E. A. Unger, "Distributed System Development: Risks and Rewards," Auerbach Series on Computer Systems, 1982.

Barker, R. and E. A. Unger, "A Predictor for Success in an Introductory Programming Class Based Upon Abstract Reasoning Development," (accepted for 1983 ACM/SIGCSE).

Research Interests:

The focus of all my research is distributed systems and the potential of operations that can be expressed within those systems. Currently, there are three active areas of research which are all interconnected.

1. The development of a model for the description of information within a computer environment. This model is called an object. The study of the properties of the data and the development of a calculus to manipulate and build new objects is the objective of this effort.

2. The use of the object in a language to allow the expression of concurrency without explicit action by the programmer. The language model exists and it is used to express office procedures in a current research project.

3. The use of the concept of an object (simplified) from the focus number one above, to implement a dynamic active data dictionary is the third area. An active dynamic dictionary has the advantage of making the physical structure and data completely invisible to user application programs. Currently, we can do this statically, but often programs must be recompiled for even minor changes in data storage or data constraints. Theoretically, this would allow two things: a) complete freedom of the DBA to change the data base and DBMS, and b) the integration of hetereogenous data base systems within a distributed environment.

DR. VIRGIL E. WALLENTINE
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Kansas State University
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Education:

1965	BS	Mathematics	Iowa State University
1970	MS	Computer Science	Iowa State University
1972	PhD	Computer Science	Iowa State University

Teaching and Interests:
Operating Systems
Programming Languages
Computer Networks
Software Engineering
High-Level Language Architecture
Office Automation

Grants (Funded):

1976 - 1977 V. E. Wallentine, Principal Investigator. Functionally Distributed Computer Systems Software and System Structure ($190,000). Grantor: U.S. Army Research Office

1977 V. E. Wallentine, Principal Investigator. Optimizing (Sequential and Concurrent) PASCAL Compilers for a High-level Language (HLL) Machine ($15,700). Grantor: Advanced Development Division, Perkin-Elmer Data Systems

1977 V. E. Wallentine, Principal Investigator. A Systems Implementation Language for an HLL Architecture ($30,000). Grantor: Advanced Development Division, Perkin-Elmer Data Systems

1977 V. E. Wallentine and W. J. Hankley, Principal Investigators. Simulation of Network Performance for Distributed Data Base Configurations ($8,196). NCR Corporation

1978 V. E. Wallentine, Principal Investigator. A Network Based Operating System ($38,000). Grantor: Advanced Development Division Perkin-Elmer Data Systems

1978 - 1980 V. E. Wallentine, Principal Investigator. Distributed Operating Systems ($265,000). Grantor: Army Research Office

1979 V. E. Wallentine, Principal Investigator. NSF Travel Grant ($3,600)

1980 - V. E. Wallentine, Principal Investigator. Performance of Message-Based Operating Systems ($8,300). Grantor: Perkin-Elmer Data Systems, Advanced Development Division.

1980 -
1981 V. E. Wallentine, Principal Investigator. Multi-level Symbolic Debugging in Separately Compiled Pascal Modules ($40,000). Perkin-Elmer Ltd., Slough, England.

1983 V. E. Wallentine, Principal Investigator. Western Electric Graduate Program ($166,000).

Equipment Grants:

1976 ($190,000) with Paul S. Fisher and Fred J. Maryanski. Minicomputer equipment from Interdata

1977 ($35,000) minicomputers, terminals, and communications interfaces from Perkin-Elmer Data Systems

1979 ($50,000) minicomputer from NCR Corp. Wichita, Kansas

1980 ($26,000) minicomputer memory from Perkin-Elmer Data Systems

Publications (papers and reports):

A Pedagogical Operating System, (with J. H. Campbell and C. T. Wright), ACM SIGPLAN Symposium on Pedagogic Languages with Small Computers, January 1972.

Separation of Introductory Programming and Language Instruction, (with P. S. Fisher and W. J. Hankley), Proceedings of ACM SIGCSE Annual Conference, February 1973.

Operating Systems in the Process Control Environments, (with F. R. Keller), Proceedings of Second Texas Conference on Computing Systems, Austin, Texas, November 1973.

Design of a Spectrum of User-oriented Languages, (with W. J. Hankley), Proceedings of Seventh Annual Conference on the Interface of Computer Science and Statistics, Ames, Iowa, October 1973.

A Model for Extensible-Contractible Language Compilers, (with G. G. Anderson), Proceedings of the 1975 International Algol 68 Conference, Stillwater, Oklahoma, June 1975.

A Simulation Model of a Backend Data Base Management System, (with F. J. Maryanski), Proceedings 5th Annual Pittsburgh Modeling and Simulation Conference, Pittsburgh, Pennsylvania, March 1976.

Evaluation of Conversion to a Backend Data Base Management System, (with F. J. Maryanski and P. S. Fisher), Proceedings of 1976 National ACM Conference, Houston, Texas, October 1976.

A Mini-Computer Based Distributed Data Base System, (with F. J. Maryanski, P. S. Fisher, M. A. Calhoun, and L. Sernovitz), Proceedings NBS-IEEE Trends and Applications Conference--Mini- and Micro-computer Systems, Washington, D. C., June 1976.

Distributed Data Base Management Using Mini-computers, (with F. J. Maryanski, P. S. Fisher, and M. A. Calhoun), Infotech State-of-the-Art Report, "Mini's Versus Mainframes," February 1978.

Experiences with the Portability of Concurrent Pascal, (with D. Neal), Software Practice and Experience, Vol. 8, No. 3 (May-June) 1978.

A Distributed Data Processing System Architecture, (with P. Fisher), (invited paper), Proceedings of SHARE 50, March 6-10, 1978, Denver, Colorado.

Programming Issues in Distributed Systems. Proceedings of the Network IPC Workshop, Georgia Tech., Phil Enslowe, editor, December 1979.

Experience with Concurrent Pascal as an Implementation Language, Proceedings of Conference on Microprocessors in DoD, Colorado State Univ., August 1979.

Data Access in Distributed Data Base Management Systems, (with F. J. Maryanski and P. Fisher), Journal of Information and Management, Vol. 2, No. 6 (December) 1979.

Editor (with W. Bulgren), Proceedings of the Eleventh ACM SIGCSE Technical Symposium, February 1980.

Color Graphics for Remote Teaching, (with W. J. Hankley), Proceedings of the 1980 ACM SIGGRAPH Conference, July 1980.

Computer Network Security, (with J. Scharf and P. Fisher), in Advances in Computer Network Security, Heyden & Sons, Philadelphia, PA, 1980.

Modeling and Simulation of the Performance of Distributed Data Management Systems, (with W. J. Hankley), in Advances in Distributed Processing Management, Paul S. Fisher and Elizabeth Unger, editors, Heyden & Son, Inc., 1981.

Discrete Simulation with a Concurrent Base Language, (with W. J. Hankley and R. A. McBride), Proceedings of 1981 Summer Simulation Conference, Reston, Va., July, 1981.

OFFICE/NET: The Backbone of the Automated Office (with J. Slonim, P. Fisher, L. McRae and R. McBride), in Electronic Office; Management and Technology , Auerbach Publishers, Inc., Pennsauken, N.J., April 1982.

An Abstract Machine to Control the Execution of Semi-Independent Concurrent Computations, (with C. T. Wright and R. F. Keller), (Iowa State University), U. S. Atomic Energy Commission Report IS-2920, August 1972.

A User-orientated Hardware Monitor, (with G. G. Anderson, F. R. Keller, and P. S. Fisher), KSU Department of Computer Science Technical Report, July 1975.

Usability and Feasibility of Backend Minicomputers, (with F. J. Maryanski and P. S. Fisher), KSU Department of Computer Science Technical Report, June 1975.

Implementation of a Backend Data Base Management System, (with F. J. Maryanski, P. S. Fisher, et al.), KSU Department of Computer Science, October 1975.

Concurrent PASCAL--A Tutorial, (with R. McBride), KSU Department of Computer Science, Technical Report No. CS76-17, December 1976.

The KSU Implementation of Concurrent PASCAL, (with D. Neal, G. Anderson, and J. Ratliff), KSU Department of Computer Science, Technical Report No. CS76-16, October 1976.

Progress Report on Functionally Distributed Computer Systems, (with M. A. Calhoun, P. S. Fisher, W. J. Hankley and F. J. Maryanski), July, 1976; and In-Progress Review of Functionally Distributed Computer Systems, December 1976, Technical Report No. CS77-04.

A User-Transparent Mechanism for the Distribution of a CODASYL Data Base Management System, (with F. J. Maryanski and P. S. Fisher), KSU Department of Computer Science, KSU Report No. CS76-22, December 1976.

SOLO Tutorials, (with D. Neal and B. North), KSU Department of Computer Science, Technical Report No. CS77-20, October 1977.

MIMICS (Asynchronous) Line Protocol, (with E. Rehme), KSU Department of Computer Science, Technical Report No. CS77-15, December 1977.

NETSIM: A Distributed Network (Data Base) Simulation Program, (with W. J. Hankley, A. Skidmore, and R. McBride), KSU Department of Computer Science, Technical Report, No. CS79-02, January 1979.

SIMMON--A Concurrent Pascal Based Simulation System, (with W. J. Hankley and R. McBride), KSU Department of Computer Science, Technical Report No. CS79-05, February 1979.

The NADEX Core Operating System Services, (with R. Young), KSU Dept. of Computer Science, Technical Report No. CS79-11, November 1979.

The Structure of the NADEX Operating System, (with R. Young), Technical Report No. CS79-12, November 1979.

Implementation of the Kernel of Concurrent Pascal/32, (with R. Young), Technical Report No. CS79-13, December 1979.

Command Processors for Dynamic Control of Software Configurations, (with R. Fundis), KSU Dept. of Computer Science, Technical Report No. CS80-02, August 1980.

A Software Structuring Tool for Message-Based Systems, (with K. Rochat), KSU Dept. of Computer Science, Technical Report No. CS80-04, August 1980.

NADEX Job Control System Implementation, (with K. Rochat), KSU Dept. of Computer Science, Technical Report No. CS80-05, July 1980.

NADEX Utility Programs, (with K. Rochat), KSU Dept. of Computer Science, Technical Report No. CS80-06, August 1980.

A Sampler of Software Configurations for NADEX (With R. Young and D. Eaton), AIRMICS Technical Report, Georgia Tech., Atlanta, Georgia, April 1982.

DR. MYRON A. CALHOUN
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Education:

1961	AA		Graceland College	Lamoni, IA
1963	BS	Electrical Eng.	Univ. of Kansas	Lawrence, KS
1964	MS	Electrical Eng.	Colorado State Univ.	Ft. Collins, CO
1967	PhD	Electrical Eng.	Arizona State Univ.	Tempe, AZ

Grants:

1971 Man-machine communication via programmable tone generators attached to computers ($300) Bureau of General Research, KSU.

1971 Music generation with a computer/ARP synthesizer interface ($1,700) Bureau of General Research, KSU.

1973 Digital computer architecture laboratory ($1,340) Bureau of General Research, KSU.

1973 Electronic control unit for cassette recorders ($675) Bureau of General Research, KSU.

1975 Development of a low-cost hardware monitor ($29,696) U.S. Army Research Office (jointly with V. Wallentine).

1977 Functionally Distributed Computer Systems Development: Software & Systems Structure ($190,000) U.S. Army Research Office (jointly with V. Wallentine, W. Hankley, and F. Maryanski).

1979 Oscilloscopes, frequency meters, terminal equipment, readouts, etc. ($15,509) solicited from various industrial companies for use in C.S. Dept's. micro-lab.

1982 Collage of projects ($500) Bureau of General Research

Publications, Papers, and Reports:

"Electricity as It Affects Our Modern Homes and Farms," First Place, Florida Statewide 4-H Club Public Speaking Contest, 1955.

"A Pseudo-Pulse Emission for the Amateur Bands Below 2.3 GHz," First Place IEEE Student Paper Contest, Undergraduate Division, Region V, 1963.

"Construction and Testing of IOD Translation Store Current Servo," Case 39873, Bell Telephone Laboratories, Holmdel, NJ, 1963.

"Cauer Synthesis by Digital Computer," Proc. GET Conf., Scottsdale, AZ, April, 1965.

Machine-independent Assemblers for Computing Systems. Ph.D. Dissertation, Arizona State University, Tempe, AZ, July, 1967.

"Meta-Assembly Made Easy," IEEE Region VI Conf., Portland, OR, May, 1968.

"SYMBOL--Large Experimental System Exploring Major Hardware Replacement of Software," with others, Proc. SJCC, Atlantic City, NJ, May, 1971.

"SYMBOL Hardware Debugging Facilities," Proc. SJCC, Atlantic City, NJ, May, 1972.

"Computer Instrumentation of SYMBOL," Proc. Third Texas Conf. on Computing Systems, Austin, TX, November, 1974.

"A Design Automation System and Its Uses," MAE-CON, Kansas City, MO, November, 1974.

"The (Semi) Automatic Testing Languages for SYMBOL," Missouri Symposium on Advanced Automation, Columbia, MO, April, 1975.

"A System for Digital Design and Simulation," with J. Scott Vance, Sixth Annual Pittsburgh Modeling and Simulation Conference, April, 1975.

"A Mini-Computer Based Distributed Data Base System," Proc. NBS-IEEE Trends & Application Symposium: Micro & Mini Systems, May, 1976 (jointly with F. Maryanski, P. Fisher, V. Wallentine, and L. Sernowitz); CS 76-11.

"Functionally Distributed Computer System Development: Software & Systems Structure," Progress Report, December, 1976 (jointly with V. Wallentine, Wm. Hankley, G. Anderson, and F. Maryanski); CS 77-04.

"Distributed Data Base Management Using Minicomputers," Infotech State-of-the-Art report "Mini's versus Mainframes," February, 1978 (jointly with F. Maryanski, P. Fisher, and V. Wallentine).

"The KSUBUS - A Functional Description," January, 1977; CS 78-01.

"The KSUBUS - A Detailed Scription," January, 1977; CS 78-02.

"Resistance-Controlled Audible Continuity Tester," Electronics Test magazine, April, 1980, page 21.

"A Shared-Peripheral Network for a Micro-Computer Development Laboratory," MAE-CON, Kansas City, MO, October, 1980.

"Dungeons and Dragons Dice Simulator for the KIM-1," COMPUTE! magazine, June, 1981, pp. 145-146.

"Inexpensive Automatic Send/Receive Changeover Relay," Ham Radio magazine, May 1982, p. 40.

Interests:

My major interests (and expertise) lie in the design and development of hardware, both digital and otherwise, and the application of this hardware to the solution of "real-world" problems. I hesitate to call these "research" interests, but would say instead "research AND development."

In particular, I am interested in:

Computer Systems--
- Digital Logic Design
- Computer-Aided Design
- Computer Architecture
- Hardware Design/Development
- Application Programming

Electrical Engineering
- Radio Transmitting and Receiving Equipment

Micro-Computer Systems--
- Peripheral Interfacing
- Application Programming

I am currently working on three small projects:

COMPUTER-ASSISTED COMMUNICATION FOR THE PHYSICALLY HANDICAPPED: An attempt to provide computer-assisted typewriting, document storage and retrieval, and speech synthesis for those physically-handicapped persons who still retain some muscle control somewhere. Later "add-on" features will include remote control of household electrical appliances, telephones, etc.

COMPUTER-/REMOTELY-CONTROLLED ROBOT: An attempt to use a micro-computer to provide "proportional" control, with feedback, of a remotely-controlled robotic device, using VERY INexpensive radio transceivers.

LOCAL-AREA NETWORK RELIABILITY: An investigation into the reliability of a local radio-frequency network operating in an electrically noisy (i.e, real-world) environment using an amplitude-modulated asynchronous protocol on those aforementioned very INexpensive radio transceivers!

Not only are these all within my interest areas of "designing, developing, and applying," but they are also somewhat interrelated in that they all use interconnected digital and RF hardware to solve an interesting problem.

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Education:

1953	Candidaat	Univ. of Leiden, the Netherlands
1956	Ph.D., Physical Chem.	Princeton University
1956	Drs., Chemistry	University of Leiden

Teaching and Interests:

Laboratory Computer Applications and Interfacing
Analytical Instrumentation
Assembly Language Programming (Applications and System Components)
Micro-Computer Applications and Interfacing
System-Level and Appl. Programming, PDP-11, MACRO, RT11 Software
System-Level and Appl. Programming, PDP-8, PAL8, OS/8 Software
Design and Construction of Laboratory Equipment
Short Courses in Micro-Computer Appl. for Industrial Audiences

Publications:

D.W. Juenker, M. van Swaay and C.E. Birchenall, "On the Use of Palladium Diffusion Membranes for the Purification of Hydrogen," Rev. Sci. Instr., 26, 888 (1955).

M. van Swaay, "Some Aspects of Palladium-Hydrogen Systems," Ph.D. Thesis, Princeton University, August, 1956.

M. van Swaay andd C.E. Birchenall, "Permeability and Diffusion of Hydrogen Through Palladium," Trans. AIME, 218, 285 (1960)

M. van Swaay and R.S. Deelder, "Trace Analysis with a Rotating Hanging Mercury Drop," Nature, 191, 241 (1960).

M. van Swaay, editor: "Gas Chromatography" 1962, Butterworths, London 1963.

M. van Swaay, "The Design of an Automatic Absolute Flow Meter for Gas Chromatography," J. Chromatog., 12, 99 (1963).

M. van Swaay, "A Fraction Collector for Distillation Columns Operating at Reduced Pressure, "Rev. Sci. Instr., 35, 164 (1964).

M. van Swaay and R.F. Lolley, "A Simple Constant-Flow Device for Use in Titrimetric Analysis," J. Chem. Ed., 42, 381 (1965).

M. van Swaay, "Coulometry," Instrumental Analysis, Chapter 14, J.F.J. Krugers and A.I.M. Keulemans, Ed., Elsevier, New York, 1965.

M. van Swaay and J.R. Bacon, ":A Septum-Less Injection System for Use in Gas Chromatography," J. Chromatog., 965).

M. van Swaay, "Study of Reaction Kinetics from Broadening of Chromatographic Elution Peaks," Advances in Chromatography, J.C. Giddings, Ed., Vol. 8, 1969.

M. van Swaay, "The Control of Temperature," J. Chem. Educ., 46, A565 (1969).

B.A. Cunningham, D.L. Roerig and M. van Swaay, "Solid-State Controller for Fraction Collectors, " Chemical Instru., 2, 405 (1970).

M. van Swaay, S.H. Ediz and H.D. McBride, "Square-Wave Operation of a Thermal Conductivity Detector," Chemical Instru., 3, 299 (1972).

D.E. Bartak, H.K. Hundley, M. van Swaay and M.D. Hawley, "A Function Generator for Electroanalytical Experiments," Chemical Instru., 4, 1 (1972).

E.M. Winkler and M. van Swaay, "An Introduction to Micro-Electronics," J. Chem. Ed., 6, A325, A363, A394 (1973).

M. van Swaay, "A Practical Potentiostat-Coulometer for the Student Laboratory and for Routine Research Use," J. Chem. Ed., 55, 1 (1978).

P.J. Marcoux, M. van Swaay, D.W. Setser and L.G. Piper, "Vibrational Relaxation of CO^+ (A^2), CS(A^1) and C_2(A^3Hg) in Helium," J. Phys. Chem. 83, 3168 (1979).

M. van Swaay and D.H. Lenhert: "Fundamentals of Microcomputers," Carnegie Press 1982.

DR. RODNEY M. BATES
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Education:

1967	BS	Electrical Engineering	Kansas State University
1968	MS	Electrical Engineering	Kansas State University
1971	PHD	Electrical Engineering	Kansas State University

Publications (papers and reports):

"Multidimensional Binary Fourier Representation," Record of Second Southeastern Symposium on Systems Theory, Gainsville, FL, March 1970. N. Ahmed, R. M. Bates, and K. R. Rao.

"Multidimensional Bifore Transform," Electronics Letters, Vol. 6, No. 8, April 1970. R. M. Bates and N. Ahmed.

"A Power Spectrum and Related Physical Interpretation for the Multidimensional Bifore Transformation," Proceedings of the Symposium on Applications of Walsh Functions, Washington, DC, April 1971. R. M. Bates and N. Ahmed.

"A Pascal Prettyprinter with a Diffferent Purpose", SIGPLAN Notices, Vol. 16, No. 3 (March 1981), pp. 10..17

"Has SIMULA Really Missed the Boat?", SIMULA Newsletter, vol. 9, No. 4, (November 1981) pp. 3..4

Grants:

Three Faculty Research Awards from KSU Graduate School: $2000 for 1979/80, $1900 for 1980/81, and $1500 for 1981/82 Research Activities

Pascal source text formatter program developed

Bootstrap of Euclid compiler to Interdata 8/32, first phase complete, second phase in progress

Work on high level language support of concurrency, without building the synchronization technique into the language, in progress

Work on automatic generation of recursive descent syntax error recovery completed, writing not begun.

Design of a recovery mechanism for distributed transaction processing completed, writing in progress

Characterization of integrated transaction processing operating systems completed, writing in progress

Research Interests:

My principle research interest is in the design of programming languages. This also extends to other "languages" not normally

viewed as such and to all forms of user interfaces.

My current particular approach is to develop linguistic support for portable operating systems. Language design I am working with will provide abstraction mechanisms which allow a programmer to define and implement concurrency systems in the high-level language. This means that concurrency need not be built into the language and that the designer of an operating system, rather than the language design, can choose what concurrency system he desires. On the other hand, the abstraction features of the language allow the compiler to provide the same degree of protection against programming errors as current languages with built-in concurrency.

My long-term plans for this work include completion of the language design, implementation of the language, and writing of trial concurrency systems in the language. These will be used to replace the kernel of existing concurrent languages, and existing and new concurrent programs will then be tested. Finally, porting of such programs will be done to verify the usefulness of the approach.

The abstraction features I am developing for this work also have much broader applicability in a variety of programming problems. I also plan to explore some of these, to demonstrate the generality of the abstraction features.

I am also interested in office automation, particularly systems which support transaction processing. This is, in part, a problem in user interface design. I have done preliminary work in this area in a former position. I would like to develop this into a system design and implement the system, using the language developed by the aforementioned efforts.

I am interested in a variety of related areas, primarily in translator design and operating system design, and system architecture and their integration.

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Education:

1967	BS	Mathematics	University of Minnesota
1969	BS	Meteorology	University of Utah
1973	MS	Computer Science	University of Wisconsin
1979	PhD	Computer Science	University of Wisconsin

Teaching and Interests:
Software Engineering
Operating Systems
Data Base Management Systems
Computer Networks
Software Engineering
Program Verification Methods
Protection Structures

Publications (papers and reports):

David A. Gustafson, "Set Evaluation," Ph.D. Thesis, January 1979, University of Wisconsin-Madison.

Meals, Randall and David A. Gustafson, "An Experiment in the Implementation of Halstead's and McCabe's Measures of Complexity", Proc. of S.E. Standards Application Workshop, San Francisco, August 18-20, 1981.

Gustafson, David A., "Control Flow, Data Flow and Data Independence", Sigplan Notices, October 1981.

Arronson, David B. and David A. Gustafson, "HLSEW Screen Editor", KS-CS Tech. Report CS 81-07.

Vestal, Daniel R. and David A. Gustafson, "An Inter-Computer Communications System for a Personal Computer", KS-CS Tech. Report CS 81-08.

Gustafson, David A., "Assigning Costs to Flow Graph Nodes", Submitted for publication.

Gustafson, David A., "A Model for Halstead's Length", Submitted for publication.

Gustafson, David A., "Productivity as a Constraint for Putnam's Software Cost Estimation Model", Submitted for publication.

Research Interests:

1. Software Complexity Metrics
   Individual metrics can be developed to selectively support particular concerns of a particular development environment. Basic research into metrics and metric evaluation is desirable.

2. Software Reliability Measurement and Prediction
   A methodology for reliability measurement and prediction in a particular development environment can be developed. Basic research into this area is desirable.

3. Theory of Software Testing and Evaluation
   A testing methodology including the IEEE standard could be developed for individual environments. Basic research into testing theory is also desirable.

(Jointly with W. Hankley)

1. The Next Generation Editor
   Editors have shown a progression from line-oriented editors to screen-oriented editors to syntax-oriented editors. The next logical step in this progression is an editor that helps the user with the program development, as well as the syntax of the programming language. This editor could be called a pdl-oriented editor. It could store the program as a tree of pdl statements and expand these statements into either pdl statements or target code. The user could generate this tree in a top-down fashion. This would support the top-down development of the program. The editor would be two-dimensional in nature; the user could either move within a level of the tree by moving the cursor up or down or the user could change levels in the tree by moving off the screen to the left or right. The editor could, at discretion of the user, use a library of predefined modules to complete the branch of the tree whenever the name of a predefined routine is used in the tree.

2. The Fifth-generation Editor
   The progression of the editors can be followed past the pdl-oriented editor to a very sophisticated program development system that provides various aids to the program development process. Included in these aids could be assertions checkers, test-case analyzers, type-checkers, paradigm checkers that compare current specifications with common paradigms, and style checkers. All of these tools would operate on the source code as the user is entering the code. The advice would be immediately available to the user.

DR. ROGER T. HARTLEY
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Education:

1969	BA	Physics	New College, Oxford, U.K.
1974	PhD	Cybernetics	Brunel University, U.K.

Teaching and Interests:

Cybernetics
Artificial Intelligence
Knowledge Engineering
Expert Systems
Logic
Data structures, programming languages, architecture
Artificial Intelligence
Knowledge engineering, expert systems

Publications (papers and reports):

Hartley, Roger T., ",Cybernetic Thinking and Share Price Prediction" PhD thesis, Brunel University, 1974.

Hartley, Roger T., "Program COIN - A New Approach to Investment Analysis in A Handbook for Management of Cybernetics", ed. F.H. George, 1975.

Hartley, Roger T., "A Fault Finding Aid Using a Content Addressable File Store" (with T. R. Addis), TN 79/3 International Computers Limited, 1979.

Hartley, Roger T., "How Expert Should an Expert System Be?", Proceedings 7th IJACI, University of British Columbia, Vancouver Canada, pp. 862-867, August 1981.

Hartley, Roger T., "The Competent Computer", MCSG/6 Man-Machine Studies Group. Brunel University, UK, January 1982.

Hartley, Roger T., "Competence Modeling as a Methodology for Computer Systems", submitted to CACM, March 1981.

Hartley, Roger T., "A Conceptual Basis for Expert Systems Methodology", Proceedings of Expert Systems 82, jointly sponsored by ACM-IEE-SPL, Brunel University, U.K. September 1982.

Hartley, Roger T. and L. Johnson, "A Short Course in Epistemology and Knowledge Engineering", MCSG/13 Man-Machine Studies Group, TR13, Brunel University, U.K.

Pashtan, Ariel and Roger T. Hartley, "A Competence Measure for Operating Systems", submitted to IEEE Computer, September 1982.

Hartley, Roger T., "Computer Fault-finding Through Knowledge Engineering", submitted to IEEE Computer, October 1982.

Research Interests (jointly with Clifford G. Stark):
Artificial intelligence research in the department falls into three areas: (1) major projects, (2) student projects, and (3) the LISP system.

1. Major Projects

A. Expert Planning Systems with Performance and Instructional Modes
The aim of the project is to design an expert planning system capable of general application. The system will be empty of application-specific knowledge (c.f. the EMYCIN concept), but will be able to accept knowledge relevant to any chosen specific domain. The planning system will then be able to operate within that domain. It is intended that the system also be used for instructional purposes: an expert system which can perform competently in some area should be capable of using its stored general knowledge for teaching. This may be accomplished by substituting for its normal direct-performance mode of use, the performance of a "higher-level" instructional system which takes the expert planning knowledge as its subject-matter. In order to implement a system with these twin goals, a uniform representation for knowledge in the areas of general planning, specific planning-application domains, and the general domain of instruction will be developed. This implementation phase will be facilitated by development of an appropriate description language. The use of such languages not only helps efficient system development but can also aids future maintenance of the system by its users. The project has been favorably received as an informal proposal by ARI.

B. Computer-aided Student Advising
A computer system is currently being designed and built to advise students on course, curriculum and career choices. The project falls into two parts: the purely mechanical book-keeping needed to keep track of a student's progress and using this information to offer proper advice according to the student's needs and wishes. Each student will keep his or her own records on a floppy disk while the central system will store course and career information common to all students. Through a dialogue with the student, the system will make inferences and offer suggestions according to the content of the dialogue.

2. Student Projects
Several graduates are engaged in projects, reports or theses in the area of AI. The topics include: theorem proving; knowledge representation (frames, production system, description language); and natural language (discourse understanding and ATNs). In addition, there are students designing an expert system in the areas of analysis of psychological tests and diagnosis of skin disease.

3. The LISP System

We have over the last year vastly improved the LISP interpreter on the computing center's 3033 lookalike. Apart from adding several modern constructs (catch and throw; I/O streams and operating system calls; extensions to cond, eval and apply; upper and lower case), there are now LISP packages to simulate the major features of MACLISP, to implement the system in Artificial Intelligence Programming and to provide a complete filing system. There is also a structure editor with a trace/break package incorporated.

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Education:

1968	BA	Mathematics	Univ. of Colorado at Boulder
1974	MSCS	Computer Sci.	Southern Illinois Univ. at Carbondale
1980	PHD	Computer Sci.	Kansas State University

Publications:

McBride, R.A. "A Generalization of the Hu-Tucker Algorithm to m-ary Trees," Master's Thesis, Southern Illinois University, 1974.

Wallentine, V. and R. McBride, "Concurrent Pascal--A Tutorial, "Kansas State University, Department of Computer Science, Technical Report CS76-17, 1976.

Wallentine, V. E., W. J. Hankley, and R. A. McBride, "SIMMON--A Concurrent Pascal Based Simulation System," Kansas State University, Department of Computer Science, Technical Report CS79-05, 1978.

Unger, E. A. , R. A. McBride, J. Slonim, and F. J. Maryanski, "Design for Integration of a DBMS into a Network Environment," in Proc. Sixth Data Communications Symposium, IEEE, N.Y., 1979.

McBride, R. A., "Modelling Techniques for Data Communication Protocols," Ph.D. Dissertation, Kansas State University, Department of Computer Science, 1980.

Slonim, J., V. Wallentine, P. Fisher, L. J. MacRae, and R. A. McBride, "OFFICE/NET: The Backbone of the Automated Office," Electronic Office: Management and Technology, Auerbach Publishers Inc., Pennsauken, N.J., April 1982, 004.0001.013, pp. 1-16.

Slonim, J., L. J. MacRae, R. A. McBride, F. J. Maryanski, E. A. Unger, and P. S. Fisher, "A Throughput Model: Sequential vs. Concurrent Processing," Information Systems, Pergamon Press Ltd., to be published in Vol. 7, 1982.

Hankley, W. J. and R. A. McBride, "Discrete Simulation with a Concurrent Base Language", Proceedings of 1981 Summer Simulation Conference, Reston, VA., July, 1981.

Research Interests:

My current and proposed research deals with the representation of information. I have been engaged in the modeling and verification of data communication protocols to ensure that data transfers can occur correctly in a distributed environment. Also, I am actively pursuing an interest in using electronic business forms that will serve both as an information template and a high-level communications protocol.

Such electronic forms provide a convenient way for casual users, e.g. office workers, to interact with such data processing tools as a data base. Further, these forms can be used to enforce restrictions on the manner in which both a particular form and its data fields are accessed.

A major area of interest for me is office information systems since these systems integrate both data communications and electronic forms. Presently tools, such as forms editors and electronic calendar systems, are being developed which are necessary in the automated office.

I am also looking into the extension of the CODASYL Common Operating System Command Language to a distributed environment. It is expected that in such an environment the flow of information can be represented and controlled by a command language program.

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Education:

1981	Ph.D.	Soil Physics	Kansas State University
1979	M.S.	Soil Physics	Kansas State University
1976	B.S.	Agronomy/Spanish	Brigham Young University

Grants:

1983 Corn production decision aid and microcomputer education for farmers ($290,000) from Kellogg Foundation. Jointly with Fred Sobering, Stephen Welch, and Fred Posten.

Publications (papers and reports):

Terry, R. V., W. L. Powers, R. V. Olson, L. S. Murphy, and R. M. Rubison. 1981. The effect of beef feedlot runoff on the NO_3-N content of a shallow aquifer, J. of Environ. Qual. 10:22-26.

Olson, R. V., R. V. Terry, W. L. Powers, and C. W. Swallow. 1982. Disposal of feedlot lagoon water by irrigating bromegrass: I. Crop removal of nitrogen, J. of Environ. Qual. 11:262-272.

Olson, R. V., R. V. Terry, W. L. Powers, C. W. Swallow and E. T. Kanemasu. 1982. Disposal of feedlot lagoon water by irrigating bromegrass: II. Soil accumulation and leaching of nitrogen, J. of Environ. Qual., Accepted.

Powers, W. L., R. V. Terry, G. W. Wallingford, and L. S. Murphy. Fate of nitrogen from manure disposal, National Conf. on Disposal of Residues on Land, St. Louis, MO, September 13-15, 1976.

Terry, R. V., P. S. Fisher. 1981. Moving Toward Construction Project Optimization--A Look at the Interactive Model Approach and Other Alternatives. Section 11-B. Kansas Department of Transportation, Topeka, Kansas.

Terry, R. V. W. L. Powers, R. V. Olson, L. S. Murphy. 1980. Monitoring Nitrate-Nitrogen at a Beef Feedlot Runoff Disposal Site. Project Completion Report (00952), Agricultural Experiment Station, Manhattan, Kansas.

CLIFFORD GERARD STARK
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Education:

1976	BA	Music (Honours)	York University, Canada
1978	BA	Computer Science	York University, Canada
1978 -		Third Year Ph.D.	University of Edinburgh

Teaching and Interests:
Artificial Intelligence
Semantic Theory
Structural Psychological Theories of Action
Artificial Intelligence
Programming Languages
Operating Systems

Research Interests:
See "Research Interests" under Roger Hartley.