MINUTES OF

BOARD OF REGENTS MEETING

November 16, 1979

TEXAS TECH UNIVERSITY
AND
TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER
Lubbock, Texas

Minutes

Board of Regents Meeting
November 16, 1979

M34. The Board of Regents of Texas Tech University and Texas Tech University Health Sciences Center met in regular session November 16, 1979 at 9:00 a.m. in the Board of Regents Suite on campus. The following Regents were present: Mr. Robert L. Pfluger, Chairman, Mr. J. Fred Bucy, Vice Chairman, Mr. Clint Formby, Mr. Roy K. Furr, Dr. Nathan C. Galloway, Mr. Joe Pevehouse, Mr. James L. Snyder, Mr. Lee Stafford, and Mr. Don R. Workman. University officials and staff present were: Dr. L. L. Graves, Interim President; Dr. Glenn E. Barnett, Vice President for Planning; Dr. Richard A. Lockwood, Vice President for the Health Sciences Center; Dr. Charles S. Hardwick, Vice President for Academic Affairs; Dr. Robert H. Ewalt, Vice President for Student Affairs; Mr. Dan Williams, Interim Vice President for Finance and Administration; Mr. Bill J. Parsley, Director of Public Affairs; Dr. Clyde E. Kelsey, Jr., Vice President for Development and University Relations; Dr. J. Knox Jones, Jr., Vice President for Research and Graduate Studies; Dr. Len Ainsworth, Associate Vice President for Academic Affairs; Dr. Marilyn E. Phelan, General Counsel; Ms. Linda Norris, Assistant General Counsel; Dr. George S. Tyner, Dean of the School of Medicine; Mr. Clyde J. Morganti, Assistant to the President; Dr. John L. Baier, Assistant Vice President for Student Affairs and Dean of Students; Mrs. Freda Pierce, Secretary of the Board; Dr. Gary Elbow, President of the Faculty Senate; Dr. Harold Luce, Chairperson, Music Department; Dr. R. H. Seacat, Chairperson, and Dr. Wm. M. Portnoy, Professor, Electrical Engineering; Mr. John Taylor, Contracting and Purchasing; Ms. Elaine Pasqual, Coordinator, and Mr. Wayland H. Winstead, Research Assistant, Systems and Procedures; Ms. Sharon Nelson, Executive Secretary, Office of the President; Ms. Connie Bibus, Student Affairs Intern; Ms. Peggy Nodurft, Director of News and Publications, Health Sciences Center; Ms. Jane Brandenberger, Director, Mrs. Bea Zeeck, Associate Director, University News and Publications; Ms. Cynthia Scott, Dad's Association; and Mr. Gary Hanson, President, Student Association.

Others present were: Mr. George Richie, Harwood K. Smith & Partners, Inc.; Mr. Berwyn Tisdel, Tisdel & Adling, Architects; Mr. Don Roach; Ms. Dalene Nichols, University Daily; Mr. Joe Gilbert, KCBD-TV; and Ms. Pam Baird, KAMC-TV.

M35. Mr. Pfluger called the meeting to order and called upon Mr. Williams to give the invocation.

M36. Mr. Pfluger then read the attached Resolution acknowledging the establishment of an endowment for the J. Fred Bucy, Jr. and Odetta Greer Bucy Chair in

Electrical Engineering; Attachment No. 1. The Board unanimously approved the resolution, and applauded Mr. and Mrs. Bucy for their generosity and his service.

M37. Mr. Pfluger announced an Executive Session, and read the following: "The Board of Regents of Texas Tech University and Texas Tech University Health Sciences Center now having been duly convened in open session, and statutory notice of these meetings of the Board of Regents having been duly given to the Secretary of State, I, as Chairman of the Board of Regents, hereby publicly announce Executive Sessions of the Board to be held in compliance with Article 6252-17 Texas Civil Statutes, and these Executive Sessions are specifically authorized by Section 2 - Paragraphs E, F, and G of the Statute."

M38. The Board of Regents of Texas Tech University reconvened in open session at 10:50 a.m. with Texas Tech University Health Sciences Center recessed until the conclusion of the present meeting.

M39. Upon motion made by Mr. Formby, seconded by Dr. Galloway, the Board approved the Minutes of the Board meeting of October 5, 1979.

M40. Mr. Formby reported for the Academic and Student Affairs Committee. The following four items (M41 through M44) constitute action taken upon committee recommendation.

M41. Upon motion made by Mr. Formby, seconded by Dr. Galloway, the Board approved the following: RESOLVED, that the Board of Regents approves the Bachelor of Science and Master of Science degrees in Computer Science. The Degree Proposal is attached; Attachment No. 2.

M42. Dr. Graves reported that the current Small Class Report and Academic Workload are in the Secretary's office for the Board's perusal.

M43. Dr. Graves reported that the program in Secretarial Administration is being developed, and it should appear in the next catalog published. Mr. Bucy commended Dr. Graves and his staff for getting this done expeditiously.

M44. Upon motion by Mr. Formby, seconded by Mr. Snyder, the Board approved that each member is to receive the schedule and place for each Board committee meeting one week in advance.

M45. Mr. Bucy reported for the Finance Committee. The following three items (M46 through M48) constitute action taken upon committee recommendation.

M46. Upon motion made by Mr. Bucy, seconded by Mr. Formby, the Board approved the following: RESOLVED, that effective the beginning of the spring semester 1980, a compulsory Student Service Fee of $4.22 per semester credit hour registered shall be collected from each student provided that the maximum shall not be more than fifty dollars and fifty cents ($50.50) for any regular semester or six-week summer session.

M47. Upon motion made by Mr. Bucy, seconded by Mr. Workman, the Board approved the following: RESOLVED, that the Board of Regents of Texas Tech University authorizes the sale of the property designated as Lots Three (3), Four (4) and Five (5), Block Two (2), Webb Addition to the City of Lubbock to the highest bidder Don Roach at a cash price, where is as is, of $127,600.00 and instructs the General Counsel of the University to prepare or have prepared all necessary documents for conveyance of the property by the Chairman of the Board of Regents. Consummation of this sale and transfer of title shall be as soon as possible.

M48. In response to Board requests, Dan Williams handed out a report regarding the funds used on the Aquatic Center.

M49. Mr. Furr reported for the Athletic Committee. Upon motion made by Mr. Furr, seconded by Mr. Pevehouse, the Board approved the following: RESOLVED, that the extension of the present athletic stadium concession contract with Coca-Cola Bottling Company of Lubbock, Inc., for an additional five-year period beginning September 1, 1981 is approved and the Chairman is authorized to sign the attached amendment to the contract; Attachment No. 3.

M50. Mr. Workman reported for the Campus and Building Committee. The two following items (M51 and M52) constitute action taken upon committee recommendation.

M51. Upon motion made by Mr. Workman, seconded by Mr. Snyder, the Board approved the following: RESOLVED, that the schematic plans are approved and that authority is given to proceed with contract documents for the addition to the Music Building.

M52. Upon motion made by Mr. Workman, seconded by Dr. Galloway, the Board approved the following: RESOLVED, that the schematic plans are approved and authority is given to proceed with contract documents and the receipt of bids for the addition and renovation of the Jones Stadium Athletic Offices.

M53. Mr. Pfluger stated there is to be an additional standing committee of the Board, which will be in the area of development. He appointed Messrs. Bucy, Pevehouse, and Furr to work up the charges of the two committees between development and public affairs, and come back to the February Board meeting with the recommendations.

M54. There being no further business, the meeting adjourned.

(Mrs.) Freda Pierce, Secretary

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Attachments (November 16, 1979)

M1. Resolution, Acknowledging Establishment of Endowment for Bucy Chair, Item M36.

M2. Degree Proposal for Bachelor and Master Degrees in Computer Science, Item M41.

M3. Contract, Coca-Cola Bottling Co. of Lubbock, Inc., Item M49.

I, Freda Pierce, the duly appointed and qualified Secretary of the Board of Regents, hereby certify that the above and foregoing is a true and correct copy of the Minutes of Texas Tech University Board of Regents meeting on November 16, 1979.

(Mrs.) Freda Pierce, Secretary

SEAL

November 16, 1979

RESOLUTION

J. Fred Bucy, Jr.

WHEREAS, J. Fred Bucy, Jr., known internationally for his erudition in the fields of electronics and business finance, has served as regent and vice chairman of the Boards of Regents of Texas Tech University and Texas Tech University Health Sciences Center; and

WHEREAS, Mr. Bucy, president of Texas Instruments Incorporated, was graduated from Texas Tech University with the bachelor's degree in physics in 1951 and from The University of Texas with the master's degree in physics; and

WHEREAS, he then joined Texas Instruments to accomplish research in instrumentation for oil exploration and in development of the first solid state, asynchronous 10 MC digital computer, as well as a digital field system and high fidelity seismic amplifier for oil exploration; and

WHEREAS, his highly successful career continued with his promotion in 1963 to the vice presidency of Texas Instruments and assumption of responsibilities for that corporation's government products, including radar, infrared, sonar, missile and space systems and instrumentation support; and

WHEREAS, in 1972 he was elected executive vice president of Texas Instruments and accorded responsibility for 49 Texas Instruments plants in 19 countries, as well as the major task of placing this corporation into the consumer business; and

WHEREAS, in 1974 he was elected director of Texas Instruments, the next year named chief operating officer and in 1976 elected president; and

WHEREAS, he also serves as director and chairman of various Texas Instruments subsidiary boards throughout the world; and

WHEREAS, in recognition of his unique talents and engineering brilliance this university named him Distinguished Engineer in 1972, and among his numerous other honors are fellowship in the Institute of Electrical and Electronics Engineers, membership on the Defense Science Board of the U. S. Department of Defense, chairmanship of the DSB Task Forces on Design-to-Cost and on the Export of U. S. Technology and membership in other major governmental, honorary professional and civic organizations; and

WHEREAS, since 1973, when he was appointed by the Governor of the State of Texas to the Boards of Regents of Texas Tech University and of the Texas Tech University Health Sciences Center, he has served these institutions with singular distinction, particularly in the area of wise and astute financial counsel.

NOW THEREFORE BE IT RESOLVED that the Board of Regents of Texas Tech University pause in their deliberations to recognize and salute Mr. and Mrs. J. Fred Bucy, Jr. for their generosity and outstanding contribution in the field of Electrical Engineering and Solid State Electronics, on the occasion of their generous endowment of the J. Fred Bucy, Jr. and Odetta Greer Bucy Chair in Electrical Engineering.

BE IT FURTHER RESOLVED that this resolution be spread upon the minutes of this meeting and a copy be delivered to J. Fred Bucy, Jr. and Odetta Greer Bucy.

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COMPUTER SCIENCE AT TEXAS TECH

INTRODUCTION

It is proposed to initiate degree programs at Texas Tech University leading to the Bachelor of Science and the Master of Science in Computer Science. The proposed programs will be interdisciplinary in nature, making use of existing faculty and courses in three departments. By so doing, an integrated curriculum in which the student is exposed to both hardware and software concepts and their interplay will be achieved.

Of special significance is the fact that the proposed degree programs are designed around faculty, courses and facilities which already exist on the Texas Tech campus. Thus, the new degree programs can be initiated with a minimal commitment of additional resources by the university. This will be achieved by integrating the existing computer science faculty in the Department of Mathematics and the faculty of the Department of Systems with their software and firmware courses into a Computer Science Section to be housed in the Department of Electrical Engineering. In combination with the electrical engineering faculty in the computer area and their hardware courses, a core of faculty members and courses around which the proposed programs can be developed will be obtained. Additionally, courses taught by faculty members in several departments at Texas Tech and adjunct professors from local industry will be included in the combined programs to achieve the desired interdisciplinary character. The programs will be supported by the university's new Itel AS/6 central computer; the AS/6, together with several computing facilities operated by the Department of Electrical Engineering, will permit us to implement the proposed programs without the acquisition of new facilities.

We believe that the initiation of computer science degree programs at Texas Tech is long overdue and will be well received by the student body and industrial community. The proposed interdisciplinary programs are unique to the State of Texas in that they are designed to fill the gap between the software specialists produced by some university computer science programs and the computer hardware engineers produced by others. Although the programs have sufficient flexibility to permit the students to specialize in either hardware or software techniques, the graduates will be competent in both. A Texas Tech educated computer scientist employed as an analyst for a financial institution will be able to cope with the coming generation of multiprocessors and dedicated minicomputers. A graduate employed in the computer industry will be cognizant of the possible tradeoffs between hardware- and software-based approaches to a design problem. We believe that this interdisciplinary approach to computer science education will provide our students with the best possible education while simultaneously providing a much needed service to industry. Therefore, we strongly urge the approval of this proposal.

COMPUTER SCIENCE AT TEXAS TECH

Over the years Texas Tech has been notoriously slow in its development of a computer science degree program. The first attempt to organize such a program apparently goes back to 1959, at which time a proposal was written to establish a computer science department in the College of Engineering. This eventually led to the formation of the Department of Systems (originally called Engineering Analysis and Design), which taught service courses in computer science, though a degree program was never established.

Soon after the founding of the university computer center in 1960, an interdisciplinary Computer Science Committee was formed under the Dean of the Graduate School. This committee coordinated the activities of an interdisciplinary computer science faculty composed of individuals from several colleges and departments. No formal degree program was, however, offered nor was the interdisciplinary faculty ever organized into a department of computer science.

In 1972, 2.55 FTE's were allocated to a new department of computer science which was administered by the office of the Academic Vice-President. Although software service courses were offered, no degree program was formulated. This situation lasted until 1975, at which time the computer science department was merged into the mathematics department. Computer scientists in the mathematics department currently teach undergraduate and graduate software courses for students minoring in computer science.

In parallel with the above cited activity in the software area, the Department of Electrical Engineering initiated an activity in the computer hardware area. This included the teaching of courses on the design of computers and the development of several computer laboratories for the study of mainframe-, mini- and microcomputers.

Consistent with the above, Texas Tech University presently teaches computer science courses in three different departments, but it has no computer science degree program. Although the numbers of computer science faculty and courses in each of these three departments is below critical mass, by combining the three existing activities into a single Computer Science Section, we believe that a viable program can be established with a minimum of additional resources.

While the failure to initiate a degree program in computer science at Texas Tech can be attributed to a multitude of factors, it is a failure for which the university, its students, its faculty and the people of West Texas have paid dearly. Universities which have initiated a computer science degree program have generally found that it quickly became viable, and attracted new students to

the university who would have attended other universities if not for the existence of the computer science program.* Representatives of companies, recruiting prospective employees at Tech, invariably comment on the lack of a computer science degree program and the minimal number of computer science courses taken by students in other disciplines. Finally, the research activity of the faculty in those areas which interface with computer science has been severely limited by the lack of a viable research program in computer science.

According to the recent report of the State 1202 Commission** on "Educational Supply and Occupational Demand in Texas for the Period of 1977-1983", computer science is one of the very few academic disciplines in which demand will exceed supply in the Texas job market. Job prospects for students with a B.S. in computer science are rated as very good while prospects for students with graduate degrees in computer science are excellent. Moreover, this optimism is born out by the experience of other universities with computer science degree programs. Typically, enrollments have increased rapidly from the inception of the program, with a stable enrollment of several hundred or more students being achieved in two to three years.* In addition, we believe that these enrollment expectations will be further enhanced by the expanding computer science and computer engineering activities at the Lubbock facility of Texas Instruments, Inc. The company employs several hundred engineers and computer scientists in their Lubbock division who design hardware and software for home computers, digital watches, calculators, etc. A Texas Instruments official has estimated that some twenty-five of these TI employees would take courses each year at Tech, in the computer area, if a degree program existed.

In light of the above, we are herewith proposing to initiate degree programs leading to the Bachelor of Science and the Master of Science in Computer Science. By making maximum use of existing courses, manpower and facilities in the three departments, these programs can be initiated with a minimal allocation of new resources on the part of the university. The programs will be administered by a Computer Science Section within the Department of Electrical Engineering and housed in the Electrical Engineering Building; this which will permit the computer science programs to share laboratory and computer facilities with the electrical engineering programs.

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* IEEE Computer Society Education Survey Subcommittee Report", Computer, Vol. 12, pp. 35-42, (Dec. 1975).

** Report of the 1202 Commission, Texas College and University System Coordinating Board, Austin, Tx., March 1978.

The proposed computer science degree programs will be interdisciplinary in nature and will make full use of existing faculty and courses in the area. In addition to the core of computer science faculty drawn from mathematics, systems, and electrical engineering, support will be obtained from other faculty members who presently teach computer related courses in their own departments. Finally, the Department of Electrical Engineering is presently employing the services of several adjunct faculty members from Texas Instruments, who teach courses on computer design and microprocessor applications. Since this practice not only increases the potential faculty in the computer science area, but also aids in the development of a close relationship between the programs and a major industrial concern, we propose to continue the use of adjunct faculty in the new degree programs.

As with the faculty, the majority of the courses to be used in the computer science degree programs will be derived from courses presently being taught on campus. These will include the mathematics courses presently being used for the computer science minor, service courses taught by the Department of Systems, the existing computer hardware courses in electrical engineering, and computer related courses in other departments. Since many of these courses are presently being taught with ten to fifteen students, their inclusion in the computer science degree programs will increase the number of students in each class without requiring the addition of new sections. Duplicative courses will be deleted from the catalog.

In summary, the proposed computer science degree programs can be implemented at Texas Tech using existing facilities, faculty and courses with a minimum of new resources. The resultant programs will attract new students to the university and will quickly reach viable enrollment levels. Moreover, the graduates of the programs will enter a job market where the demand far exceeds the supply and is expected to do so for the foreseeable future.

PROPOSAL FOR A BACHELOR OF SCIENCE IN COMPUTER SCIENCE

1. What is the title and nature of the proposed degree program?

It is proposed to initiate a new degree program leading to the Bachelor of Science in Computer Science. The proposed degree program is aimed at the middle ground between software dominated computer science curricula offered by many Arts and Sciences colleges and the hardware dominated computer engineering curricula offered by some Engineering colleges. Indeed, the proposed program attempts to achieve the best of both worlds without being limited by the constraints of either. Each degree student will take a basic core composed of 44 hours in the sciences, humanities and engineering plus 18 hours of mathematics and an 18 hour minor, which can be taken in any of Texas Tech's six undergraduate colleges. In the major area the computer science student will take 24 hours of required courses, covering the fundamentals of computer science in both the hardware and software areas, followed by 21 hours of computer science electives. Indeed, up to 6 hours of the computer science electives may be taken from an approved list of interdisciplinary courses offered in the Colleges of Business Administration, Arts and Sciences, and Engineering. Consequently, the computer science major will receive an extremely broad-based education drawing on the resources available in the university's several colleges.

The program, which will be administered by the Computer Science Section housed in the Department of Electrical Engineering, will be designed around an integrated, interdisciplinary curriculum Which includes both hardware and software techniques and their interrelationships. The graduates of the program will be prepared for an industrial career in a corporate computing center, a career with a manufacturer of computers or computer based machinery, or a career in software development and support. Moreover, by virtue of the integrated hardware/software program, students with any of these career goals will be prepared for the coming generation of mini- and micro-computers, in which the boundary between hardware and software is blurred.

Resources for the new program will be obtained by combining existing computer science activities in the Department of Mathematics, the Department of Systems, and the Department of Electrical Engineering. Therefore, the Computer Science Section will come into being with a core of courses, faculty, and laboratory equipment sufficient to support the needs of the proposed program up to the estimated enrollments of 150 computer science majors and 35 minors. Indeed, with the abolishment of the Department of Systems and the elimination of duplicative courses in the computer science area, the university will realize a considerable reduction in administrative costs. In addition, the implementation of the proposed degree program will attract many new students to the campus.

Consistent with the interdisciplinary philosophy of the proposed program, the Computer Science Section will also offer a minor designed to be taken by students majoring in any of Tech's undergraduate colleges. The minor will consist of 18 hours of computer science; certain computer courses offered in the student's major college will be accepted for credit towards the minor.

2. List the course offerings to comprise the program. Which of these courses will be new ones?

In the following list, the first course number indicates the computer science number the course will have in the proposed degree program, while the second course number indicates the present number for the course in mathematics, systems, or electrical engineering. New courses are denoted by "new" in this column. The list of interdisciplinary courses represents existing courses related to computer science; these are not being transferred to the Computer Science Section, but will be acceptable for credit towards the computer science degree in lieu of computer science courses (up to a limit of 6 credit hours).

The addition of the six new courses required for the computer science degree program is more than balanced by the deletion of twelve existing mathematics and systems courses. The deleted courses either will not be needed for, or duplicate courses in, the proposed program. Additionally, non-computer science service courses presently being offered by the Department of Systems will be transferred to the Department of Industrial Engineering. Thus, the implementation of the present proposal will completely eliminate the entire course offering of the Department of Systems and the computer science courses offered by mathematics, with a commensurate reduction in administrative costs.

REQUIRED COURSES

CS Number	Previous Number	Title
CS 1362[1]	CS 1362	Fundamentals of Computer Science I
CS 1363	CS 1363	Fundamentals of Computer Science II
CS 2361	CS 2361	Information Structures
CS 2371	EE 136	Introduction to Computer Logic
CS 3360	CS 2362[1]	Computer Organization and Assembly Language Programming
CS 3362	CS 3362	Introduction to Systems Programming
CS 3372	New	Logic Laboratory
CS 3375	CS 434	Machine Structure and Organization

ELECTIVE COURSES

CS Number	Previous Number	Title
CS 331	CS 331	Algorithmic Processes
CS 335	CS 335	Effective Programming
CS 3361	CS 3361	Concepts of Programming Languages
CS 3363	CS 3363	Discrete Computational Structures
CS 431	CS 431	Special Topics in Computer Science
CS 4361[4]	CS 4361	Data Base Organization
CS 4362[4]	CS 4362	Operating Systems
CS 4363[4]	CS 4363	Compiler Construction
CS 4371[4]	SYS 3321	Simulation
CS 4372	EE 4311	Analog and Digital Computation
CS 4373	EE 4312	Microprocessors for Engineers and Scientists
CS 4375	EE 4314	Finite State Machines
CS 4376	New	Minicomputer Laboratory
CS 4377	New	Control Structure of Computers
CS 4378	New	Microprocessor Applications Laboratory
CS 4379	New	Microprogramming

SERVICE COURSES

CS Number	Previous Number	Title
CS 131[3]	CS 131	Computers and Modern Society
CS 1360[2]	New	Introductory Programming with FORTRAN
CS 1361[5]	CS 1361	Introductory Programming with COBOL
CS 4374[3]	EE 4313	Microprocessors for Business and Humanities

INTERDISCIPLINARY COURSES

Course Number	Title
EE 4361	Introduction to Information Theory and Noise
EE 4381	Integrated Circuits
IE 3313	Engineering Statistics
IE 3321	Operations Research I
IE 4321	Operations Research II
IE 4325	Reliability and Engineering Statistics
BA 2342	Quantitative Analysis for Management Decision I
BA 3342	Quantitative Analysis for Management Decision II
BA 3348	Database Management Systems
MATH 4310	Introduction to Numerical Analysis I
MATH 4311	Introduction to Numerical Analysis II
MATH 4313	Probability
MATH 4314	Mathematical Statistics I
MATH 4315	Mathematical Statistics II
EET 4314	Applications of Integrated Circuits in Digital Systems
EET 4316	Minicomputer Technology

[1]These courses will undergo change of content to reflect the requirements of the new program.

[2]A student may receive credit for only one of the three courses: CS 1360, 1361, or 1362.

[3]May not be used for credit towards a computer science minor.

[4]The phrase "Introduction to" has been dropped from the title of these courses.

[5]This course will undergo a title change from "Fundamentals of Computer Science with COBOL".

In addition to the above listed service courses, the computer science program will absorb computer science service courses presently being offered in departments other than mathematics/computer science, electrical engineering, and systems at the request of the department offering the course. Furthermore, special courses to serve the needs of the various degree programs at Texas Tech will be initiated as required.

Except for the six new required courses for the computer science degree program, all of the above courses have been approved and are presently being offered in their respective departments. Tentative catalog descriptions for the six new courses are given below.

CS 1360: Introductory Programming with FORTRAN. Prerequisite: College Algebra and Trigonometry. First programming course for students who require the FORTRAN language. Emphasis will be placed on algorithmic processes and their implementation with FORTRAN. 3 hours.

CS 3372: Logic Laboratory. Prerequisite: CS 2371. Integrated circuits will be used to realize logic functions such as decoders, half adders, four types of flip-flops and other such combinational circuits. Sequential circuits will be realized to perform the function of counting. A ROM will be used to execute sequential functions. 3 hours.

CS 4376: Minicomputer Laboratory. Prerequisite: CS 3362. A number of projects on the modification and application of minicomputers. Students will write modified firmware packages for a minicomputer and interface the computer to various external systems. 3 hours.

CS 4377: Control Structure of Computers. Prerequisite: CS 3362, or consent of instructor. Asynchronous, synchronous and microprogrammed control structures in the framework of computer architecture; interlocking of autonomous subcontrols; case studies in typical control features; instruction lookahead, multi-processing, interrupt, and input/output. 3 hours.

CS 4278: Microprocessor Applications Laboratory. Prerequisite: CS 4373. The application of a microprocessor to function as a data acquisition and control unit will be the majority of this lab effort. A program must be written, loaded into a PROM, electronic circuits interfaced, and finally the program will be tested and executed. Special functions may also be implemented by the microprocessor, such as Kalman filtering, Fourier Transforms, etc. 3 hours.

CS 4379: Microprogramming. Prerequisite: CS 3362, senior standing; corequisite: CS 4377. The architecture and application of microprogrammable computers will be investigated. The student will write programs to execute pre-determined functions and learn to use microprogramming as a means of effectively changing the architecture of a computer. Additionally, the principles of real-time debugging will be investigated. 3 hours.

3. Outline a semester-by-semester curriculum for the proposed program, if applicable.

The proposed curriculum is outlined below.

Semester 1		Semester 2	
ENG 131, College Rhet. I	3	ENG 132, College Rhet. II	3
MATH 1316[1], An. Geom.	3	MATH 1317[1], Calculus I	3
CS 1362, Fund. of CS I	3	CS 1363, Fund. of CS II	3
Laboratory Science	4	Laboratory Science	4
Humanities Elec.	3	Humanities Elec.	3
Physical Education	(1)	Physical Education	(1)
	16 + (1)		16 + (1)
Semester 3		**Semester 4**	
MATH 1318[1], Calculus II	3	MATH 235, Calculus III	3
CS 2371, Intro. to Comp. Logic	3	CS 3372, Logic Lab.	3
CS 2361, Info. Structures	3	CS 3360, Comp. Org. and Assem. Lang.	3
HIST 231, Hist. of U.S. before 1877	3	HIST 232, Hist. of U.S. after 1877	3
EE 233, Elec. Sys. Anal.	3	EE 234, Elec. Inst.	3
	15		15
Semester 5		**Semester 6**	
MATH 233, Linear Algebra	3	Comp. Sci. Elec.[2]	6
CS 3375, Mach. Struc. and Organ.	3	Minor	6
Minor	3	POLS 232, Amer. Public Policy	3
POLS 231, Amer. Gov. Org.	3	Free Elective	3
CS 3362 Systems Pgmg.	3		18
	15		
Semester 7		**Semester 8**	
Comp. Sci. Elec.[2]	6	Comp. Sci. Elec.[2]	9
Minor	6	Minor	3
MATH Elec.	3	Free Elec.	3
Free Elec.	3		15
	18		
		Total Hours	128+(2)

[1] MATH 151 and 152 may be substituted for MATH 1316, 1317, and 1318.

[2] Up to six hours of interdisciplinary courses may be substituted for computer science electives with the consent of the advisor.

4. What special requirements are included in the degree plan? If a graduate degree is contemplated, is a thesis or dissertation required? If not, what will be substituted? Describe any innovations or changes in degree requirements.

A significant aspect of the proposed degree program is its broad-based character. The required courses cut across humanities, science, engineering, and mathematics while the minor may be taken in any of the university's six undergraduate colleges. Furthermore, interdisciplinary courses from the list in Item 2 may be taken in lieu of six hours of computer science electives with approval of the computer science advisor.

5. Is the proposed program entirely new to the institution? Is it an extension of a minor field? If so, give the number of students minoring in the program during the last three years.

The proposed program will subsume the computer science minor presently being offered by mathematics. Most of the courses used in this minor program will be continued under the proposed program and will be adjoined by a number of hardware courses which did not previously exist. As such, the minor will become accessible to students in engineering and the sciences, who require a hardware oriented computer science minor, while still serving its present clientele. In the past three years, the number of undergraduates at Texas Tech taking a computer science minor has ranged from 31 to 36 as tabulated below.

1975-76	31 Undergraduate CS minors
1976-77	31 Undergraduate CS minors
1977-78	36 Undergraduate CS minors

An undergraduate computer science minor consists of 18 hours in which each student takes two core courses followed by four computer science electives. Although the student may choose a mixture of courses, three suggested groups of electives (shown below) are: languages, systems programming or hardware emphasis. Each computer science minor must also take MATH 137 and MATH 138 or the equivalent. The computer science advisor must approve the 18 hours required for all minors in computer science; the student must maintain a C average in these courses.

Core courses:

CS 1362: Fundamentals of Computer Science I
CS 1363: Fundamentals of Computer Science II

Computer Science Electives:

Languages Emphasis	Systems Programming	Hardware Emphasis
CS 2361 Information Struc.	CS 2361 Information Struc.	CS 2371 Intro. to Comp. Logic
CS 3360 Comp. Org.& Assem. Lang.	CS 3360 Comp. Org. & Assem. Lang.	CS 3360 Comp. Org. & Assem. Lang.
CS 3361 Concepts of Progr. Lang.	CS 3362 Intro. to Sys. Progr.	CS 3372 Logic Circuit Lab.
CS 4363 Intro. to Compiler Struc.	CS 4362 Intro. to Oper. Sys.	CS 3375 Machine Struc. and Org.

6. How many similar programs are offered elsewhere in Texas, and where? What is the nearest institution offering a similar program?

Although the concept of an integrated hardware/software computer science degree program has gained acceptance nationwide, it is unique to the State of Texas. The closest approximation to such a program is the Electrical Systems Emphasis option of the Department of Electrical Engineering and Computer Science at Texas A&I (700 miles from Lubbock). A number of schools offer software oriented programs leading to a B.S. degree in computer science. These include Texas A&M, SMU, the University of Texas at Permian Basin, the University of Houston, the University of Texas at San Antonio, the University of Texas at Austin, North Texas State University, Angelo State University, Texas A&I, and West Texas State University, Of these, the closest large program is that at North Texas State University which is 300 miles from Lubbock. The smaller programs at Angelo State, West Texas State and the University of Texas at Permian Basin are all located at least 100 miles from Lubbock. Finally, a number of schools in West Texas offer an Associate Degree in the computer area.

Although there are a number of computer science degree programs presently offered in Texas, the proposed program is the only integrated hardware/software program. As such, it offers a unique opportunity to both students and prospective employers in the state.

7. Describe the manpower needs for graduates of the program. Also, describe how the proposed program strengthens the total academic program of the institution.

According to the report of the State 1202 Commission*, the job market for graduates with a Bachelor of Science in Computer Science will be "very good". More precisely, the average annual demand in Texas for graduates with a B.S. in Computer Science will range from 375 to 410 in areas directly related to computer science and 60 to 65 in areas generally related to computer science. Since Texas schools are only expected to produce 345 graduates with a Baccalaureate in Computer Science annually, the demand will far exceed the supply. Furthermore, we note that there is presently no supply whatsoever of Texas graduates with an integrated hardware/software background to meet the demand of the state's computer and aerospace industries, much less those industries dealing with computer applications. We foresee no difficulty in placing the graduates of the proposed program.

Academically, the proposed program will support the existing computer related activities in the Departments of Mathematics, Electrical Engineering, Industrial Engineering and the College of Business Administration.

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*Report of the 1202 Commission, Texas College and University Coordinating Board, Austin, Texas, March, 1978.

8. Has the proposed program been approved by the institution's governing board? Give the date of action.

The proposed program was approved by the Board of Regents of Texas Tech University on _____.

9. Project the enrollment for the proposed program for the next five years. Explain the basis for this projection. Include majors and minors in separate columns.

1979-80	35	Undergraduate Computer Science minors	20	B.S. in Computer Science majors
1980-81	35	Undergraduate Computer Science minors	50	B.S. in Computer Science majors
1981-82	35	Undergraduate Computer Science minors	90	B.S. in Computer Science majors
1982-83	35	Undergraduate Computer Science minors	120	B.S. in Computer Science majors
1983-84	35	Undergraduate Computer Science minors	150	B.S. in Computer Science majors

We estimate that about a half of the students presently minoring in computer science would major in the field if such a major existed. An equal number of students presently majoring in engineering and engineering technology would major in a hardware oriented computer science program if it existed (though they are not presently enrolled in a software oriented minor). These students will make up the bulk of the computer science majors for the first two years of its operation. After the program becomes known around the state, however, we believe that it will attract new students who would not otherwise have attended Tech. Such students will be particularly attracted by the unique integrated hardware/software program.

The number of students taking the computer science minor has remained constant over the past few years and we are predicting that it will continue to do so. Although the inclusion of hardware courses in the minor will attract new students to the minor program, this will be balanced by students who choose to major rather than minor in computer science. Therefore, we feel that the relatively low estimate for students minoring in computer science is realistic.

Finally, we note that computer science has been a popular major wherever it has been implemented. North Texas State has some 400 majors in the area even though it is located in the vicinity of several other schools with computer science degree programs. Given the relative sparsity of computer science degree programs in West Texas, and the uniqueness of the proposed program, we anticipate little difficulty in meeting the estimated enrollment figures.

10. Describe the likely source of students who will enroll in this program. (Will they come from existing programs, or will they be attracted to the institution to enroll in the proposed program?)

We believe that most of the fifty students expected to enroll in the computer science degree program during its first two years of operation would have attended Tech without the computer science degree program, majoring in a related engineering discipline or mathematics, and minoring in computer science. Once the program has become known, however, it will begin to attract students to the university who would not otherwise have come to Tech. These will include students attracted to the integrated hardware/software program and many West Texans who might otherwise leave the state. Indeed, many West Texans presently attend the University of New Mexico and New Mexico State University, both of which offer integrated hardware/ software programs in computer science. A source of part-time students for the program will be the employees of the Texas Instruments Consumer Products Division in Lubbock, who work in an integrated hardware/software computer science environment. The flexibility of the program also will attract new students to campus.

The field of computer science is expanding by leaps and bounds and the demand for computer scientists by Texas industry is expected to exceed by far the supply for the foreseeable future.

11. Give the number of persons presently on the faculty who will be most directly involved in the proposed program. List name, rank, highest degree, present course load, and estimated course load in the proposed program for each. Do present faculty meet minimal criteria for the requested program?

The core of faculty for the proposed Computer Science Section will be made up of two computer scientists, presently housed in the Department of Mathematics, and two faculty members each from the Department of Systems and the Department of Electrical Engineering. In addition, the mathematics faculty has .55 open full-time equivalents in computer science, and the Department of Systems has several open positions which we expect to fill with qualified computer scientists to complete the proposed Computer Science Section.

The faculty members from mathematics, systems and electrical engineering who will man the proposed program all hold Ph.D.'s, and are fully qualified to teach hardware and/or software courses. Moreover, several have viable on-going research programs in computer science and related areas. Pertinent data concerning these individuals is tabulated below.

Name	Rank	Present Dept.	Present Load[1]	Proposed Load[1]
John Jensen[2]	Asst. Prof.	MATH/CS	9 hrs.	9 hrs.
Leonard Weiner[2]	Assoc. Prof.	MATH/CS	9 hrs.	9 hrs.
James Burns	Asst. Prof.	SYS	9 hrs.	9 hrs.
James Archer	Prof.	SYS	9 hrs.	9 hrs.
Donald Gustafson	Assoc. Prof.	EE	12 hrs.	12 hrs.
Darrell Vines	Prof.	EE	13 hrs.	12 hrs.

[1]Includes both graduate and undergraduate courses, but excludes thesis direction, administration, etc.

[2]Holds Ph.D. in Computer Science.

12. Calculate the present student-faculty ratio in the subject matter field(s) or department(s) in which the proposed program will be offered. (Divide full-time equivalent students by full-time equivalent faculty). Also, give the average teacher-student ratio in the courses given by the department (planned number of students per class.)

	MATH Fall 77	MATH Spg. 78	EE Fall 77	EE Spg. 78	SYS Fall 77	SYS Spg. 78
Number of Undergraduate Students[1]	146	143	1051	1003	89	91
Number of Graduate Students[1]	58	52	241	215	25	39
Total number of students[1]	204	195	1291	1218	114	130
Number of classes	6	7	88	81	8	10
Average class size	34	28	14.7	15	14.25	13.6
FTE Faculty[2]	4	4	24.25	24.25	3.25	3.25
FTE Students[3]	41	39	258	244	22.8	26
FTE Student Faculty Ratio[4]	10.25	9.75	10.64	10.06	7.01	8

[1] Total number of students registered in courses taught under the program (with students taking multiple courses counted multiply).

[2] Includes 1.45 mathematics FTE used in support of the computer science minor program.

[3] Total number of students divided by 5

[4] FTE students divided by FTE faculty.

13. Project the need for new faculty required for the proposed program for the next five years. If teaching responsibilities for the proposed program will be absorbed in part or whole by the present faculty, describe how this will be done.

Since the proposed Computer Science Section will be built from resources which presently exist on the Texas Tech campus, and many of the computer science courses are presently being taught in small sections, we believe that the present faculty together with the computer scientists hired to fill the existing open positions can handle the proposed program in its initial phases. As the number of computer science students reaches the estimated levels of 150 B.S. and 30 M.S. students, or if they exceed these levels, we will, however, require additional positions. In anticipation of reaching these goals, we have budgeted for one additional FTE in each of the third and fourth years of the program's operation.

14. Will the acquisition of new faculty for the program require an additional outlay in funds? Explain in detail.

Funds for the open computer science position (actually .55 FTE) in mathematics and one of the open positions in systems are presently included in the budgets for these departments and will be transferred to the new Computer Science Section. We have, however, budgeted for one new position in 1982-83 and one new position in 1983-84. On the assumption that we will hire one Assistant Professor and one Associate Professor, we have budgeted these position at $20,000 and $25,000, respectively, in 1979 dollars.

15. Describe the involvement of the faculty, present and projected, in research, extension, correspondence, and other activities related to the proposed program. Will this activity decrease or increase the course load of the present faculty?

The Department of Electrical Engineering places great emphasis on faculty research and professional activities, and it is proposed to continue to do so with the new Computer Science Section. It has been our experience that such activities greatly enhance both the undergraduate and graduate programs by (i) keeping the faculty abreast of the latest trends in the field, (ii) developing a working relationship between the university and industry (and government), (iii) developing laboratories and computing facilties, and (iv) supplying funds for both graduate and undergraduate assistants.

Among the electrical engineering faculty to participate in the proposed program, Professor Gustafson specializes in microprocessor applications, an area in which he has received NSF funding as well as corporate grants. Professor Vines is active in professional circles in both electrical engineering and computer science as a member of the IEEE board of directors. Moreover, he has developed several of the computing facilities to be employed in the proposed program from government surplus equipment obtained under various research grants. Among the mathematics faculty, Professor Jensen directs a research program in computer architecture and Professor Weiner conducts research in computer science education and maintains a corporate grant in the software engineering area. Finally, Professor Burns of the Department of Systems is active in the computer simulation and modeling areas.

As indicated above, all of the present faculty are involved in computer-related research and professional activities, and are carrying normal course loads. Therefore, their course loads under the proposed program will not be affected.

16. Are present library holdings in relevant fields adequate to begin the proposed program? How will the library have to be improved to meet program needs in the next four years? (Please explain need for books, periodicals, reference books, primary source materials, etc.) What are your institutional surpluses or deficiencies in holdings as measured by the Clapp-Jordan formula? How will approval of this program alter this situation?

The present library holdings in the computer science area exceed the requirements of the Clapp-Jordan formula by more than 10%. Moreover, we anticipate no difficulty in maintaining this rating given the approval of the proposed degree program.

17. Do faculty and students now use libraries of other institutions? Could they do so in the proposed program? Explain in detail.

Faculty and students in computer science and related areas do not presently use the libraries of other institutions nor do any libraries superior to our own exist within a reasonable distance from Lubbock.

18. Estimate the total expenditure for the last two complete fiscal years for library acquisitions in the departments or subject matter fields in which the proposed program will be offered, or in fields which are closely related to the proposed program.

In the two most recent years for which we have data, the Texas Tech library expenditures in the computer science area have been $1,800 (1975-76) and $2,000 (1976-77). In addition, there have been small expenditures for library materials by the several departments with interests in the computer science area, though detailed figures are not available.

19. Project library expenditures to be budgeted annually for the next five years in supporting this program.

We anticipate no additional expenditures over and above those which would be required if the computer science degree program were not approved (about $2,000 per year).

20. Describe existing facilities that are available for the proposed program. Describe the present utilization of these facilities. What new facilities will be needed in the near future? Specify what facilities and equipment will be needed and estimate their cost. From what sources do you anticipate obtaining needed facilities and equipment? Will the approval of this program result in planning for the addition of new facilities?

A major factor which has hitherto prevented Tech from applying for a computer science degree program, has been the lack of viable computing facilities. Fortunately, the past year has seen a monumental increase in the university's computational capabilities. This has included the purchase of a new Itel AS/6 computer for the university's central computer center. Additionally, the Department of Electrical Engineering has recently acquired a pair of CDC 3600 computers (through military surplus channels) to upgrade its existing CDC 1604 facility. These mainframe computers will be augmented by a half dozen minicomputers purchased under various federal grants during the past several years and by a newly developed microprocessor laboratory. Therefore, we can now fully support the proposed computer science degree program.

We anticipate that each of these facilities will play a role in the proposed degree program. The AS/6 with its eighty plus on-line terminals will be used for the introductory computing courses and will carry the bulk of the course load for the proposed degree program. On the other hand, the CDC machines, though antiquated, were designed from the ground up as scientific computers and are ideally suited for upper division and graduate courses in which individual students require lengthy periods of hands-on computer time in which to try out new compilers, operating systems, data management systems, etc. Finally, the mini's and micro's are ideally suited for experimentation with new hardware concepts, microprogramming courses, etc.

The new central computer, which was installed in July, 1979, and is plug compatible with the IBM 370 series, has 4 megabytes of memory and 6 I/O ports. In addition, the AS/6 is supported by 8 tape drives, 2.8 billion bytes of on-line disc storage, two card readers, two line printers, and a new plotter.

The CDC 1604 is an old, but relatively efficient, scientific computer, presently used in a "hands-on" batch processing mode by undergraduate students. In the proposed program, the 1604 will be used for software experimentation by advanced undergraduate and

graduate students, i.e., the design of compilers, operating systems, new computer languages, etc.

The CDC 1604 actually consists of three mainframes: one installed and operating, a second in the process of installation, and the third to be used as a spare. The first machine consists of a 32K word, 48 bits per word, mainframe supported by 8 tape drives, a CDC 1612 line printer, a CDC 405 card reader, a paper tape reader and punch, and a CalComp 560 plotter. The second is a partial system which includes a 32K word mainframe, a Goodyear 2000 word, 50 bits/word, associative memory and 6 tape drives.

The programming languages available on the 1604 include FORTRAN-63, COBOL and Algol. FORTRAN-63 programs are readily converted to run on the university's AS/6.

Although the 1604 presently is used in support of advanced software studies, the major requirements for our upper division software courses will be absorbed by the new CDC 3600 facility. This system is presently operational, though the formal opening of the facility to student use has been delayed pending the receipt of a new line printer and the installation of air conditioning. These difficulties should be resolved by the Fall of 1979, and then the facility will be available for the use of both students and faculty. Since the CDC 3600 has eight times the capacity of the CDC 1604, we anticipate no difficulty in handling the increased load of computer science students generated by the proposed degree program.

The 3600 is equipped with a 64K memory of 48 bit words and is ideally suited for the type of scientific computing required for a computer science degree program. Of course, the facility is supported by the usual complement of tape drives, discs, card readers, etc. Furthermore, we have obtained a second 3600 CPU (through military surplus channels) which we plan to parallel with the existing facility; the combined facility will have 128K words of memory.

The Department of Electrical Engineering presently possesses several minicomputers. Although these computers will function as a computational tool in the curriculum, their primary purpose will be as test beds in which the students can experiment with various hardware concepts. These facilities are already playing a fundamental role in the electrical engineering degree program; thus they will be able to play a dual role in an integrated hardware/software computer science program.

The minicomputer facilities are centered around a fully expanded Hewlett-Packard 2100 with 32K of core memory and a microprogramming capability. Additional minicomputers include a Hewlett-Packard 21MX with 16K of semiconductor memory, a Hewlett-

Packard 9825 with plotter, a Hewlett-Packard 9845, a Tektronix 4051 with a hard copy capability, a PDP 11-04, and a PDP 11/34 (in procurement). These minicomputers are supported by a full complement of tape drives, discs, graphic terminals, etc. In addition, interfaces between the various computers have been built; these are used either to combine the capabilities of several computers or to facilitate student experiments in computer networking.

Finally, during the past three years, we have developed a major microprocessor laboratory. This laboratory was built to support the several elective and service microprocessor courses given by the Department of Electrical Engineering. The existing microprocessor courses will be incorporated into the proposed computer science degree program and the laboratory will be used in support thereof. The microprocessor laboratory is equipped with more than a dozen microcomputers of various manufacture, two Hewlett-Packard digital system analyzers, a prom programmer, and the usual instrumentation required in support of any electronics laboratory.

We believe that these facilities will be fully capable of supporting the proposed computer science degree program for at least the next five years. Indeed, we are presently teaching most of the courses which will be used in the proposed degree program with the support of only the central computer and the CDC 1604. When the CDC 3600 comes on line in the Fall of 1979, our ability to cover the existing and proposed computer science courses will be greatly enhanced.

Consistent with the above comments, we do not propose to purchase any new facilities in support of the proposed computer science degree program; nor do we have any plans for future purchases.

21. Will the proposed program affect the administrative structure of the institution? If yes, describe how. In what department, division, school, or college will the proposed program be administered? If the program is to have inter-departmental or inter-unit administration, explain in detail.

The proposed program will be administered as the Computer Science Section of the Department of Electrical Engineering. In addition to the existing computer science activity within the Department of Electrical Engineering, the proposed Computer Science Section will absorb the existing computer science groups of the Departments of Mathematics and Systems. An entire administrative unit will be eliminated through the absorption of the Department of Systems by the new Computer Science Section; the existing informal administration of the computer science group in mathematics will be replaced by a somewhat more formal administration in electrical engineering.

If, however, the computer science degree program eventually expands much beyond our present estimates (to several hundred undergraduate students) we will consider the possibility of splitting computer science off into a separate department. At the present time, however, we have no plans for taking such action.

22. Describe the requirements for accreditation, if the program is eligible to be accredited. What is the name of the accrediting agency? What will be the initial costs of accreditation and the subsequent annual costs to maintain it? Identify basic criteria for accreditation and describe how these are presently being met.

At the present time computer science degree programs are not accredited by any agency, although degree programs in computer engineering are accredited by the Engineers Council for Professional Development. While we do not presently plan to obtain engineering accreditation for the proposed program the curriculum has been designed to permit an accredited computer engineering option to be created at some time in the future.

23. Evaluate the subject matter fields at your institution which may be considered as necessary or valuable, in support of the proposed program. Will these fields need improvement or expansion? If so, how, to what extent, and at what cost? Be specific.

Texas Tech is fortunate in having a strong interdisciplinary faculty in the computer science area. The proposed program will take advantage of the computer related activities in the Departments of Industrial Engineering and Mathematics, and the College of Business Administration. These fields are quite capable of supporting the proposed program and will not require upgrading or expansion. This also holds true for the departments teaching service courses for the proposed program.

24. Estimate the initial (first year) costs of the proposed program. If this is an extension of an on-going program, what will be the cost differential?

1977-78 Expenditures[1]

	MATH[2]	EE[3]	SYS[4]	Total
Faculty Salaries	$45,300	$56,528	$65,260	$167,088
Teaching Asst.	0	5,460	0	5,460
Classified Employees	5,904	8,860	9,480	24,244
Student Asst.	500	1,120	1,000	2,620
M&O	1,500	1,890	3,500	6,890
Travel	2,000	980	1,200	4,180
Total Expenditures	$55,204	$74,838	$80,440	$210,482

1978-79 Expenditures[1]

	MATH[2]	EE[3]	SYS[4]	Total
Faculty Salaries	$47,255	$56,750	$69,710	$173,715
Teaching Asst.	0	4,480	0	4,480
Classified Employees	6,540	9,440	7,248	23,228
Student Asst.	500	1,260	2,000	3,760
M&O	1,500	1,890	3,500	6,890
Travel	2,000	980	1,200	4,180
Total Expenditures	$57,795	$74,800	$83,658	$216,253

Estimated 1979-80 Expenditures[1,5]

Faculty Salaries	$173,715
Teaching Asst.	4,480
Classified Employees	18,228
Student Asst.	3,760
M&O	6,890
Travel	4,180
Total Estimated Expenditures	$211,253

[1] These estimates represent the cost of both the proposed graduate and undergraduate programs.

[2] Includes 2.55 computer science faculty positions.

[3] Includes two faculty members working full-time in the computer area and three faculty members working one-quarter time in the computer area.

[4] Includes three faculty positions.

[5] These estimates do not include an inflationary correction.

Estimated Cost Differential for 1979-80

Faculty Salaries	0
Teaching Assistants	0
Classified Employees	-5,000
Student Assistants	0
M&O	0
Travel	0
Total Estimated Cost Differential	-$5,000

The estimated $5,000 savings in classified employees' salaries will result from the merger of the three existing computer science activities into a single Computer Science Section with a commensurate reduction in administrative overhead and secretarial help.

All other costs will be unaffected by the approval of the program since the proposed computer science degree program will make use of existing faculty, staff and courses.

25. Estimate the annual cost of the program for the three years following its first year. (Use current formulas in arriving at your estimate.) Explain the rationale for your estimate. If this is an extension of an on-going program, what will be the cost differential?

Estimated 1980-81 Expenditures		Estimated 1980-81 Cost Differential[1]
Faculty Salaries	$173,715	0
Teaching Asst.	4,480	0
Classified Employees	18,228	-5,000
Student Asst.	3,760	0
M&O	6,890	0
Travel	4,180	0
Total	$211,253	-$5,000

Estimated 1981-82 Expenditures		Estimated 1981-82 Cost Differential[1]
Faculty Salaries	$193,715	20,000
Teaching Asst.	8,480	4,000
Classified Employees	18,228	-5,000
Student Asst.	4,260	500
M&O	8,390	1,500
Travel	4,680	500
Total	$237,753	$21,500

Estimated 1982-83 Expenditures		Estimated 1982-83 Cost Differential[1]
Faculty Salaries	$218,715	45,000
Teaching Asst.	12,480	8,000
Classified Employees	18,228	-5,000
Student Asst.	4,760	1,000
M&O	9,890	3,000
Travel	5,180	1,000
Total	$269,253	$53,000

[1] These estimates represent the combined costs of both the proposed graduate and undergraduate programs without an inflationary correction.

Note these estimates are in 1979 dollars and include no inflationary correction. The estimates assume that the existing faculty can handle the program for its first two years given our enrollment estimates. Since, in the first two years, most of the computer science majors will be students who would have attended Tech and enrolled in computer science courses even if there were no major, no additional costs are anticipated. In each of the third and fourth years of the program, however, when the number of students taking computer science courses begins to increase significantly, we will require one additional faculty member and one additional teaching assistant (to handle laboratory courses). We will also require a small increase in student assistant, M&O and travel funds to support the new faculty. Of course, in these later years, the computer science degree program will be generating significant amounts of formula funding which would not have otherwise accrued to the university. Therefore, the approval of the computer science degree program as proposed should prove to be profitable to the university from its inception, and will begin to generate significant additional formula funding in its later years.

26. Departmental Costs. (a) Show the departmental operating expenditures for the last two fiscal years for the departments which will contribute significantly to the support of the proposed program. (b) How will the proposed program affect the allocation of distribution of these funds.

The present computer science group is administered under the auspices of the Department of Mathematics. On the other hand the faculty in electrical engineering in the computer science area form an integral part of the electrical engineering department. Finally, the Department of Systems is an administratively independent unit. The budgets for mathematics, electrical engineering, and systems are as follows.

1977-78 Expenditures

	MATH	EE	SYS
Faculty Salaries	$940,193	$417,590	$120,950
Teaching Asst.	189,173	39,000	0
Classified Employees	34,536	63,284	9,480
Student Asst.	13,000	8,000	1,000
M&O	20,000	13,500	3,500
Travel	14,000	7,000	1,200
Univ. Comp. Cen.	75,000	0	0
Capitol Equip.	500	0	0
Total Expenditures	$1,286,902	$548,374	$136,130

1978-79 Expenditures (budgeted)

Faculty Salaries	962,225	431,832	130,531
Teaching Asst.	180,000	32,000	0
Classified Employees	36,350	67,464	7,248
Student Asst.	13,000	9,000	2,000
M&O	22,000	13,500	3,500
Travel	14,000	7,000	1,200
Univ. Comp. Cen.	85,000	0	0
Capitol Equip.	500	0	0
Total Budgeted Expenditures	$1,313,075	$560,796	$144,479

The approval of the proposed degree program will require that the budgets for the existing computer science group in mathematics and the computer science activity in the Department of Systems be transferred to electrical engineering. These budgets are itemized as follows.

1978-79 Expenditures (budgeted)

	MATH/ Comp. Sci. Sect.	Systems (Comp. Sci. act.)	Total to be Trans. to EE	Savings due to merger of CS act.
Faculty Salaries	$47,255	$69,710	$158,710	0
Teaching Asst.	0	0	0	0
Classified Employees	6,540	7.248	8,788	5,000
Student Asst.	500	2,000	2,500	0
M&O	1,500	3,500	5,000	0
Travel	2,000	1,200	3,200	0
Capital Equip.	0	0	0	0
Total	$57,795	$83,658	$136,453	$5,000

27. What additional funds for research will be needed to support the proposed program? Explain.

No additional state funds will be needed for research. The electrical engineering and mathematics faculty in the computer science area and the systems faculty presently have on-going research programs supported by federal grants and industry. With the merger of the three activities and the approval of degree programs, we anticipate no difficulty in expanding this on-going research activity. Indeed, the existence of a degree program in the area will greatly enhance our research proposals. This is especially true with corporate funding, wherein a degree program is often prerequisite to a grant.

28. How many graduate assistantships are considered desirable to begin the program? Estimate the amount of funds required for these assistantships over the next four years. What sources are available to support these assistantships? Will student aid funds be needed for undergraduates other than those provided for all undergraduates? Explain in detail.

Since the proposed degree program will be built around existing faculty and courses, the need for additional teaching assistantships in the proposed program will be quite moderate, as indicated in Item 25. For the first two years of the program, most of the computer science degree students will be students who would have otherwise attended Tech and taken computer science courses as a minor. Therefore, no additional teaching assistantships will be needed for 1979-80 and 1980-81. As the number of students grow we will, however, require an additional teaching assistantship in each of the fiscal years 1981-82 and 1982-83 to teach the computer science laboratory courses.

Since we are specifically requesting teaching assistantships, funds will have to come from institutional sources. With respect to the support of other graduate students (in the M.S. program), the Department of Electrical Engineering already has sufficient federal research funding in the computer and tangential areas to support the expected enrollment of computer science students without aid from the university. These grants also have budgets for undergraduate student assistants, which may be used in support of the computer science undergraduates.

29. Describe briefly the sources of financial support for this program and evaluate the adequacy of funds for the inauguration and support of the program. Does the program give indications of becoming self-supporting within three years in terms of formula generated income?

The key to the proposed program is the merger of existing resources in the Departments of Mathematics, Systems, and Electrical Engineering into a single section, under whose auspices the proposed computer science degree will be offered. Indeed, not only will the proposed program be built around existing faculty, computers and courses but, by virtue of merging these resources into a single unit, their efficiency will be increased.

The savings accrued to the university, by administering all computer science courses under the auspices of a single computer science section, more than makes up for the budget increases required to handle the increased student load generated by the new degree program. Indeed, these additional students will generate sufficient formula funding to put the program in the black from its inception. In order to estimate the additional formula funding which will accrue to the university upon implementation of the proposed computer science program, we have divided the estimated enrollment from Item 9 into four categories: minor students (whom we assume would have enrolled at Texas Tech even without the new degree program), major students who would have enrolled in engineering at Tech, major students who would have otherwise enrolled at Texas Tech but not in engineering, and major students who would not have otherwise attended Tech. Our estimates of the number of students in each of these categories are tabulated below.

	Minor Students	Majors Who Would Have Enrolled in Engineering at TTU	Majors Who Would Have Enrolled Outside of Engineering at TTU	Majors Attracted to TTU by the CS Degree Program
1979-80	35	10	10	0
1980-81	35	20	20	10
1981-82	35	20	20	50
1982-83	35	20	25	80

Although the minor students would have attended Tech anyway, by virtue of transferring computer science to engineering the formula funding for their computer science hours will be based on the Engineering Factors rather than the Liberal Arts Factors. Assuming an average of five credit hours of computer science per

year for each minor student, Tech will benefit to the amount of 175 credit hours times the difference between the Engineering Factors and the Liberal Arts Factors. A similar argument applies to the computer science majors who would have enrolled outside of engineering at Texas Tech if not for the new degree program. We assume that all of these students will take an average of fifteen credit hours in engineering per year. On the other hand, for students who would have majored in engineering at Tech, there will be no funding increment. Finally, for new students attracted to Tech by the program, we estimate that they will take an average of thirty-two credit hours per year of which fifteen will be in engineering, and three will be in the sciences. The increase in formula funding which will accrue to Tech by approving the proposed program based on the above estimates and assuming the 1979-80 Funding Formula is tabulated below.

	1979-80	1980-81	1981-82	1982-83
Minor Students	$ 5,838	$5,838	$ 5,838	$ 5,838
Majors who would have enrolled in engineering at TTU	0	0	0	0
Majors who would have enrolled outside of engineering at TTU	5,004	10,008	10,008	10,008
Majors attracted to TTU by the CS degree program	0	13,174	65,870	105,392
Estimated formula funding from graduate CS program (see parallel M.S. proposal for details)	15,544	23,390	31,242	42,723
Gross increase in Formula Funding derived from the approval of the CS program	26,386	52,410	112,958	163,961
Estimated differential cost to operate the proposed CS program (see Items 24 & 25)	-5,000	-5,000	21,500	53,000
Net estimated profit to the university	$31,386	$57,410	$91,458	$110,961

30. Add any comments which would be helpful to the Coordinating Board in evaluating this program request.

Although the above items emphasize the financial benefits of the proposed degree program, we should not lose sight of the fact that we are also proposing an academic program comparable to the best in the nation. The integrated hardware/software program permits us to serve students interested in all aspects of the field while the minor program will be highly beneficial to the student interested in the application of computer science to a specific area. Indeed, the program is ideally suited to the needs of students interested in a career in business, agriculture, engineering, etc.

PROPOSAL FOR A MASTER OF SCIENCE IN COMPUTER SCIENCE

1. What is the title and nature of the proposed degree program?

It is proposed to initiate a new degree program leading to the Master of Science in Computer Science. The program will have an integrated, interdisciplinary curriculum encompassing both hardware and software techniques and their interrelationships. Therefore, the graduates of the program will be prepared for a business career in a corporate computing center, a career in software development, or a career with a manufacturer of computers or computer based equipment. Moreover, by virtue of the integrated hardware/software program, the students will be prepared for the coming generation of mini- and micro-computers, in which the boundary between hardware and software is blurred.

The program will be designed to accept students from all undergraduate backgrounds. In general, it is expected that those with a science or engineering background and an undergraduate computer science minor will require no levelling upon entering the program. The program will include intensive courses which will enable other students to remove any deficiencies in their backgrounds.

Consistent with the goal of serving students from all backgrounds and with a variety of career goals, the proposed program will be extremely flexible in nature. There will be no core courses; each student will be allowed, with the consent of his advisor, to map out a program which meets his or her career goals. In particular, the curriculum will have sufficient flexibility to permit the student to design a software or hardware oriented degree program or a hybrid thereof. The program will consist of at least eight graduate level courses, at least six of which must be in computer science. Each student may elect to take two courses in an approved minor area. In addition, each student will be required to write and defend a Master's Thesis.

2. List the course offerings to comprise the program. Which of these courses will be new ones?

In the following list, the left-hand column indicates the computer science course number the course will have in the proposed degree program, while the next column indicates the present course number for the course in mathematics, systems, or electrical engineering. (New courses are denoted by "new" in this column.) The list of interdisciplinary courses represents existing courses related to computer science. Any of these courses will be acceptable for credit in the program in lieu of one computer science course. Furthermore, two additional interdisciplinary courses may be used for the optional minor. (Courses in other approved areas may also be used for the minor.)

The addition of the four new courses required for the computer science degree program is more than balanced by the deletion of fourteen existing mathematics and systems courses in the computer science area; these courses either will not be needed for the proposed program or they duplicate computer science courses in the proposed program. Additionally, four non-computer science service courses presently being offered by the Department of Systems will be transferred to the Departments of Industrial and Mechanical Engineering. Therefore, the implementation of the present proposal will completely eliminate the entire course offering of the Department of Systems and the computer science courses in the Department of Mathematics, with a commensurate reduction in administrative costs.

Computer Science Courses

CS Number	Previous Number	Title
CS 531	CS 531	Special Problems in Computer Science
CS 533	CS 533	Theory of Finite Automata
CS 534	CS 534	Theory of Computability and Unsolvability
CS 536	CS 536	Real Time and Time Sharing Systems
CS 539	CS 539	Systems Organization and Evaluation
CS 5300	New	Foundations of Computer Engineering
CS 5301	CS 5301	Foundations of Computer Science I
CS 5302	CS 5302	Foundations of Computer Science II
CS 5303	New	Software Engineering
CS 5304	New	Advanced Data Structures
CS 5314	CS 5314	Design of Computer Languages
CS 5315	CS 5315	Heuristic Programming and Artificial Intelligence
CS 5351	SYS 5351	Computer Logic Design and Switching Theory
CS 5353	SYS 5353	Computer Systems Organization
CS 5354	SYS 5354	Simulation Techniques
CS 5370	SYS 5370	Data Base Organization
CS 5371	SYS 5371	Information Systems
CS 5376	SYS 5376	System Simulation
CS 5381	EE 5321	Digital Systems
CS 5382	EE 5326	Network Applications of Linear Graph Theory
CS 5383	EE 5393	Digital Computer Design
CS 5384	EE 5325	Information Theory
CS 631	New	Master's Thesis

Interdisciplinary Courses

Course Number	Title
IE 5312	Queueing Theory
IE 5313	Network Flows
IE 5314	Multistage Decision Processes
IE 5315	Nonlinear Programming
IE 5316	Reliability Theory
IE 5342	Statistical Analysis for Digital Simulation
IE 5344	Computerized Statistical Data Analysis
IE 5345	Selected Topics in Linear and Integer Programming
MATH 5329	Numerical Analysis I
MATH 5330	Numerical Analysis II
MATH 5337	Topics in Numerical Analysis I
MATH 5338	Topics in Numerical Analysis II
MATH 5371	Design of Experiments
MATH 5379	Statistical Sampling Theory
MATH 5380	Intermediate Probability Theory
MATH 5383	Intermediate Mathematical Statistics I
MATH 5384	Intermediate Mathematical Statistics II
BA 5339	Management Information Sys.
BA 5342	Computer Systems for Information Processing
BA 5343	Mathematical Programming in Business
BA 5344	Computer Methods for Business, Industry, and Government
BA 5346	Quantitative Analysis for Business
BA 5349	Statistical Decision Making
EE 5318	Pulse and Timing Circuits
EE 5327	Multistage Decision Processes

Except for the four new required courses for the computer science degree program, all of the above courses have been approved, and are presently being offered in their respective departments. Tentative catalog descriptions for the four new courses are given below.

CS 5300: Foundations of Computer Engineering. Prerequisite: Consent of instructor. Overview course covering the fundamentals of computer engineering for students with a non-computer hardware background. Fundamentals of switching devices, logic design, and computer architecture. Introduction to digital systems theory and design. 3 hours.

CS 5303: Software Engineering. Prerequisite: Programming proficiency and consent of instructor. Block structured languages, control structures, and mathematical foundations of structured programming; program development by stepwise refinement; proving program correctness; extensive reading from current literature. 3 hours.

CS 5304: Advanced Data Structures. Prerequisite CS 5302, or equivalent. Structured and unstructured data types; recursive data structures; data structure models for programming languages; semantics of data structures; Vienna Definition Language; readings from current literature. 3 hours.

CS 631: Master's Thesis. Prerequisite; Graduate standing. 3 hours.

3. Outline a semester-by-semester curriculum for the proposed program, if applicable.

As indicated above, the proposed program will have no core courses, thereby allowing the student to tailor a curriculum which fits his or her needs. Moreover, one of the interdisciplinary courses listed in Item 2 will be accepted in lieu of a computer science course. By combining the optimal, six-credit minor with an appropriate choice of courses from the above lists, an extremely wide variety of programs can be formulated. We list below four typical programs with emphasis in the areas of Computer Design, Numerical Methods, Information Systems, and Computer Science Theory.

Computer Design (Electrical Engineering Minor)

Semester 1	Semester 2
CS 5381 Digital Systems	CS 5383 Digital Computer Design
CS 533 Theory of Finite Auto.	CS 536 Real-Time & Time Sharing Sys.
EE 5318[1] Pulse and Timing Circ.	CS 539 Systems Org. and Eval.
Semester 3	**Semester 4**
EE 5313[2] Solid State Elec. I	EE 5314[2] Solid State Elec. II
CS 631 Master's Thesis	CS 631 Master's Thesis

Numerical Methods (Mathematics Minor)

Semester 1	Semester 2
CS 5303 Software Engrg.	CS 5304 Adv. Data Structures
MATH 5329[2] Numerical Anal. I	MATH 5330[2] Numerical Anal. II
CS 533 Theory of Finite Auto.	CS 534 Theory of Comp. and Unsolvability
Semester 3	**Semester 4**
MATH 5337[1] Topics in Num. Anal. I	CS 536 Real Time and Time Sharing Sys.
CS 631 Master's Thesis	CS 631 Master's Thesis

Information Systems (Business Administration Minor)

Semester 1	Semester 2
CS 5303 Software Engineering	CS 5354 Simulation Techniques
CS 5370 Data Base Org.	CS 5304 Adv. Data Structures
BA 5339[1] Man. Info. Sys.	BA 5344[2] Comp. Methods for Business, Industry, and Govt.
Semester 3	**Semester 4**
BA 5500[2] Prin. of Accounting	CS 5376 System Simulation
CS 631 Master's Thesis	CS 631 Master's Thesis

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[1] Interdisciplinary course which is accepted in lieu of a computer science course.
[2] Minor course.

Computer Science Theory (no minor area)

Semester 1	Semester 2
CS 5303 Software Engineering	CS 5304 Adv. Data Structures
CS 533 Theory of Finite Automata	CS 534 Theory of Comp. & Unsolvability
CS 5315 Heuristic Prog & Art. Intel.	CS 5302 Found. of Comp. Sci. II
Semester 3	**Semester 4**
CS 539 Systems Org. and Eval.	CS 5314 Design of Comp. Lang.
CS 631 Master's Thesis	CS 631 Master's Thesis

4. What special requirements are included in the degree plan? If a graduate degree is contemplated, is a thesis or dissertation required? If not, what will be substituted? Describe any innovations or changes in degree requirements.

In addition to the general requirements for admission to the Graduate School, a prospective computer science graduate student must have successfully completed 18 semester hours of undergraduate computer science, electrical engineering, mathematics or physics courses.

Furthermore, those students without adequate undergraduate computer science background will be required to take some or all of the following Foundations courses:

CS 5300[1]	Foundations of Computer Engineering
CS 5301[1]	Foundations of Computer Science I
CS 5302[2]	Foundations of Computer Science II

In order to obtain an M.S. degree in computer science, the student must successfully complete eight graduate level courses (24 credit hours); these must include at least six[3] computer science courses. The remaining two courses may either be in computer science or an approved minor area. In addition, the student will be required to write and defend a six-credit Master's thesis.

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[1] Credit will not be given towards the M.S. degree.

[2] Credit for CS 5302 may be applied towards the degree if at least five other graduate level CS (not including interdisciplinary) courses are included in the program.

[3] One of these may be chosen from the list of interdisciplinary courses shown in Item 2.

5. Is the proposed program entirely new to the institution? Is it an extension of a minor field? If so, give the number of students minoring in the program during the last three years.

The proposed program will absorb the computer science minor presently being offered by the Department of Mathematics. Most of the courses used in this minor program will be continued under the proposed program; they will be adjoined by a number of courses from the Department of Systems and four hardware courses from the Department of Electrical Engineering. Thus, the minor will become available to students in engineering and the sciences who require a hardware oriented computer science minor while still serving its present clientele. In the past three years, the number of graduate students at Texas Tech taking a computer science minor, or the "Computer Science Emphasis" option in the mathematics degree program, has ranged from 24 to 37 as tabulated below.

1975-76	32 Graduate CS minors
1976-77	24 Graduate CS minors
1977-78	37 Graduate CS minors

6. How many similar programs are offered elsewhere in Texas, and where? What is the nearest institution offering a similar program?

Although the concept of an integrated hardware/software computer science degree program has gained acceptance nationwide, it is unique to the State of Texas. The closest approximation to such a program, is the "Electrical Systems Emphasis" option of the Department of Electrical Engineering and Computer Science at Texas A&I (700 miles from Lubbock). A number of schools, however, offer purely software oriented programs leading to an M.S. degree in computer science. These include Texas A&M, the University of Houston, the University of Texas at Austin, and North Texas State University. Of these, the nearest is North Texas State University which is 300 miles from Lubbock.

Although there are a number of computer science degree programs presently offered in Texas, the proposed program is the only integrated hardware/software program. As such, it offers a unique opportunity to both students and prospective employers in the state.

7. Describe the manpower needs for graduates of the program. Also, describe how the proposed program strengthens the total academic program of the institution.

According to the report of the State 1202 Commission*, the job market for graduates with a Master of Science in Computer Science will be "excellent". More precisely, the average annual demand in Texas for graduates with an M.S. in Computer Science will range from 190 to 210 in areas directly related to computer science. Since Texas schools are only expected to produce 125 graduates with a Master's in Computer Science annually, the demand will far exceed the supply. Furthermore, we note that there is presently no supply whatsoever of Texas graduates with an integrated hardware/software background to meet the demand of the state's computer and aerospace industries, much less those industries dealing with computer applications. We foresee no difficulty in placing the graduates of the proposed program.

Academically, the proposed program will support the existing computer related activities in the Departments of Mathematics, Electrical Engineering, Industrial Engineering, and the College of Business Administration.

*Report of the 1202 Commission, Texas College and University Coordinating Board, Austin, Texas, March, 1978.

8. Has the proposed program been approved by the institution's governing board? Give the date of action.

The proposed program was approved by the Board of Regents of Texas Tech University on _____.

9. Project the enrollment for the proposed program for the next five years. Explain the basis for this projection. Include majors and minors in separate columns.

1979-80	30 M.S. in Computer Science minors	10 M.S. in Computer Science majors
1980-81	30 M.S. in Computer Science minors	15 M.S. in Computer Science majors
1981-82	30 M.S. in Computer Science minors	20 M.S. in Computer Science majors
1982-83	30 M.S. in Computer Science minors	25 M.S. in Computer Science majors
1983-84	30 M.S. in Computer Science minors	30 M.S. in Computer Science majors

The basis for these projections is included in Item 10.

10. Describe the likely source of students who will enroll in this program. (Will they come from existing programs, or will they be attracted to the institution to enroll in the proposed program?)

We estimate that about a half of the students presently minoring in computer science would major in the field, if such a major existed. An equal number of students presently majoring in engineering would major in a hardware oriented computer science program if it existed (though they are not presently enrolled in a software oriented minor). These students will make up the bulk of the computer science majors for the first two years of its operation. After the program becomes known around the state, however, we believe that it will attract new students who would not otherwise have attended Tech. We believe that students will be attracted by the flexibility of the proposed M.S. degree program.

Students looking toward a career in the computer hardware industry may adopt a curriculum based on the typical "Computer Design" degree plan of Item 3 while a student interested in a business career can opt for a degree plan in the "Information Systems" area, etc. Indeed, with one course from the list of interdisciplinary courses in Item 2 and an optimal six-hour minor, prospective students can develop a degree plan which is specifically directed to their personal goals.

In addition to the usual sources of students for a graduate program, we expect a number of the employees of the Lubbock division of Texas Instruments to enroll in the program on a part-time basis. The company employs several hundred computer scientist/engineers in the Lubbock area, most of whom work in an integrated hardware/software environment and should, therefore, be attracted by the proposed program.

In addition to the attractions of the proposed program, the field of computer science is expanding by leaps and bounds and the demand for computer scientists by Texas industry is expected to exceed the supply in the foreseeable future. Any viable computer science masters degree program, and especially our unique program, can be expected to attract new students to the university.

11. Give the number of persons presently on the faculty who will be most directly involved in the proposed program. List name, rank, highest degree, present course load, and estimated course load in the proposed program for each. Do present faculty meet minimal criteria for the requested program?

The core of faculty for the proposed Computer Science section will be made up of two computer scientists, presently housed in the Department of Mathematics, and two faculty members each from the Department of Systems and the Department of Electrical Engineering. In addition, the mathematics faculty has .55 open full-time equivalents in computer science, and the Department of Systems has several open positions which we expect to fill with qualified computer scientists to complete the proposed Computer Science Section.

The faculty members from mathematics, systems and electrical engineering who will comprise the proposed program all hold Ph.D.'s, and are fully qualified to teach hardware and/or software courses in the area. Moreover, several have viable on-going research programs in Computer Science and related areas. Pertinent data concerning these individuals is tabulated below.

Name	Rank	Present Dept.	Present Load[1]	Proposed Load[1]
John Jensen[2]	Asst. Prof.	MATH/CS	9 hrs.	9 hrs.
Leonard Weiner[2]	Assoc. Prof.	MATH/CS	9 hrs.	9 hrs.
James Burns	Asst. Prof.	SYS	9 hrs.	9 hrs.
James Archer	Professor	SYS	9 hrs.	9 hrs.
Donald Gustafson	Assoc. Prof.	EE	12 hrs.	12 hrs.
Darrell Vines	Professor	EE	13 hrs.	12 hrs.

[1]Includes both graduate and undergraduate courses but excludes thesis direction, administration, etc.

[2]Holds Ph.D. in Computer Science.

12. Calculate the present student-faculty ratio in the subject matter field(s) or department(s) in which the proposed program will be offered. (Divide full-time equivalent students by full-time equivalent faculty). Also, give the average teacher-student ratio in the courses given by the department (planned number of students per class.)

	MATH Fall 77	MATH Spg. 78	EE Fall 77	EE Spg. 78	SYS Fall 77	SYS Spg. 78
Number of Undergraduate Students[1]	146	143	1051	1003	89	91
Number of Graduate Students[1]	58	52	241	215	25	39
Total number of students[1]	204	195	1291	1218	114	130
Number of classes	6	7	88	81	8	10
Average class size	34	28	14.7	15	14.25	13.6
FTE Faculty[2]	4	4	24.25	24.25	3.25	3.25
FTE Students[3]	41	39	258	244	22.8	26
FTE Student Faculty Ratio[4]	10.25	9.75	10.64	10.06	7.01	8

[1] Total number of students registered in courses taught under the program (with students taking multiple courses counted multiply).

[2] Includes 1.45 mathematics FTE used in support of the computer science minor program.

[3] Total number of students divided by 5

[4] FTE students divided by FTE faculty.

13. Project the need for new faculty required for the proposed program for the next five years. If teaching responsibilities for the proposed program will be absorbed in part or whole by the present faculty, describe how this will be done.

Since the proposed Computer Science Section will be built from resources which presently exist on the Texas Tech campus, and many of the computer science courses are presently being taught in small sections, we believe that the present faculty together with the computer scientists hired to fill the existing open positions can handle the proposed program in its initial phases. As the number of computer science students reaches the estimated levels of 150 B.S. and 30 M.S. students, or if they exceed these levels, we will, however, require additional positions. In anticipation of reaching these goals, we have budgeted for one additional FTE in each of the third and fourth years of the program's operation.

14. Will the acquisition of new faculty for the program require an additional outlay in funds? Explain in detail.

Funds for the open computer science position (actually .55 FTE) in mathematics and one of the open positions in systems are presently included in the budgets for these departments and will be transferred to the new Computer Science Section. We have, however, budgeted for one new position in 1982-83 and one new position in 1983-84. On the assumption that we will hire one Assistant Professor and one Associate Professor, we have budgeted these position at $20,000 and $25,000, respectively, in 1979 dollars.

15. Describe the involvement of the faculty, present and projected, in research, extension, correspondence, and other activities related to the proposed program. Will this activity decrease or increase the course load of the present faculty?

The Department of Electrical Engineering places great emphasis on faculty research and professional activities, and it is proposed to continue to do so with the new Computer Science Section. It has been our experience that such activities greatly enhance both the undergraduate and graduate programs by (i) keeping the faculty abreast of the latest trends in the field, (ii) developing a working relationship between the university and industry (and government), (iii) developing laboratories and computing facilties, and (iv) supplying funds for both graduate and undergraduate assistants.

Among the electrical engineering faculty to participate in the proposed program, Professor Gustafson specializes in microprocessor applications, an area in which he has received NSF funding as well as corporate grants. Professor Vines is active in professional circles in both electrical engineering and computer science as a member of the IEEE board of directors. Moreover, he has developed several of the computing facilities to be employed in the proposed program from government surplus equipment obtained under various research grants. Among the mathematics faculty, Professor Jensen directs a research program in computer architecture and Professor Weiner conducts research in computer science education and maintains a corporate grant in the software engineering area. Finally, Professor Burns of the Department of Systems is active in the computer simulation and modeling areas.

As indicated above, all of the present faculty are involved in computer-related research and professional activities, and are carrying normal course loads. Therefore, their course loads under the proposed program will not be affected.

16. Are present library holdings in relevant fields adequate to begin the proposed program? How will the library have to be improved to meet program needs in the next four years? (Please explain need for books, periodicals, reference books, primary source materials, etc.) What are your institutional surpluses or deficiencies in holdings as measured by the Clapp-Jordan formula? How will approval of this program alter this situation?

The present library holdings in the computer science area exceed the requirements of the Clapp-Jordan formula by more than 10%. Moreover, we anticipate no difficulty in maintaining this rating given the approval of the proposed degree program.

17. Do faculty and students now use libraries of other institutions? Could they do so in the proposed program? Explain in detail.

Faculty and students in computer science and related areas do not presently use the libraries of other institutions nor do any libraries superior to our own exist within a reasonable distance from Lubbock.

18. Estimate the total expenditure for the last two complete fiscal years for library acquisitions in the departments or subject matter fields in which the proposed program will be offered, or in fields which are closely related to the proposed program.

In the two most recent years for which we have data, the Texas Tech library expenditures in the computer science area have been $1,800 (1975-76) and $2,000 (1976-77). In addition, there have been small expenditures for library materials by the several departments with interests in the computer science area, though detailed figures are not available.

19. Project library expenditures to be budgeted annually for the next five years in supporting this program.

We anticipate no additional expenditures over and above those which would be required if the computer science degree program were not approved (about $2,000 per year).

20. Describe existing facilities that are available for the proposed program. Describe the present utilization of these facilities. What new facilities will be needed in the near future? Specify what facilities and equipment will be needed and estimate their cost. From what sources do you anticipate obtaining needed facilities and equipment? Will the approval of this program result in planning for the addition of new facilities?

A major factor which has hitherto prevented Tech from applying for a computer science degree program, has been the lack of viable computing facilities. Fortunately, the past year has seen a monumental increase in the university's computational capabilities. This has included the purchase of a new Itel AS/6 computer for the university's central computer center. Additionally, the Department of Electrical Engineering has recently acquired a pair of CDC 3600 computers (through military surplus channels) to upgrade its existing CDC 1604 facility. These mainframe computers will be augmented by a half dozen minicomputers purchased under various federal grants during the past several years and by a newly developed microprocessor laboratory. Therefore, we can now fully support the proposed computer science degree program.

We anticipate that each of these facilities will play a role in the proposed degree program. The AS/6 with its eighty plus on-line terminals will be used for the introductory computing courses and will carry the bulk of the course load for the proposed degree program. On the other hand, the CDC machines, though antiquated, were designed from the ground up as scientific computers and are ideally suited for upper division and graduate courses in which individual students require lengthy periods of hands-on computer time in which to try out new compilers, operating systems, data management systems, etc. Finally, the mini's and micro's are ideally suited for experimentation with new hardware concepts, microprogramming courses, etc.

The new central computer, which was installed in July, 1979, and is plug compatible with the IBM 370 series, has 4 megabytes of memory and 6 I/O ports. In addition, the AS/6 is supported by 8 tape drives, 2.8 billion bytes of on-line disc storage, two card readers, two line printers, and a new plotter.

The CDC 1604 is an old, but relatively efficient, scientific computer, presently used in a "hands-on" batch processing mode by undergraduate students. In the proposed program, the 1604 will be used for software experimentation by advanced undergraduate and

graduate students, i.e., the design of compilers, operating systems, new computer languages, etc.

The CDC 1604 actually consists of three mainframes: one installed and operating, a second in the process of installation, and the third to be used as a spare. The first machine consists of a 32K word, 48 bits per word, mainframe supported by 8 tape drives, a CDC 1612 line printer, a CDC 405 card reader, a paper tape reader and punch, and a CalComp 560 plotter. The second is a partial system which includes a 32K word mainframe, a Goodyear 2000 word, 50 bits/word, associative memory and 6 tape drives.

The programming languages available on the 1604 include FORTRAN-63, COBOL and Algol. FORTRAN-63 programs are readily converted to run on the university's AS/6.

Although the 1604 presently is used in support of advanced software studies, the major requirements for our upper division software courses will be absorbed by the new CDC 3600 facility. This system is presently operational, though the formal opening of the facility to student use has been delayed pending the receipt of a new line printer and the installation of air conditioning. These difficulties should be resolved by the Fall of 1979, and then the facility will be available for the use of both students and faculty. Since the CDC 3600 has eight times the capacity of the CDC 1604, we anticipate no difficulty in handling the increased load of computer science students generated by the proposed degree program.

The 3600 is equipped with a 64K memory of 48 bit words and is ideally suited for the type of scientific computing required for a computer science degree program. Of course, the facility is supported by the usual complement of tape drives, discs, card readers, etc. Furthermore, we have obtained a second 3600 CPU (through military surplus channels) which we plan to parallel with the existing facility; the combined facility will have 128K words of memory.

The Department of Electrical Engineering presently possesses several minicomputers. Although these computers will function as a computational tool in the curriculum, their primary purpose will be as test beds in which the students can experiment with various hardware concepts. These facilities are already playing a fundamental role in the electrical engineering degree program; thus they will be able to play a dual role in an integrated hardware/software computer science program.

The minicomputer facilities are centered around a fully expanded Hewlett-Packard 2100 with 32K of core memory and a microprogramming capability. Additional minicomputers include a Hewlett-Packard 21MX with 16K of semiconductor memory, a Hewlett-

Packard 9825 with plotter, a Hewlett-Packard 9845, a Tektronix 4051 with a hard copy capability, a PDP 11-04, and a PDP 11/34 (in procurement). These minicomputers are supported by a full complement of tape drives, discs, graphic terminals, etc. In addition, interfaces between the various computers have been built; these are used either to combine the capabilities of several computers or to facilitate student experiments in computer networking.

Finally, during the past three years, we have developed a major microprocessor laboratory. This laboratory was built to support the several elective and service microprocessor courses given by the Department of Electrical Engineering. The existing microprocessor courses will be incorporated into the proposed computer science degree program and the laboratory will be used in support thereof. The microprocessor laboratory is equipped with more than a dozen microcomputers of various manufacture, two Hewlett-Packard digital system analyzers, a prom programmer, and the usual instrumentation required in support of any electronics laboratory.

We believe that these facilities will be fully capable of supporting the proposed computer science degree program for at least the next five years. Indeed, we are presently teaching most of the courses which will be used in the proposed degree program with the support of only the central computer and the CDC 1604. When the CDC 3600 comes on line in the Fall of 1979, our ability to cover the existing and proposed computer science courses will be greatly enhanced.

Consistent with the above comments, we do not propose to purchase any new facilities in support of the proposed computer science degree program; nor do we have any plans for future purchases.

21. Will the proposed program affect the administrative structure of the institution? If yes, describe how. In what department, division, school, or college will the proposed program be administered? If the program is to have inter-departmental or inter-unit administration, explain in detail.

The proposed program will be administered as the Computer Science Section of the Department of Electrical Engineering. In addition to the existing computer science activity within the Department of Electrical Engineering, the proposed Computer Science Section will absorb the existing computer science groups of the Departments of Mathematics and Systems. An entire administrative unit will be eliminated through the absorption of the Department of Systems by the new Computer Science Section; the existing informal administration of the computer science group in mathematics will be replaced by a somewhat more formal administration in electrical engineering.

If, however, the computer science degree program eventually expands much beyond our present estimates (to several hundred undergraduate students) we will consider the possibility of splitting computer science off into a separate department. At the present time, however, we have no plans for taking such action.

22. Describe the requirements for accreditation, if the program is eligible to be accredited. What is the name of the accrediting agency? What will be the initial costs of accreditation and the subsequent annual costs to maintain it? Identify basic criteria for accreditation and describe how these are presently being met.

At the present time graduate level computer science and computer engineering degree programs are not accredited by any agency.

23. Evaluate the subject matter fields at your institution which may be considered as necessary or valuable, in support of the proposed program. Will these fields need improvement or expansion? If so, how, to what extent, and at what cost? Be specific.

Texas Tech is fortunate in having a strong interdisciplinary faculty in the computer science area. The proposed program will take advantage of the computer related activities in the Departments of Industrial Engineering and Mathematics, and the College of Business Administration. These fields are quite capable of supporting the proposed program and will not require upgrading or expansion. This also holds true for the departments teaching service courses for the proposed program.

24. Estimate the initial (first year) costs of the proposed program. If this is an extension of an on-going program, what will be the cost differential?

1977-78 Expenditures[1]

	MATH[2]	EE[3]	SYS[4]	Total
Faculty Salaries	$45,300	$56,528	$65,260	$167,088
Teaching Asst.	0	5,460	0	5,460
Classified Employees	5,904	8,860	9,480	24,244
Student Asst.	500	1,120	1,000	2,620
M&O	1,500	1,890	3,500	6,890
Travel	2,000	980	1,200	4,180
Total Expenditures	$55,204	$74,838	$80,440	$210,482

1978-79 Expenditures[1]

	MATH[2]	EE[3]	SYS[4]	Total
Faculty Salaries	$47,255	$56,750	$69,710	$173,715
Teaching Asst.	0	4,480	0	4,480
Classified Employees	6,540	9,440	7,248	23,228
Student Asst.	500	1,260	2,000	3,760
M&O	1,500	1,890	3,500	6,890
Travel	2,000	980	1,200	4,180
Total Expenditures	$57,795	$74,800	$83,658	$216,253

Estimated 1979-80 Expenditures[1,5]

Faculty Salaries	$173,715
Teaching Asst.	4,480
Classified Employees	18,228
Student Asst.	3,760
M&O	6,890
Travel	4,180
Total Estimated Expenditures	$211,253

[1] These estimates represent the cost of both the proposed graduate and undergraduate programs.

[2] Includes 2.55 computer science faculty positions.

[3] Includes two faculty members working full-time in the computer area and three faculty members working one-quarter time in the computer area.

[4] Includes three faculty positions.

[5] These estimates do not include an inflationary correction.

Estimated Cost Differential for 1979-80

Faculty Salaries	0
Teaching Assistants	0
Classified Employees	-5,000
Student Assistants	0
M&O	0
Travel	0
Total Estimated Cost Differential	-$5,000

The estimated $5,000 savings in classified employees' salaries will result from the merger of the three existing computer science activities into a single Computer Science Section with a commensurate reduction in administrative overhead and secretarial help.

All other costs will be unaffected by the approval of the program since the proposed computer science degree program will make use of existing faculty, staff and courses.

25. Estimate the annual cost of the program for the three years following its first year. (Use current formulas in arriving at your estimate.) Explain the rationale for your estimate. If this is an extension of an on-going program, what will be the cost differential?

Estimated 1980-81 Expenditures		Estimated 1980-81 Cost Differential[1]
Faculty Salaries	$173,715	0
Teaching Asst.	4,480	0
Classified Employees	18,228	-5,000
Student Asst.	3,760	0
M&O	6,890	0
Travel	4,180	0
Total	$211,253	-$5,000

Estimated 1981-82 Expenditures		Estimated 1981-82 Cost Differential[1]
Faculty Salaries	$193,715	20,000
Teaching Asst.	8,480	4,000
Classified Employees	18,228	-5,000
Student Asst.	4,260	500
M&O	8,390	1,500
Travel	4,680	500
Total	$237,753	$21,500

Estimated 1982-83 Expenditures		Estimated 1982-83 Cost Differential[1]
Faculty Salaries	$218,715	45,000
Teaching Asst.	12,480	8,000
Classified Employees	18,228	-5,000
Student Asst.	4,760	1,000
M&O	9,890	3,000
Travel	5,180	1,000
Total	$269,253	$53,000

[1] These estimates represent the combined costs of both the proposed graduate and undergraduate programs without an inflationary correction.

Note these estimates are in 1979 dollars and include no inflationary correction. The estimates assume that the existing faculty can handle the program for its first two years given our enrollment estimates. Since, in the first two years, most of the computer science majors will be students who would have attended Tech and enrolled in computer science courses even if there were no major, no additional costs are anticipated. In each of the third and fourth years of the program, however, when the number of students taking computer science courses begins to increase significantly, we will require one additional faculty member and one additional teaching assistant (to handle laboratory courses). We will also require a small increase in student assistant, M&O and travel funds to support the new faculty. Of course, in these later years, the computer science degree program will be generating significant amounts of formula funding which would not have otherwise accrued to the university. Therefore, the approval of the computer science degree program as proposed should prove to be profitable to the university from its inception, and will begin to generate significant additional formula funding in its later years.

26. Departmental Costs. (a) Show the departmental operating expenditures for the last two fiscal years for the departments which will contribute significantly to the support of the proposed program. (b) How will the proposed program affect the allocation of distribution of these funds.

The present computer science group is administered under the auspices of the Department of Mathematics. On the other hand the faculty in electrical engineering in the computer science area form an integral part of the electrical engineering department. Finally, the Department of Systems is an administratively independent unit. The budgets for mathematics, electrical engineering, and systems are as follows.

1977-78 Expenditures

	MATH	EE	SYS
Faculty Salaries	$940,193	$417,590	$120,950
Teaching Asst.	189,173	39,000	0
Classified Employees	34,536	63,284	9,480
Student Asst.	13,000	8,000	1,000
M&O	20,000	13,500	3,500
Travel	14,000	7,000	1,200
Univ. Comp. Cen.	75,000	0	0
Capitol Equip.	500	0	0
Total Expenditures	$1,286,902	$548,374	$136,130

1978-79 Expenditures (budgeted)

Faculty Salaries	962,225	431,832	130,531
Teaching Asst.	180,000	32,000	0
Classified Employees	36,350	67,464	7,248
Student Asst.	13,000	9,000	2,000
M&O	22,000	13,500	3,500
Travel	14,000	7,000	1,200
Univ. Comp. Cen.	85,000	0	0
Capitol Equip.	500	0	0
Total Budgeted Expenditures	$1,313,075	$560,796	$144,479

The approval of the proposed degree program will require that the budgets for the existing computer science group in mathematics and the computer science activity in the Department of Systems be transferred to electrical engineering. These budgets are itemized as follows.

1978-79 Expenditures (budgeted)

	MATH/ Comp. Sci. Sect.	Systems (Comp. Sci. act.)	Total to be Trans. to EE	Savings due to merger of CS act.
Faculty Salaries	$47,255	$69,710	$158,710	0
Teaching Asst.	0	0	0	0
Classified Employees	6,540	7,248	8,788	5,000
Student Asst.	500	2,000	2,500	0
M&O	1,500	3,500	5,000	0
Travel	2,000	1,200	3,200	0
Capital Equip.	0	0	0	0
Total	$57,795	$83,658	$136,453	$5,000

27. What additional funds for research will be needed to support the proposed program? Explain.

No additional state funds will be needed for research. The electrical engineering and mathematics faculty in the computer science area and the systems faculty presently have on-going research programs supported by federal grants and industry. With the merger of the three activities and the approval of degree programs, we anticipate no difficulty in expanding this on-going research activity. Indeed, the existence of a degree program in the area will greatly enhance our research proposals. This is especially true with corporate funding, wherein a degree program is often prerequisite to a grant.

28. How many graduate assistantships are considered desirable to begin the program? Estimate the amount of funds required for these assistantships over the next four years. What sources are available to support these assistantships? Will student aid funds be needed for undergraduates other than those provided for all undergraduates? Explain in detail.

Since the proposed degree program will be built around existing faculty and courses, the need for additional teaching assistantships in the proposed program will be quite moderate, as indicated in Item 25. For the first two years of the program, most of the computer science degree students will be students who would have otherwise attended Tech and taken computer science courses as a minor. Therefore, no additional teaching assistantships will be needed for 1979-80 and 1980-81. As the number of students grow we will, however, require an additional teaching assistantship in each of the fiscal years 1981-82 and 1982-83 to teach the computer science laboratory courses.

Since we are specifically requesting teaching assistantships, funds will have to come from institutional sources. With respect to the support of other graduate students (in the M.S. program), the Department of Electrical Engineering already has sufficient federal research funding in the computer and tangential areas to support the expected enrollment of computer science students without aid from the university. These grants also have budgets for undergraduate student assistants, which may be used in support of the computer science undergraduates.

29. Describe briefly the sources of financial support for this program and evaluate the adequacy of funds for the inauguration and support of the program. Does the program give indications of becoming self-supporting within three years in terms of formula generated income?

The key to the proposed program is the merger of existing resources in the Departments of Mathematics, Systems, and Electrical Engineering into a single section, under whose auspices the proposed computer science degree will be offered. Indeed, not only will the proposed program be built around existing faculty, computers and courses but, by virtue of merging these resources into a single unit, their efficiency will be increased.

The savings accrued to the university, by administering all computer science courses under the auspices of a single computer science section, more than makes up for the budget increases required to handle the increased student load generated by the new degree program. Indeed, these additional students will generate sufficient formula funding to put the program in the black from its inception. In order to estimate the additional formula funding which will accrue to the university upon implementation of the proposed computer science program, we have divided the estimated enrollment from Item 9 into four categories: minor students (whom we assume would have enrolled at Texas Tech even without the new degree program), major students who would have enrolled in engineering at Tech, major students who would have otherwise enrolled at Texas Tech but not in engineering, and major students who would not have otherwise attended Tech. Our estimates of the number of students in each of these categories are tabulated below.

	Minor Students	Majors Who Would Have Enrolled in Engineering at TTU	Majors Who Would Have Enrolled Outside of Engineering at TTU	Majors Attracted to TTU by the CS Degree Program
1979-80	30	4	4	2
1980-81	30	5	5	5
1981-82	30	6	6	8
1982-83	30	6	6	13

Although the minor students would have attended Tech anyway, by virtue of transferring computer science to engineering the formula funding for their computer science hours will be based on the Engineering Factors rather than the Liberal Arts Factors. Assuming an average of five credit hours of computer science per

year for each minor student, Tech will benefit to the amount of 90 credit hours times the difference between the Engineering Factors and the Liberal Arts Factors. A similar argument applies to the computer science majors who would have enrolled outside of engineering at Texas Tech if not for the new degree program. We assume that all of these students will take an average of twelve credit hours in engineering per year. On the other hand, for students who would have majored in engineering at Tech, there will be no funding increment. Finally, for new students attracted to Tech by the program, we estimate that they will take an average of fifteen credit hours per year of which twelve will be in engineering, and three will be in the sciences. The increase in formula funding which will accrue to Tech by approving the proposed program based on the above estimates and assuming the 1979-80 Funding Formula is tabulated below.

	1979-80	1980-81	1981-82	1982-83
Minor Students	$ 7,140	$ 7,140	$ 7,140	$ 7,140
Majors who would have enrolled in engineering at TTU	0	0	0	0
Majors who would have enrolled outside of engineering at TTU	3,808	4,760	5,712	5,712
Majors attracted to TTU by the CS degree program	4,596	11,490	18,390	29,871
Estimated formula funding from graduate CS program (see parallel B.S. proposal for details)	10,842	29,020	81,716	121,238
Gross increase in Formula Funding derived from the approval of the CS program	26,386	52,410	112,958	163,961
Estimated differential cost to operate the proposed CS program (see Items 24 & 25)	-5,000	-5,000	21,500	53,000
Net estimated profit to the university	$31,386	$57,410	$91,458	$110,961

30. Add any comments which would be helpful to the Coordinating Board in evaluating this program request.

Although the above items emphasize the financial benefits of the proposed degree program, we should not lose sight of the fact that we are also proposing an academic program comparable to the best in the nation. The integrated hardware/software program permits us to serve students interested in all aspects of the field while the minor program will be highly beneficial to the student interested in the application of computer science to a specific area. Indeed, the program is ideally suited to the needs of students interested in a career in business, agriculture, engineering, etc.

APPENDIX A: TYPICAL COMPUTER SCIENCE MINORS

1. Requirements for an Undergraduate Computer Science Minor.

An undergraduate computer science minor consists of 18 hours in which each student takes two core courses followed by four computer science electives. Although the student may choose a mixture of courses, three suggested groups of electives (shown below) are: languages, systems programming or hardware emphasis. Each computer science minor must also take MATH 137 and MATH 138 or the equivalent. The computer science advisor must approve the 18 hours required for all minors in computer science; the student must maintain a C average in these courses.

Core Courses

CS 1362: Fundamentals of Computer Science I
CS 1363: Fundamentals of Computer Science II

Computer Science Electives

Languages Emphasis		Systems Programming		Hardware Emphasis	
CS 2361	Information Struc.	CS 2361	Information Struc.	CS 2371	Intro. to Comp. Logic
CS 3360	Comp. Org. and Assem. Lang.	CS 3360	Comp. Org. and Assem. Lang.	CS 3360	Comp. Org. and Assem. Lang.
CS 3361	Concepts of Progr. Lang.	CS 3362	Intro. to Sys. Progr.	CS 3372	Logic Circuit Lab.
CS 4363	Intro. to Compiler Struc.	CS 4362	Intro. to Oper. Sys.	CS 3375	Machine Struc. & Org.

2. Suggested Plan for a Computer Science Emphasis for Students in Curricula Which Do Not Allow for a Minor.

A 12 hour emphasis is recommended in which each student takes two core courses followed by two computer science electives. Although the student may choose a mixture of courses, three suggested groups of electives for students desiring a languages, systems programming, or hardware emphasis are listed below.

Core Courses

CS 1362: Fundamentals of Computer Science I
CS 1363: Fundamentals of Computer Science II

Computer Science Electives

Languages Emphasis	Systems Programming	Hardware Emphasis
CS 3360 Comp. Org. and Assem. Lang.	CS 3360 Comp. Org. and Assem. Lang.	CS 2371 Intro. to Comp. Lab.
CS 3361 Concepts of Progr. Lang.	CS 3362 Intro. to Sys. Progr.	CS 3372 Logic Circuit Lab.

3. Suggested Plan for a Computer Science Minor in the Bachelor of Business Administration - General Business Degree Program.

Required Courses

Group I	General Education Courses (46 hours)
Group II	Basic Core Courses (34 hours)
Group III	Two advanced courses in each of any three areas (Marketing, Management, Finance, and Accounting, 30 hours)
Group IV	Core Courses for the Minor (12 hours)
	BA 2341 Business Computer Programming
	BA 3348 Database Management Systems
	CS 1362 Fundamentals of Computer Science I
	CS 1363 Fundamentals of Computer Science II

Electives

Four computer science electives are required (12 hours). Typical choices of electives for students desiring a languages, systems programming, or hardware emphasis are listed below though any four advanced computer science courses are acceptable.

Languages Emphasis	Systems Programming	Hardware Emphasis
CS 2361 Information Struc.	CS 2361 Information Struc.	CS 2371 Intro. to Comp. Logic
CS 3360 Comp. Org. and Assem. Lang.	CS 3360 Comp. Org. and Assem. Lang.	CS 3360 Comp. Org. and Assem. Lang.
CS 3361 Concepts of Progr. Lang.	CS 3362 Intro. to Sys. Progr.	CS 3372 Logic Circuit Lab.
CS 4361 Data Base Org.	CS 4361 Data Base Org.	CS 4361 Data Base Org.

4. Suggested Plan for a Computer Science Minor in the Bachelor of Science Degree Program in Mathematics.

An 18 hour minor is required in which each student takes two core courses followed by four computer science electives. Although the student may choose a mixture of courses, three suggested groups of electives for students desiring a languages, systems programming, or hardware emphasis are shown below. In addition, it is highly recommended that mathematics majors minoring in computer science take the numerical analysis courses, MATH 4310 and MATH 4311, as mathematics electives.

Core Courses

CS 1362: Fundamentals of Computer Science I
CS 1363: Fundamentals of Computer Science II

Computer Science Electives

Languages Emphasis		Systems Programming		Hardware Emphasis	
CS 2361	Information Struc.	CS 2361	Information Struc.	CS 2371	Intro. to Comp. Logic
CS 3360	Comp. Org. and Assem. Lang.	CS 3360	Comp. Org. and Assem. Lang.	CS 3360	Comp. Org. and Assem. Lang.
CS 3361	Concepts of Progr. Lang.	CS 3362	Intro. to Sys. Progr.	CS 3372	Logic Circuit Lab.
CS 3363	Discrete Comp. Struc.	CS 3363	Discrete Comp. Struc.	CS 3363	Discrete Comp. Struc.

5. Suggested Plan for a Computer Science Minor in the Bachelor of Arts Degree Program in Psychology.

A Psychology major wishing to minor in computer science must take MATH 137-138, or the equivalent followed by an 18 hour minor in which the student takes two core courses followed by four computer science Electives. Although the student may choose a mixture of courses, three suggested groups of electives for students desiring a languages, systems programming, or hardware emphasis are suggested. In addition, it is highly recommended that psychology majors minoring in computer science take the quanitative methods courses, PSY 343 and PSY 433, as psychology electives.

Core Courses

CS 1362: Fundamentals of Computer Science I
CS 1363: Fundamentals of Computer Science II

Computer Science Electives

Languages Emphasis	Systems Programming	Hardware Emphasis
CS 2361 Information Struc.	CS 2361 Information Struc.	CS 2371 Intro. to Comp. Logic
CS 3360 Comp. Org. and Assem. Lang.	CS 3360 Comp. Org. and Assem. Lang.	CS 3360 Comp. Org. and Assem. Lang.
CS 3361 Concepts of Progr. Lang.	CS 3362 Intro. to Sys. Progr.	CS 3372 Logic Circuit Lab.
CS 4371 Simulation	CS 4371 Simulation	CS 4371 Simulation

6. Suggested Plan for a Computer Science Minor in the Agricultural Economics Curriculum.

An 18 hour minor is required in which each student takes two core courses followed by four computer science electives. Although the students may choose a mixture of courses, three suggested groups of electives for students desiring a languages, systems programming, or hardware emphasis are shown below. In addition, it is highly recommended that agricultural economics majors minoring in computer science take AECO 432 if it is not otherwise required by their specialization.

Core Courses

CS 1362: Fundamentals of Computer Science I
CS 1363: Fundamentals of Computer Science II

Computer Science Electives

Languages Emphasis	Systems Programming	Hardware Emphasis
CS 2361 Information Struc.	CS 2361 Information Struc.	CS 2371 Intro. to Comp. Logic
CS 3360 Comp. Org. and Assem. Lang.	CS 3360 Comp. Org. and Assem. Lang.	CS 3360 Comp. Org. and Assem. Lang.
CS 3361 Concepts of Progr. Lang.	CS 3362 Intro. to Sys. Progr.	CS 3372 Logic Circuit Lab.
CS 4361 Data Base Org.	CS 4361 Data Base Org.	CS 4361 Data Base Org.

7. Suggested Plan for a Computer Science Minor in the Engineering Technology Curriculum.

An 18 hour minor composed of both computer science and computer technology courses is required in which each student takes three core courses followed by three electives.

Core Courses

EET 2314: Computer Technology
CS 1362: Fundamentals of Computer Science I
CS 1363: Fundamentals of Computer Science II

Computer Science Electives

Languages Emphasis		Systems Programming		Hardware Emphasis	
CS 2361	Information Struc.	CS 2361	Information Struc.	CS 2371	Intro. to Comp. Logic
CS 3360	Comp. Org. and Assem. Lang.	CS 3360	Comp. Org. and Assem. Lang.	CS 3360	Comp. Org. and Assem. Lang.
CS 3361	Concepts of Progr. Lang.	CS 3362	Intro. to Sys. Progr.	CS 3375	Machine Struc. and Org.

Computer Technology Electives

EET 4314: Appl. of Integrated Circuits
EET 4316: Minicomputer Technology

APPENDIX B: DISPOSITION OF COURSES

Since the implementation of the proposed computer science degree program will require the merger of the existing computer science activities in mathematics, electrical engineering, and systems, the courses associated with these activities will be merged into a single course listing with extraneous and duplicative courses being deleted. In particular, the catalog entries for the mathematics/computer science group and the Department of Systems will be deleted with the appropriate courses being transferred to a new Computer Science Section listed under electrical engineering. In addition, certain electrical engineering courses will be transferred to the computer science listing and several non-computer science courses in the Department of Systems will be transferred to other engineering departments. The disposition of each course effected by the proposed action is tabulated below.

Mathematics/Computer Science

Course Number	Title	Disposition
CS 131	Comp. and Modern Soc.	Remains in CS Program
CS 1361	Fund. of CS with COBOL	Remains in CS Program
CS 1362	Fund. of CS I	Remains in CS Program
CS 1363	Fund. of CS II	Remains in CS Program
CS 2361	Info. Structures	Remains in CS Program
CS 2362	Comp. Org. and Assem. Lang. Prog.	Becomes CS 3360
CS 331	Algorithmic Processes	Remains in CS Program
CS 332	Nonnumeric Comp. Appl.	Deleted
CS 335	Effective Programming	Remains in CS Program
CS 3361	Concepts of Prog. Lang.	Remains in CS Program
CS 3362	Intro. to Sys. Progr.	Remains in CS Program
CS 3363	Discrete Comp. Struc.	Remains in CS Program
CS 411	Seminar	Deleted
CS 431	Special Topics in CS	Remains in CS Program
CS 434	Machine Struc. and Org.	Becomes CS 3375
CS 4361	Intro. to Data Base Org.	Remains in CS Program
CS 4362	Intro. to Oper. Sys.	Remains in CS Program
CS 4363	Intro. to Compiler Construction	Remains in CS Program
CS 511	Seminar	Deleted
CS 531	Special Problems in CS	Remains in CS Program
CS 532	Comp. Network Appl.	Deleted, Subsumed by CS 5302
CS 533	Theory of Finite Automata	Remains in CS Program
CS 5330	Comp. Tech. for Museum Science	Deleted
CS 534	Theory of Computability and Unsolvability	Remains in CS Program

CS 535	Algebraic Ling. Appl. to Comp. Lang.	Deleted
CS 536	Real Time and Time Sharing Sys.	Remains in CS Program
CS 537	Info. Storage and Retrieval	Deleted, subsumed by CS 5370
CS 538	Computer Facility Op.	Deleted
CS 539	Sys. Org. and Eval.	Remains in CS Program
CS 5301	Foundations of CS I	Remains in CS Program
CS 5302	Foundations of CS II	Remains in CS Program
CS 5314	Design of Comp. Lang.	Remains in CS Program
CS 5315	Heuristic Prog. and Art. Intell.	Remains in CS Program
CS 5319	Info. Theory and Coding	Deleted, subsumed by CS 5384
CS 5330	Comp. Tech. for Museum Science	Deleted

Systems

Course Number	Title	Disposition
SYS 2351	Intro. to CS I	Deleted, subsumed by CS 1362
SYS 2352	Intro. to CS II	Deleted, subsumed by CS 1363
SYS 330	Systems, Complexity, and Soc.	Transferred to IE
SYS 332	Systems, Org. and Management	Transferred to IE
SYS 333	Intro. to Sys. Sci. Methods	Transferred to IE
SYS 337	Systems, Planning and Cont.	Transferred to IE
SYS 338	Elements of Methods Analysis	Transferred to IE
SYS 339	Work, Environment and Man	Transferred to IE
SYS 3321	Intro. to Simulation	Becomes CS 4371
SYS 3351	Data and Info. Struc.	Deleted, subsumed by CS 2361
SYS 430	Patterns of Prob. Solv.	Deleted
SYS 435	Technology Assesment	Transferred to IE
SYS 4331	Special Probs. in EA&D	Deleted
SYS 4333	Special Probs. in CS	Deleted
SYS 4341	Machine Lang., Assem. Software and Prog.	Deleted, subsumed by CS 3360
SYS 4342	Compilers and Formal Lang.	Deleted, subsumed by CS 4363
SYS 4353	Digital Prog. Sys.	Deleted, subsumed by CS 3362

SYS 5314	Anal. of Engrg. Sys. I	Transferred to ME
SYS 5315	Anal. of Engrg. Sys. II	Transferred to ME
SYS 5331	Spec. Probs. in EA&D	Deleted
SYS 5333	Spec. Probs. in CS	Deleted
SYS 5350	Prog., Sys., and Lang.	Deleted, subsumed by CS 5301
SYS 5351	Comp. Logic Design and Switching Thy.	Becomes CS 5351
SYS 5352	Comp. Sys. Org.&Prog. I	Deleted
SYS 5353	Comp. Sys. Org.	Becomes CS 5353
SYS 5354	Simulation Tech.	Becomes CS 5354
SYS 5357	Info. Retrieval	Deleted, subsumed by CS 5371
SYS 5361	Anal. and Syn. of Complex Sys. I	Transferred to IE
SYS 5362	Anal. and Syn of Complex Sys. II	Deleted
SYS 5363	Thy. of Systems	Deleted
SYS 5365	Technology Assessment	Transferred to IE
SYS 5367	Management of Tech. Innovation	Deleted
SYS 5370	Data Base Organization	Becomes CS 5370
SYS 5371	Info. Systems	Becomes CS 5371
SYS 5376	Sys. Simulation	Becomes CS 5376

Electrical Engineering Computer Hardware Courses

EE 136	Intro. to Comp. Logic	Becomes CS 2371
EE 4311	Analog and Digital Comp.	Becomes CS 4372
EE 4312	Microprocessors for Engineers and Sci.	Becomes CS 4373
EE 4313	Microprocessors for Business and Hum.	Becomes CS 4374
EE 4314	Finite State Machines	Becomes CS 4375
EE 5321	Digital Systems	Becomes CS 5381
EE 5325	Info. Theory	Becomes CS 5384
EE 5326	Network Appl. of Linear Graphs	Becomes CS 5382
EE 5393	Digital Comp. Design	Becomes CS 5383

New Courses

New	Intro. Prog. with FORTRAN	CS 1360
New	Logic Laboratory	CS 3372
New	Minicomputer Lab.	CS 4376
New	Cont. Struc. of Comp.	CS 4377
New	Microprocessor Appl. Laboratory	CS 4378

New	Microprogramming	CS 4379
New	Foundations of Computer Engineering	CS 5300
New	Structured Prog.	CS 5303
New	Adv. Data Struc.	CS 5304
New	Master's Thesis	CS 631

Summary of Course Disposition

	Undergraduate	Graduate	Total
Courses Transferred from MATH to CS	16	8	24
Courses Transferred from Systems to CS	1	6	7
Courses Transferred from EE to CS	5	4	9
Courses Transferred from Systems to IE	7	2	9
Courses Transferred from Systems to ME	0	2	2
Courses Deleted from MATH/CS	2	7	9
Courses Deleted from Systems	9	8	17
Total Courses Deleted	11	15	26
New Courses	6	4	10
Net Reduction in Course Offerings	5	11	16

AMENDMENT TO CONTRACT

The contract, dated June 23, 1965, between Coca-Cola Bottling Company of Lubbock, Inc. and Texas Tech University, is amended as follows:

I

Amended to read - - For and in consideration of the guaranteed sum of $7,778.10 ($6,600.00 plus $1,178.10 increase necessary to raise commission on first $23,570.00 to 33%) if applicable to be paid to the University by Concessionaire in four payments on October 1, November 1, December 1 and December 31 of each year of the contract beginning in 1975 and ending with the last payment December 31, 1985. In the event the gross receipts, as that term is hereinafter defined, received by Concessionaire shall exceed the sum of Twenty-three Thousand Five Hundred Seventy Dollars ($23,570.00) in any annual period, then and in that event Concessionaire shall pay to the University the sum of Thirty-three percent (33%) of such excess. In consideration of the above payments and receipts, University hereby grants and sells to Concessionaire the exclusive concession privilege for Jones Stadium for the full twenty (20) year period from September 1, 1966, until August 31, 1986. Said privilege shall include the exclusive right to sell all articles, except programs, which shall be sold to patrons at all varsity, freshman and high school football games and other special events, including track, under the jurisdiction of the University at which the University desires to have available concessions, which may be held in said stadium during the regular school year from September 1st to June 1st. In the event special events are held in the stadium which are not under the jurisdiction of the University, and it is the desire of the University that concession be sold, then and in that event Concessionaire shall operate said concessions provided reasonable notice is given to Concessionaire. All sales taxes will be paid by the Concessionaire.

17.

Amended to add the following:
For the extension of this contract for an additional 5-year period, beginning September 1, 1981, the Concessionaire agrees to the following remodeling program to begin immediately after final game of 1979 season and to have the remodeling completed by the beginning of the 1980 season:

REMODELING PROGRAM

The Coca-Cola Bottling Company will make the following investments at no cost to Texas Tech:

1. Construct two hustler stands complete with fast-fill equipment, each one to be located on the east and west sides.

2. Construct four additional concession stands on the west side and install soft-drink dispensing and food preparation equipment.

Estimated cost of hustler stands ----------	$10,400
Equipment for hustler stands ----------	3,600
Cost for four concession stands ----------	9,200
Soft drink dispensing and food preparation equipment--	6,000
	$29,200

PURPOSE:

Jones Stadium is now handling capacity crowds up to 52,000 people per game. The present hustler stands cannot service drinks for more than 100 hustlers. This addition will allow increasing the number of hustlers to 200 for the stadium.

Whereas concession stands have been added on the east side, new ones now seem to be a necessity for the west side. This should eliminate long lines around the diamond stands.

GOAL:

Construct additional stands in order to average $1.00 per person for each game.

All other paragraphs and provisions of the contract will remain as originally written.

IN WITNESS WHEREOF, the parties hereto have executed this AMENDMENT TO CONTRACT at Lubbock, Texas in triplicate, each of which shall be considered an original by their duly appointed officers, this the 16th day of November 1979.

ATTEST:

COCA-COLA BOTTLING COMPANY
OF LUBBOCK, INC.

/s/ Eugene Roberts

/s/ Pat W. McNamara, Jr.

ATTEST:

BOARD OF REGENTS
TEXAS TECH UNIVERSITY

/s/ Freda Pierce
Freda Pierce, Secretary

/s/ Robert L. Pfluger
Robert L. Pfluger, Chairman

TEXAS TECH UNIVERSITY
Lubbock, Texas

TABLE OF CONTENTS

FOR BOARD INFORMATION

TEXAS TECH UNIVERSITY
Lubbock, Texas

1. For Information Only: Professorial Appointments
September through October, 1979

Name, Rank and/or Title	Department or Office	Appointment Period
Allen, Catherine Visiting Assistant Professor	Sociology	6/4/79 8/25/79
Barnes, Marsha Lecturer, Part-time	Business Administration	9/1/79 1/15/80
Carlton, David L. Visiting Assistant Professor	History	9/1/79 5/31/80
Chatterjee, Sankar Visiting Assistant Professor	Geosciences	9/1/79 5/31/80
Corbett, Stephen S. Assistant Professor	Classical and Romance Languages	9/1/79 5/31/80
DeVine, Carolyn S. Lecturer	Geosciences	9/1/79 5/31/80
Douglas, Omer Lecturer, Part-time	Education	9/1/79 1/15/80
Frye, Gary Adjunct Professor	Psychology	9/1/79 5/31/80
Goodrich, Robert Lecturer, Part-time	Business Administration	9/1/79 5/31/80
Hadaway, Beverly Visiting Assistant Professor	Economics	9/1/79 5/31/80
Hayward, Colleen Adjunct Instructor	Family Management Housing, and Con. Ser.	9/1/79 12/30/79
Johansen, Beverly Lecturer	Mass Communications	9/1/79 5/31/80

Name, Rank and/or Title	Department or Office	Appointment Period
Kent, George Visiting Professor	Germanic and Slavic Languages	9/1/79 5/31/80
Mogel, Robert W. Visiting Assistant Professor	Theatre Arts	9/1/79 5/31/80
Mozafar, Ahmad Adjunct Professor	Biological Sciences	8/1/79 7/31/80
Oglesby, Caroline Lecturer	English	9/1/79 5/31/80
Owen, John Visiting Professor	Sociology	7/16/79 8/25/79
Schultz, Alton Visiting Assistant Professor	Physics	9/1/79 5/31/80
Scott, Jean P. Assistant Professor	Home and Family Life	9/1/79 5/31/80
Sharp, Linda M. Lecturer	English	9/1/79 5/31/80
Sollie, Donna L. Assistant Professor	Home and Family Life	9/1/79 5/31/80
Taylor, Bonnie E. Visiting Assistant Professor	Speech Pathology and Audiology	9/1/79 5/31/80
Thompson, Mary J. Lecturer	English	9/1/79 5/31/80
Wiggins, Gary Lecturer	Mathematics	9/1/79 5/31/80
Wilkinson, Stan Lecturer, Part-time	Engineering Technology	9/1/79 1/15/80

TEXAS TECH UNIVERSITY
Lubbock, Texas

2. Summary of Professorial Appointments
September through October, 1979

ARTS AND SCIENCES

Biological Sciences	
Adjunct Professor	1
Classical and Romance Languages	
Assistant Professor	1
Economics	
Visiting Assistant Professor	1
English	
Lecturer	3
Geosciences	
Visiting Assistant Professor	1
Lecturer	1
Germanic and Slavic Languages	
Visiting Professor	1
History	
Visiting Assistant Professor	1
Mass Communications	
Lecturer	1
Mathematics	
Lecturer	1
Physics	
Visiting Assistant Professor	1
Psychology	
Adjunct Professor	1
Sociology	
Visiting Assistant Professor	1
Visiting Professor	1

ARTS AND SCIENCES (continued)

Speech Pathology and Audiology	
Visiting Assistant Professor	1
Theatre Arts	
Visiting Assistant Professor	1

BUSINESS ADMINISTRATION

Business Administration	
Lecturer, Part-time	2

EDUCATION

Lecturer, Part-time	1

ENGINEERING

Engineering Technology	
Lecturer, Part-time	1

HOME ECONOMICS

Home and Family Life	
Assistant Professor	2
Family Management, Housing, & Consum. Ser.	
Adjunct Professor	1
Total	25

TEXAS TECH UNIVERSITY
Lubbock, Texas

3. For Information Only: Resignations and/or Terminations - Professorial Personnel, September through October, 1979

Name, Rank and/or Title	Department or Office	Effective Date
Greene, Wayne Assistant Professor	Art	8/31/79
Holder, William Associate Professor	Business Administration	6/1/79
Korkowski, Eugene Assistant Professor	English	9/1/79
Petty, John Professor	Business Administration	8/31/79
Walser, Ronald Assistant Professor	Plant and Soil	8/31/79

TEXAS TECH UNIVERSITY
Lubbock, Texas

4. Summary of Professorial Resignations
September through October, 1979

AGRICULTURAL SCIENCES	
Plant and Soil	
Assistant Professor	1
ARTS AND SCIENCES	
Art	
Assistant Professor	1
English	
Assistant Professor	1
BUSINESS ADMINISTRATION	
Professor	1
Assistant Professor	1
Total	5

TEXAS TECH UNIVERSITY
Lubbock, Texas

5. For Information Only: Faculty and Professional Staff Appointments other than Professorial Ranks - September through October, 1979

	Description	Appointment Period: 9 months or over	Appointment Period: 4.5 months or under
1.	Instructor	1	3
2.	Visiting Part-time Instructor	0	0
3.	Part-time Instructor	6	15
4.	Teaching Assistant	35	18
	Total	42	36

TEXAS TECH UNIVERSITY
Lubbock, Texas

6. For Information Only: Employment and Termination of Classified Personnel
June 1979 through August 1979

	Description	Appointments	Revisions	Terminations
1.	Clerical and Fiscal Group	70	26	75
2.	Equipment Operators	7	3	7
3.	Building, Grounds Services	60	11	73
4.	Engineering, Trades Technical	8	2	17
5.	Personnel Services Residence Halls & Public Relations	16	11	25
6.	Agricultural Services	2	0	1
7.	Stores & Purchasing	4	1	3
8.	Miscellaneous Group	28	5	355
9.	Food Services	7	3	15
	Totals	202	62	571

TEXAS TECH UNIVERSITY
Lubbock, Texas

7. For Information Only: Official Travel
September 11 through October 22, 1979

Out-of-State Travel Voucher Amounts:

1. Purpose of Travel Summarized Into Five Groups:	Number
a. To Present an Original Research Paper	40
b. To Attend a Professional Meeting	65
c. Trip in Conjunction with Research Project	20
d. Trip Required in Performance of University Duties	52
e. Multiple Purpose: Meeting/Paper	1
Total	178

2. Estimated Expenses and Sources of Funds to be Used:	Number	Estimated Amount
a. From State Appropriated Funds	100	$33,701.23
b. From Auxiliary Accounts	13	3,707.34
c. From Current Restricted Funds	64	29,180.85
d. From Museum	1	583.90
e. From Agency Funds Funds and Other Sources	-0-	-0-
Total	178	$67,173.32

8. For Information Only

Report of Out of Country Leaves

Dr. Thomas F. X. Noble, Assistant Professor, Department of History, May 1 - June 30, 1980, Paris and other cities in France. Purpose of trip: To collect information for a book.

9.

For Information Only

TEXAS TECH UNIVERSITY

OFFICE OF STATISTICS AND REPORTS

UNDERGRADUATE ENROLLMENT
FALL SESSION 1979

	FRESHMEN			SOPHOMORES			JUNIORS			SENIORS			UNDERGRADUATE TOTALS		
	Men	Women	Both	Men	Women	Both	Men	Women	Both	Men	Women	Both	Men	Women	Both
Ag. Sciences	398	86	484	274	61	335	221	65	286	263	59	322	1156	271	1427
Arts and Sciences	1497	1691	3188	811	806	1617	589	620	1209	622	587	1209	3519	3704	7223
Business Adm.	1224	736	1960	687	398	1085	587	295	882	544	252	796	3042	1681	4723
Engineering	950	110	1060	694	54	748	560	44	604	800	56	856	3004	264	3268
Home Economics	14	488	502	14	317	331	16	313	329	20	305	325	64	1423	1487
Education	75	413	488	43	311	354	44	281	325	51	344	395	213	1349	1562
T O T A L S	4158	3524	7682	2523	1947	4470	2017	1618	3635	2300	1603	3903	10998	8692	19690

10.

For Information Only

TEXAS TECH UNIVERSITY

OFFICE OF STATISTICS AND REPORTS

GRADUATE ENROLLMENT
FALL SESSION 1979

	MASTERS			DOCTORS			GRADUATE TOTALS			L A W			UNIVERSITY TOTALS		
	Men	Women	Both	Men	Women	Both	Men	Women	Both	Men	Women	Both	Men	Women	Both
Ag. Sciences	139	27	166	33	4	37	172	31	203	0	0	0	1328	302	1630
Arts and Sciences	389	441	830	256	132	388	645	573	1218	0	0	0	4164	4277	8441
Business Adm.	234	81	315	44	13	57	278	94	372	0	0	0	3320	1775	5095
Engineering	187	13	200	51	6	57	238	19	257	0	0	0	3242	283	3525
Home Economics	11	107	118	15	22	37	26	129	155	0	0	0	90	1552	1642
Education	101	301	402	126	132	258	227	433	660	0	0	0	440	1782	2222
Law	0	0	0	0	0	0	0	0	0	435	139	574	435	139	574
T O T A L S	1061	970	2031	525	309	834	1586	1279	2865	435	139	574	13019	10110	23129

Mike Kline General Contractor, Inc. - Goddard Range and Wildlife Building Basement

11. a. The following Contract No. 277 with Mike Kline General Contractor, Inc. in the amount of $198,470.00 for the final construction phase of Goddard Range and Wildlife Building is entered for information purposes. Execution of this contract was authorized in the Board meeting of October 5, 1979, Item M26.

Contract No. 277

AGREEMENT

made this eighth day of October in the year Nineteen Hundred and Seventy Nine.

BETWEEN

The Board of Regents, Texas Tech University, Lubbock, Lubbock County, Texas, acting herein by and through Robert L. Pfluger, Chairman, the Owner, and Mike Klein General Contractor, Inc., Lubbock, Texas, the Contractor.

The Owner and the Contractor agree as set forth below:

ARTICLE 1

THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda issued prior to execution of this Agreement and all Modifications issued subsequent thereto. These form the Contract, and all are as fully a part of the Contract as if attached to this Agreement or repeated herein. An enumeration of the Contract Documents appears in Article 8.

ARTICLE 2

THE WORK

The Contractor shall perform all the Work required by the Contract Documents for construction work in the Goddard Range and Wildlife Building Basement.

ARTICLE 3

ARCHITECT

Office of New Construction, Texas Tech University.

ARTICLE 4

TIME OF COMMENCEMENT AND COMPLETION

The Work to be performed under this Contract shall be commenced on or before a date to be specified in a written "Notice to Proceed" from the Owner and completed in 210 consecutive calendar days thereafter. The Contractor further agrees to pay, as liquidated damages, the sum of $140.00 for each consecutive calendar day after date shown in Notice to Proceed.

ARTICLE 5

CONTRACT SUM

The Owner shall pay the Contractor for the performance of the Work, subject to additions and deductions by Change Order as provided in the Conditions of the Contract, in current funds, the Contract Sum of:

One Hundred Ninety Eight Thousand Four Hundred Seventy Dollars ($198,470)

ARTICLE 6

PROGRESS PAYMENTS

Based upon Applications for Payment submitted to the Architect by the Contractor, recommended by the Architect, and approved by Owner, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in the Conditions of the Contract as follows:

Once each calendar month, the Owner shall make a progress payment to the Contractor on the basis of a duly certified and approved estimate of the Work performed during the preceding calendar month under this Contract; but to insure the proper performance of this Contract, the Owner shall retain ten percent (10%) of the amount of each estimate until final completion and acceptance of all Work covered by this Contract: Provided that the Owner, at any time after fifty percent (50%) of the Work has been completed finds that satisfactory progress is being made, may make any of the remaining progress payments in full; and provided further that, upon completion and acceptance of each separate building, public work, or other division of the Contract on which the price is stated separately in the Contract, payment may be made in full including retained percentages thereon less authorized deductions. It shall be the Owner's option that upon "substantial completion" of the entire Work he may increase the total payments to ninety-five percent (95%) of the Contract price provided satisfactory evidence is furnished that all payrolls, material bills, and other indebtedness connected with the Work have been paid.

In addition, and in connection with any progress payment, if the Owner requests same, he shall be furnished manifest proof of any Subcontractors' actual fiscal account as related to the actual Subcontract value; and such account shall be in a form as requested by the Owner.

ARTICLE 7

FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, shall be paid by the Owner to the Contractor thirty days after Substantial Completion of the Work unless otherwise stipulated in the Certificate of Substantial Completion, provided the Work has then been completed, the Contract fully performed and a final Certificate for Payment has been issued by the Contractor and approved by the Architect.

ARTICLE 8

MISCELLANEOUS PROVISIONS

Terms used in this Agreement which are defined in the Conditions of the Contract shall have the Meanings designated in those Conditions.

The Contract Documents, which constitute the entire agreement between the Owner and the Contractor, are listed in Article I and except for Modifications issued after execution of this Agreement, are enumerated as follows:

	PAGES
Table of Contents	3
Notice to Bidders	1
Information to Bidders	3
Proposal	3
Bid Bond (Form)	2
Power of Attorney	1
Agreement (Form)	4
Performance Bond (Form)	2
Payment Bond (Form)	2
Exemption Certificate	1
Equal Opportunity Clause	4
Wage Scale	3
Uniform General Conditions	16
Supplementary General Conditions	22

Specifications, Divisions 1,2,3,(4),5,6,7,8,9,10,(11),(12),13,14,15,16.
(0) Divisions not included.

Drawings: Dated 8/29/79
Architectural A1, A2, A3, A4, A5, A6.
Structural M.A.
Mechanical MPE 1.
Plumbing MPE 2.
Electrical MPE 3. and MPE 4.

Addenda No. 1&2

The Owner reserves the right to do work and to award other contracts in connection with other portions of the project.

Included in the total contract sum is $180,000.00 which represents cost of materials and other expenses requiring tax exemptions from City and State sales taxes.

ARTICLE 9

PAYMENT AND PERFORMANCE BONDS

It is hereby agreed that a Performance Bond and a Payment Bond, each of 100% of the contract sum, are included herein and made a part of this contract.

ARTICLE 10

OWNER'S REPRESENTATIVE

The Owner hereby designated the President of Texas Tech University or the person designated as acting President in his absence, as its duly authorized and designated representative as that term is used and appears in this Agreement to act for and on behalf of Owner. This designation shall remain in full force and effect until and unless Contractor is otherwise notified in writing by Owner and directed to Contractor at his address.

This Agreement executed the day and year first written above.

OWNER
BOARD OF REGENTS
TEXAS TECH UNIVERSITY

/s/ Robert L. Pfluger
Robert L. Pfluger, Chairman

ATTEST:

/s/ Freda Pierce
Freda Pierce, Secretary

CONTRACTOR
MIKE KLEIN GENERAL CONTRACTOR, INC.

By /s/ Mike Klein
Mike Klein

ATTEST:

By /s/ Nola Klein
Nola Klein

* * * * * * * * * * * * * * * * * *

Pharr and Pharr Enterprises - Dressing Rooms Lubbock Coliseum

11. b. The following Contract No. 278 with Pharr and Pharr Enterprises in the amount of $92,446.00 for construction of women's dressing rooms in Lubbock Coliseum is entered for information purposes. Execution of this contract was authorized in the Board meeting of October 5, 1979, Item M25.

Contract No. 278

AGREEMENT

made this eighth day of October in the year Nineteen Hundred and Seventy Nine.

BETWEEN

The Board of Regents, Texas Tech University, Lubbock, Lubbock County, Texas, acting herein by and through Robert L. Pfluger, Chairman, the Owner, and Pharr and Pharr Enterprises, Lubbock, Texas, the Contractor.

The Owner and the Contractor agree as set forth below:

ARTICLE 1

THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda issued prior to execution of this Agreement and all Modifications issued subsequent thereto. These form the Contract, and all are as fully a part of the Contract as if attached to this Agreement or repeated herein. An enumeration of the Contract Documents appears in Article 8.

ARTICLE 2

THE WORK

The Contractor shall perform all the Work required by the Contract Documents for construction of women's dressing rooms in Lubbock Coliseum, 6th Street and Brownfield Highway.

ARTICLE 3

ARCHITECT

Office of New Construction, Texas Tech University.

ARTICLE 4

TIME OF COMMENCEMENT AND COMPLETION

The Work to be performed under this Contract shall be commenced on or before a date to be specified in a written "Notice to Proceed" from the Owner and completed in 150 consecutive calendar days thereafter.

The Contractor further agrees to pay, as liquidated damages, the sum of $105.00 for each consecutive calendar day after date shown in Notice to Proceed.

ARTICLE 5

CONTRACT SUM

The Owner shall pay the Contractor for the performance of the Work, subject to additions and deductions by Change Order as provided in the Conditions of the Contract, in current funds, the Contract Sum of:

NINETY TWO THOUSAND, FOUR HUNDRED
FORTY SIX DOLLARS ($92,446)

ARTICLE 6

PROGRESS PAYMENTS

Based upon Applications for Payment submitted to the Architect by the Contractor, recommended by the Architect, and approved by Owner, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in the conditions of the Contract as follows:

Once each calendar month, the Owner shall make a progress payment to the Contractor on the basis of a duly certified and approved estimate of the Work performed during the preceding calendar month under this Contract; but to insure the proper performance of this Contract, the Owner shall retain ten percent (10%) of the amount of each estimate until final completion and acceptance of all Work covered by this Contract: Provided that the Owner, at any time after fifty percent (50%) of the Work has been completed finds that satisfactory progress is being made, may make any of the remaining progress payments in full; and provided further that, upon completion and acceptance of each separate building, public work, or other division of the Contract on which the price is stated separately in the Contract, payment may be made in full including retained percentages thereon less authorized deductions. It shall be the Owner's option that upon "substantial completion" of the entire Work he may increase the

total payments to ninety-five percent (95%) of the Contract price provided satisfactory evidence is furnished that all payrolls, material bills, and other indebtedness connected with the Work have been paid.

In addition, and in connection with any progress payment, if the Owner requests same, he shall be furnished manifest proof of any Subcontractors' actual fiscal account as related to the actual Subcontract value; and such account shall be in a form as requested by the Owner.

ARTICLE 7

FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, shall be paid by the Owner to the Contractor thirty days after Substantial Completion of the Work unless otherwise stipulated in the Certificate of Substantial Completion, provided the Work has then been completed, the Contract fully performed and a final Certificate for Payment has been issued by the Contractor and approved by the Architect.

ARTICLE 8

MISCELLANEOUS PROVISIONS

Terms used in this Agreement which are defined in the Conditions of the Contract shall have the Meanings designated in those Conditions.

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Proposal	3
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Payment Bond (Form)	2
Exemption Certificate	1
Equal Opportunity Clause	4
Wage Scale	3
Uniform General Conditions	22
Supplementary General Conditions	15
Specifications, Divisions 1,2,3,4,5,6,7,8,9,10,(11),(12),(13),(14), 15,16.	(0) Divisions Not Included.

Drawings: Dated 7/16/79

Architectural	P1,A1,A2,A3, and A4..
Structural	N.A.
Mechanical	MPE1.
Plumbing	MPE2.
Electrical	MPE3.
Addenda No.	1,2,&3.

The Owner reserves the right to do work and to award other contracts in connection with other portions of the project.

Included in the total contract sum is $20,000.00 which represents cost of materials and other expenses requiring tax exemptions from City and State sales taxes.

ARTICLE 9

PAYMENT AND PERFORMANCE BONDS

It is hereby agreed that a Performance Bond and a Payment Bond, each of 100% of the contract sum, are included herein and made a part of this contract.

ARTICLE 10

OWNER'S REPRESENTATIVE

The Owner hereby designates the President of Texas Tech University or the person designated as acting President in his absence, as its duly authorized and designated representative as that term is used and appears in this Agreement to act for and on behalf of Owner. This designation shall remain in full force and effect until and unless Contractor is otherwise notified in writing by Owner and directed to Contractor at his address.

This Agreement executed the day and year first written above.

OWNER
BOARD OF REGENTS
TEXAS TECH UNIVERSITY

/s/ Robert L. Pfluger
Robert L. Pfluger, Chairman

CONTRACTOR
PHARR AND PHARR ENTERPRISES

BY /s/ Jimmy R. Pharr

ATTEST:

/s/ Freda Pierce
Freda Pierce, Secretary

* * * * * * * * * * * * * * * * * *