MichiganTech
School of Technology

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Proposal for a Bachelor of Science Degree in Computer Systems Administration

System Administration is defined as: "Activities which directly support the operations and integrity of computing systems and their use and which manage their intricacies. These activities minimally include system installation, configuration, integration, maintenance, performance management, data management, security management, failure analysis and recovery, and user support. In an inter-networked computing environment, the computer network is often included as part of the complex computing system."[1]

The field of computing and information technology is very broad and covers a range of duties and skills from high end computer design, to networking, to repair, to web design and graphics, to a wide range of other position titles. An organization by the name of ITWorks.Ohio uses a graphic in the shape of a pinwheel to depict the wide variety of computer related occupations (See appendix A, page 15.) The graphic shows four broad categories of computer related occupations. They are: Network Systems, Interactive Media, Information Support and Services, and Programming and Software Development. Within each "vane" of the pinwheel a number of occupational titles are given. If computer engineering was to be added to the graphic it would serve to point out fields of study and course work currently offered at Michigan Tech.

Michigan Technological University offers many computer related degrees and much computer related course work. The College of Science and Arts offers a degree in Computer Science and Bioinformatics while the College of Engineering offers a degree in Computer Engineering. The School of Business offers course work in the Management of Information Systems while the Department of Humanities offers a variety of computer based media related courses. What is shown on the aforementioned graphic, but missing from the mix of course work and degree programs at Michigan Tech, is a degree in the area of Computer Systems Administration. The School of Technology proposes such a degree to fill this void. The degree will be housed in the School of Technology.

Specifically, faculty members in the School of Technology propose a Computer Systems Administration degree program that prepares a student to be productive in the Microsoft and UNIX operating systems arenas and to be proficient in the hardware and software aspects of computers and their associated peripherals, the operation of servers, and performance, security, reliability, and redundancy issues. Along with the degree, faculty want the student to acquire the appropriate industry certifications such as those offered by Microsoft and the System Administrator's Guild (SAGE) while studying at MTU. The nature of the degree is that it is an applications based, practically oriented study of the workings of computer networks including the hardware items in a network and the practical software responsibilities, such as scripting, that is expected of a computer systems administrator.

Additionally, an emphasis for this degree program will the management and human relations aspects of

[1] WWW.SAGE.ORG. The Systems Administrators Guild.

this occupation. System administrators often manage or recommend expenditures from a budget so skills in business management are important. They also must communicate with people who are likely not to be on the same technical level as the system administrator. The professional will need to be able to communicate issues of importance to the organization, such as network security, that may not be fully appreciated by the non-technical end users and management. The computer systems administrator professional must be able to communicate effectively with these people. Thus, written, oral, and media enhanced communication skills must be developed.

This degree is crafted by using much existing course work from the BSET - EET degree program to provide electrical / electronics / digital communications basics along with other existing course work from the School of Business and Economics, the Department of Humanities, and other departments on campus. New courses (See ITT/EET prefixed courses on page 11 and descriptions on page 13.) are anticipated in the curriculum.

History

The School of Technology has a history of offering course work related to computer systems administration. The courses were first taught under the direction of Assistant Professor Anthony Farrell in the Winter Quarter of 1996-97. The courses were open to any student in any major on campus and were taken by students, system administrator employees, and other IT professionals on campus. Students who completed these courses went on, in many cases, to take jobs related to the courses they took from Prof. Farrell in the School of Technology. In several cases, students who took these classes either improved their system administration skills or became system administrators on the Michigan Tech campus. Thus, this degree program will help to provide talent in our region where the number of IT professional talent is not that great, as well as, throughout the State and region.

In the process of offering the courses, it was necessary to establish a computer laboratory in which the hardware and software principals could be taught. This was accomplished with the assistance of Michigan Tech's Department of Information Technology and with the cooperation of many departmental system administrators who donated equipment to make the classes possible. It is anticipated that the cooperation between IT, departmental system administrators and the School of Technology will continue into the new degree program. Additionally, with a formal degree in the University Catalog, it will be possible to approach industry for hardware and software support for the degree.

The Need for the Degree

The literature continually states that there is a shortage of IT professionals. Bob Cohen a spokesman for the Information Technology Association of America, says; "Despite the efforts of the nation's colleges, not nearly enough students are graduating with technology training.[2]" The U. S. Department of Labor states that; "Computer support specialists and systems administrators are projected to be among the fastest growing occupations over the 2000-10 period.[3]" Barbara Dijker, vice president of the System Administrators' Guild in 1999, stated; "There has never been a market glut of systems administrators. In fact, there are probably five jobs available for every existing sysadm today. In fact, most experienced

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[2]The Detroit Free Press, August 18, 1999. *Virtual college gets Ameritech grant to train workers.*

[3]U. S. Department of Labor, Bureau of Labor Statistics, *Occupational Outlook Handbook* "Computer Support Specialists and System Administrators.

system administrators find they are doing the work of five people. Demand has out-paced supply for at least the last six years."[4]

But what about the current IT situation . . .

With all the recent news about failed "dot.com's" and the number of IT professionals who are out-of-work, one could jump to the conclusion that there is now an excess of system administrators seeking employment. Recalling the ITWorks.Ohio graphic there should be the realization that not all IT jobs are system administrator type jobs. An employer who is currently posting a systems administrator position through Michigan Tech's Techjobnet-l list server yielded the following observation. The Chicago based recruiter wrote; "My problem is that most of the applicants have MS in computer science or related terms, or MBA's or even PhD's (or, would you believe, law degrees) and expect salary levels commensurate with business. Many are actually engineers with certificates or short courses in CIS, etc." Graduates of the MTU degree program will probably have to compete with these types of individuals, that is those individuals with ad hoc or peripheral education in systems administration, but who are unemployed and seeking employment in this field. However, MTU graduates will have the competitive advantage of having completed a logical plan of study and will have earned a degree in the specific subject material and earned industry certifications along with their degree.

Additionally, Brian Tumulty of the Gannet News Service reports that "Tens of millions of Americans are job hoppers. . ." He reports that "Although an estimated 52.9 million workers were laid off, quit or were put out of their jobs for other reasons over the 12 months ending in May 2002, an almost equal number — 52.3 million — were new hires. That represents a 39 percent job turnover rate in a nation that employs just more than 134 million people, although some of the churning involves people who change jobs several times a year and are counted multiple times." He summarizes by quoting economists who say our economy; ". . . is a vibrant economy that quickly adapts to a changing world of shifting consumer demands and embraces new technology."[5] This, it would appear that the economy is still in need of systems administration professionals.

The field of IT is very broad so many opportunities exists. The School of Technology envisions installation (using many broad definitions of "installation"), technical operation and management of networks as important aspects of preparation the degree will need to provide. Michigan Tech's phone system will soon be a digital, networked system that blends the voice / data technologies into one networked system and automobiles are becoming computer controlled machines with their own series of networks. The need for system administrators will only continue to grow and the demand will grow for reasons not yet imagined.

Curriculum

Faculty in the School of Technology have identified new courses that would need to be developed for this BS degree program, however, the curriculum draws heavily from a collection of courses already

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[4]Careers in System Administration, by Barbara Dijker, *Dr. Dobb's Journal*, Fall 1999. http://www.ddj.com/documents/s=894/ddj9914d/9914d.htm

[5]Gannett News Service, 08/09/2002 - Updated 11:39 AM ET, *Job Hoppers Make Up 39% of Employee Turnover Rate*, By Brian Tumulty.

available on the Michigan Tech campus. This curriculum is crafted with thought not just for the technical aspects of system administration, but with a realization that graduates must work with many non-technical people in this occupation. Therefore, courses in communication skills (written, oral and graphic) are necessary. The system administrator must also be able to work with people who are likely to be angry that a part of their network has failed and they need to be able to talk to users in such a way that the jargon of the occupation does not become a barrier. Management skill will be very important to the administrator as well.

The School of Business and Economics offers technical courses in the MIS area, such as a database management and management skills that are desirable to include in this degree. There are five courses in the School of Business and Economics in the Management of Information Systems Concentration that are appropriate for this program. They are: BA2700 Business Problem Solving, BA3700 - Organizational Behavior, BA3200 - IS/IT Management, BA3210 - Business Database Management, and BA3220 - Systems Analysis and Design.

General education classes are readily available on campus. Underlying courses in electrical engineering technology (circuits, digital, digital communications, micro interfacing, & math) are already in place. Several of the key system administration classes have been in the Michigan Tech Catalog since 1996. They have been refined and rewritten during the calendar conversion project.

In 1999, Barbara Dijker wrote; "A degree in computer science isn't required, just a basic understanding of how computers, operating systems, and applications work and interact, logic, binary numbers, a little electronics, and some common sense."[6] The School of Technology degree program will raise the quality of system administrations through a program of study that formalizes the study of electronics, operating systems, and applications, and adds the management and people skills that are often lacking in a self taught system administrator.

The fact that thousands of system administrators are working without having the advantage of a formal education points to the "applications" nature of this profession. The School of Technology feels that the occupation can greatly benefit from a formal educational program, but that the education does not have to be strongly theoretical in nature.

This curriculum lends itself to on-campus internship experiences as students could be deployed to departments to serve as assistants to the professional administrators. Additionally, it will be possible for students to participate in co-op assignments both on- and off-campus for gaining practical experience and income. These details will be explored as the curriculum develops.

Articulation with High School Programs

The design of the curriculum is crafted with the awareness that many high schools now offer classes which deal with computers. Locally, the Copper Country Intermediate School district offers a program of study which leads to A+ Certification. A+ Certification affirms that an individual is capable of assembling a computer, installing operating systems and applications and can successfully troubleshoot them. The School of Technology envisions advanced placement credit for similar course work in the MTU degree program; ITT1600 - PC Construction. However, since A+ Certification has no scholastic requirements, the

[6] Careers in System Administration, by Barbara Dijker, *Dr. Dobb's Journal*, Fall 1999. http://www.ddj.com/documents/s=894/ddj9914d/9914d.htm

application of advanced credit will be granted carefully.

Resources

Enrollments

To begin a discussion of resources an estimate of program enrollment is necessary. Looking back at the growth of the School of Technology Bachelor of Science in Engineering Technology degree, the growth was from zero to 200 students in a time period of six years. It is estimated that the demand for this degree will be greater since students in high school are being introduced to computing related professions (system administration, web page design, programming, etc.) much more than they are being introduced to engineering and engineering technology. The program should be able to grow at the rate of 50 new and transfer students per year to a total of 200 students in the fourth year. The resource estimates are based on this initial growth.

With new classes in the curriculum the School sees the need for two new positions. The new faculty members do not need to have a Ph.D. degree to be productive in this degree program or to fulfill accreditation requirements. The reason for this is that the School of Technology recognizes that the appropriate terminal degree for people in this profession is a Masters of Science degree and that the Ph.D. for this profession is rare. Of importance will be experience as an administrator and an understanding of the management issues of this occupation.

When the Anita Jones, of the Washington Advisory Group (and Chair of Computer Science at the University of Virginia), reviewed computing issues on the MTU campus, she suggested that the instructional help for a degree such as the one being proposed could be enlisted from currently employed systems administrators. The School of Technology has experience in trying to use employed system administrators as instructors. While this has been tried, it has been the evaluation of both the dean and faculty in the School of Technology and the system administrator who taught for the School that this scheme does not work well. A system administrator already has a full time job with a great deal of responsibility. To ask that person to develop class presentations, tests and laboratories and then do the required grading and student advising is just not realistic. The faculty member - system administrator would also have to choose between students and the “customers” using a computer network.

It is felt that finding a qualified individual to teach will not be a difficult problem as individuals are in the area who are qualified and there may be those who would like to return to Houghton to teach. At least one IT employee at MTU has expressed an interest in teaching in this program should it develop as a career change opportunity.

The new courses would have both a recitation and a laboratory components. Assuming one section of each course and two sections of each lab, the work load is 45 hours of instruction per year or 22.5 hours of instruction per semester per faculty member.

Equipment

The School of Technology has operated system administration classes using surplus equipment from departments on campus. The equipment is somewhat slow, but entirely adequate to teach principles. The faculty believe that there is enough equipment for PC and UNIX instruction for a few years after which upgrades will be needed. As new operating systems come out, software will need to be purchased.

It is advisable for this degree to include the subject of wireless networking. Some new equipment will be needed to support this topic in the degree, but it is not especially costly and it may be available in the Department of Electrical Engineering. This avenue will be explored prior to making any purchases that

would duplicate any existing resources. The School's membership in the *Global Wireless Education Consortium* may be beneficial in this degree and may provide contacts for obtaining wireless equipment.

Hardware currently available would allow the curriculum to be launched. There is some additional equipment that is necessary, such as wireless communication equipment, programmable routers/switches, and network analyzers. Some current hardware would need normal upgrading in 2-3 years. Speciality software would need to be purchased for Microsoft networking. A budget of $50,000 would cover hardware and software needs. This could be offset through accumulated lab fees that would be collected over time and through using equipment donations.

Laboratory Space

Laboratory space to teach systems classes is available in the School of Technology - Technology Center. The building is 11 miles off campus and has worked for the several courses faculty already teach in systems administration. For this new degree program it would be desirable to identify space on campus where computers can be set up with enough space to work around them and in such a way that they are not part of the production network on campus. The room used by the Forest Technology program, room 231EERC, will become available in a year and can be used for this purpose.

Offices

Offices for the additional faculty will be needed, but will become available within the School of Technology with the closure of the Forest Technology program in the spring of 2003.

Library

Traditional library resources for this program are not an important consideration. It is expected that the information will come mainly from the Internet. This is because the Internet is the distribution and documentation medium of the systems administration profession. Considering the urgency with which security upgrades and documentation are needed, it will be the Internet environment that best distributes information.

Accreditation

Accreditation under the auspices of ABET is possible, but the opnion of the faculty is that ABET accreditation may not be as desirable as would be the recognition and accreditation of Microsoft, the Systems Administrators Guild (SAGE) and other industry organizations. This needs to be studied further to determine the best form of accreditation/recognition, but at this time there is a feeling that ABET accreditation is not necessary although the new accreditation commission in ABET which deals with these kind of degree programs needs to be investigated.

Additional Considerations

The Michigan Virtual University (MVU) has created the Michigan Virtual Information Technology College which is designed to offer on-line classes and degrees in the area of information technology. There could possibly be a tie in to MVU with this degree which could be important to the realization of our next building on campus. Some curricular content may be available from MVU if only for review and drill in the subject matter.

Marketing

Perhaps a shortcoming of many of our new programs at MTU has been that they are not well known throughout the State of Michigan and in our region. It will be <u>essential</u> to adequately promote any new

degree program to high school counselors, community college graduates, parents, and students.

It is expected that many students will be attracted to this degree from other programs on campus. The most likely sources will be students who transfer from the College of Engineering's undeclared pool of students, Computer Science, and Computer Engineering. Transfers from these and other programs on campus should be quite easy and with the loss of few, if any, credits.

Secondary school teachers (also, intermediate school districts and skill center teachers) will be contacted to inform them of this new degree. Schools with programs in A+ Certification will receive special attention to ensure students are familiar with the MTU degree program.

Students with a systems administration degree from a community college should be able to transfer easily to complete this degree. Articulation agreements will be established as soon as possible to be used as a tool to attract two-year graduates.

Costs

Personnel

It will be necessary to hire two new faculty members at an estimated cost of about $55,000 each plus benefits. One faculty member can be funded by reallocating the salary monies from the retirement of the Coordinator of Forest Technology. The second faculty member will need to be funded out of new monies. However, both faculty members do not need to be hired immediately. It is possible to stage a "roll-out" of the program that will allow the second faculty member to be hired in the second year of the degree program.

Supplies & Services

A supplies and services budget of $5,000 will be needed to support the program, travel and supplies. Here again, the SS&E that was allocated for the Forest Technology program can be reallocated to this new degree program.

Impact on other Departments / Schools

This degree draws on the resources of the School of Business and Economics for five courses. It is likely that as the enrollment increases that instructor resources will be needed in the School. This has been discussed with the Associate Dean in the School of Business so there is an awareness that the SB&E may be impacted. As enrollments increase in this program resources may be needed in the School of Business and Economics.

Budget Summary Table

ITEM	COST	COMMENTS
Faculty Member(s)	$55,000 plus Benefits - each. One funded from reallocation of existing funds.	By staging the start of this program, it would be possible to reallocate the salary of a retiring Forest Technology faculty member and hire the second faculty member a year later.
Hardware (computers, routers, wireless, test equipment, etc)	$50,000 - $75,000	1) Some surplus / salvaged equipment from within the University can be used and is a likely source. 2) Donations from industry can offset costs. 3) Donations from alumni can offset costs.

Lab Space	Available	The laboratory used by the Forest Technology program can be reallocated. Rm 231 EERC
Office Space	Available	The offices used by Forest Technology faculty can be reallocated.
Supplies and Services	$5,000 - Mostly available	To support program and faculty. Most of this can be reallocated from the Forest Technology program.
School of Business & Economics	None until the enrollment in this degree exceeds the capacity of SB&E to serve the additional students.	This degree calls for five SB&E courses to be included in the curriculum. As the enrollment grows it is likely that the SB&E will require additional resources.

Placement of Graduates

Placement

Graduates will be in demand according to such organizations as SAGE and other such groups which support system administration concerns. New technologies and security considerations will drive the demand. While many companies have already installed networks, the demand at smaller companies will mean more opportunities for the graduates. Previously cited literature speaks to the need for graduates of this degree.

Salaries

For U.S. system administrators, mean salary was $64,271 and the median was $62,500; mean total cash was $70,565 and the median was $65,200; the mean bonus was $3,464 and the median was zero. Mean and median salaries were lower in other countries and areas of the world than in the U.S., particularly in Eastern Europe/Western Asia. Mean salaries were over $75,000 for two New York City (10 and 11), one North Carolina (28), and the Sacramento and San Francisco area (94 and 95) zip codes. From: SAGE System Administrator Salary Profile 1999, www.sage.org

Other Degree Programs in the State of Michigan

Remembering the vanes on the pinwheel graphic of appendix A, the variety of jobs in the field of information technology is great. So too, there is great variety of academic programs relating to computer systems administration. The emphasis in a degree program may be very focused or it may take a generalist approach. Degree titles vary greatly as well. Therefore, one will find degree programs at colleges and universities in Michigan that claim to prepare an individual for employment as a computer systems administrator, however, the curriculum can vary greatly from one program to the next.

An Internet search using the Google search engine of the first 200 “hits” using all the keywords “computer”, “system”, “administration”, “Michigan” from domains identified as “EDU” yielded three entries. Another Google search using all of the keywords, “network”, “administration”, “Michigan” from domains identified as “EDU” yielded no “hits” of degree programs in Michigan for the first 200 entries. The results of the search are as follows:

Northern Michigan University - http://www.nmu.edu/business/bcis.htm

NMU offers a degree out of the College of Business at the bachelors level titled; “Business Computer

Information Systems."

Northern says the following about career opportunities on completion of the degree. . .

Job opportunities in the computer information systems area are diverse and growing in number. Graduates find employment in organizations ranging from small firms to large corporations. People-oriented career paths lead to positions as computer consultants, analysts, trainers, help desk managers, and high tech marketers. Alternate careers as software programmers, database managers, Internet specialists, and network administrators tie the technical skills to the support and use of computer systems. The areas of concentration properly prepare a student for their chosen career. The combined technical/business degree, favored by employers, prepares a student for their career advancement.

The proposed Michigan Tech degree is designed to be focused on the career of computer systems administration and will not be so broad as to include competencies in all the career subsets mentioned in the Northern literature.

University of Michigan - Flint - http://www.flint.umich.edu/departments/catalog/cas/csc.html#general%20program

The U of M at Flint offers a General Program in Computer Science which offers a system/networking track. Students following this track take three specific classes and nine additional credits in computer science to complete the degree and track.

The proposed Michigan Tech degree is designed to concentrate on the practical applications of computer systems administration and the human relations aspects of the occupation. The MTU degree does not emphasize computer science, but rather the technical aspects of networking.

Saginaw Valley State University - http://www.svsu.edu/cs/cs.htm

The degree program at SVSU is housed in the Department of Computer Science. SVSU literature states:

Students may concentrate in one of three different tracks available in the Computer Science program: Software Engineering, Computer Systems and Networking or a "Generalist" track by carefully selecting four senior-level technical courses within a given track. Two of the selected courses are required, while the other two courses are electives.

The proposed Michigan Tech degree is specific to the applications of computer systems administration, is a stand alone degree; not a track program within another degree program and is not aimed at preparing graduates for the wide list of career titles listed on the SVSU website including; Software Engineer, Applications Programmer, System Administrator, Web Developer, Algorithm Development Engineer, Network Administrator, and Database Administrator.

An additional check was made on the third four-year university in the Upper Peninsula, Lake Superior State University. What was found was a Bachelor of Science degree from the College of Engineering and Mathematical Science that offers as career descriptions those of "Senior Programmer", "Systems Analyst", and "Database Administrator." The description of systems analyst is someone who; ". . . sets up systems for company." The MTU program will be computer systems administration specific while the LSSU degree appears to be broad in scope.

(http://www.lssu.edu/academics/degrees/bachelors/computer_mathematical_science/default.html)

The Michigan Tech School of Technology degree program is squarely aimed at preparing the practical applications oriented systems administrator who is capable of installing and maintaining networks systems. Courses from the Electrical Engineering Technology program will prepare a graduate to understand and troubleshoot the electronics of networking. Courses from the School of Business and Economics and the Department of Humanities will prepare the graduate to be a team player in what is often a pressured environment (pressure to maintain 24-7-365 service). The courses will also prepare a graduate to make good business decisions based on the economics of installing and maintaining network systems.

Implementation

The curriculum has one new course which is scheduled for the Spring semester of the first year. It is possible to teach that course with existing faculty and staff. Therefore, the hiring of a new faculty member could be postponed to the fall of 2003. The academic year 2002-2003 would be spent conducting the search with the expectation that the faculty member would begin work in the fall.

Conclusion

The School of Technology can and will work hard to make this degree a successful reality. A great deal of the necessary resources are in place in the School and on campus or will be reallocated within the School of Technology by staging the launch of the program. It is believed that the degree will attract a large number of high school graduates who have developed an interest in this career while serving as "student administrators" in high school. It is also expected that graduates from community college programs and practicing systems administrators will be enticed to further their education in this degree. The potential community college market is large since it appears that every community college in Michigan has some emphasis on computing related professions.

Experience has shown that a significant number of students who come to MTU will change their major. In shopping for a new degree program, it is felt that a computer systems administration degree will be popular. Inquiries concerning this degree are already being made by on-campus students. This degree will retain them at MTU. We have also heard from students scheduled to enter college next year that they are interested in this degree.

The School of Technology has been successful in growing its BSET degree, that was approved in 1994, from no students to 200 in six years. It is expected that faculty can again implement this degree and show a steady growth in student enrollment for the university.

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Bachelor of Science in Computer Systems Administration - Curriculum Flow Sheet

1st Year - Fall Semester

EET2311 - Electricity & Electronic Devices	4
EET2241 - Structure & Assembly Programming	3
MAT1115 - College Algebra & Trigonometry for Technology	5
UN1001 - Perspectives on Inquiry	3
Total =	15 Credits

1st Year - Spring Semester

ITT1600 - PC Construction	4
MAT1125 - Applied Derivatives for Technology	5
EET2141 - Digital Electronics & Microprocessor Fundamentals	4
UN1002 - World Cultures	4
Total =	17 Credits

2nd Year - Fall Semester

BA2700 Business Problem Solving	4
UN2001 - Revisions	3
MAT2215 - Applied Integral Calculus for Technology	3
EET4141 - Microcomputer Interfacing	4
EET3341 - System Administration & Network Administration Basics	4
Total =	18 Credits

2nd Year - Spring Semester

EET3281 - Electrical Project Development & Troubleshooting.	3
BA3700 - Organizational Behavior	3
PH1100 - Physics 1 Lab	1
ITT4441 - Microsoft Networking	4
BA3200 - IS/IT Management	3
Total =	14 Credits

3rd Year - Fall Semester

Science Elective	4
BA3210 - Business Database Management	3
Distribution Class	3
HU3820 Interpersonal Communications	3
PH1110 - Physics 1	3
Total =	16 Credits

3rd Year - Spring Semester

UN2002 - Institutions	3
EET4341 - Network Administration	4
BA3220 - Systems Analysis and Design	3
ITT Technical Electives	7
Total =	17 Credits

4th Year - Fall Semester

EET4480 - Senior Project	3
Distribution Class	3
Distribution Class	3
ITT Technical Electives	6
Total =	15 Credits

4th Year - Spring Semester

EET4480 - Senior Project (continued)	3
Distribution Class	3
Distribution Class	3
Free Elective	3
ITT Technical Electives	4
Total =	16 Credits

Credits needed for Graduation = 128.
PE - Physical Education - 4 classes needed for Gen. Ed. Requirement

Bachelor of Science in Systems Administration - Course Descriptions

BA2700 Business Problem Solving -- 4 Credits
Develops individual and group problem-solving skills using active, hands-on learning. Emphasizes problem identification and problem solution under conditions of ambiguity and uncertainty. Stresses creativity, interpersonal skills and skill assessment, communication, group process and teamwork, and action planning.

BA3200 IS/IT Management -- 3 Credits
Focuses on the theory and application of the information systems discipline to organizations and roles of management, users, and information systems professionals. Covers the role of telecommunications and distributed systems for business, the use of information and its implications for decision support in organizations, and the ethical, legal, and social issues of IT. Credits: 3.0 Lec-Rec-Lab: (0-3-0) Semesters Offered: Fall Spring Summer Prerequisites: BA 2310 and (BA1200 or CS 1122 or CS 1132)

BA3210 Business Database Management -- 3 Credits
Emphasizes database principles that are constant across different database software products through concrete examples using a relational database management system. Provides a well-rounded business perspective about developing, utilizing, and managing organizational databases. Credits: 3.0 Lec-Rec-Lab: (0-3-0) Semesters Offered: Fall Prerequisites: BA 3200©) and BA 1200 and (BA 2200 or CS 1122) or permission of instructor

BA3220 Systems Analysis and Design -- 3 Credits
Provides an understanding of the IS development and modification process and the evaluation choices of a system development methodology. Emphasizes effective communication with users and team members and others associated with the development and maintenance of the information system. Stresses analysis and logical design of departmental-level information system. Credits: 3.0 Lec-Rec-Lab: (0-3-0) Semesters Offered: Spring Prerequisites: BA 3210

BA3700 Organizational Behavior – 3 Credits
Covers concepts of human relations and organizational behavior through the study of people's behavior at work. Develop understanding, attitudes, and skills leading to increased personal effectiveness. Credits: 3.0 Lec-Rec-Lab: (3-0-0) Semesters Offered: Fall Spring Summer

Distribution Distribution Classes -- 15 Credits
Distribution classes are selected from an extensive list. 15 credits are needed to fulfill General Education requirements.

EET2141 Digital Electronics and Microprocessor Fundamentals -- 3 Credits
Introduction to digital logic circuits and their applications developing into microprocessor architecture. Topics include number systems, codes, Boolean algebra, Karnaugh maps, arithmetic circuits, counters, registers, bus structures, I/O devices, A/D and D/A conversions, serial communications and memory devices.

EET2241 Structure and Assembly Programming -- 3 Credits
Introduction to computer programming using a structured language. Topics include syntax, programming structure, style and documentation. In addition the use of programming packages, such as Matlab and Mathcad, are used to solve problems common to engineering technology.

EET2311 Electricity and Electronic Devices -- 4 Credits
A study of elementary DC and AC electrical networks and devices leading to the analysis of strain gage and LVDT instrumentation circuits and AC power. Circuit devices include voltage sources, resistors, strain gages, capacitors, inductors, diodes, LVDTs, and operational amplifiers. Not for students enrolled in electrical or electromechanical engineering technology.

EET3281 Electrical Project Development and Troubleshooting -- 3 Credits
Covers soldering, component layout, printed circuit board artwork, troubleshooting, electrical and environmental factors in design as well as an overview of the practical methods used by industry to process projects. The student designs and fabricates a circuit board and assembles a project.

EET3341 System Administration and Network Administration Basics -- 4 Credits
Study of computer systems administration using stand-alone and networked systems. Topics include user and process management, backup/restore, adding devices, installation, maintenance, networking hardware, including cabling, modems, routers, and other communication devices. Studies ethernet, TCP/IP, and networking protocols. Emphasizes the role of system administrators in an organization.

EET4141 Microcomputer Interfacing -- 4 Credits
The design of systems, hardware, and software needed to perform serial and parallel data transmission between microcomputers. Data collection using analog to digital converters, and analog and digital control outputs.

EET4341 Network Administration -- 4 Credits
A study of computer network topologies and administration of networked UNIX or NT systems running TCP/IP. Investigation of networking hardware including cabling, bridges, routers, and other communications devices.

EET4480 Senior Project -- 3 Credits
A capstone course requiring the application of knowledge gained in lower division courses. Projects are normally team oriented, require weekly progress reports, and culminate with a final report and oral presentation. Six credits of Senior Project is required for graduation, normally satisfied in two three-credit semesters.

Elective Elective Course -- 3 Credits
Student can select any class in the University to fulfill this requirement. This is a general elective class.

HU3820 Interpersonal Communication -- 3 Credits
Introduces theories of interpersonal communication. Considers communication issues in various relational contexts such as acquaintance relationships, friendships, kinships, and workplace relations. Encourages critical awareness of the common assumptions about interpersonal interactions.

ITT1600 PC Construction -- 4 Credits
A class to teach the assembly of computers from components, installing fundamental operating system software, and component debugging. Connection to common peripherals and installation of appropriate software.

ITT4441 Microsoft Networking -- 4 Credits
Microsoft server software installation and configuration. Development of system interface scripts to perform tasks specific to client / server applications.

ITT Technical Electives
A series of technical electives to be prepared by faculty in the degree program that emphasize technical aspects of the profession such as Oracle certification, Microsoft certifications, speciality topics related to hardware and special concerns such as network security issues.

MAT1115 College Algebra and Trigonometry for Technology -- 5 Credits
An intermediate course in algebra and trigonometry. Examples emphasize applications of engineering technology. Requires a TI-85 calculator. Requires an ACT math score > 18 or SAT math score > 450 or MAT0111 or permission of instructor.

MAT1125 Applied Derivatives for Technology -- 5 Credits
A course in complex numbers, exponential and logarithmic functions, matrix operations, trigonometric identities and trigonometric equations, analytic geometry, basic statistics, derivatives and applications of derivatives. Examples will emphasize applications. Requires a TI-85 calculator.

MAT2215 Applied Integral Calculus for Technology -- 3 Credits
A course in integration, applications of integration, differentiation of transcendental functions and methods of integration. Examples emphasize applications. Requires a TI-85 calculator.

MAT3225 Integration and Differential Equations for Technology -- 3 Credits
A course in methods of integration, series methods, solution methods for first and second order differential equations,

including Laplace transforms and applications of differential equations. Examples emphasize applications. Requires a TI-85 calculator.

PE Physical Education Courses -- 0 Credits
PE classes are required, but do not count toward graduation. Therefore, they carry zero credits.

PH1100 Introductory Physics Lab I -- 3 Credits
Introduction to physics concepts of mechanics, waves, and thermodynamics through hands-on discovery-based learning. Emphasizes small-group collaboration, peer learning, observation, prediction, data acquisition, and data analysis.

PH1110 College Physics I -- 1 Credits
An overview of basic principles of kinematics, dynamics, elasticity, fluids, heat, thermodynamics, mechanical waves, and interference and diffraction of mechanical waves.

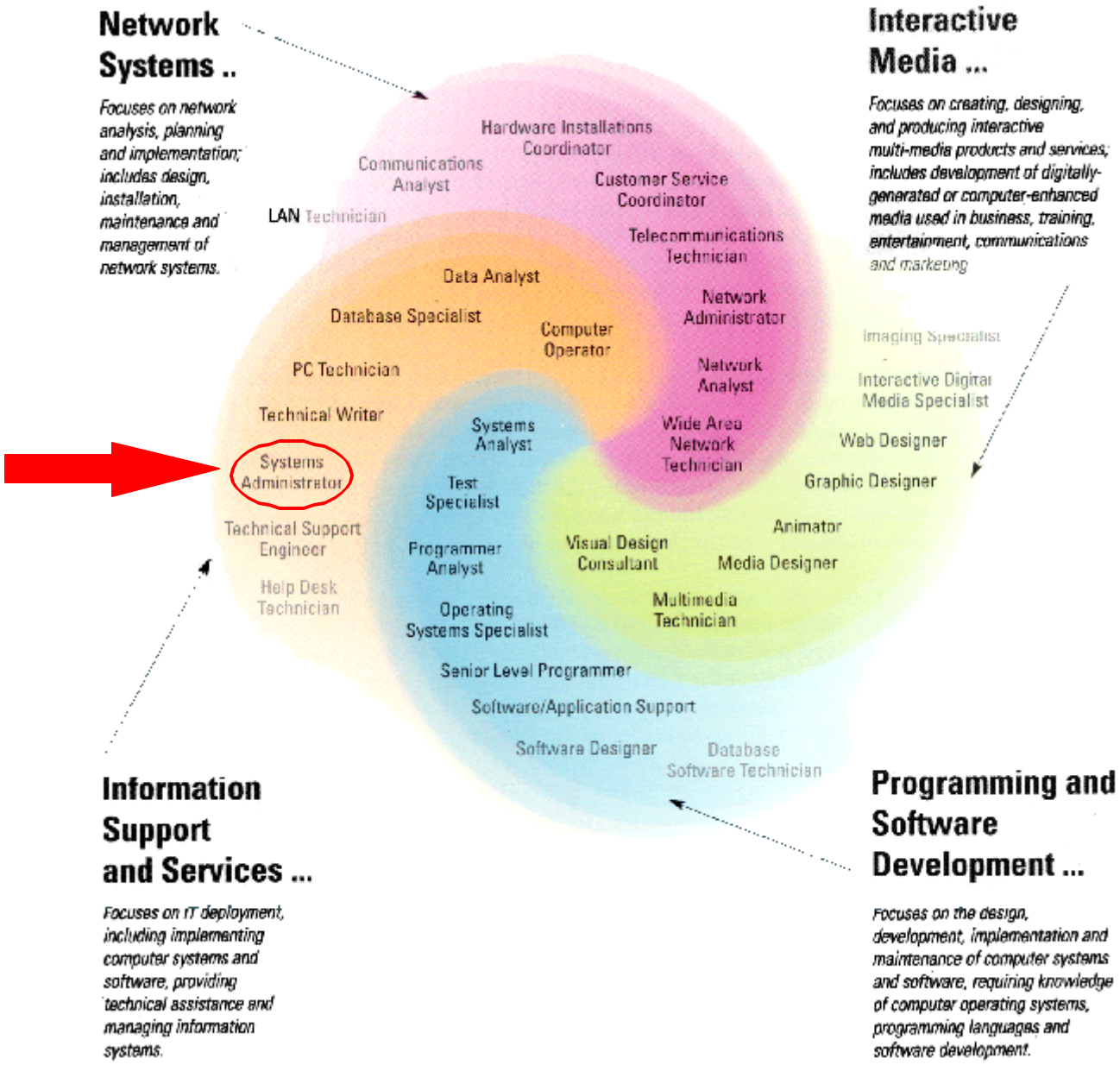
Science Elective Science Elective -- 4 Credits
Students select an elective class of their choice from the sciences.

UN1001 Perspectives on Inquiry -- 3 Credits
Engages students in college level inquiry through which they develop fundamental intellectual habits, understand how to integrate perspectives on knowledge, and begin to learn how to meet the changing needs of a global, technological, diverse, and environmentally sensitive society.

UN1002 World Cultures -- 4 Credits
Examines diversity and change around the globe from perspectives of social sciences, humanities, and arts; explores human experience from prehistory to present. Classroom lectures accompanied by films, live performances, and guest speakers. One complete year of a single foreign language plus World Cultures (UN1003, 1-credit-activities) substitutes for World Cultures.

UN2001 Revisions -- 3 Credits
Provides direct instruction in communication and strategies for revision. Writing portfolios provide a starting point for the course. Instruction in the composing process is often accompanied by work in small groups and conferences with the instructor.

UN2002 Institutions -- 3 Credits
From families to governments, to markets, to our interactions with the natural environment, institutions organize collective human action. Introduces students to the nature and role of institutions in shaping today's world. Specific topics will vary by section, but all sections address a set of core questions and concepts.



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