Academic Program Review

Computer Networks and Systems

Computer Networks Certificate

Computer Networks Minor

College of Engineering Technology

Ferris State University

2014

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Report Summary

This is a brief summary of the following APR report for the BS Computer Networks and Systems (CNS), the CNS certificate and the CNS minor.

BS CNS Program

The CNS program is a desirable degree and provides students with an education that leads to an excellent career in network engineering. The graduates of the program are in high demand and receive good starting salaries. There are ample opportunities for the CNS graduate to advance in their career. Responses from CNS graduates are positive concerning the program and the opportunities that it affords.

The main concern about the CNS program is its visibility and the resulting enrollment. Increasing the enrollment of the CNS program is the most important item identified by this report.

Like all technology programs, the CNS program needs to invest substantially in the hardware and software for the lab facilities in the program. The program is fortunate to have donations from industry partners that provide for many of the equipment needs. However, more financial support from the University is necessary to keep the program technologically relevant.

CNS Certificate and Minor

These are offered as a service to existing students and students outside of the program. The certificate and minor represent very little expense in offering them to the student. There have been two minors and several certificates issued since their inception. The department feels that it is worthwhile to continue to offer these certificates and minors.

Thanks

The department would like to offer thanks to the following for their support during the APR process:

Keith Jewett
Steve Johnson
Warren Klope
Robert Most
Murry Stocking
Gary Todd
Doug Blakemore

The department would also like to say a special thanks to Sandy Kerridge for her assistance in preparing this report.

Program Name and History

The following report pertains to the Computer Networks and Systems (CNS) Program in the College of Engineering Technology (CET) at Ferris State University (FSU).

The curriculum of the CNS program is unique in the State of Michigan and among very few similar programs in the entire United States. Almost all other computer networking programs consist of networking software fundamentals. While the CNS program incorporates this standard material, it also includes classes in electronic theory and hardware. This gives the CNS graduate a unique blend of expertise in both network hardware and software. Students learn about LANs, WANs, Network Security, routers, switches, and all of the other standard network topics. Students graduating from the CNS program are qualified to sit for the CCNA certification from Cisco Systems®. In addition, the CNS student is able go inside these devices and understand, on a fundamental component level, the operation of network hardware. This gives the CNS student a unique perspective of the design, installation, and operation of computer network systems. Because of the classes taken by CNS students, several have obtained both a BS CNS and a BS EEET in 5 years.

The CNS program began in 1996 with 17 students. Since its inception, the direction of the program has been influenced by its students, graduates, its graduates' employers, and the CNS industrial advisory committee. The robustness of the curriculum, the quality of the education that our students receive, the technical merit and relevance of the course material, and the preparation of our students for meaningful employment is evaluated by our students, graduates, employers, and advisory committee on a regular basis. The value of the program to the students is indicated by the near 100% placement for our graduates. The program makes every effort to convey this information to prospective students, employers, and advisory committee members.

Program Mission

- *The FSU mission statement*

  Ferris State University prepares students for successful careers, responsible citizenship, and lifelong learning. Through its many partnerships and its career-oriented, broad-based education, Ferris serves our rapidly changing global economy and society.

- *The College of Engineering Technology mission statement*

  Our mission is to prepare graduates who have met the high academic standards of our programs for current and future industrial and business needs of the state, the nation and the global market. That is why we want to help you Imagine More in your career choices, so plan on visiting us. If there is a specific program you are interested in please request to meet with the program leaders while here and start making the most of your career path today.

- *The EET/CNS Department mission statement*

  The mission of the EET/CNS department is to provide our students with the necessary instruction and guidance so that they become knowledgeable and skilled in the areas of automation, embedded systems, computer networks, and electronics. The EET/CNS programs will prepare the student to obtain meaningful employment now and in the future, provide the student the tools to continue learning as the knowledge base changes, and to equip the student to be productive, ethical, and to encourage the students to assume leadership roles.

- *The CNS Program mission statement*

  The mission of the CNS program is to provide our students with the necessary instruction and guidance so that they become knowledgeable and skilled in the areas of computer networks and systems. The CNS program will prepare the student to obtain meaningful employment now and in the future, provide the student the tools to continue learning as the knowledge base changes, and to equip the student to be productive, ethical, and to encourage the students to assume leadership roles.

- *Incorporating the CNS Program mission statement*

  The mission of the department, college, and the university are echoed in the mission of the CNS program. First, through the emphasis on current and future technologies, the student will find and grow in a successful career. Second, through interaction with fellow students and external interactions, the student is exposed to leadership and the accompanying responsibilities. Third, the examination of changing technologies helps the student realize the necessity to maintain lifelong learning in a highly technical field.

  The mission of the program to provide the student with an education that meets current and future needs is critical for a highly technical program such as CNS. The knowledge base is constantly changing and it is absolutely mandatory that the program and the program curriculum be kept current and relative. This aspect of the mission statement affects every

decision that is made concerning courses offered, materials covered, and the direction of future curricula modifications.

The mission of the program is communicated to our stakeholders through regular meetings with our industrial advisory committee. This committee includes industry leaders and employers of our graduates. Our students are a second group of stakeholders which are reminded on a continuing basis of the mission of the CNS program.

The mission of the program is evaluated by the employability of our graduates, the success of the graduates in their chosen occupations, and by feedback from our graduates and employers. The program maintains communications with graduates and employers to constantly monitor the mission of the program.

The program furthers the mission of the department, college, and university by producing graduates that are highly employable, have the ability to become leaders, understand the necessity to maintain lifelong learning, and contribute to their company and community.

Program Goals

The goals of the CNS program are to provide comprehensive instruction so that our students become knowledgeable, skilled and responsible employees in the areas of automation, computer-based systems, networks or electronics where employment is a realistic probability both now and in the future.

The goals of the CNS program include:

1. Employment in a discipline appropriate for the technical degree.
2. Achieve recognition as a valued employee through varied forms of promotion and merit.
3. Demonstrate a high standard of ethical and social values.
4. Ability and desire to continue education through varied means including advanced degrees.

In addition to visibility by prospective students, the CNS program has attained substantial attention by entities that benefit from the graduates of the program. Prospective employers seek out FSU's CNS graduates because of their reputation for having solid fundamentals and track record. This is reflected in both graduate hiring, as well as internship opportunities. With statistics of nearly 100% graduate placement, the program's outside influences go beyond hiring. The department also has hosted many different companies in "Connect with Industry" colloquial conferences on an ongoing basis for the benefit of the program's current student body. Many of these companies request campus visits for such meetings.

The CNS program has industry advisors which comprise an advisory committee that assists in directing the program's curriculum and outcomes. The input from the advisory committee is a great asset, as it allows the programs to adapt to changing conditions in industry, technology and the graduate environment. Advisors on the committee are all volunteers from area industries, many of which are strong supporters of the programs and employers of CNS graduates. The continued support of the advisory committee is a clear indication of the strengths, value and visibility of the CNS programs. A complete list of CNS advisory committee members and their respective companies is listed in the appendix.

The CNS program is not only unique in the state of Michigan, but is amongst a handful in the entire United States. The CNS program is unique because it is not only strong in networking fundamentals from a software perspective, but also buttresses the software foundation with a strong mix of hardware in the curriculum. This amalgam of hardware and software fundamentals has garnered the attention of many diverse employers, from insurance companies to intelligence agencies of the United States Government. Indeed, with the emphasis on homeland security in the last seven years, CNS students and graduates have benefited from a heightened visibility in this crucial area of national importance.

Strategic Plan

The CNS program strategic plan consists of short-term plans and long-term plans. The basics of these plans are as follows:

Strategic Plan – Short-Term

1. Investigate and evaluate current trends in the network environment.
2. Determine the quality of the current employment opportunities for graduates.
3. Insure that graduates are prepared to enter the current job market.
4. Adjust the course content to reflect environment and market conditions.

Strategic Plan – Long-Term

1. Project the technological trends in the network environment for the next 5 years.
2. Determine the stability of employment opportunities for graduates for the next 5 years.
3. Consider long-term projections of the technologies and the network environment.
4. Adjust the course structure to reflect projections and market technologies.
5. Work with other programs, departments, and colleges in the University to provide educational diversity to students in the CNS program and other students in other programs.

The CNS strategic plans are evaluated on a continuous basis through department meetings and faculty discussions. The fundamentals of the plans are reviewed and discussed during our annual Industry Advisory Committee meetings.

The success of the CNS program and our strategic plans are measured by the success of our students to obtain employment in the computer network industry. In addition, we follow up on the success of our graduates after a number of years of employment.

We receive feedback from our graduates and follow their success in the CNS field. This is one of the key methods of evaluating the appropriateness of the CNS curriculum. Graduates indicate to us the value that they perceive of the courses and curriculum in the CNS program.

Curriculum

The CNS curriculum program check sheet is attached in the appendix of this report. In addition to the standard mathematics, physics, English and general education courses, the curriculum contains electronics courses from the BS EET program and BS CNS program specific courses. There are ten (10) CNS specific courses as follows:

ECNS-115 – Networks 1
ECNS-125 – Networks 2
ECNS-215 – Networks 3
ECNS-225 – Networks 4
ECNS-311 – High Level Programming
ECNS-315 – Network Theory and Test
ECNS-323 – Real Time Operating Systems
ECNS-414 – Advanced Digital Systems
ECNS-424 – Advanced Digital Design
ECNS-425 – Network Security

The syllabi for these courses are included in the appendix at the end of this report.

Quality, Consistency and Currency – As with every technical discipline, the quality, consistency and currency of all courses are paramount. CNS has a distinct advantage of being associated with Cisco Systems® Inc. and the Cisco CCNA online curriculum. This curriculum is maintained and updated by the global technical leader in network systems and equipment. This ensures that our students are exposed to the most current technology and techniques. In addition, the faculty maintain currency by attending conferences and researching technical publications.

Experiential Education – Each student in the CNS program is required to take EEET-393, Internship. This experiential learning is critical to the education of the students in this program. Each student must apply and be accepted to summer employment which he or she has located. This internship must be 400 hours long and must be in the field of study of the student. The internship course requires bi-weekly status reports, supervisor evaluation, and a final report by the student covering all aspects of the internship employment. This course gives the student the opportunity to apply for a position, be interviewed, hired, and then make a contribution to their employer.

Program Requirements – The program requirements are available to the student in the program check sheet, through discussions in class, and in consultation with the program advisor. Each student is assigned a faculty advisor who reviews the student's progress every semester before registration.

Implemented Curricular Changes – There have been several curricular changes in the previous five (5) years.

1. The total number of credits for the BS CNS degree was reduced from 132 credits to 127 credits.

2. The credit hours of the capstone course, ECNS-315, was increased from 3 to 4 (2 Lecture, 2 Lab to 3 Lecture, 3 Lab). This increase was in the lab portion of the course to permit extended hands-on experience for the CNS students.

3. Because of the technological nature of the CNS program and workplace environment, it is critical to constantly update the course materials and emphasis.

4. The security course, ECNS-425, has been modified to include a lab component.

Proposed Curricular Changes – The department has been discussing the addition of some additional courses to the CNS program. These considerations are driven by the state of the technology and the demands of the employers and users. There are ongoing discussions about adding other network courses and perhaps a Linux course to the curriculum.

Policy and Procedures – All curricular considerations are driven by feedback from graduates, employers, our advisory committee and faculty evaluations. Each year, we discuss the curriculum with current students and recent graduates. Employers of current students provide feedback on the relevance of the CNS program and the preparedness of the CNS graduates that they hire. Once a year, the faculty meets with the advisory committee which consists of leaders in the computer networks industry. The curriculum is also evaluated each year at the EET/CNS faculty retreat.

Assessment of Student Learning

ASSESSMENT AND EVALUATION

Because the CNS program uses courses that are provided through the Cisco Networking Academy, assessment used by Cisco is used in CNS.

The Cisco Networking Academy Program is a comprehensive e-learning program that provides students with the Internet technology skills essential in a global economy. The Networking Academy delivers web-based content, online assessment, student performance tracking, hands-on labs, instructor training and support, and preparation for industry standard certifications.

The Networking Academy program continually raises the bar on e-learning and educational processes. Through community feedback and electronic assessment, the Academy program adapts curriculum to improve outcomes and student achievement. The Academy infrastructure is designed to deliver a rich, interactive, and personalized curriculum to students around the world. The Internet has the power to change the way people learn, work, and play, and the Cisco Networking Academy Program is in the forefront of this transformation.

Following are the program educational objectives and program outcomes for the CNS program.

Program Educational Objectives

Goals of the CNS Program's graduates include:

1. Employment in a discipline appropriate to the degree.
2. Achieve recognition as a valued employee through varied forms of promotion or merit.
3. Demonstrate high standard of ethical and social values.
4. Ability and desire to continue education through varied means including advanced degrees.

Objective	Frequency	Evaluation
1. Employment in a discipline appropriate to the degree.	Annual	Graduate Exit Survey Alumni Survey Advisor Committee Input Academic Program Review
2. Achieve recognition as a valued employee through varied forms of promotion or merit.	Annual	Alumni Survey Advisor Committee Input
3. Demonstrate high standard of ethical and social values.	Annual	Alumni Survey Advisor Committee Input
4. Ability and desire to continue education through varied means including advanced degrees.	Annual	Alumni Survey Advisor Committee Input

Program Outcomes

Each program student will demonstrate before graduation:

a) An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.
b) An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology.
c) An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.
d) An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.
e) An ability to function effectively on teams,
f) An ability to identify, analyze and solve technical problems.
g) An ability to communicate effectively.
h) Recognition of the need for, and an ability to engage in lifelong learning.
i) An ability to understand professional, ethical and social responsibilities.
j) A respect for diversity and knowledge of contemporary professional, societal and global issues.
k) A commitment to quality, timeliness, and continuous improvement.
l) The application of circuit analysis and design, computer programming, associated software, analog and digital electronics, microcomputers to the building, testing, operation, and maintenance of electrical and computer systems.
m) The applications of physics to electrical and computer circuits in a rigorous mathematical environment at or above the level of algebra or trigonometry.
n) The ability to analyze, design, and implement control systems, instrumentation systems, communication systems, computer systems, or power systems.
o) The ability to apply project management techniques to systems.
p) The ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations is support of electrical and computer systems.

Courses have been selected to measure students' knowledge and skills in the above areas as part of the evaluation process.

Although the CNS program is not ABET accredited, the above outcomes are based upon the ABET accreditation criteria.

Program Profile

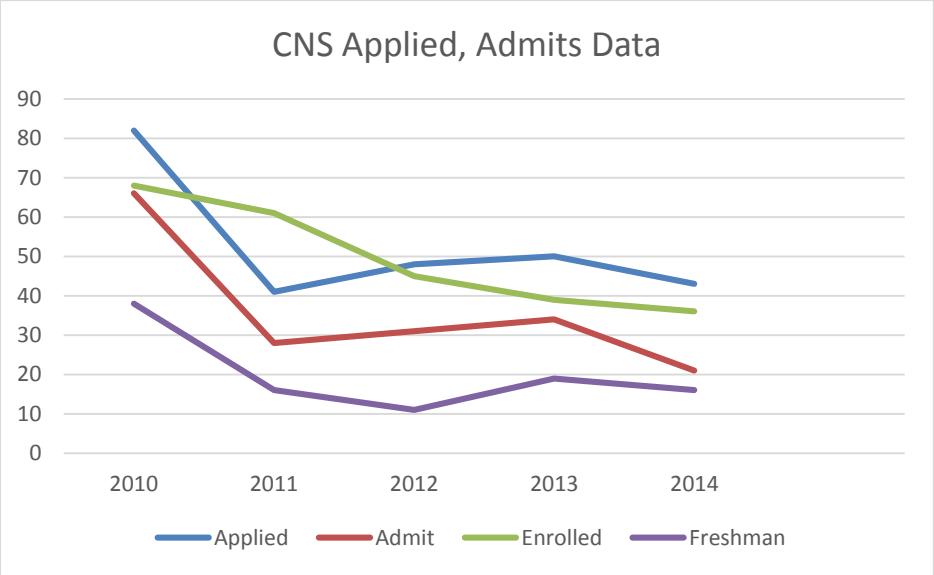
The following data is collected by Institutional Research and provided for this report by Ferris State University.

Applied and Admits

The following data shows the Applied, Admitted, Enrolled and freshman for the past 5 years:

Applied, Admits, Enrolled
CNS

Year	Applied	Admit	Enrolled	Freshman
2010	82	66	68	38
2011	41	28	61	16
2012	48	31	45	11
2013	50	34	39	19
2014	43	21	36	16



It is obvious from the above data that the trend in enrollment is a downward one. There are many factors that affect enrollment but there are two main influences that the department has been able to identify.

1. Competition – Unfortunately, the College of Business has chosen to offer a program that seems to be directly competitive with the hardware aspects of our CNS program. In addition, we have had reports that when students contact the University and ask about computer programs, they are directed to the COB and to the CIS/CIT programs and not to the CNS program. We have been working with the admissions department to better inform them about the CNS program and the differences between the CNS and CIS/CIT programs.

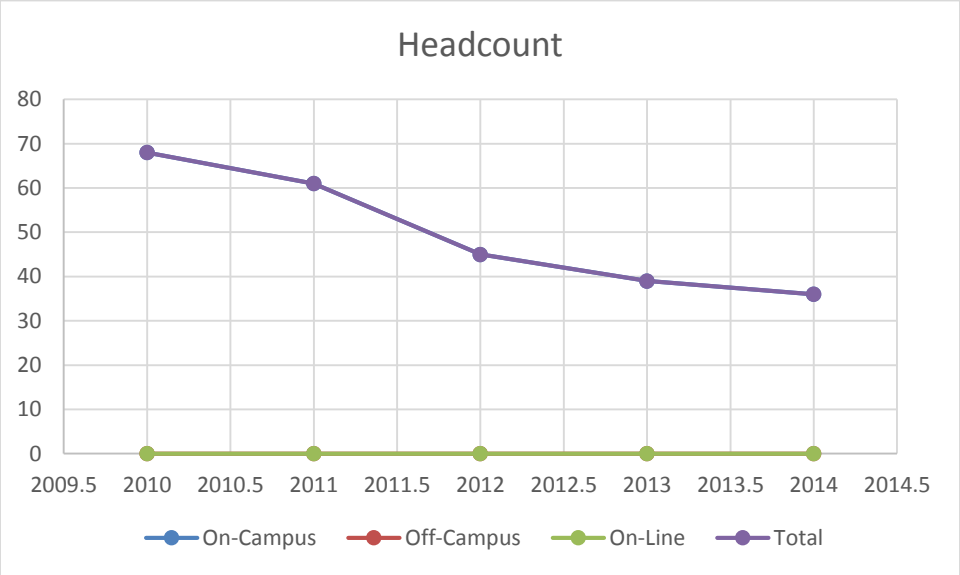
2. Recruitment – The department has not been doing enough to reach out to prospective students and this has affected the enrollment numbers. We need to do a much better job of recruiting new students to the program.

Enrolled

The following data shows the enrollment for the CNS program for the past five years:

Enrollment

Year	On-Campus	Off-Campus	On-Line	Total
2010	68	0	0	68
2011	61	0	0	61
2012	45	0	0	45
2013	39	0	0	39
2014	36	0	0	36



3. Capacity – The actual capacity of the program depends upon several factors. This is especially true for the CNS program because the CNS student also takes courses in the IET/EET program. As a result, student enrollment will affect capacity in the IET/EET program as well as in the CNS program. We can look at the capacity of the CNS program in a simple case if we look at the basic CNS courses and assume that each course has two fully populated lab sections. From this we can determine the number of students in the program and the required faculty load. The following table makes these assumptions to determine the total number of students for the program:

Theoretical Capacity

Fall 2014		student	lecture	lab	Lab	Lab		Load	Load
course	number	credits	hours	hours	Cap	Sections	Students	Cr-Hrs	Ctc-Hrs
ECNS	115	3	2	3	16	2	32	4	8
ECNS	215	3	2	2	16	2	32	4	6
ECNS	311	4	2	2	12	2	24	4	6
ECNS	315	4	3	3	15	2	15	5	9
ECNS	414	4	3	3	12	2	24	5	9
						Total	127	22	38
							FTEF	1.83	2.11

This table indicates that with two lab sections per course, the theoretical student capacity would be 112 students. However, this requires an FTEF of 1.61 when considering contact hours. This is only a rough approximation, but the actual situation would be worse because the ECNS-311 course is taken by both CNS and EET students. As a result, the actual load would be larger than shown above. Currently, there is only one faculty member dedicated to the CNS department and the above enrollment number represents an overload condition.

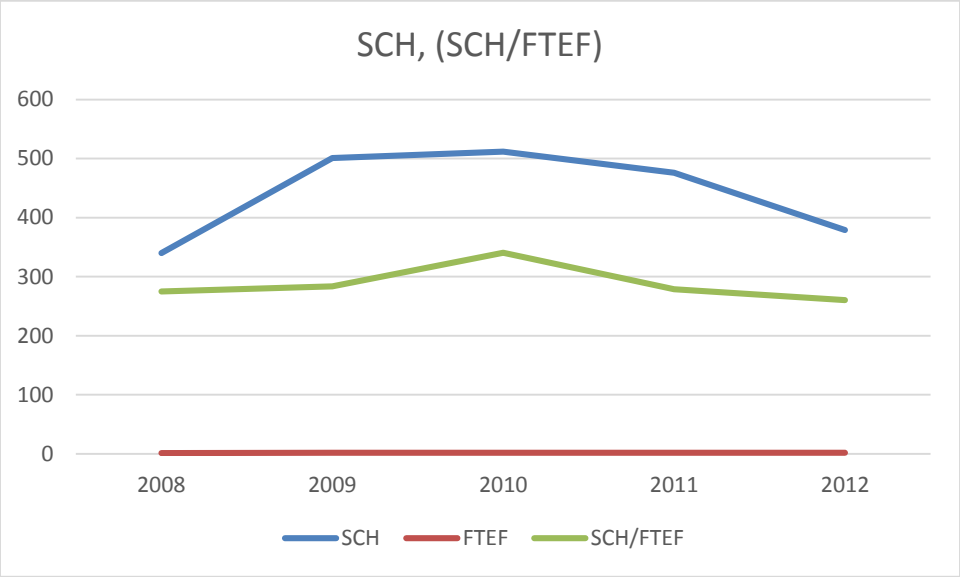
Obviously, the current enrollment of 36 falls far short of the theoretical value of 112. Even if we reduce the theoretical number to the value that lets the FTEF be 1, the current enrollment is below that value.

These numbers indicate the recruitment of students must be the first priority of the department. We are currently in the process of hiring a replacement for Professor Keith Jewett. This new faculty member will be part of the effort to increase the visibility of the program and to see the enrollment numbers return to the desired levels.

SCH, FTEF, (SCH/FTEF)

The following data shows the SCH, FTEF and (SCH/FTEF) for 5 years for the CNS program:

Year	SCH	FTEF	SCH/FTEF
2008	340	1.24	275.08
2009	501	1.77	283.32
2010	512	1.5	340.39
2011	476	1.71	278.62
2012	379	1.46	260.07



Both SCH and SCH/FTEF are directly related to the student enrollment. Of course, SCH is directly related to enrollment because the higher the enrollment, the higher the SCH. Productivity (SCH/FTEF) is related to enrollment but not as directly as SCH. Productivity relates to enrollment through the size and capacity of the lab sections associated with the course being taught. A lecture only class that has a cap of 32 will be most productive when the class is filled to the lecture capacity of 32. Because the CNS courses all have lab sections associated with them, the lab capacities alter the effect of the linear nature of the productivity seen in the lecture only classes. A class with a lab section capacity of 16 will be most productive when the enrollment is either 16 or 32, resulting in full lab sections. An enrollment of 17 in a class means that a second lab section must be opened and the productivity will actually drop by the addition of the 17th student. So while the lab section caps complicate the productivity calculation, it is desirable to have more students enrolled if the number is approaching a multiple of the lab section cap size.

It is still fundamental for the CNS program that the enrollment be increased to generate more SCHs and also productivity. The typical productivity average for the CET is usually stated to be in the area of 350. An increase in enrollment will bring the CNS program more in line with this average.

Residency, Age, FSU GPA, ACT

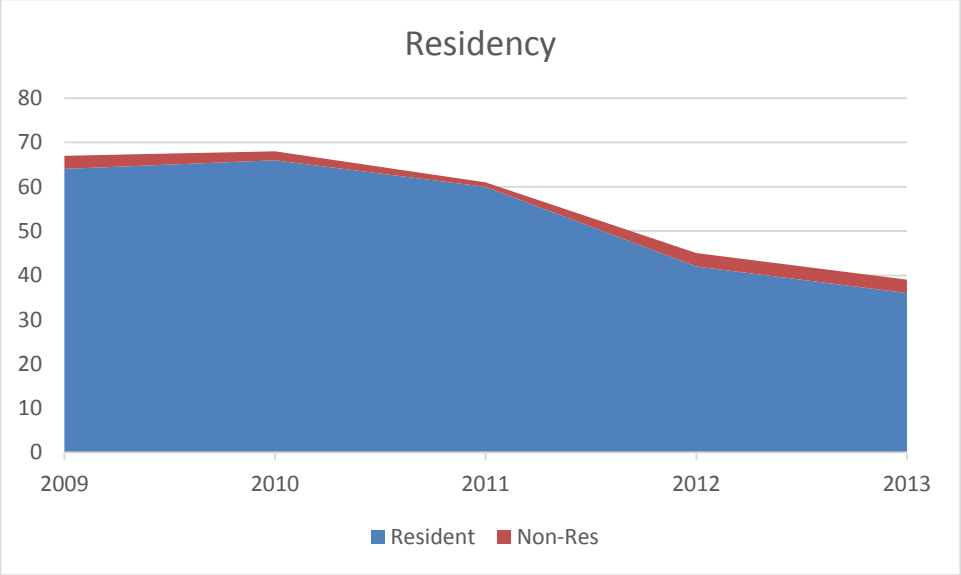
The following data shows the residency, average age, average FSU GPA and average ACT for the students in the CNS program. There are two sets of data for these categories. The first set of data is for Pre-CNS students. These are students that will be enrolled in the CNS program after they complete some missing item in their admittance data. For example, the most common case is for a student that cannot enter MATH-116 in the first semester. Usually this student will take MATH-110 in the first semester and then take MATH-116 in the second semester.

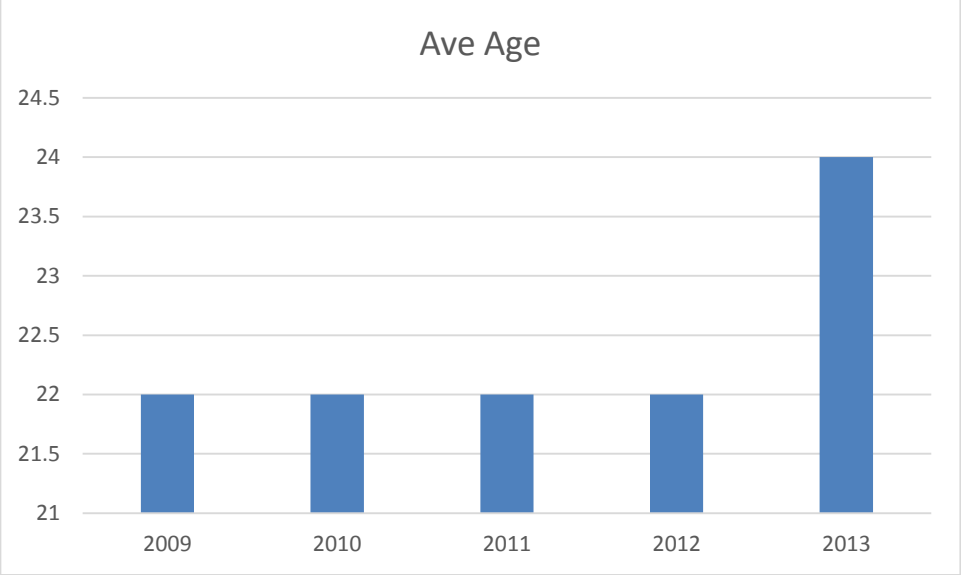
Pre-CNS Residency, Age, FSU GPA, ACT

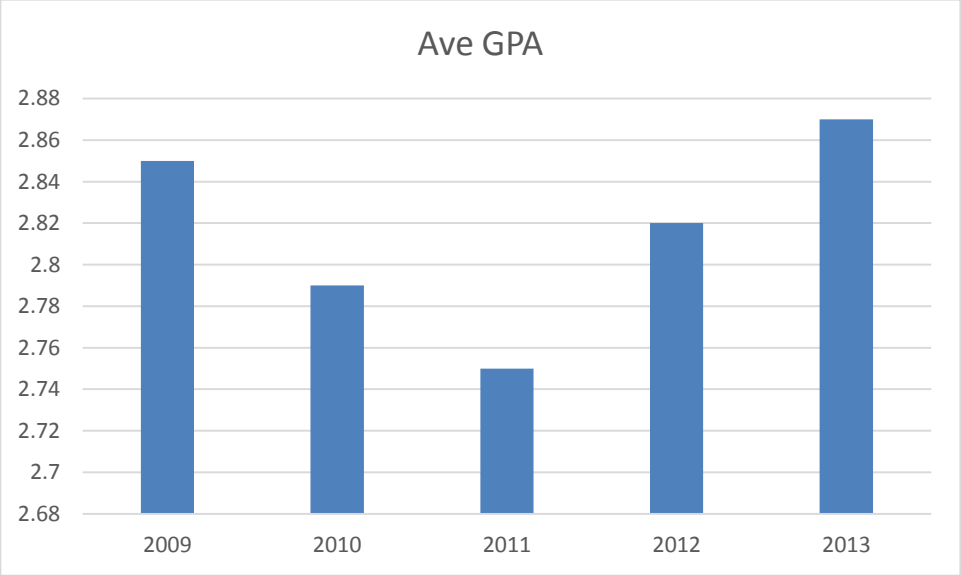
Year	Resident	Mid-West	Non-Res	Ave Age	Ave GPA	Ave ACT
2009	5	0	0	19	2.44	19
2010	3	0	0	18	0	17.67
2011	4	0	1	20	0	19.5
2012	3	1	1	20	2.67	19.75
2013	3	0	0	20	1.98	23.33

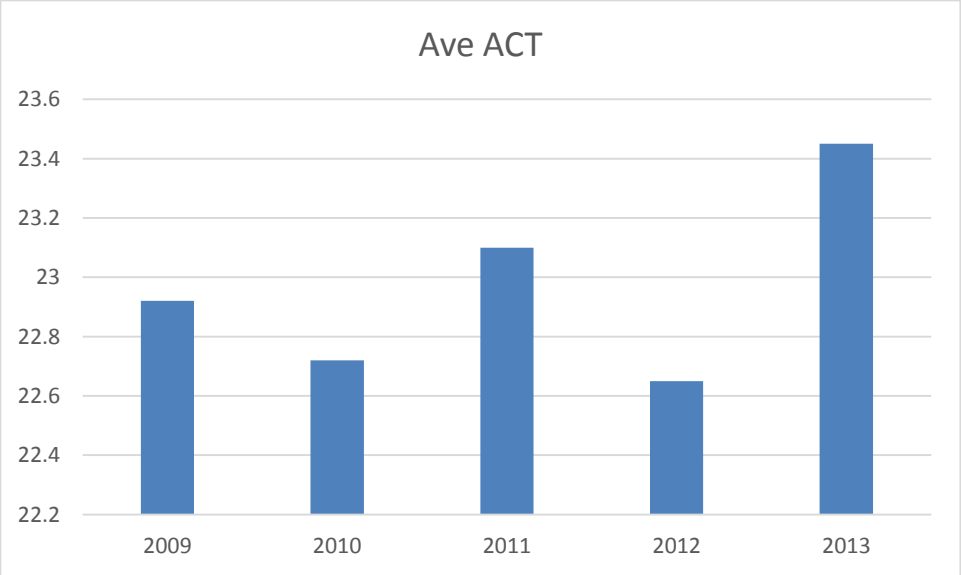
CNS Residency, Age, FSU GPA, ACT

Year	Resident	Mid-West	Non-Res	Ave Age	Ave GPA	Ave ACT
2009	64	0	3	22	2.85	22.92
2010	66	0	2	22	2.79	22.72
2011	60	0	1	22	2.75	23.1
2012	42	0	3	22	2.82	22.65
2013	36	0	3	24	2.87	23.45




Ave Age
24.5
24
23.5
23
22.5
22
21.5
21
2009
2010
2011
2012
2013


Ave GPA
2.88
2.86
2.84
2.82
2.8
2.78
2.76
2.74
2.72
2.7
2.68
2009
2010
2011
2012
2013


Ave ACT
23.6
23.4
23.2
23
22.8
22.6
22.4
22.2
2009
2010
2011
2012
2013

The enrollment residency data indicates that almost all of the CNS students are Michigan residents. This reflects the “word of mouth” nature of the promotion of the CNS program at the present time. The plan to increase the visibility of the program will include efforts to extend the pool of prospective students to those outside of the Michigan area.

Sex and Ethnicity

The following data shows the breakdown of the CNS enrollment by sex and by ethnicity.

CNS Enrollment by Sex

Year	Enrolled	Male	Female
2009	67	67	0
2010	68	67	1
2011	61	60	1
2012	45	44	1
2013	39	38	1

CNS Enrollment by Ethnicity

Year	Unknown	Black	Hispanic	Native	Asian	White	Hawaiian	Multi	Foreign
2009	3	4	1	0	0	56	0	0	3
2010	3	3	1	0	0	57	0	2	2
2011	3	2	1	0	0	53	0	1	1
2012	1	1	2	0	0	38	0	1	2
2013	2	0	1	0	0	32	0	1	3

The lack of female students is unfortunately typical of technical fields. This is doubly unfortunate since female graduates in the CNS program are in high demand. The female graduates from our program have had great success in obtaining excellent jobs and have outstanding careers. The difficulty in recruiting female students for the CNS program, and for technical programs in general, is that they are “discouraged” from seeking technical degrees very early in their education. Those females that do pursue a technical education are highly motivated and very talented.

To some extent, the same situation occurs when considering the ethnic diversity of the CNS and other technical programs. The CNS program provides a welcoming environment for a diverse student population.

Retention and Graduation Rates

The following data indicates the retention rates, graduation rates and graduation numbers for the CNS program:

CNS Retention Rates (%)

Year	% Still Enr
2008	67
2009	56
2010	73
2011	40
2012	56

CNS Graduation Rates (%)

Year	Year 4	Year 5	Year 6	Year 7
2003	3	29	52	61
2004	6	25	44	44
2005	0	38	54	62
2006	0	31	38	38
2007	9	36	36	36
2008	0	33	50	
2009	0	11		
2010	9			

CNS Degrees Awarded

Year	On-Campus	Off-Campus	On-Line	Total
2008	13	0	0	13
2009	11	0	0	11
2010	9	0	0	9
2011	11	0	0	11
2012	9	0	0	9

CNS Six Year Graduation (%)

Year	Year 7	Persisters
2003	68	
2004	44	
2005	62	
2006	54	
2007	36	

Retention and Graduation Rates – The retention and graduation rates of the CNS program are a reflection of the rigor of the program. Some students enter the program

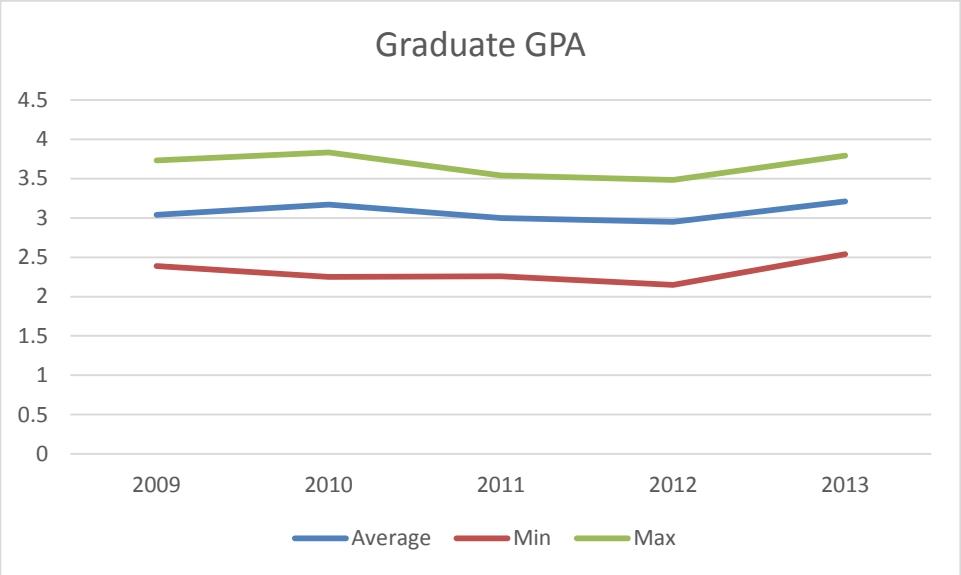
because they “like computers” or enjoy playing video games and are not prepared for the level of effort and study required for a very technical discipline. Those students that are prepared and exhibit a desire and dedication to learn the subject are invariably successful in the program. In addition, because the CNS students take many of the same classes that the EET students take, it is possible to earn a BS CNS and a BS EEET in 5 years of study. This results in several students requiring 5 or 6 years to complete the CNS degree.

Graduate Average GPA and ACT

The following data shows the average GPA and average ACT scores for graduates of the CNS program:

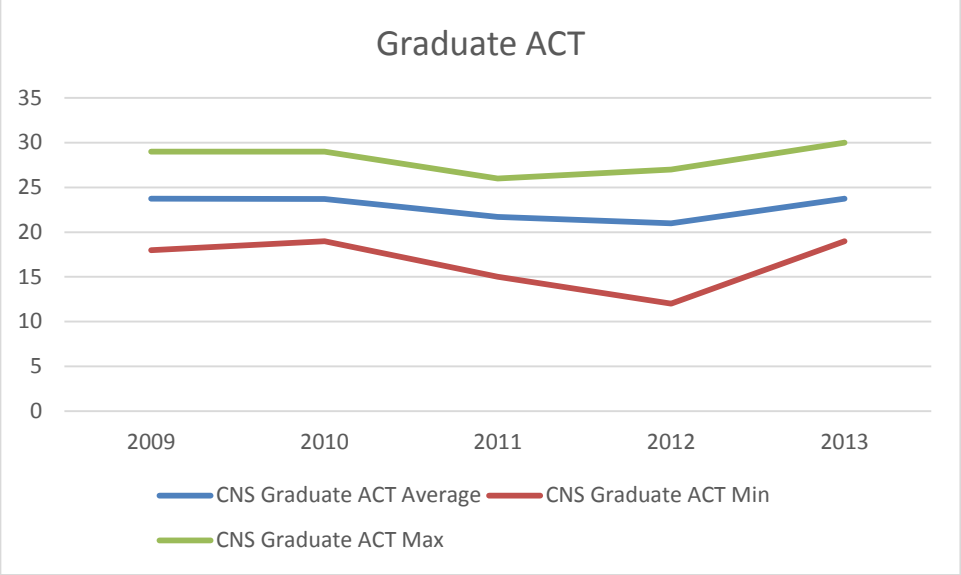
CNS Graduate GPA

Year	Average	Min	Max
2009	3.04	2.39	3.73
2010	3.17	2.25	3.83
2011	3	2.26	3.54
2012	2.95	2.15	3.48
2013	3.21	2.54	3.79



CNS Graduate ACT

Year	Average	Min	Max
2009	23.75	18	29
2010	23.7	19	29
2011	21.71	15	26
2012	21	12	27
2013	23.75	19	30



As can be seen from the above data, the graduate GPA and ACT values are fairly constant for the CNS program with a general increase in the 2013/2014 semester. The important factor for the student is that the ACT scores of the students are compatible with the probability of student success in the CNS program. While we always strive to increase the standards of students entering the CNS program, the current levels seem to be indicative of success for the students.

State and National Examinations

For the CNS graduate and for the Network Engineering Professional, there are several national examinations and certifications that are applicable. For our students, the most important examination and certification is the Cisco Systems® CCNA certification. This certification is highly respected and difficult to obtain. The first four courses in the CNS curriculum (ECNS-115, ECNS-125, ECNS-215 and ECNS-225) prepare the student to sit for this exam. In fact, these four courses, which have on-line modules created by Cisco Systems®, are specifically designed to prepare the student for this exam. It is not required for the CNS graduate to pass this exam as a condition of graduation; however, it is strongly recommended by the faculty that CNS students sit for this exam. Very rarely does anyone that takes the CCNA exam pass it on the first try. Usually, it takes 2 or 3 attempts to pass this exam and obtain the CCNA certification. Our students find about the same situation when they take the exam and, as a result, compare favorably with the national averages.

Program Value beyond Productivity and Enrollment Numbers

Assessing the value of the CNS program can be qualified with the following perspectives:

- Value to Ferris State University.
- Value with respect to employers of our graduates.
- Value to students in this program.

The quantification of value to the mission of Ferris State University in the area of CNS is evident in several facets. The programs have received grants from the National Science Foundation (NSF) in the recent past. In addition to the NSF grants, several faculty members have received FSU's Exceptional Merit Grants as well as Timme Funding for conference travel.

The application and funding of the respective grants has allowed the faculty in the CNS program to develop and improve teaching methods, and enabled purchase of new equipment for studies. The ongoing building of this type of value in the programs is indicative of a "continuous improvement" methodology.

Advisory committee members are voluntary positions which also are indicators of the program's value. The industry advisors are consigned to help direct the programs and their respective outcomes over the long term. The value of the CNS program and its visibility can be indirectly measured by the quality of the program's graduates which also feeds the advisory committee's commitment to assure the continued success of the program.

Due to the very high placement rates of the CNS graduates, industry representatives have vied to gain visibility with our graduates. This has been leveraged through the "Connect with Industry" meetings that are held in the CNS department. Each year a variety of industry representatives have held meetings to familiarize students with their respective industry and applications of real-world engineering projects. These meetings also present an opportunity for students to interface with industry representatives, a window outside the FSU Job Fair for networking and answering questions. The value of the programs is evident by resources and commitment of these outside firms to our students.

Program Flexibility and Access

Offsite Locations - Because of the nature of the CNS courses and the lab equipment necessary to provide the student with a comprehensive education, the department has concentrated on providing the CNS curriculum only at the Big Rapids campus. It would be extremely expensive to offer this program at another location because the cost of the lab equipment would be in the $500K to $1M range.

On-Line – It is not feasible to offer this program in a fully on-line manner because of the extensive “hands on” component in the lab portion of the courses. Because of the course modules provided by Cisco Systems®, it is possible to provide the students with much of the material covered in lectures in an on-line format.

Flexibility and Access – The fundamental flexibility and access for the CNS courses relate mainly to the lab periods. Formally, a CNS course will have one or two lab sessions a week with each lab session lasting 2 hours. Actually, a typical student will spend a great deal more time in the lab to be able to master the necessary concepts. Students are able to access labs in off hours and in the evenings as fits their schedules during the semester. There are no plans at the present to offer the CNS program at other locations or times.

Visibility and Distinctiveness

In addition to visibility by prospective students, the CNS program has attained substantial attention by entities that benefit from the graduates of the program. Prospective employers seek out FSU's CNS graduates because of their reputation for having solid fundamentals and track record. This is reflected in both graduate hiring, as well as internship opportunities. With statistics of nearly 100% graduate placement, the program's outside influences go beyond hiring. The department also has hosted ten different companies in "Connect with Industry" colloquial conferences on an ongoing basis in the department for the benefit of the program's current student body. Many of these companies request campus visits for such meetings.

The CNS program has industry advisors which comprise an advisory committee that assists in directing the program's curriculum and outcomes. The input from the advisory committee is a great asset, as it allows the programs to adapt to changing conditions in industry, technology and the graduate environment. Advisors on the committee are all volunteers from area industries, many of which are strong supporters of the programs and employers of CNS graduates. The continued support of the advisory committee is a clear indication of the strengths, value and visibility of the CNS programs. A complete list of CNS advisory committee members and their respective companies is attached in the appendix of this report.

The CNS program is not only unique in the state of Michigan, but is amongst a handful in the entire United States. The CNS program is unique because it is not only strong in networking fundamentals from a software perspective, but also buttresses the software foundation with a strong mix of hardware in the curriculum. This amalgam of hardware and software fundamentals has garnered the attention of many diverse employers, from insurance companies to intelligence agencies of the United States Government. Indeed, with the emphasis on homeland security in the last seven years, CNS students and graduates have benefited from a heightened visibility in this crucial area of national importance.

The challenge for the CNS program is to become more widely known. The program has the potential to become a preeminent program in the United States because of the scope of the material in the curriculum and the employability of its graduates.

Demand

The CNS program's relevance is attributed to several key factors that can be summarized as follows:

- Addressing the needs of industry for a specific skill set.
- Addressing the needs of other FSU programs by providing appropriate curriculum.
- Responding to changes in technology by producing productive graduates.

The CNS program's relevance can be acknowledged by the following observations:

- CNS graduates enjoy a nearly 100% placement rate.
- Industry leaders ask the CNS department for lecture time in "Connect the Industry" meetings held in the department.
- Specific CNS scholarships have been endowed by industry.
- Donations by industry to the department to improve instruction.
- Continued interest and input by the CNS Advisory Committee volunteers.

Industry has sought out the graduates of FSU's CNS program because of our unique blend of theory and hands-on emphasis in the laboratory. The very nature of the technology used in electronics and computer networks belies the need to adjust the curriculum to the ever changing horizon. The CNS program leverages the knowledge and experience of the Advisory Committee for direction in curriculum. This leverage and feedback as well as the openness for change by the faculty are key factors in keeping the programs relevant to industry on an ongoing basis.

Part of the faculty load in the CNS program is directed toward students outside the CNS program. This supporting role not only reinforces the relevance of the type of instruction necessary for graduates of other programs, but also highlights the importance of electronics and computer networks in the everyday lives of people today. It goes without saying that everything from automobiles to heating, ventilation and cooling systems would cease to function, if it were not for electronics and Computer Networks and Systems.

The graduates of the CNS program are highly recruited and receive almost a 100% placement rate upon graduation. This type of recruiting pressure is evident during the FSU job fair, as well as direct inquiries into the department for our graduates. Many companies vie for time in the department to meet prospective future employees. These include "Connect with Industry" meetings held on an ongoing basis, or even visits to CNS laboratories to give students a perspective in "real world" applications. All of the students in the CNS program are required to complete an internship before graduation, which also acts as an interface to industry for our students.

The continued diffusion of CNS graduates in industry, coupled with the increased interest in graduates of this program has provided fertile ground for targeted scholarships. Scholarships are offered to CNS students to enhance their academic experience.

The CNS program receives input from the CNS Advisory Committee, which is a volunteer driven entity. It should be noted that many of the Advisory Committee members have little

turnover or attrition, despite its voluntary nature. The members of this committee represent important industry representatives which provide input to the curriculum and direction for the programs. The relevance of the CNS program is evident by importance placed upon it by these respective industrial representatives. A complete list of CNS Advisory Committee members and their respective companies is given in the appendix. An abbreviated list of companies is listed below:

- Allstate Insurance
- Aon Corporation
- Dow Corning Corporation
- Cisco Systems Corporation
- National Instruments

Student Achievement

Student participation takes several forms for the CNS program. The following are some of the extracurricular activities in which CNS students have taken part:

IEEE (Institute of Electrical and Electronic Engineers) – IEEE is an international organization of engineers in electrical and computing engineering. The Ferris chapter has the following CNS students as chapter officers:

President – Craig Watz
Vice President – Brandon Scott
Secretary – Scott Wehrle
Treasurer – Cody Clark
Community Representative – Zach Hill

National Collegiate Cyber Defense Competition – This is a national event sponsored by the Department of Homeland Security, Raytheon Corporation, Boeing Corporation, Microsoft and other corporations. This competition pits students from universities around the nation in network security explorations.

IEEEXtreme 24-Hour Programming Competition - IEEEXtreme is a global challenge in which teams of IEEE Student members, supported by an IEEE Student Branch, advised and proctored by an IEEE member, compete in a 24-hour time span against each other to solve a set of programming problems.

GrrCon (Information Security Summit & Hacking Conference) – GrrCon is an information security and hacking conference put together to provide the community with a venue to come together and share ideas, information, solutions, forge relationships, and engage with like-minded people. An alumni of the CNS program was a presenter at this conference.

The Big Event - The Ferris sponsored event to serve the Big Rapids community.

The CNS program has not kept records of the number of students or the time spent by students in these activities. The program does make a specific effort to keep all students informed about these activities and supports students that want to undertake new activities and experiences.

Employability of Graduates

The CNS graduate employability is attributed to several key factors that can be summarized in the following table which comes from a graduate survey submitted by graduates at the spring senior project presentations:

	Seeking	Employment	7
Not	Received	Offer	0
Received	One	Offer	1
Received	2 - 4	Offers	7
Received	5 or More	Offers	2
Accepted	Position	In Major	5
Accepted	Position	Out of Major	2
Not	Seeking	Employment	2
In	Graduate	Program	1
	Entering	Military	1
		Other	4

In addition, this same survey reported an average starting salary of $51, 053 for CNS graduates. The above data is based upon a survey of 29 graduates.

Institutional Research reported the following information from a survey of 12 graduates:

Average Starting Salary - $48,333

Average Current Salary - $72,917

There is a continued interest by employers for graduates of the CNS program. Typically, we have requests from employers for more positions than we have graduates. In most cases the graduate looks for a position that reflects their interests and abilities. That the graduate has this choice can be seen from the above survey which indicated that 9 graduates had reported having multiple job offers.

The program meets with the Advisory Committee each year to examine the perception of the CNS program in industry and to evaluate the preparedness and abilities of CNS graduates. The advisory committee consistently rates the CNS graduates as highly prepared for network engineering jobs. This is verified by the number of Advisory Committee companies that hire CNS graduates.

Faculty Composition and Engagement

The full time CNS faculty consists of two positions.

Full Time Position 1 - The first position was filled by Professor Keith Jewett. Professor Jewett has retired from teaching at the end of the spring 2014 semester. His information is included in this report because he was the prime instructor for the CNS program for the past 5 years. The department is in the process of hiring a replacement for Professor Jewett.

Full Time Position 2 - The second full time position is an open position that has not been filled for the past three years. Prior to that, this position was filled by Luis Costa who was in the tenure track position but was not asked to continue.

Part Time Faculty - There are three other faculty that teach some classes for the program. Associate Professor Robert Most and Professor Ronald Mehringer are in the EET program. Associate Professor Most teaches two courses (ECNS-414 and ECN-424) in the CNS program. Professor Mehringer teaches courses in the CNS program as required to cover load in the program.

Temporary Faculty - Adjunct Professor Steve Johnson teaches two courses (ECNS-311 and ECNS-323) in the CNS program.

The CVs for these professors are included in the appendix but the following are some of the highlights of those CVs.

Keith Jewett – Professor Emeritus

BS Human Resources Management - New School for Social Research
MS Information Systems – Ferris State University
CCNA – Cisco Systems® Certification
Cisco Systems® CCNA Certified Instructor
Years at Ferris – 1996 to 2014

Ronald Mehringer – Professor

BS Electrical Engineering – Case Western Reserve University
MS Electrical Engineering – Carnegie Mellon University
MS Industrial Engineering – University of Pittsburgh
ABD PhD Electrical Engineering – University of Pittsburgh
Years at Ferris – 2004 to 2014

Robert Most – Associate Professor

BS Electrical Engineering – GMI Engineering and Management Institute
MS Electrical Engineering – Cornell University
Years at Ferris – 2004 to 2014

Steve Johnson – Adjunct Professor

AAS Industrial Electronics – Ferris State University
Minor in Computer Science – Ferris State University
BS EEET – Ferris State University
BS CNS – Ferris State University
CCNA – Cisco Systems® Certification
Cisco Systems® CCNA Certified Instructor
Years at Ferris – 1986 to 2014

All of the faculty teach at the Big Rapids campus. There are no off-campus or fully on-line offerings for the CNS program.

At the current enrollment levels, the FTEF load for the CNS courses is approximately 1.5. This load is covered by one full time faculty and one-half equivalent adjunct faculty. With a moderate increase in enrollment, there will be an FTEF load of 2.0 or more. Thus, as the enrollment returns to normal levels, the department will have to fill the 2nd full time position.

Because of the nature of the networking environment and industry, it is necessary for the faculty to keep up to date with the changing technologies. The faculty engage in seminars, training sessions, and literature searches to monitor the state of the technology in the networking and embedded systems environment. Examples of these are the following:

Embedded Systems Conference
Instrument Society of America Conference
Society of Automotive Engineers Conference
Lilly West Conference
Analog Devices Seminar
Microchip Seminar

The faculty have participated in service to the college and university in a number of different ways. The following is a partial list of activities that the above faculty have participated in:

College of Engineering Technology Dean Search Committee Chairperson
College of Engineering Technology Associate Dean Search Committee Chairperson
College Curriculum Committee
University Committee on Discipline
University Curriculum Committee
College of Engineering Technology Strategic Planning Committee
College of Engineering Technology Restructure Committee
Dean's Student Recruitment Committee
EET/CNS Program Coordinator
Academic Senate
College of Engineering Technology Promotion and Merit
University Committee on Security Management

Advisory Committee

The CNS industry advisory committee evaluates the CNS program at the yearly advisory committee meetings. In these meetings, the committee discusses the CNS program with the students, listens to a report from the faculty and makes recommendations to improve the quality of the program. In addition, the committee members fill out a survey form pertaining to the CNS program. The questions on this form are as follows:

1. How would you rate the curriculum of the CNS program?
2. How would you rate the quality of the equipment used in the CNS program?
3. How would you rate the quality of the facilities for the CNS program?
4. For the CNS program, are the program outcomes and objectives appropriate for current industrial practice?
5. From your discussions with the students, are they meeting the program outcomes and objectives?
6. What level 0f importance does your organization place on the ability to understand professional, ethical and social responsibilities when hiring an employee?
7. How important is a student's respect for diversity and being knowledgeable of contemporary professional, societal and global issues to his/her employment and future?

The results from this survey are summarized in the following table.

Advisory Committee Survey

Ranking - 1 = unsatisfactory, 2 = poor, 3 = neutral, 4 = good, 5 = excellent

Number	Score	Question
1	4.5	Rate CNS Curriculum
2	4	Rate Quality of Equipment
3	4.5	Rate CNS Facilities
4	4.5	Outcomes and Objectives Appropriate
5	4	Student Input from Meeting
6	4.5	Ethics and Social Responsibility
7	4.5	Diversity and Global Awareness

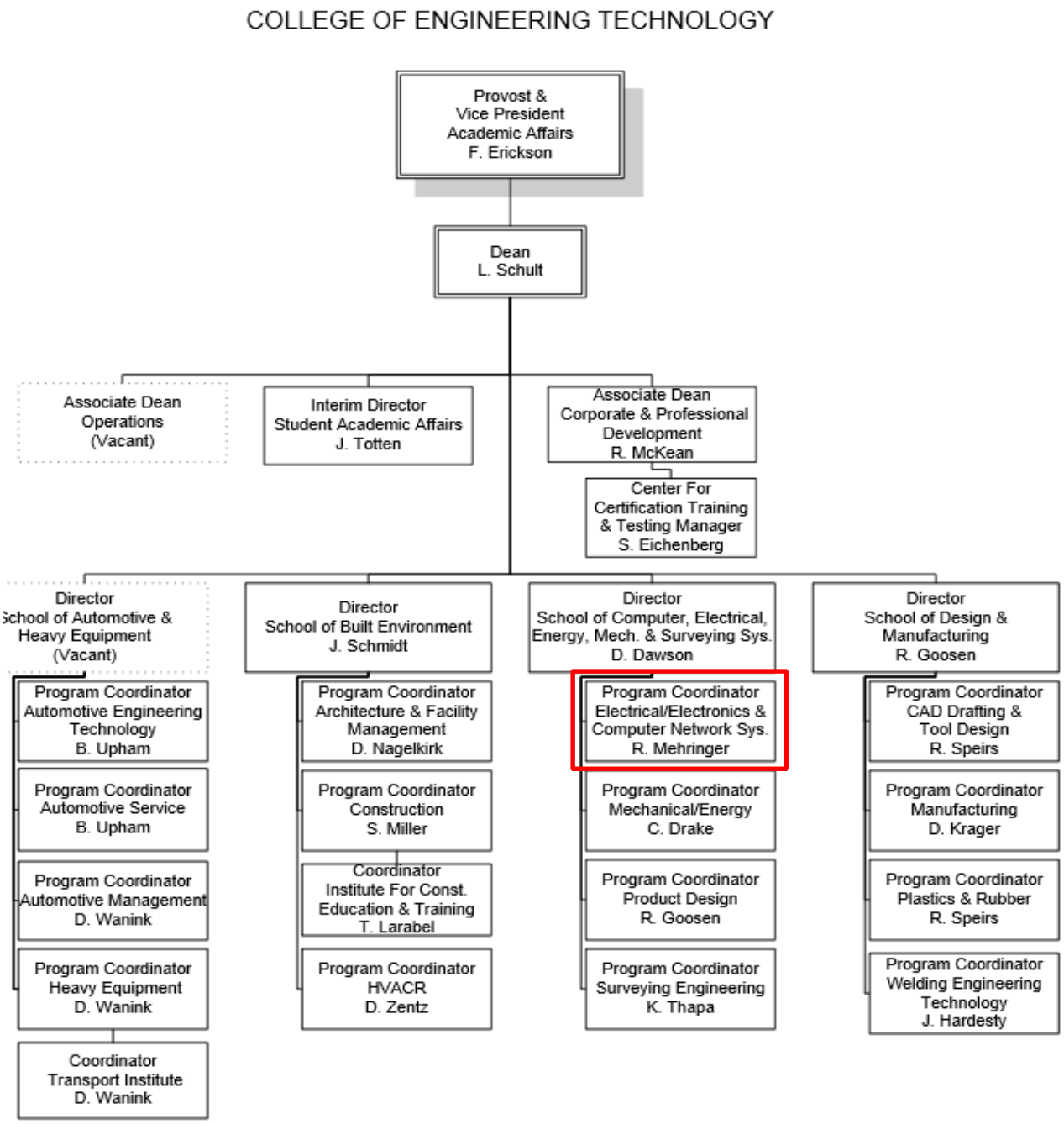
Hiring and Retention

Hiring and retention of faculty is a problem for the CNS program. We have been fortunate to have had a long term commitment from Professor Keith Jewett. He has been the main and usually the only permanent faculty for the CNS program. The qualifications for a CNS instructor include the CCAI certification as a Cisco Systems® certified CCNA curriculum instructor. In addition, the instructor must have the necessary network engineering experience to be able to teach the material for the Cisco Systems® CCNA exam. Ideally, the instructor would have the CCNA certification. Unfortunately, the individual that can meet these requirements is in high demand in the networks industry and can command a substantial salary. A CCNA certified network engineer can easily earn 2 or 3 times the salary offered by Ferris for a CNS instructor. The difficulty in finding a suitable candidate for a CNS position can be illustrated by our current search to find a replacement for Professor Keith Jewett. Of all of the candidates that applied for the position, only one candidate met the minimum requirements.

Even at current student enrollment levels, the program has an overload condition of approximately ½ FTEF. Ideally, this overload would be filled by an adjunct professor, but it is very difficult to find anyone with the necessary qualifications that would consider working as an adjunct at the pay rate offered to adjunct professors.

Program Administration and Support

The following is the organizational chart for the College of Engineering Technology.



The following are the administrative positions in the above structure that affect the CNS program:

Program Coordinator – Professor Ronald Mehringer
Highest Degree – MS EE
Experience – 10 years as member of faculty. 3 years as program coordinator.

School Director – Debbie Dawson
Highest Degree – MS EE
EdD (To Be Awarded 2016)
Experience – 3 years as school director

Dean – Larry Schult
Highest Degree – MA
Experience – 2 years as dean

The structure of the College of Engineering Technology has been modified several times over the previous years. The current structure has been in effect for 2 years. This structure combines centralized and distributed responsibilities. The programs are grouped together in schools which combine programs with similarities to improve coordination and cooperation. Dean Schult is working on distributing the academic and fiscal responsibilities to the school directors to improve efficiency. Dean Schult has fostered communications and cooperation among all of the programs in the college.

Staff – The School of Computer, Electrical, Energy, Mechanical, PDET and Surveying Systems has two secretarial personnel and an electronic technician. This level of staff has worked well mainly because of the quality of the individuals in these positions. We are extremely grateful to have such dedicated staff workers.

The CNS program employs a program coordinator hierarchy instead of a directed department head. The program coordinator is a member of the faculty which has the privilege of 25% release time from teaching duties. In addition to this release time, the program coordinator also has the distinction of serving over the summer timeframe, as classes are not offered by the program during this time.

The release time given to the program coordinator enables the holder of that position to assume several key duties, including:

- Assigning future schedules for faculty, courses, classrooms and labs.
- Facilitation of departmental meetings.
- Liaison for EET & CNS department to Dean's Office and other programs.
- Coordinator for office assistants.
- Lead contact and interface to EET & CNS Advisory Committee.
- Facilitator for EET & CNS recruiting and program marketing.
- Face of EET & CNS department for visiting prospective students and interested parties.
- Manager of EET & CNS yearly budget.

Although the program coordinator is not in an authoritative position for directing assessment, promotion or discipline of faculty members in the department, the position rather requires cooperation from the other faculty members to operate effectively.

Support Services

Library Resources

The CNS program's utilization of Ferris State University's FLITE (Library for Information, Technology and Education) is mainly through the student's use of library resources on an as-needed basis. The use of these resources for periodical research, journal searches and textbook utilization varies from course to course.

FLITE also provides a sizable computer resource for students working on course specific projects. The FLITE computers provide a suite of Microsoft software that covers the basic needs of students, such as spreadsheets and word processors. The FLITE computers also have specialized software requested by the CN program such as Microsoft Project for use in the EEET-418 project management class. Such resources are a beneficial asset to the CNS program's students.

Tutoring Center

Students are always encouraged to take advantage of the tutoring center. Any student that is having difficulty is instructed to contact the tutor center for additional help. Students from the program are encouraged to volunteer for tutoring CNS classes for the tutoring center as well as informal tutoring of fellow students.

Educational Counseling and Disabilities Services

All students are encouraged to take advantage of the counseling and disabilities services. Any student requiring additional support is encouraged to do so and the faculty is aware of the expected procedures.

Facilities and Equipment

INSTRUCTIONAL ENVIRONMENT

CNS Department Lab Facilities Summary: The Ferris State University's CNS program maintains three Computer Networking Labs. These labs are:

401 Computer Lab

This lab is used for Operating System courses and embedded systems courses

Stations:

12 Computer workstations
12 Beagle Committee embedded processor OS training committees

Computer Resources:

All computers have their operating systems installed as part of the appropriate educational course. Typically, Windows XP, QNX, UNIX, or a Linux variant. Computers have access to the Internet via two Nortel business switches and a DHCP hub which provides an internal private network for the programming of the embedded systems yet provides access to the Internet for external research.

Resources available in the room:

Equipment supporting 402 CNS Network Lab: Adtran TSU/ACE and Netvanta 5305; Bay Networks Centillion 100; Cabletron SSR-8; Cisco 4000 (2) and Catalyst 4006; Enterasys Matrix (2); and Nortel Business Policy Switch 2000 (2).

402 CNS Network Lab

This lab is mainly used for Advanced Computer Network Theory and Test and Network Security courses.

Stations:

15 unsupported computer workstations.

Resources available in the room:

3Com Super Stack Hub (8) and ISDN Pro (2); Adtran Atlas 550, Netvanta 5305, and NT1 ACE (2); Analog Phones (4); Bay Networks Centillion 100 (3); Cisco 675, 1721, 1900, 2500 (3), 2600 (2), 2620, 2900 XL (3), 3550, 4000 (8), 871W (2), Aironet 350 (3), AS 5200 (2), ASA 5505 (3), Catalyst 4006 (6), FastHub 400 (2), and 7912 (2), 7940 (13), 7941, 7942, 7960 (3), 7961 (5) IP Phones; Cabletron SSR-8 (6) and SSR-16 (6); Cajun P120; Courier V.Everything (3); D-Link DI-624M, DWL-7100AP (2), DWL-AG132 (2), DWL-AG530, DWL-AG660, DWL-G132, and DWL-MG0AT (2); Dell PowerEdge 1600SC; Engenius USB 2.0 Adapter; Enterasys Matrix (4); Hayes SmartModem; HP Proliant DL360, DL380 (7), and DL385 (7); Larscom Access-T (4); Linksys WRT-SSAG; Lucent SuperPipe; Network Associates S4000 (2); Nokia IP530 (4); Nortel Business Policy Switch 2000 (9); Packeteer Packet Shaper 6500, 7500 and 10000; Riverstone 8000; Sniffer Server (2); Sun SPARC Enterprise T5220 (6); Verilink Access 2000 (2) and Connect T1 Plus (3); and WatchGuard Firebox 1000.

403 CNS Network Lab

This lab is mainly used for the basic computer network design and implementation training – primarily the first four networking classes.

Stations:
23 unsupported computer workstations, 20 for students, one instructor, one instructor student assistant, and one "Eagle" server.

Resources available in the room:
3Com Super Stack Hub (8); Cisco 1841 (4), 2620 (2), 2900XL (6), 2950 (8), 2960 (4), 4000 (8), WMP54G (6), and WRT300N-RM (2). Fluke test equipment including models 620 (11), LinkRunner (5), NetTool (4), and DSP-4000.
Equipment supporting 402 CNS Network Lab: Adtran TSU/ACE and Netvanta 5305; Bay Networks Centillion 50; Cisco 1720 (4), 2620, 3550 (3), 3640, and 7940 IP Phone; Enterasys Matrix; and Verilink Access 2000.

COMPUTER ACCESS AND AVAILABILITY

The CNS program maintains three laboratories and two lecture rooms. Each of the laboratories has unique equipment but most are multipurpose in nature. Depending on semester, one or two labs are open in the evening: typically between 6 and 9 p.m.

The department maintains a lounge for student, faculty and staff use. There are three computers located in this room that are available from 8:00 a.m. to 5:00 p.m. daily and during open lab hours in the evening. There are two computers in two lecture rooms that are used for lectures and presentations. These presentations systems are available to students on a scheduled basis.

In the administrative and technician offices, there are five computers used by the program coordinator, secretary, technician and office assistants. The two computers used by the office assistants are also available for faculty to use. Each faculty member has a desktop or laptop computer for their personal use.

Over 85% of these computers are available to students during the work day and early evening. All are connected or can be connected to the Internet. In addition, all students are required to have personal laptop computers to use in classes and class work assignments.

OTHER INSTRUCTIONAL TECHNOLOGY

The CNS program is housed on the 4th floor of the Swan Technology building and has two main classrooms and three laboratories. Being that this curriculum is heavily laboratory oriented, the technology used in the laboratories is paramount and worthy of note. Both instructional classrooms have LCD projection technology. A new "Sympodium" lecture aid was added in the fall semester of 2009.

The laboratories facilitate several aspects of the curriculum that can be classified as follows:

- Communications Electronics
- Digital Electronics
- Networking Hardware
- Wireless Networking
- Electric Machines and Three Phase
- Electronics and Electricity
- Instrumentation and Data Acquisition
- High Level Networking and Interfacing

These laboratories incorporate test equipment, instructional apparatus, and instrumentation that have a replacement cost that is in the millions of dollars. Maintenance of this equipment is paramount and a key mission of the department and the EET & CNS programs. The department has a full-time instrument technician whose role is to maintain and calibrate the department's equipment, among other tasks.

To maintain a program that has relevance to current technological trends requires the replacement and upgrading of the laboratory equipment on a prudent and cost-effective basis. The CNS program must continue to be vigilant in asserting the need to keep these laboratories effective to not only maintain a high quality of instruction, but to also recruit and retain students in the program.

Perceptions of Overall Quality

The overall quality of the CNS program is 85%. This rating is based upon what the faculty consider to be the most important parts of the CNS program. They are:

1. Employability of Graduates
2. Quality of the Program
3. Current Technology
4. Program Visibility

The CNS program does an excellent job with items 1 through 3. The difficulty that the program is currently having is with item 4. The department has an excellent program which will allow its graduating students to obtain meaningful and fulfilling jobs. The area that needs the most improvement is the program visibility. This is reflected in the declining student population. The program is visible to employers but not to future students. If the program brings the visibility up to desirable levels, the program overall quality rating would rise to 95%. There is always room for more improvement.

Implementation of Findings

As can be seen in the above report, the APR is one part of the continuous improvement process for the CNS program. The process includes the following:

1. Department Retreat – Annual Meeting
2. Advisory Committee Meeting – Annual Meeting
3. APR – Every 5 Years
4. Department Meetings – Monthly
5. Student Evaluations – Each Semester
6. Graduate Evaluations – Annual
7. Alumni Evaluations – Annual

In any technical field, it is absolutely imperative to constantly monitor the quality of the educational product being offered to the student. The APR process provides a means to evaluate the CNS program on a long term basis and identify long term trends. The APR report will be discussed at the program's advisory committee meeting as well as our department retreat and department meetings.

The most fundamental outcome of the APR report will be to emphasize the importance of program visibility and to undertake steps to increase enrollment.

Certificate and Minor

CNS Certificate – The CNS certificate is intended to allow a student that has taken the first four CNS network courses receive recognition for completing these courses. These courses constitute the Cisco Systems® CCNA certification course. A student taking these courses can sit for the CCNA certification exam. Not all students that take the Cisco Systems® CCNA course take or pass the CCNA certification exam. A student that passes the first four network courses can obtain this certificate and include this on a resume. If for some reason the student is unable to complete the last two years of the CNS degree, he or she would have the certificate to prove competency in the CCNA curriculum. The check sheet for this certificate is attached to this report in the appendix.

CNS Minor – The purpose of the CNS minor was to allow students outside the CNS program to obtain expertise in network engineering. Students in the BS EEET program can use a course from the EEET program (EEET-414) to satisfy one of the course requirements of the minor. Students in other programs need to take six courses (18 or 19 credits) to obtain this minor. The minor does allow some credits from other programs to be counted toward the minor requirements. The check sheet for this minor is attached to this report in the appendix.

The mission and outcomes of the CNS certificate and minor mirror those of the CNS program.

Resources - The CNS certificate and CNS minor do not represent any costs to the department. No additional courses or course equipment is needed to provide these certificates and minors.

Minors Issued by Year

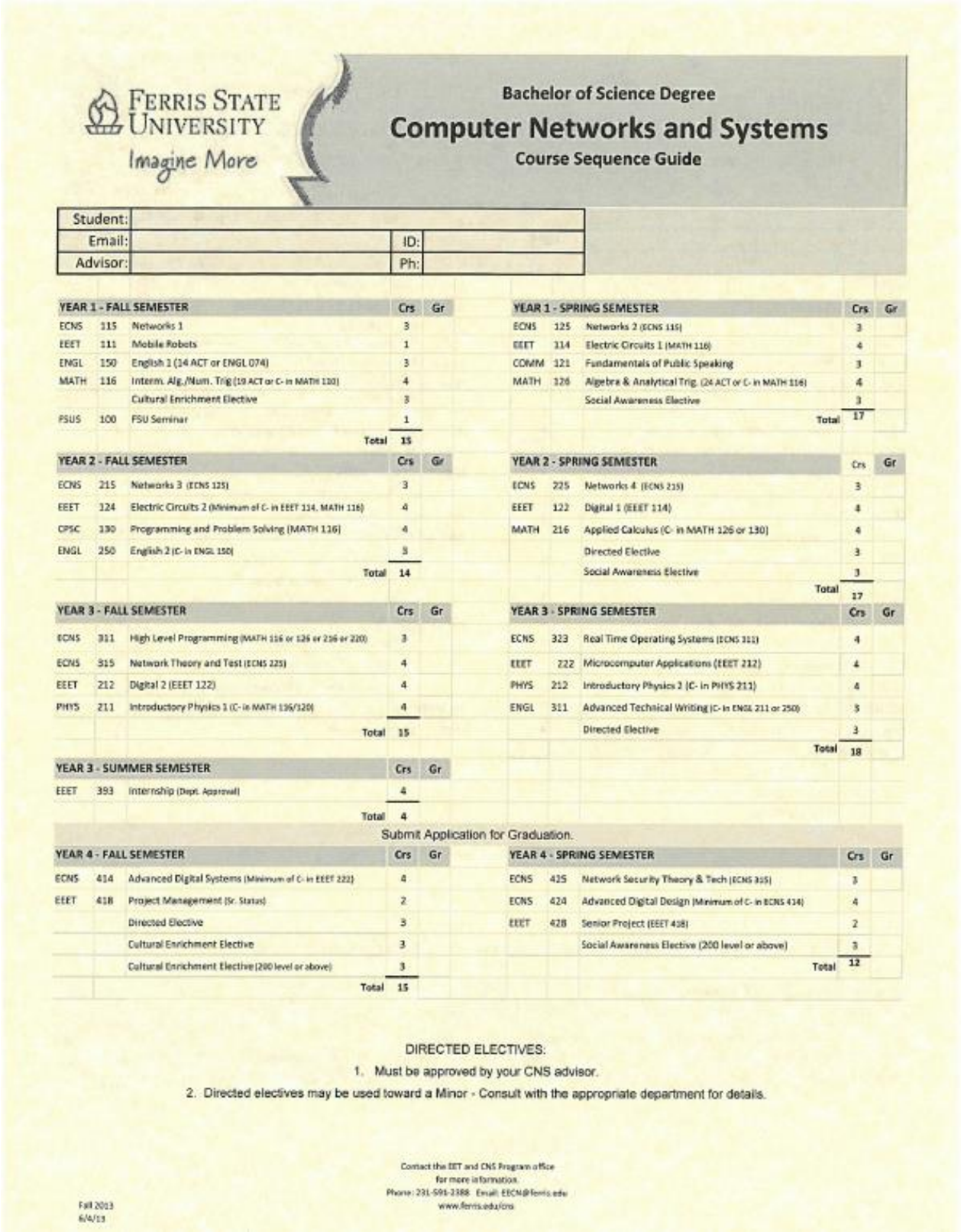
Year	Number
2005	2
2006	
2007	
2008	2
2009	
2010	2
2011	1
2012	3
2013	1
2014	1
Total	12

Appendix

The following are the supporting documents for the above report.

CNS Program Checksheet

(Front)



FERRIS STATE UNIVERSITY
Imagine More

Bachelor of Science Degree

Computer Networks and Systems

Course Sequence Guide

Student:			
Email:		ID:	
Advisor:		Ph:	

YEAR 1 - FALL SEMESTER			Crs	Gr
ECNS	115	Networks 1	3	
EEET	111	Mobile Robots	1	
ENGL	150	English 1 (14 ACT or ENGL 074)	3	
MATH	116	Interm. Alg./Num. Trig (19 ACT or C- in MATH 110)	4	
		Cultural Enrichment Elective	3	
FSUS	100	FSU Seminar	1	
		Total	15	

YEAR 1 - SPRING SEMESTER			Crs	Gr
ECNS	125	Networks 2 (ECNS 115)	3	
EEET	114	Electric Circuits 1 (MATH 116)	4	
COMM	121	Fundamentals of Public Speaking	3	
MATH	126	Algebra & Analytical Trig. (24 ACT or C- in MATH 116)	4	
		Social Awareness Elective	3	
		Total	17	

YEAR 2 - FALL SEMESTER			Crs	Gr
ECNS	215	Networks 3 (ECNS 125)	3	
EEET	124	Electric Circuits 2 (Minimum of C- in EEET 114, MATH 116)	4	
CPSC	130	Programming and Problem Solving (MATH 116)	4	
ENGL	250	English 2 (C- in ENGL 150)	3	
		Total	14	

YEAR 2 - SPRING SEMESTER			Crs	Gr
ECNS	225	Networks 4 (ECNS 215)	3	
EEET	122	Digital 1 (EEET 114)	4	
MATH	216	Applied Calculus (C- in MATH 126 or 130)	4	
		Directed Elective	3	
		Social Awareness Elective	3	
		Total	17	

YEAR 3 - FALL SEMESTER			Crs	Gr
ECNS	311	High Level Programming (MATH 116 or 126 or 216 or 220)	3	
ECNS	315	Network Theory and Test (ECNS 225)	4	
EEET	212	Digital 2 (EEET 122)	4	
PHYS	211	Introductory Physics 1 (C- in MATH 126/120)	4	
		Total	15	

YEAR 3 - SPRING SEMESTER			Crs	Gr
ECNS	323	Real Time Operating Systems (ECNS 311)	4	
EEET	222	Microcomputer Applications (EEET 212)	4	
PHYS	212	Introductory Physics 2 (C- in PHYS 211)	4	
ENGL	311	Advanced Technical Writing (C- in ENGL 211 or 250)	3	
		Directed Elective	3	
		Total	18	

YEAR 3 - SUMMER SEMESTER			Crs	Gr
EEET	393	Internship (Dept. Approval)	4	
		Total	4	

Submit Application for Graduation.

YEAR 4 - FALL SEMESTER			Crs	Gr
ECNS	414	Advanced Digital Systems (Minimum of C- in EEET 222)	4	
EEET	418	Project Management (Sr. Status)	2	
		Directed Elective	3	
		Cultural Enrichment Elective	3	
		Cultural Enrichment Elective (200 level or above)	3	
		Total	15	

YEAR 4 - SPRING SEMESTER			Crs	Gr
ECNS	425	Network Security Theory & Tech (ECNS 315)	3	
ECNS	424	Advanced Digital Design (Minimum of C- in ECNS 414)	4	
EEET	428	Senior Project (EEET 418)	2	
		Social Awareness Elective (200 level or above)	3	
		Total	12	

DIRECTED ELECTIVES:

1. Must be approved by your CNS advisor.
2. Directed electives may be used toward a Minor - Consult with the appropriate department for details.

Contact the EET and CNS Program office
for more information.
Phone: 231-591-2388 Email: EECN@ferris.edu
www.ferris.edu/cns

Fall 2013
6/4/13

CNS Program Checksheet
(Back)

FERRIS STATE UNIVERSITY
Imagine More

Bachelor of Science Degree

Computer Networks and Systems

Program Academic Requirements

Student:				Transfer Credits:	
Email:		ID:		GPA Major:	
Advisor:				GPA Degree:	

MAJOR			Cr	Gr	TR
ECNS	115	Networks 1	3		
ECNS	125	Networks 2 (ECNS 115)	3		
ECNS	215	Networks 3 (ECNS 125)	3		
ECNS	225	Networks 4 (ECNS 215)	3		
ECNS	311	High Level Programming (MATH 116 or 126 or 216 or 220)	3		
ECNS	315	Network Theory and Test (ECNS 225)	4		
ECNS	323	Real Time Operating Systems (ECNS 311)	4		
ECNS	414	Advanced Digital Systems (Minimum of C- in EEET 222)	4		
ECNS	424	Advanced Digital Design (Minimum of C- in ECNS 414)	4		
ECNS	425	Network Security Theory & Tech (ECNS 315)	3		
EEET	111	Mobile Robots	1		
EEET	114	Electric Circuits 1 (MATH 116)	4		
EEET	122	Digital 1 (EEET 114co.)	4		
EEET	124	Electric Circuits 2 (Minimum of C- in EEET 114, MATH 116)	4		
EEET	212	Digital 2 (EEET 122)	4		
EEET	222	Microcomputer Applications (EEET 212)	4		
EEET	393	Internship (Dept. Approval)	4		
EEET	418	Project Management (Sr. Status)	2		
EEET	428	Senior Project (EEET 418)	2		
TECHNICAL RELATED					
CPSC	130	Programming and Problem Solving (MATH 116)	4		
DIRECTIVE ELECTIVE (C- or better / Consult advisor)					
		Directed Elective	3		
		Directed Elective	3		
		Directed Elective	3		

COMMUNICATIONS COMPETENCE			Cr	Gr	TR
ENGL	150	English 1 (14 ACT or ENGL 074)	3		
ENGL	250	English 2 (C- in ENGL 150)	3		
ENGL	311	Advanced Technical Writing (C- in ENGL 211 or 250)	3		
COMM	121	Fundamentals of Public Speaking	3		
QUANTITATIVE SKILLS					
MATH	116	Intermediate Algebra (ACT19 or C- in MATH 110)	4		
MATH	126	Algebra & Analytical Trig. (24 ACT or C- in MATH 116)	4		
MATH	216	Applied Calculus (MATH 126 or 130)	4		
SCIENTIFIC UNDERSTANDING					
PHYS	211	Introductory Physics (MATH 116/120 or 26 ACT)	4		
PHYS	212	Introductory Physics 2 (C- in PHYS 211)	4		
CULTURAL ENRICHMENT					
		Cultural Enrichment Elective	3		
		Cultural Enrichment Elective	3		
		Cultural Enrichment Elective (200 level or above)	3		
SOCIAL AWARENESS					
		Social Awareness Elective	3		
		Social Awareness Elective	3		
		Social Awareness Elective (200 level or above)	3		
FRESHMEN SEMINAR					
FSUS	100	FSU Seminar	1		

Note: A minimum grade of C- is required for any EEET or ECNS course to qualify as a prerequisite for another EEET or ECNS course.

Bachelor of Science General Education Requirements:

One Global Consciousness (G) Course (3cr), One Race - Ethnicity - Gender(REG) Course (3cr), and One Foundation Course(3cr) –

Multiple requirements may be satisfied by a single course.

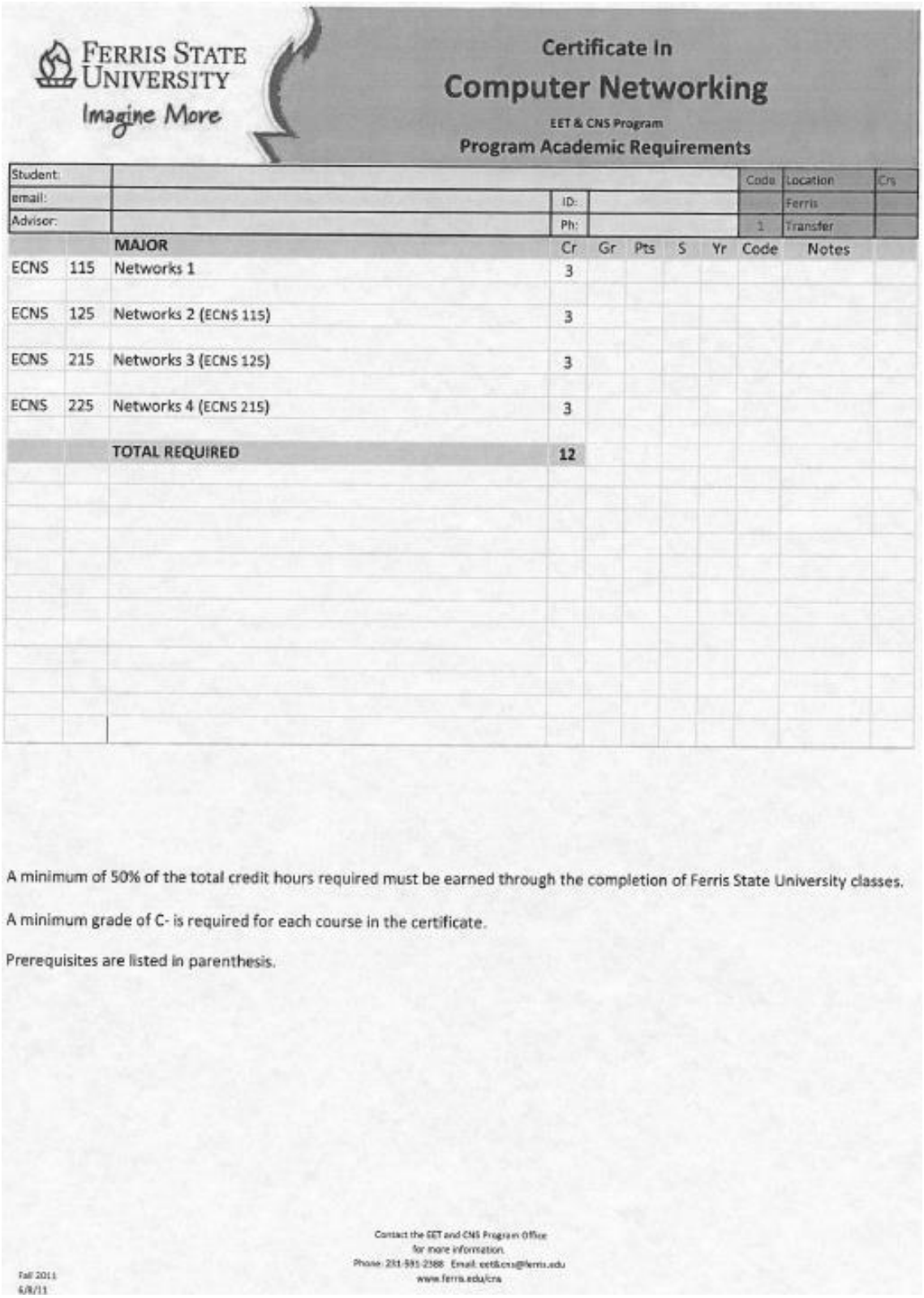
Cultural Enrichment – 9 credits (3 credits in course > 200 level); Social Awareness - 9credits (3 credits in course > 200 level)

Students must complete 40 credits at or above the 300. (Reference: http://www.ferris.edu/htmls/academics/genecl/gen_edspecific.html)

Contact the EET and CNS Program office
for more information.
Phone: 231-591-2688 Email: EECN@ferris.edu
www.ferris.edu/ces

Fall 2013
6/4/13

CNS Certificate Checksheet



FERRIS STATE UNIVERSITY
Imagine More

Certificate In
Computer Networking
EET & CNS Program
Program Academic Requirements

Student:								Code	Location	Crs
email:			ID:						Ferris	
Advisor:			Ph:					1	Transfer	
		MAJOR	Cr	Gr	Pts	S	Yr	Code	Notes	
ECNS	115	Networks 1	3							
ECNS	125	Networks 2 (ECNS 115)	3							
ECNS	215	Networks 3 (ECNS 125)	3							
ECNS	225	Networks 4 (ECNS 215)	3							
		TOTAL REQUIRED	12							

A minimum of 50% of the total credit hours required must be earned through the completion of Ferris State University classes.

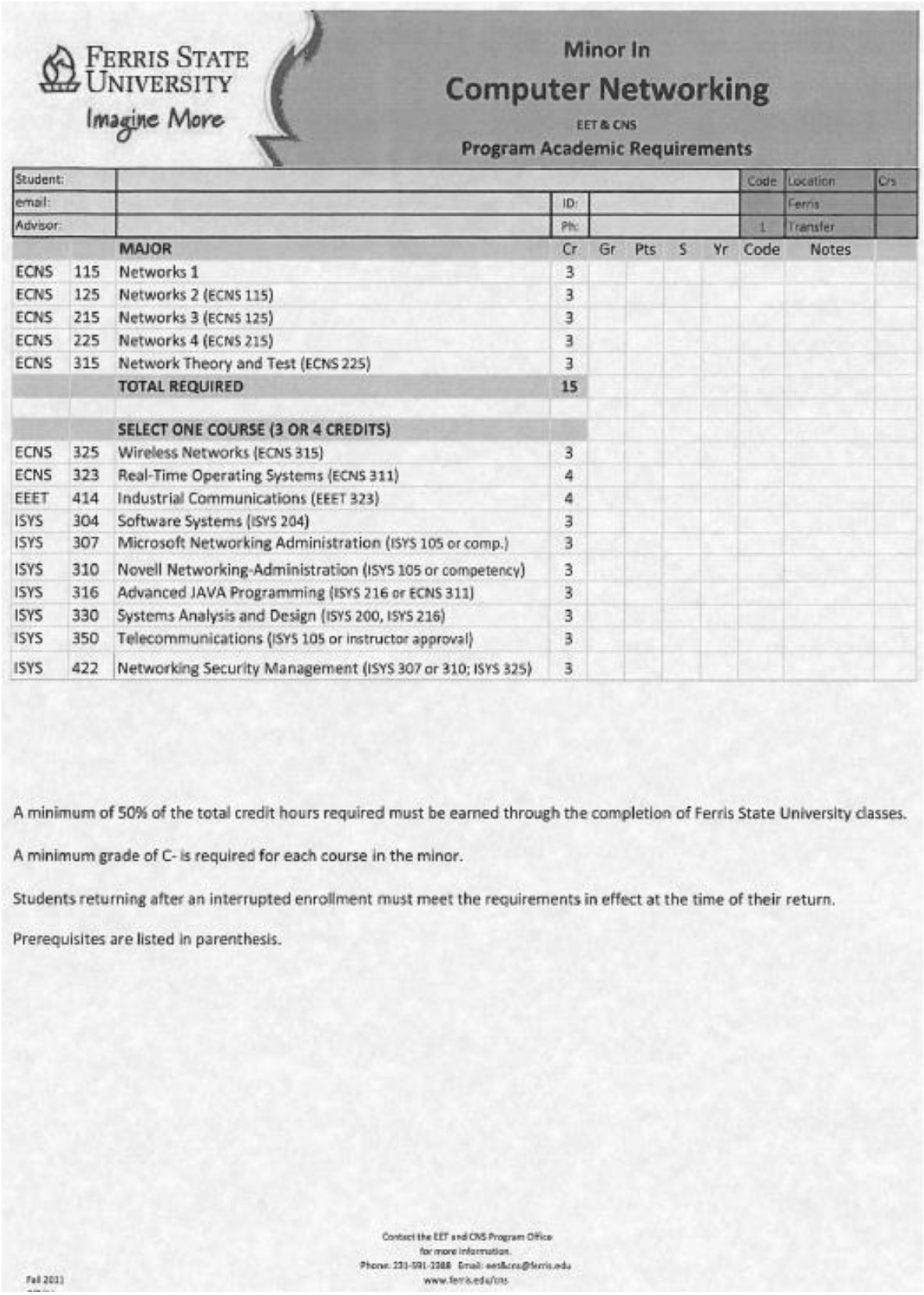
A minimum grade of C- is required for each course in the certificate.

Prerequisites are listed in parenthesis.

Contact the EET and CNS Program Office
for more information.
Phone: 231-591-2588 Email: eet&cns@ferris.edu
www.ferris.edu/cns

Fall 2011
6/8/11

CNS Minor Checksheet



FERRIS STATE UNIVERSITY
Imagine More

Minor In
Computer Networking

EET & CNS

Program Academic Requirements

Student:					Code	Location	Crs
email:		ID:				Ferris	
Advisor:		Ph:			1	Transfer	

		MAJOR	Cr	Gr	Pts	S	Yr	Code	Notes	
ECNS	115	Networks 1	3							
ECNS	125	Networks 2 (ECNS 115)	3							
ECNS	215	Networks 3 (ECNS 125)	3							
ECNS	225	Networks 4 (ECNS 215)	3							
ECNS	315	Network Theory and Test (ECNS 225)	3							
		TOTAL REQUIRED	**15**							
		SELECT ONE COURSE (3 OR 4 CREDITS)								
ECNS	325	Wireless Networks (ECNS 315)	3							
ECNS	323	Real-Time Operating Systems (ECNS 311)	4							
EEET	414	Industrial Communications (EEET 323)	4							
ISYS	304	Software Systems (ISYS 204)	3							
ISYS	307	Microsoft Networking Administration (ISYS 105 or comp.)	3							
ISYS	310	Novell Networking-Administration (ISYS 105 or competency)	3							
ISYS	316	Advanced JAVA Programming (ISYS 216 or ECNS 311)	3							
ISYS	330	Systems Analysis and Design (ISYS 200, ISYS 216)	3							
ISYS	350	Telecommunications (ISYS 105 or instructor approval)	3							
ISYS	422	Networking Security Management (ISYS 307 or 310; ISYS 325)	3							

A minimum of 50% of the total credit hours required must be earned through the completion of Ferris State University classes.

A minimum grade of C- is required for each course in the minor.

Students returning after an interrupted enrollment must meet the requirements in effect at the time of their return.

Prerequisites are listed in parenthesis.

Contact the EET and CNS Program Office
for more information.
Phone: 231-591-2388 Email: eet&cns@ferris.edu
www.ferris.edu/cns

Fall 2011

Course Syllabi

The following are the course syllabi for the ECNS courses in the BS ECNS program:

Course: ECNS 115 Networks 1

Credits: 3 Hours

Contacts: 2 Lecture, 3 Lab Hours per Week

Course Description: CCNA Exploration Network Fundamentals is the first of four courses leading to the Cisco Certified Network Associate (CCNA) designation. CCNA 1 introduces Cisco Networking Academy Program students to the fundamental networking concepts and technologies. It provides a theoretically-rich, hands-on introduction to networking and the Internet.

As the course title states, the focus of this course is on learning the fundamentals of networking. In this course, you will learn both the practical and conceptual skills that build the foundation for understanding basic networking. First, you will examine human versus network communication and see the parallels between them. Next, you will be introduced to the two major models used to plan and implement networks: OSI and TCP/IP. You will gain an understanding of the "layered" approach to networks and examine the OSI and TCP/IP layers in detail to understand their functions and services. You will become familiar with the various network devices, network addressing schemes and, finally, the types of media used to carry data across the network.

In this course, you will gain experience using networking utilities and tools, such as Packet Tracer and Wireshark®, to explore networking protocols and concepts. These tools will help you to develop an understanding of how data flows in a network. A special "model Internet" is also used to provide a test environment where a range of network services and data can be observed and analyzed.

Course Prerequisites: None.

Course Outline: http://btclx1.ferris.edu/cisco/syllabi/ECNS_115_Outline.pdf

Required Textbooks: http://btclx1.ferris.edu/cisco/en_ENetwork_v4040_ACC_Linux

Course Web Site: http://btclx1.ferris.edu/cisco/

Required Materials: Composition Book (Journal)

Reference Materials: Many excellent books exist on networking and make useful references to go beyond the basics. Some will be discussed throughout the semester.

Faculty: Professor Keith R. Jewett

Office: JOH 308
Phone: (231) 591 – 2954 Alt. Phone: (231) 832 - 0483
Email: jewettk@ferris.edu Alt. Email:

Office Hours:

Day	Times	Day	Times
Tuesday	1200-1320	Wednesday	1330-1550

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate…:

A competent student will be able to perform the following tasks:

1. Explain the importance of data networks and the Internet in supporting business communications and everyday activities
2. Explain how communication works in data networks and the Internet
3. Recognize the devices and services that are used to support communications across an Internetwork
4. Use network protocol models to explain the layers of communications in data networks
5. Explain the role of protocols in data networks
6. Describe the importance of addressing and naming schemes at various layers of data networks
7. Describe the protocols and services provided by the application layer in the OSI and TCP/IP models and describe how this layer operates in various networks
8. Analyze the operations and features of transport layer protocols and services
9. Analyze the operations and feature of network layer protocols and services and explain the fundamental concepts of routing
10. Design, calculate, and apply subnet masks and addresses to fulfill given requirements
11. Describe the operation of protocols at the OSI data link layer and explain how they support communications
12. Explain the role of physical layer protocols and services in supporting communications across data networks
13. Explain fundamental Ethernet concepts such as media, services, and operation
14. Employ basic cabling and network designs to connect devices in accordance with stated objectives
15. Build a simple Ethernet network using routers and switches
16. Use Cisco command-line interface (CLI) commands to perform basic router and switch configuration and verification
17. Analyze the operations and features of common application layer protocols such as HTTP, Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), Simple Mail Transfer Protocol (SMTP), Telnet, and FTP
18. Utilize common network utilities to verify small network operations and analyze data traffic

Course Assessments

Grading will be based on points received for various activities to include tests, quizzes, labs, etcetera. No curve is used. Keep all of your returned papers for review and to determine your grade at any point in the semester. Students will be penalized for late work.

1. Homework/Quizzes: [45%]
2. Skills Exam / Labs: [25%]
3. Attendance/attitude/neatness [5%]
4. Final: [25%]

   Given at the time specified in class schedule book, unless other arrangements made.
   Covers all material in class i.e. cumulative!

Course Policies

Attendance:	**Lecture:** Students are expected to be present for every class meeting. Attendance sheets will be passed around in class and the results recorded. The **overall percentage will be reduced by 5%** for each lecture or portion thereof missed by the student without prearranged and documented arrangements made with the instructor. One class can be missed without penalty. Civil behavior to include language is mandatory. **Late work will be accepted only for documented excused absences or when prior arrangements have been made**. **Lab:** Students must be **on time** to **all lab sessions** and if late, you may be required to **make up** the lab at another session. If you are going to miss a lab, you must inform the instructor and make arrangements to attend another section (if space is available). If you did not complete a lab in the allotted time, you may attend an "**open lab**" or possibly attend another session if space is available. The report must still come in on time. If handed in late but before 5 p.m. of the due day, 20% penalty. No points for anything later, but hand in report so instructor knows you did perform the lab. **If more than three lab sessions are not attended and no documentation provided, student will receive an F even if other scores are at a passing level. A student attending an open lab must get a signoff from the open-lab instructor. Attendance will be taken.**
Assignments:	***Prior to each lecture, reading assignments must be completed.*** All assignments must be submitted prior to the beginning of class in the designated location. Late or improperly prepared work will not be accepted.
Behavior:	Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. In the lab, students are not permitted to wander about the lab or compare their results with others. Work only with your partner. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be turned off during lecture and lab periods.
Exams and quizzes:	Exams will be given at times listed in the class schedule. All exams are cumulative. The final exam will be given at a time to be determined by the University during finals week. Quizzes may be given at any time during the course as required by the instructor. No advanced notice will be given for quizzes and all quizzes will be given during a regularly scheduled lecture or lab period.

Grading Percentage: **(Earned Points/Total Points) * 100**	93-100 A, 90-92.9 A- 87-89.9 B+, 83-86.9 B, 80-82.9 B- 77-79.9 C+, 73-76.9 C, 70-72.9 C- <70 F
Integrity:	All of your assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.
Student Responsibilities:	Assistance in this course is available to help you with academic and other difficulties you may be experiencing. It is your responsibility to seek help. 1. Office hours – I will be happy to work with you during regularly scheduled office hours. 2. Pre-scheduled assistance outside of normal office hours (as my schedule permits). 3. Meet with your Academic advisor. 4. Meet with an educational counselor. College Educational Counselor – Mike Ropele x 2890, JHN 200 5. The ACADEMIC SUPPORT SERVICES CENTER offers free tutoring and assistance for test anxiety, study skills, writing skills, exam preparation, content reading, personal growth, and classroom skills. The Center is located in Room 1017 of the Arts and Sciences Commons Buildings and they can be reached at 591-3543.

Course Schedule

Date	Lecture Topic	Assignment
Week 1	Living in a Network Centric World	Activities 1.1.1, 1.4.5 Labs 1.6.1, 2
Week 2	Communicating over the Network	Activity 2.2.5 Labs 2.6.1, 2
Week 3	Application Layer Functionality and Protocols	Activity 3.4.1 Labs 3.4.2, 3
Week 4	OSI Transport Layer	Labs 4.5.1, 2, 3
Week 5	OSI Network Layer	Lab 5.5.1
Week 6	OSI Network Layer	Labs 5.5.2
Week 7	Addressing the Network IPv4	Labs 6.7.1, 2, 3
Week 8	Addressing the Network IPv4	Labs 6.7.4, 5
Week 9	Data Link Layer	Lab 7.5.2
Week 10	Data Link Layer	
	OSI Physical Layer	Lab 8.4.1
Week 11	OSI Physical Layer	Lab 8.4.1
	Ethernet	Labs 9.8.1, 2
Week 12	Ethernet	Lab 9.8.3
	Planning and Cabling Networks	Lab 10.3.2
Week 13	Planning and Cabling Networks	Labs 10.6.1, 2, 3
Week 14	Configuring and Testing your Network	11.4.3.3
Week 15	Configuring and Testing your Network	Labs 11.5.1, 2, 3, 4, 5, 6
Week 16	Final Exam	

Course: ECNS 125 Networks 2

Credits:	3 Hours
Contacts:	2 Lecture, 2 Lab Hours per Week
Course Description:	CCNA Exploration Routing Protocols and Concepts is the second of four courses leading to the Cisco Certified Network Associate (CCNA) designation. CCNA 2 introduces Cisco Networking Academy Program students to the fundamentals of routing. It provides a theoretically-rich, hands on introduction to networking and the Internet. The primary focus of this course is on routing and routing protocols. The goal is to develop an understanding of how a router learns about remote networks and determines the best path to those networks. This course includes both static routing and dynamic routing protocols. By examining multiple routing protocols, you will gain a better understanding of each of the individual routing protocols and a better perspective of routing in general. Learning the configuration of routing protocols is fairly simple. Developing an understanding of the routing concepts themselves is more difficult, yet is critical for implementing, verifying, and troubleshooting routing operations. Each static routing and dynamic routing protocol chapter uses a single topology throughout that chapter. You will be using that topology to configure, verify, and troubleshoot the routing operations discussed in the chapter. The labs and Packet Tracer activities used in this course are designed to help you develop an understanding of how to configure routing operations while reinforcing the concepts learned in each chapter.
Course Prerequisites:	Networks 1.
Course Outline:	http://btclx1.ferris.edu/cisco/syllabi/ECNS_125_Outline.pdf
Required Textbooks:	http://btclx1.ferris.edu/cisco/en_ERouting_v4050_ACC_Linux
Course Web Site:	http://btclx1.ferris.edu/cisco/
Required Materials:	Composition Book (Journal)
Reference Materials:	Many excellent books exist on networking and make useful references to go beyond the basics. Some will be discussed throughout the semester.

Faculty: Professor Keith R. Jewett

Office: SWN 403
Phone: (231) 591 – 2954 Alt. Phone: (231) 832 - 0483
Email: jewettk@ferris.edu Alt. Email:

Office Hours:

Day	Times	Day	Times
Tuesday	1200-1250	Thursday	1400-1450
Tuesday	1400-1550		

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate…:

A competent student will be able to perform the following tasks:

1. Describe the purpose, nature, and operations of a router
2. Explain the critical role routers play in enabling communications across multiple networks
3. Describe the purpose and nature of routing tables
4. Describe how a router determines a path and switches packets
5. Explain the route lookup process and determine the path packets will take in a network
6. Configure and verify basic operations for a newly-installed router
7. Describe the purpose of static routes and the procedure for configuring them
8. Configure and verify static and default routing
9. Describe the role of dynamic routing protocols and place these protocols in the context of modern network design
10. Describe how metrics are used by routing protocols and identify the metric types used by dynamic routing protocols
11. Identify the characteristics of distance vector routing protocols
12. Describe the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP)
13. Describe the functions, characteristics, and operations of the RIPv1 protocol
14. Compare and contrast classful and classless IP addressing
15. Describe classful and classless routing behaviors in routed networks
16. Design and implement a classless IP addressing scheme for a given network
17. Describe the main features and operations of the Enhanced Interior Gateway Routing Protocol (EIGRP)
18. Use advanced configuration commands with routers implementing EIGRP and OSPF
19. Describe the basic features and concepts of link-state routing protocols
20. Describe the purpose, nature, and operations of the Open Shortest Path First (OSPF) Protocol
21. Configure and verify basic RIPv1, RIPv2, single area OSPF, and EIGRP operations in a small routed network
22. Use router show and debug commands to troubleshoot common errors that occur in small routed networks

Course Assessments

Grading will be based on points received for various activities to include tests, quizzes, labs, etcetera. No curve is used. Keep all of your returned papers for review and to determine your grade at any point in the semester. Students will be penalized for late work.

1. Homework/Quizzes: [40%]
2. Skills Exam / Labs: [30%]
3. Attendance/attitude/neatness [5%]
4. Final: [25%]
   Given at the time specified in class schedule book, unless other arrangements made.
   Covers all material in class i.e. cumulative!

Course Policies

Attendance:	**Lecture:** Students are expected to be present for every class meeting. Attendance sheets will be passed around in class and the results recorded. The **overall percentage will be reduced by 5%** for each lecture or portion thereof missed by the student without prearranged and documented arrangements made with the instructor. One class can be missed without penalty. Civil behavior to include language is mandatory. **Late work will be accepted only for documented excused absences or when prior arrangements have been made.** **Lab:** Students must be **on time** to **all lab sessions** and if late, you may be required to **make up** the lab at another session. If you are going to miss a lab, you must inform the instructor and make arrangements to attend another section (if space is available). If you did not complete a lab in the allotted time, you may attend an "**open lab**" or possibly attend another session if space is available. The report must still come in on time. If handed in late but before 5 p.m. of the due day, 20% penalty. No points for anything later, but hand in report so instructor knows you did perform the lab. **If more than three lab sessions are not attended and no documentation provided, student will receive an F even if other scores are at a passing level. A student attending an open lab must get a signoff from the open-lab instructor. Attendance will be taken.**
Assignments:	***Prior to each lecture, reading assignments must be completed.*** All assignments must be submitted prior to the beginning of class in the designated location. Late or improperly prepared work will not be accepted.
Behavior:	Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. In the lab, students are not permitted to wander about the lab or compare their results with others. Work only with your partner. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be turned off during lecture and lab periods.
Exams and quizzes:	Exams will be given at times listed in the class schedule. All exams are cumulative. The final exam will be given at a time to be determined by the University during

	finals week. Quizzes may be given at any time during the course as required by the instructor. No advanced notice will be given for quizzes and all quizzes will be given during a regularly scheduled lecture or lab period.
Grading Percentage: **(Earned Points/Total Points) * 100**	93-100 A, 90-92.9 A- 87-89.9 B+, 83-86.9 B, 80-82.9 B- 77-79.9 C+, 73-76.9 C, 70-72.9 C- <70 F
Integrity:	All of your assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.
Student Responsibilities:	Assistance in this course is available to help you with academic and other difficulties you may be experiencing. It is your responsibility to seek help. 1. Office hours – I will be happy to work with you during regularly scheduled office hours. 2. Pre-scheduled assistance outside of normal office hours (as my schedule permits). 3. Meet with your Academic advisor. 4. Meet with an educational counselor. College Educational Counselor – Mike Ropele x 2890, JHN 200 5. The ACADEMIC SUPPORT SERVICES CENTER offers free tutoring and assistance for test anxiety, study skills, writing skills, exam preparation, content reading, personal growth, and classroom skills. The Center is located in Room 1017 of the Arts and Sciences Commons Buildings and they can be reached at 591-3543.

Course Schedule

Date	Lecture Topic	Assignment
Week 1	Introduction to Routing and Packet Forwarding	Labs 1.5.1, 2
Week 2	Introduction to Routing and Packet Forwarding	Labs 1.5.3
	Static Routing	Lab 2.8.1
Week 3	Static Routing	Labs 2.8.2, 3
Week 4	Introduction to Dynamic Routing Protocols	Labs 3.5.2, 3
Week 5	Introduction to Dynamic Routing Protocols	Lab 3.5.4
	Distance Vector Routing Protocols	Lab 4.6.1
Week 6	RIP version 1	Labs 5.6.1
Week 7	RIP version 1	Labs 5.6.2, 3
	VLSM and CIDR	Activities 6.4.1, 2, 3
Week 8	VLSM and CIDR	Activities 6.4.4, 5, 6
Week 9	RIPv2	Lab 7.5.1, 2

Week 10	RIPv2	Lab 7.5.3
	The Routing Table: A Closer Look	Lab 8.4.1
Week 11	The Routing Table: A Closer Look	Lab 8.4.2
Week 12	EIGRP	Lab 9.6.1
Week 13	EIGRP	Labs 9.6.2, 3
	Link-State Routing Protocols	
Week 14	OSPF	Lab 11.6.1
Week 15	OSPF	Labs 11.6.2, 3
Week 16	Final Exam	

Course: ECNS 215 Networks 3

Credits:	3 Hours
Contacts:	2 Lecture, 2 Lab Hours per Week
Course Description:	CCNA Exploration LAN Switching and Wireless is the third of four courses leading to the Cisco Certified Network Associate (CCNA) designation. CCNA 3 introduces Cisco Networking Academy Program students to the fundamentals of switching. It provides a theoretically-rich, hands on introduction to networking and the Internet. The primary focus of this course is on LAN switching and wireless LANs. The goal is to develop an understanding of how a switch communicates with other switches and routers in a small- or medium-sized business network to implement VLAN segmentation. Switching technologies are relatively straightforward to implement; however, as with routing, the underlying protocols and algorithms are often quite complicated. This course will go to great lengths to explain the underlying processes of the common Layer 2 switching technologies. The better the underlying concepts are understood, the easier it is to implement, verify, and troubleshoot the switching technologies. Each switching concept will be introduced within the context of a single topology for each chapter. The individual chapter topologies will be used to explain protocol operations as well as providing a setting for the implementation of the various switching technologies. The labs and Packet Tracer activities used in this course are designed to help you develop an understanding of how to configure switching operations while reinforcing the concepts learned in each chapter.
Course Prerequisites:	Networks 2.
Course Outline:	http://btclx1.ferris.edu/cisco/syllabi/ECNS_215_Outline.pdf
Required Textbooks:	http://btclx1.ferris.edu/cisco/en_ESwitching_v4030_ACC_Linux
Course Web Site:	http://btclx1.ferris.edu/cisco/
Required Materials:	Composition Book (Journal)
Reference Materials:	Many excellent books exist on networking and make useful references to go beyond the basics. Some will be discussed throughout the semester.

Faculty: Professor Keith R. Jewett

Office: JOH 308
Phone: (231) 591 – 2954 Alt. Phone: (231) 832 - 0483
Email: jewettk@ferris.edu Alt. Email:

Office Hours:

Day	Times	Day	Times
Tuesday	1200-1320	Wednesday	1330-1550

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate…:

A competent student will be able to perform the following tasks:

1. Identify and correct common network problems at layers 1, 2, 3, and 7 using a layered model approach
2. Interpret network diagrams
3. Select the appropriate media, cables, ports, and connectors to connect switches to other network devices and hosts
4. Explain the technology and media access control method for Ethernet networks
5. Explain basic switching concepts and the operation of Cisco switches
6. Perform and verify initial switch configuration tasks including remote access management
7. Describe enhanced switching technologies such as VLANs, VLAN Trunking Protocol (VTP), Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Protocol (PVSTP), and 802.1q
8. Describe how VLANs create logically separate networks and how routing occurs between them
9. Configure, verify, and troubleshoot VLANs, trunking on Cisco switches, interVLAN routing, VTP, and RSTP
10. Interpret the output of various show and debug commands to verify the operational status of a Cisco switched network
11. Verify network status and switch operation using basic utilities such as ping, traceroute, Telnet, Secure Shell (SSH), Address Resolution Protocol (ARP), and ipconfig, as well as the show and debug commands.
12. Identify, prescribe, and resolve common switched network media issues, configuration issues, autonegotiation, and switch hardware failures
13. Manage Cisco IOS® Software
14. Manage Cisco IOS configuration files (save, edit, upgrade, and restore)
15. Describe standards associated with wireless media, such as IEEE WI-FI Alliance and ITU/FCC
16. Identify and describe the purpose of the components in a small wireless network, such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS)
17. Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points
18. Compare and contrast Wi-Fi Protected Access (WPA) security features and capabilities of open, Wired Equivalent Privacy (WEP), and WPA-1/2 networks
19. Describe common wireless-network implementation issues such as interference and misconfiguration

Course Assessments

Grading will be based on points received for various activities to include tests, quizzes, labs, etcetera. No curve is used. Keep all of your returned papers for review and to determine your grade at any point in the semester. Students will be penalized for late work.

1. Homework/Quizzes: [30%]
2. Skills Exam / Labs: [30%]
3. Case Study: [10%]
3. Attendance/attitude/neatness [5%]
4. Final: [25%]
   Given at the time specified in class schedule book, unless other arrangements made.
   Covers all material in class i.e. cumulative!

Course Policies

Attendance:	**Lecture:** Students are expected to be present for every class meeting. Attendance sheets will be passed around in class and the results recorded. ~~The **overall**~~ **percentage will be reduced by 5%** for each lecture or portion thereof missed by the student without prearranged and documented arrangements made with the instructor. One class can be missed without penalty. Civil behavior to include language is mandatory. **Late work will be accepted only for documented excused absences or when prior arrangements have been made.** **Lab:** Students must be **on time** to **all lab sessions** and if late, you may be required to **make up** the lab at another session. If you are going to miss a lab, you must inform the instructor and make arrangements to attend another section (if space is available). If you did not complete a lab in the allotted time, you may attend an "**open lab**" or possibly attend another session if space is available. The report must still come in on time. If handed in late but before 5 p.m. of the due day, 20% penalty. No points for anything later, but hand in report so instructor knows you did perform the lab. **If more than three lab sessions are not attended and no documentation provided, student will receive an F even if other scores are at a passing level. A student attending an open lab must get a signoff from the open-lab instructor. Attendance will be taken.**
Assignments:	***Prior to each lecture, reading assignments must be completed.*** All assignments must be submitted prior to the beginning of class in the designated location. Late or improperly prepared work will not be accepted.
Behavior:	Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. In the lab, students are not permitted to wander about the lab or compare their results with others. Work only with your partner. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be turned off during lecture and lab periods.
Exams and quizzes:	Exams will be given at times listed in the class schedule. All exams are cumulative.

	The final exam will be given at a time to be determined by the University during finals week. Quizzes may be given at any time during the course as required by the instructor. No advanced notice will be given for quizzes and all quizzes will be given during a regularly scheduled lecture or lab period.
Grading Percentage: **(Earned Points/Total Points) * 100**	93-100 A, 90-92.9 A- 87-89.9 B+, 83-86.9 B, 80-82.9 B- 77-79.9 C+, 73-76.9 C, 70-72.9 C- <70 F
Integrity:	All of your assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.
Student Responsibilities:	Assistance in this course is available to help you with academic and other difficulties you may be experiencing. It is your responsibility to seek help. 1. Office hours – I will be happy to work with you during regularly scheduled office hours. 2. Pre-scheduled assistance outside of normal office hours (as my schedule permits). 3. Meet with your Academic advisor. 4. Meet with an educational counselor. College Educational Counselor – Mike Ropele x 2890, JHN 200 5. The ACADEMIC SUPPORT SERVICES CENTER offers free tutoring and assistance for test anxiety, study skills, writing skills, exam preparation, content reading, personal growth, and classroom skills. The Center is located in Room 1017 of the Arts and Sciences Commons Buildings and they can be reached at 591-3543.

Course Schedule

Date	Lecture Topic	Assignment
Week 1	LAN Design	Labs 1.3.1, 2
Week 2	LAN Design	Lab 1.3.3
	Basic Switch Concepts and Configuration	Labs 2.5.1, 2
Week 3	Basic Switch Concepts and Configuration	Lab 2.5.3
	VLANs	Lab 3.5.1
Week 4	VLANs	Lab 3.5.1
Week 5	VLANs	Lab 3.5.3
	VTP	
Week 6	VTP	Lab 4.4.1
Week 7	VTP	Lab 4.4.2
Week 8	VTP	Lab 4.4.3
	STP	Lab 5.5.1
Week 9	STP	Lab 5.5.2
Week 10	STP	Lab 5.5.3

	Inter-VLAN Routing	Lab 6.4.1
Week 11	Inter-VLAN Routing	Lab 6.4.2
Week 12	Inter-VLAN Routing	Lab 6.4.3
	Basic Wireless Concepts and Configuration	Lab 7.5.1
Week 13	Basic Wireless Concepts and Configuration	Lab 7.5.2
Week 14	Basic Wireless Concepts and Configuration	Lab 7.5.3
Week 15	Case Study / Skills Based Assessment	http://btclx1.ferris.edu/cisco/materials_resources/CCNA3_CS1.pdf
Week 16	Final Exam	

Course: ECNS 225 Networks 4

Credits:	3 Hours
Contacts:	2 Lecture, 2 Lab Hours per Week
Course Description:	CCNA Exploration Accessing the WAN is the last of four courses leading to the Cisco Certified Network Associate (CCNA) designation. CCNA 4 introduces Cisco Networking Academy Program students to the fundamentals of WAN technologies. It provides a theoretically-rich, hands on introduction to networking and the Internet. The primary focus of this course is on accessing wide area networks (WAN). The goal is to develop an understanding of various WAN technologies to connect small- to medium-sized business networks. The course introduces WAN converged applications and quality of service (QoS). It focuses on WAN technologies including PPP, Frame Relay, and broadband links. WAN security concepts are discussed in detail, including types of threats, how to analyze network vulnerabilities, general methods for mitigating common security threats and types of security appliances and applications. The course then explains the principles of traffic control and access control lists (ACLs) and describes how to implement IP addressing services for an Enterprise network, including how to configure NAT and DHCP. IPv6 addressing concepts are also discussed. During the course, you will learn how to use Cisco Router and Security Device Manager (SDM) to secure a router and implement IP addressing services. Finally, students learn how to detect, troubleshoot and correct common Enterprise network implementation issues. The labs and Packet Tracer activities used in this course are designed to help you develop an understanding of how to configure routing operations while reinforcing the concepts learned in each chapter.
Course Prerequisites:	Networks 3.
Course Outline:	http://btclx1.ferris.edu/cisco/syllabi/ECNS_225_Outline.pdf
Required Textbooks:	http://btclx1.ferris.edu/cisco/en_EWAN_v4030_ACC_Linux
Course Web Site:	http://btclx1.ferris.edu/cisco/
Required Materials:	Composition Book (Journal)
Reference Materials:	Many excellent books exist on networking and make useful references to go beyond the basics. Some will be discussed throughout the semester.

Faculty: Professor Keith R. Jewett

Office: SWN 403
Phone: (231) 591 – 2954 Alt. Phone: (231) 832 - 0483
Email: jewettk@ferris.edu Alt. Email:

Office Hours:

Day	Times	Day	Times
Tuesday	1200-1250	Thursday	1400-1450
Tuesday	1400-1550		

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate…:

A competent student will be able to perform the following tasks:

1. Describe the impact of Voice Over IP and Video Over IP applications on a network
2. Identify and correct common network problems at layers 1, 2, 3, and 7 using a layered model approach
3. Interpret network diagrams
4. Describe the components required for network and Internet communications
5. Implement basic switch security measures such as port security, trunk access, and management VLANs
6. Explain the operation and benefits of DHCP and DNS
7. Configure, verify, and troubleshoot DHCP and DNS operations on a router
8. Describe current network security threats and explain how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications
9. Describe the functions of common security appliances and applications
10. Describe recommended security practices to secure network devices
11. Describe the purpose and types of access control lists (ACLs)
12. Configure and apply ACLs based on network filtering requirements
13. Configure and apply an ACLs to limit Telnet and SSH access to the router using the Security Device Manager command-line interface (SDM/CLI)
14. Verify, monitor, and troubleshoot ACLs in a network environment
15. Explain the basic operation of Network Address Translation (NAT)
16. Configure NAT for given network requirements using SDM/CLI
17. Troubleshoot NAT issues
18. Describe different methods for connecting to a WAN
19. Configure and verify a basic WAN serial connection
20. Configure and verify a Point-to-Point Protocol (PPP) connection between Cisco routers
21. Configure and verify Frame Relay on Cisco routers
22. Troubleshoot WAN implementation issues
23. Describe the importance, benefits, role, impact, and components of VPN technology

Course Assessments

Grading will be based on points received for various activities to include tests, quizzes, labs, etcetera. No curve is used. Keep all of your returned papers for review and to determine your grade at any point in the semester. Students will be penalized for late work.

1. Homework/Quizzes: [25%]
2. Skills Exam / Labs: [30%]
3. Case Study: [15%]
4. Attendance/attitude/neatness [5%]
5. Final: [25%]
   Given at the time specified in class schedule book, unless other arrangements made.
   Covers all material in class i.e. cumulative!

Course Policies

Attendance:	**Lecture:** Students are expected to be present for every class meeting. Attendance sheets will be passed around in class and the results recorded. ~~The **overall**~~ **percentage will be reduced by 5%** for each lecture or portion thereof missed by the student without prearranged and documented arrangements made with the instructor. One class can be missed without penalty. Civil behavior to include language is mandatory. **Late work will be accepted only for documented excused absences or when prior arrangements have been made.** **Lab:** Students must be **on time** to **all lab sessions** and if late, you may be required to **make up** the lab at another session. If you are going to miss a lab, you must inform the instructor and make arrangements to attend another section (if space is available). If you did not complete a lab in the allotted time, you may attend an "**open lab**" or possibly attend another session if space is available. The report must still come in on time. If handed in late but before 5 p.m. of the due day, 20% penalty. No points for anything later, but hand in report so instructor knows you did perform the lab. **If more than three lab sessions are not attended and no documentation provided, student will receive an F even if other scores are at a passing level. A student attending an open lab must get a signoff from the open-lab instructor. Attendance will be taken.**
Assignments:	***Prior to each lecture, reading assignments must be completed.*** All assignments must be submitted prior to the beginning of class in the designated location. Late or improperly prepared work will not be accepted.
Behavior:	Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. In the lab, students are not permitted to wander about the lab or compare their results with others. Work only with your partner. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be turned off during lecture and lab periods.
Exams and quizzes:	Exams will be given at times listed in the class schedule. All exams are cumulative.

	The final exam will be given at a time to be determined by the University during finals week. Quizzes may be given at any time during the course as required by the instructor. No advanced notice will be given for quizzes and all quizzes will be given during a regularly scheduled lecture or lab period.
Grading Percentage: **(Earned Points/Total Points) * 100**	93-100 A, 90-92.9 A- 87-89.9 B+, 83-86.9 B, 80-82.9 B- 77-79.9 C+, 73-76.9 C, 70-72.9 C- <70 F
Integrity:	All of your assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.
Student Responsibilities:	Assistance in this course is available to help you with academic and other difficulties you may be experiencing. It is your responsibility to seek help. 1. Office hours – I will be happy to work with you during regularly scheduled office hours. 2. Pre-scheduled assistance outside of normal office hours (as my schedule permits). 3. Meet with your Academic advisor. 4. Meet with an educational counselor. College Educational Counselor – Mike Ropele x 2890, JHN 200 5. The ACADEMIC SUPPORT SERVICES CENTER offers free tutoring and assistance for test anxiety, study skills, writing skills, exam preparation, content reading, personal growth, and classroom skills. The Center is located in Room 1017 of the Arts and Sciences Commons Buildings and they can be reached at 591-3543.

Course Schedule

Date	Lecture Topic	Assignment
Week 1	Introduction to WANs	Lab 1.4.1
Week 2	Introduction to WANs	Lab 1.4.1
	PPP	Labs 2.5.1, 2, 3
Week 3	PPP	Labs 2.5.1, 2, 3
Week 4	Frame Relay	Labs 3.5.1, 2, 3
Week 5	Frame Relay	Labs 3.5.1, 2, 3
	Network Security	Labs 4.6.1, 2, 3
Week 6	Network Security	Labs 4.6.1, 2, 3
Week 7	Network Security	Labs 4.6.1, 2, 3
	ACLs	Labs 5.5.1, 2, 3
Week 8	ACLs	Labs 5.5.1, 2, 3
Week 9	ACLs	Labs 5.5.1, 2, 3
	Teleworker Services	
Week 10	Teleworker Services	
Week 11	IP Addressing Services	Labs 7.4.1, 2, 3
Week 12	IP Addressing Services	Labs 7.4.1, 2, 3

Week 13	Network Troubleshooting	Lab 8.3.7
Week 14	Network Troubleshooting	Labs 8.5.1, 2, 3
Week 15	Case Study / Skills Based Assessment	http://btclx1.ferris.edu/cisco/ materials_resources/CCNA4_CS1.pdf
Week 16	Final Exam	

Course: ECNS311 High-level Programming

Credits:	3 (2 for lectures + 1 for labs)
Contacts:	2 lecturer hours, 2 Lab hours per week
Course Description:	Course teaches the fundamentals of C and C++ programming with emphasis on embedded systems and technical applications. C/C++ will be used to solve engineering problems and to introduce concepts of modular program design, object oriented programming, real-time control, system hardware/software dependencies, and other software engineering topics. Topics include structured program design, C/C++ input and output, functions, pointers, arrays, structures, run-time libraries, classes and object oriented design.
Course Prerequisites:	Pre-Requisites: MATH 116 or MATH 126 or MATH 216 or minimum score of 24 on ACT or minimum score of 560 on SAT.

Required Textbooks:	Keninghan, Brian W. & Ritchie, Dennis M., "The C Programming Language", Prentice Hall Software Series, 2nd Edition, 46th Printing 2010, ISBN 0-13-110362-8
Suggested Materials:	2GByte or larger Flash-Drive, Scientific Calculator, Laptop, Microsoft Visual Studio 2012 programming language software.

Faculty: Steve Johnson

Office: Swan 412
Phone (231) 591-2389
Email Steve_Johnson@Ferris.edu

Office Hours and Location

Swan 412 Mon 12:00-12:50

Student Learning Outcomes

Students satisfactorily completing this course will:

1. Understand the command syntax of the C/C++ programming language.
2. Understand the building and compiling of C/C++ projects.
3. Understand program execution and basic debugging methods.
4. Understand object oriented programming.
5. Possess the ability to migrate C/C++ programming onto different platforms like embedded systems, different operating systems, and real-time systems.

Course Policies

Attendance:

According to a study by Robert M. Schmidt ("Who Maximizes What? A Study in Student Time Allocation ", AMERICAN ECONOMIC REVIEW, May, 1983, pp. 23-28) … he found that (while holding constant all other explanatory variables for the grade), the mean GPA for **students with strong attendance was, on average, one entire letter grade higher** than that of students with poorer attendance.

As pupils in a three hundred level class you ~~should~~ must understand the importance of attendance, being prepared, and being on time. These factors are directly connected to your success and therefor are your responsibility as there is no grading reward for attending class.

Information missed by an absence is the student's sole responsibility to obtain from fellow classmates. Missed Quizzes are lost and cannot be rescheduled. Disruptive tardiness will not be tolerated.

Behavior:

Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be muted during lecture and lab periods and must not be a distraction to the student or class. **Basically treat others and your surroundings with respect.**

Exams and quizzes:

Exams will be given at times listed in the class schedule. All exams are cumulative. The final exam will be given at a time to be determined by the University during finals week.

Quizzes may be given at the discretion of the instructor at any time with no advanced notice. Missed quizzes cannot be made up!

Integrity:

All assignments must be developed independently. Students are encouraged to discuss programming concepts with fellow classmates but not their own programming specifics. Cheating will be turned over to the office of Student Judicial Services.

Assignments/Labs:

Assignments are due per the class schedule. Reading assignments are due prior to the lectures where Lab assignments are due at the conclusion of the due date lab session. Lab assignments require a demonstration, check off, and printed listing. Late assignments may be accepted per the class schedule with a 10% reduction in its total possible points. Assignments outside of the class schedule *(over a week late)* will not be accepted.

Grading Percentage:

(Earned/Total Points) * 100

Grading will follow the following formula:

A = 92 – 100, A- = 90 – 91,
B+ = 88 – 89, B = 82 – 87, B- = 80 – 81
C+ = 78 – 79, C = 72 – 77, C- = 70 – 71
D+ = 68 – 69, D = 62 – 67, D- = 60 – 61
F = 0 – 59

Revisions

The instructor reserves the right to make changes and adjustments to the course syllabus and schedule as needed.

Course Schedule:

Week 1	Topic	Assignment Due	Last Call
Aug 26 Lecture	Intro	Read Chap 1	
Aug 28 Lecture	DataTypes	Read Chap 2	
Aug 28 Lab	Lab 1		

Week 2	Topic	Assignment Due	Last Call
Sept 2 Lecture	Labor Day, No Class		
Sept 4 Lecture	DataTypes	Read Chap 2	
Sept 4 Lab	Lab 2	Lab 1	

Week 3	Topic	Assignment Due	Last Call
Sept 9 Lecture	Control Flow	Read Chap 3	
Sept 11 Lecture	Control Flow	Read Chap 3	
Sept 11 Lab	Lab 3	Lab 2	Lab 1

Week 4	Topic	Assignment Due	Last Call
Sept 16 Lecture	Functions	Read Chap 4	
Sept 18 Lecture	Test 1	Understand Chap 1,2,3,4	
Sept 18 Lab	Lab 4	Lab 3	Lab 2

Week 5	Topic	Assignment Due	Last Call
Sept 23 Lecture	Input/Output	Read Chap 7	
Sept 25 Lecture	Structures	Read Chap 6	
Sept 25 Lab	Lab 5	Lab 4	Lab 3

Week 6	Topic	Assignment Due	Last Call
Sept 1 Lecture	Structures, Unions	Read Chap 6	
Oct 2 Lecture	Pointers, Arrays	Read Chap 5	
Oct 2 Lab	Lab 6	Lab 5	Lab 4

Week 7	Topic	Assignment Due	Last Call
Oct 7 Lecture	Pointers, Arrays	Read Chap 5	
Oct 9 Lecture	Disk I/O	Read Handout	
Oct 9 Lab			Lab 5

Week 8	Topic	Assignment Due	Last Call
Oct 14 Lecture	Disk I/O	Read Handout	
Oct 16 Lecture	Test 2	Understand Chap 1-7	
Oct 16 Lab	Lab 7	Lab 6	

Week 9	Topic	Assignment Due	Last Call
Oct 21 Lecture	Classes	Read Handout	
Oct 23 Lecture	Classes	Read Handout	
Oct 23 Lab			Lab 6

Week 10	Topic	Assignment Due	Last Call
Oct 28 Lecture	Classes	Read Handout	
Oct 30 Lecture	Classes	Read Handout	
Oct 30 Lab	Lab 8	Lab 7	

Week 11	Topic	Assignment Due	Last Call
Nov 4 Lecture	Memory Allocation, OOP	Read Handout	
Nov 6 Lecture	Templates	Read Handout	
Nov 6 Lab			Lab 7

Week12	Topic	Assignment Due	Last Call
Nov 11 Lecture	Review/Questions		
Nov 13 Lecture	Test 3		
Nov 13 Lab	Lab 9	Lab 8	

Week 13	Topic	Assignment Due	Last Call
Nov 18 Lecture	Windows Visual C++	Read Handout	
Nov 20 Lecture	Windows Visual C++	Read Handout	
Nov 20 Lab			Lab 8

Week 14	Topic	Assignment Due	Last Call
Nov 25 Lecture	Windows Visual C++	Read Handout	
Nov 27 Lecture	Windows Visual C++	Read Handout	
Nov 27 Lab	Lab 10	Lab 9	

Week 15	Topic	Assignment Due	Last Call
Dec 2 Lecture	Embedded, QNX	Read Handout	
Dec 4 Lecture	Review/Questions	Read Handout	
Dec 4 Lab		Lab 10	Lab 9

Course: ECNS 315 Network Theory and Test

Credits:	4 Hours
Contacts:	3 Lecture, 3 Lab Hours per Week
Course Description:	This course provides a study investigating several advanced telecommunications technologies and techniques producing an in-depth technical understanding of wired and wireless network implementation, operation, and maintenance. Topics include: data transmission principles including time and frequency domain concepts, transmission impairments (delay distortion, noise), channel capacity, sampling and quantization; electronic and optical communication devices and data transmission media; routing and switching theory including routing algorithms and protocols, high-speed networking technologies, queuing theory, congestion control mechanisms; local and wide area network components, interconnection and protocols; network models including LAN, WAN, Cellular and Internet with performance specifications, servers, troubleshooting, and test equipment. Real world labs are the central learning core of this course and are unique and different between groups and vary from year to year. The projects vary with equipment and skills available and are developed for the individual students and their associated groups. The semester's many projects build upon each other and culminate in a complex internetwork. Successful completion of the lab activities will prepare the student well for operational functionality following graduation.
Course Prerequisites:	Networks 4 or current CCNA Certification.
Course Outline:	http://btclx1.ferris.edu/ntt/syllabi/ECNS_315_Outline.pdf
Required Textbooks:	Data & Computer Communications, 9th Ed.; William Stallings; Prentice Hall
Course Web Site:	http://btclx1.ferris.edu/ntt/
Required Materials:	
Reference Materials:	Many excellent books exist on networking and make useful references to go beyond the basics. Some will be discussed throughout the semester.

Faculty: Professor Keith R. Jewett

Office: JOH 308
Phone: (231) 591 – 2954 Alt. Phone: (231) 832 - 0483
Email: jewettk@ferris.edu Alt. Email:

Office Hours:

Day	Times	Day	Times
Tuesday	1200-1320	Wednesday	1330-1550

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate…:

A competent student will be able to perform the following tasks:

1. Demonstrate advanced knowledge of computer/telecommunications networks, benefits and shortcomings of various encoding techniques.
2. Plan, install configure, manage, and troubleshoot advanced WAN/LAN/Wireless technology that was assigned, able to work well with group members in a manufactured, real-world setting, and gain the ability to accomplish tasks without specific, detailed guidelines.
3. Accomplish assignments without specific guidelines (outside of the overall task) from the professor, and will be more prepared for real world by knowing how to work well with others.
4. Prepare, organize, and write a detailed, technical report with a group.
5. Relay the main points of their semester lab successfully to the rest of the class in a presentation.
6. Demonstrate an understanding of how to perform research to learn more about unknown equipment.

Course Assessments

Grading will be based on points received for various activities to include tests, quizzes, labs, etcetera. Keep all of your returned papers for review and to determine your grade at any point in the semester. Students will be penalized for late work.

1. Homework/Quizzes: [40%]
2. Projects: [30%]
3. Attendance/attitude/neatness [5%]
4. Final: [25%]
   Given at the time specified in class schedule book, unless other arrangements made.
   Covers all material in class i.e. cumulative!

Course Policies

Attendance:	**Lecture:** Students are expected to be present for every class meeting. Attendance sheets will be passed around in class and the results recorded. Civil behavior to include language is mandatory. **Late work will be accepted only for documented excused absences or when prior arrangements have been made.** **Lab:** Students must be **on time** to **all lab sessions** and if late, you may be required to **make up** the lab at another session. If you are going to miss a lab, you must inform the instructor and make arrangements to attend another section (if space is available). If you did not complete a lab in the allotted time, you may attend an "**open lab**" or possibly attend another session if space is available. The report must still come in on time. If handed in late but before 5 p.m. of the due day, 20% penalty. No points for anything later, but hand in report so instructor knows you did perform the lab. **If more than three lab sessions are not attended and no documentation provided, student will receive an F even if other scores are at a passing level. A student attending an open lab must get a signoff from the open-lab instructor. Attendance will be taken.**
Assignments:	***Prior to each lecture, reading assignments must be completed.*** All assignments must be submitted prior to the beginning of class in the designated location. Late or improperly prepared work will not be accepted.
Behavior:	Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. In the lab, students are not permitted to wander about the lab or compare their results with others. Work only with your partner. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be turned off during lecture and lab periods.
Exams and quizzes:	Exams will be given at times listed in the class schedule. All exams are cumulative. The final exam will be given at a time to be determined by the University during finals week. Quizzes may be given at any time during the course as required by the instructor. No advanced notice will be given for quizzes and all quizzes will be given during a regularly scheduled lecture or lab period. No makeup for missed quizzes.
Grading Percentage: **(Earned Points/Total Points) * 100**	93-100 A, 90-92.9 A- 87-89.9 B+, 83-86.9 B, 80-82.9 B- 77-79.9 C+, 73-76.9 C, 70-72.9 C- <70 F
Integrity:	All of your assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.
Student Responsibilities:	Assistance in this course is available to help you with academic and other difficulties you may be experiencing. It is your responsibility to seek help. 1. Office hours – I will be happy to work with you during regularly scheduled office hours. 2. Pre-scheduled assistance outside of normal office hours (as my schedule permits). 3. Meet with your Academic advisor. 4. Meet with an educational counselor. College Educational Counselor –

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Course Schedule 9th Edition

Date	Lecture Topic	Assignment (Chapter HW Due*)
Week 1	Overview of Data Communications, Data Networks, and the Internet	‡
	Protocol Architecture, TCP/IP, and Internet-Based Applications	‡
Week 2	Protocol Architecture, TCP/IP, and Internet-Based Applications	‡ (2Q.All, P.3,5,8,11)
	Data Transmission	‡
Week 3	Data Transmission	‡ (3Q.Odd/Even, P.2,16,19,26)
	Transmission Media	‡ (4Q.Even/Odd, P.2,4,6^,11,17)
Week 4	Digital Data Communications Techniques	‡ (6Q.All, P.1,4,9,17)
Week 5	Data Link Control Protocols	‡ (7Q.Odd, P.1,4,7,11,14,20)
Week 6	Circuit Switching and Packet Switching	‡ (10Q.2,5,7,+, P.4,7)
Week 7	Circuit Switching and Packet Switching	‡ (11Q.Odd, P.5)
	Asynchronous Transfer Mode	‡
Week 8	Asynchronous Transfer Mode	‡ (12Q.Even,++, P.1,14,18)
	Routing in Switched Networks	‡
Week 9	Routing in Switched Networks	‡ (13Q.2,4,7, P.2,4)
	Congestion Control in Data Networks	‡
Week 10	Congestion Control in Data Networks	‡ (15Q.Odd+++, P.1,6)
	Local Area Network Overview	‡ (16Q.Even, P.1,6)
Week 11	Ethernet	‡ (18Q.2,3,5,7, P.3,12,25)
	Internet Protocols	‡
Week 12	Signal Encoding Techniques	‡ (5Q.Even, P.1,9,18,19)
Week 13	Spread Spectrum	‡ (9Q.Odd, P.2,3,6,7,9)
Week 14	Cellular Wireless Networks	‡ (14Q.Odd, P.2,4,5) Lab Reports
Week 15	Wireless LANs	‡ (17Q.2,5,7++++) Lab Report Presentation
Week 16	Final Exam	

‡ Refer to Minimum Required Student Laboratory Activities in Course Outline for discussion of lab assignments.

*Most chapters will have homework problems assigned and due at the beginning of first class period of week.

^4P.6 Substitute 76Hz for 30Hz.

+10.Add: What are the relative advantages and disadvantages of frame relay compared to X.25?
What is the difference between InChannel and Common Channel signaling?

++12.Add: What is the Busy-Hour traffic load?

+++15.Add: How do the key requirements for computer room networks differ from those for personal computer local networks?

++++17.Add: List and briefly define three transmission techniques for infrared LANs.

Course: ECNS323 Real Time Operating Systems

Credits:	4
Contacts:	3 lecturer hours, 3 Lab hours per week
Course Description:	Computer operating systems that provide features and performance suitable for high speed control is called real time operating systems. This course will introduce the theory, functional components, features, and specifications of real time operating systems. Lab projects will re-enforce lecture topics and provide experience programming and analyzing real-time operating systems.
Course Prerequisites:	Pre-Requisites: ECNS 311 with minimum grade of C-.

Required Textbooks:	Stallings, William, "Operating Systems Internals and Design Principles", Pearson – Prentice Hall, 7th Edition, 2012.
Suggested Materials:	2GByte or larger Flash-Drive.

Faculty: Steve Johnson

Office: Swan 412
Phone (231) 591-2389
Email Steve_Johnson@Ferris.edu

Office Hours and Location

Swan 412 Mon 12:00-12:50

Student Learning Outcomes

Students satisfactorily completing this course will:

1. Understand the basics of operating systems.
2. Demonstrate an ability to write applications that utilize operating system features and interfaces.
3. Understand concurrency, mutual exclusion and message synchronization and the operating systems role in these techniques.
4. Understand issues with concurrency such as Deadlocks, Starvation and Spinlocks.
5. Demonstrate an understanding of real-time hardware and software concepts.

Course Policies

Attendance:

According to a study by Robert M. Schmidt ("Who Maximizes What? A Study in Student Time Allocation ", AMERICAN ECONOMIC REVIEW, May, 1983, pp. 23-28) … he found that (while holding constant all other explanatory variables for the grade), the mean GPA for **students with strong attendance was, on average, one entire letter grade higher** than that of students with poorer attendance.

As pupils in a three hundred level class you ~~should~~ must understand the importance of attendance, being prepared, and being on time. These factors are directly connected to your success and therefor are your responsibility as there is no grading reward for attending class.

Information missed by an absence is the student's sole responsibility to obtain from fellow classmates. Missed Quizzes are lost and cannot be rescheduled. Disruptive tardiness will not be tolerated.

Behavior:

Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be muted during lecture and lab periods and must not be a distraction to the student or class. **Basically treat others and your surroundings with respect.**

Exams and quizzes:

Exams will be given at times listed in the class schedule. All exams are cumulative. The final exam will be given at a time to be determined by the University during finals week.

Quizzes may be given at the discretion of the instructor at any time with no advanced notice. Missed quizzes cannot be made up!

Integrity:

All assignments must be developed independently. Students are encouraged to discuss programming concepts with fellow classmates but not their own programming specifics. Cheating will be turned over to the office of Student Judicial Services.

Assignments/Labs:

Assignments are due per the class schedule. Reading assignments are due prior to the lectures where Lab assignments are due at the conclusion of the due date lab session. Lab assignments require a demonstration, check off, and printed listing. Late assignments may be accepted per the class schedule with a 10% reduction in its total possible points. Assignments outside of the class schedule *(over a week late)* will not be accepted.

Grading Percentage:

(Earned/Total Points) * 100

Grading will be based on the following formula:

A = 92 – 100, A- = 90 – 91,
B+ = 88 – 89, B = 82 – 87, B- = 80 – 81
C+ = 78 – 79, C = 72 – 77, C- = 70 – 71
D+ = 68 – 69, D = 62 – 67, D- = 60 – 61
F = 0 – 59

Revisions

The instructor reserves the right to make changes and adjustments to the course syllabus and schedule as needed.

Course Schedule:

Week 1	Topic	Assignment Due	Last Call
Jan 13 Lecture	Intro	Read Chap 1-1.4	
Jan 15 Lecture	uProcessor Systems	Read Chap 1.4-1.8	
Jan 15 Lab	Intro		
Jan 17 Lecture	uProcessor Systems	Read 1.8-1A	

Week 2	Topic	Assignment Due	Last Call
Jan 20 Lecture	MLK - No Class		
Jan 22 Lecture	Operating Systems	All of Chap 1,Chap 2-2.3	Review Questions 1.1-1.10
Jan 22 Lab	Lab 1		
Jan 24 Lecture	Operating Systems	Read Chap 2.3-2.6	

Week 3	Topic	Assignment Due	Last Call
Jan 27 Lecture	Operating Systems	Read Chap 2.6-2.8	
Jan 29 Lecture	Operating Systems	Read Chap 2.8-2.13	
Jan 29 Lab	Lab 2	Lab 1	
Feb 31 Lecture	Test 1	Understand Chap 1,2	Review Questions 2.1-2.11

Week 4	Topic	Assignment Due	Last Call
Feb 3 Lecture	Processes	Read Chap 3-3.4	
Feb 5 Lecture	Processes	Read Chap 3.4-3.7	
Feb 5 Lab	Lab 3	Lab 2	Lab 1
Feb 7 Lecture	Processes	Read Chap 3.7-3.10	Review Questions 3.1-3.14

Week 5	Topic	Assignment Due	Last Call
Feb 10 Lecture	Threads	Read Chap 4-4.3	
Feb 12 Lecture	Threads	Read Chap 4.3-4.4	
Feb 12 Lab	Lab 4	Lab 3	Lab 2
Feb 14 Lecture	Threads	Read Chap 4.4-4.10	Review Questions 4.1-4.8

Week 6	Topic	Assignment Due	Last Call
Feb 17 Lecture	Concurrency	Read Chap 5-5.3	
Feb 19 Lecture	Mutual Exclusion	Read Chap 5.3-5.5	
Feb 19 Lab	Lab 5	Lab 4	Lab 3
Feb 21 Lecture	Mutual Exclusion	Read Chap 5.5-5.9	Review Questions 5.1-5.13

Week 7	Topic	Assignment Due	Last Call
Feb 24 Lecture	Deadlock & Starvation	Read Chap 6-6.3	
Feb 26 Lecture	Deadlock & Starvation	Read Chap 6.3-6.5	
Feb 26 Lab	Lab 6	Lab 5	Lab 4
Feb 28 Lecture	Deadlock & Starvation	Read Chap 6.5-6.8	

Week 8	Topic	Assignment Due	Last Call
Mar 3 Lecture	Deadlock & Starvation	Read Chap 6.8-6.11	
Mar 5 Lecture	Deadlock & Starvation	Read Chap 6.11-6.13	
Mar 5 Lab	Lab 7	Lab 6	Lab 5
Mar 7 Lecture	Test 2	Understand Chap 1-6	Review Questions 6.1-6.7

	Topic	Assignment Due	Last Call
Mar 10 - 14	Spring Recess - no Class		

Week 9	Topic	Assignment Due	Last Call
Mar 17 Lecture	Concurrency Pitfalls	Handout - Concurrency in Embedded Systems (Part 1)	
Mar 19 Lecture	TOCTTOU	Handout - Concurrency in Embedded systems (Part 2)	
Mar 19 Lab	Lab 8	Lab 7	Lab 6
Mar 21 Lecture	Avoiding Concurrency Problems	Handout - Concurrency in Embedded Systems (Part 3)	

Week 10	Topic	Assignment Due	Last Call
Mar 24 Lecture	Introducing Linux and Concurrency	Handout - Concurrency in Embedded Systems (Part 4)	
Mar 26 Lecture	Memory Management	Read Chap 7-7.3	
Mar 26 Lab	Lab 9	Lab 8	Lab 7
Mar 28 Lecture	Memory Management	Read Chap 7.3-7.5	

Week11	Topic	Assignment Due	Last Call
Mar 31 Lecture	Memory Management	Read Chap 7.5-7.A	Review Questions 7.1-7.9
Apr 2 Lecture	Virtual Memory	Read Chap 8-8.3	
Apr 2 Lab	Lab 10	Lab 9	Lab 8
Apr 4 Lecture	Virtual Memory	Read Chap 8.3-8.6	

Week 12	Topic	Assignment Due	Last Call
Apr 7 Lecture	Virtual Memory	Read Chap 8.6-8.8	
Apr 9 Lecture	Uniprocessor Scheduling	Read Chap 9-9.2	
Apr 9 Lab	Lab 11	Lab 10	Lab 9
Apr 11	Exam 3	Understand Chap 1-8	Review Questions 8.1-8.12

Week 13	Topic	Assignment Due	Last Call
Apr 14 Lecture	Uniprocessor Scheduling	Read Chap 9.2-9.3	
Apr 16 Lecture	Uniprocessor Scheduling	Read Chap 9.3-9.6	Review Questions 9.1-9.11
Apr 16 Lab	Lab 12	Lab 11	Lab 10
Apr 18 Lecture	Mid-Sem Recess – No Class		

Week 14	Topic	Assignment Due	Last Call
Apr 21 Lecture	Multiprocessor Scheduling	Read Chap 10-10.2	
Apr 23 Lecture	Multiprocessor Scheduling	Read Chap 10.2-10.5	
Apr 23 Lab	Lab 13	Lab 12	Lab 11
Apr 25 Lecture	No Class – SR Projects	Extra Credit Opportunity	

Week 15	Topic	Assignment Due	Last Call
Apr 28 Lecture	Multiprocessor Scheduling	Read Chap 10.5-10.8	Extra Credit Turn-In
Apr 30 Lecture	Multiprocessor Scheduling	Read Chap 10.8-10.10	
Apr 30 Lab		Lab 13	Lab 12
May 2 Lecture	Questions		Review Questions 10.1-10.8

Course: ECNS-414 Advanced Digital Systems

Credits:	4 Hours
Contacts:	3 Lecture, 3 Lab Hours per Week
Time:	Lecture: T,R(9:30-10:20) SWN502 Lab: R 5:00 – 7:50PM SWN 411
Course Description:	*As a continuation of EEET 222, this course will expand the concepts of internal CISC microcontroller hardware with advanced assembly language. Advanced concepts such as timers, pulse width modulation and feedback control will be explored. Introduction to embedded systems will be introduced using embedded C language with existing hardware and software tools.*
Course Prerequisites:	EEET 122, EEET 212, EEET 222 (Minimum 70 required in each course)
Course Outline:	The official course outline is located in the EET/CNS office
Required Textbooks:	Software and Hardware Engineering: Assembly and C Programming for the Freescale HCS12 Microcontroller, Frederick M. Cady, 2nd Edition, ISBN-13: 978-0195308266 Freescale Data Sheets – available as free PDF files – details in class
Course Web Site:	Reference materials, homework, handouts and updates can be found under this course in MyFSU through the Ferris State University home page.
Required Materials:	Electronics kits for lab.

Faculty: Professor Robert Most

Office: Johnson – 415
Phone: (231) 591 – 3044
Email: robertmost@ferris.edu

Office Hours*:

Day	Times	Day	Times
Tue	2:00-2:50PM	Thurs	8:30-9:20AM
Fri	8:00-9:50AM		

*Note: May be in lab.

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. Use of assembly language in CISC microcontroller A/D conversion
2. Feedback control using lab hardware and software
3. Use of C language in embedded applications
4. Application of an Integrated Development Environment in executing and debugging software and hardware

Course Assessments

Student learning outcomes will be assessed as follows:

- Graded Homework
- Five Exams through the semester
- Graded Lab Reports
- Final Exam

Course Policies

Attendance:	Attendance is not graded; however, students are responsible for all material that is presented in class, as well as homework.
Homework:	Homework will be due the week after assigned and collected in class. Late assignments will incur a 20% penalty. Late assignments will not be accepted after homework solutions have been distributed. All work must be shown for credit.
Lab Safety & Conduct:	Students must follow safety guidelines for lab. Unsafe behavior will result in expulsion from lab and a forfeiture of the week's lab grade. Students are encouraged to use web resources and tools to aid in reports, calculations and data sheets. Inappropriate websites visited during lab may result in expulsion from lab and a forfeiture of the week's lab grade.
Exams and quizzes:	Exams will be given at times listed in the class scheduled. Students that cannot attend regular exams must make prior arrangements, or otherwise forfeit the exam grade.
Grading:	In accordance with established policy in the Ferris State University catalog and student handbook. 90 =< [A-] < 93, A >= 93 80 =< [B-] < 83, 83 =< [B] < 87, 87 =< [B+] < 90 70 =< [C-] < 73, 73 =< [C] < 77, 77 =< [C+] < 80 60 =< [D-] < 63, 63 =< [D] < 67, 67 =< [D+] < 70 60 > [F]
Weighting:	Homework 10% Labs 20% Quizzes (up to 7) 10% Exams (5) 40% Final 20%
Integrity:	All student assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.

Student Responsibilities:	Scheduling changes may occur and will be announced with advanced notice. Writing ability, correct use of grammar and spelling will be considered in the grading of homework, project reports and essay questions on examinations. Students are encouraged to participate in lecture discussion for maximum interaction.
Miscellaneous:	Students with disabilities that may restrict their full participation in course activities are encouraged to meet with the instructor or contact the FSU Office of Disability Services, Arts & Sciences Common 1017K (x3772) for assistance.

Course Schedule

Fall 2013 Events Schedule ECNS-414

Week		Date	Assignment	Due	Last day to turn in for credit	Comments
1	T	27-Aug	Homework #1 / Lab #1			
	R	29-Aug				
	F	30-Aug				
2	T	3-Sep				
	R	5-Sep		Homework #1	Homework #1	Solutions Distributed
	F	6-Sep	**B.A.R.T. - TEST #1**			
3	T	10-Sep	Homework #2 / Lab #2			
	R	12-Sep		Lab #1		
	F	13-Sep				
4	T	17-Sep	Lab #3			
	R	19-Sep		Lab #2	Lab #1	
	F	20-Sep				
5	T	24-Sep	Lab #4			
	R	26-Sep		Homework #2, Lab #3	Homework #2, Lab #2	Solutions Distributed
	F	27-Sep	**TEST #2**			
6	T	1-Oct	Lab #5, Homework #3			
	R	3-Oct		Lab #4	Lab #3	
	F	4-Oct	Advisory Meeting			
7	T	8-Oct	Lab #5 Continued			
	R	10-Oct			Lab #4	
	F	11-Oct				
8	T	**15-Oct**	Lab #6			
	R	17-Oct		Homework #3, Lab #5	Homework #3	Solutions Distributed
	F	18-Oct	**TEST #3**			
9	T	22-Oct	Lab #7, Homework #4			Mid Term Grades Due 9AM
	R	24-Oct		Lab #6	Lab #5	
	F	25-Oct				
10	T	29-Oct	Lab #7 Continued			
	R	31-Oct			Lab #6	Last day for 'W' Grade
	F	1-Nov				
11	T	5-Nov	Lab #8			
	R	7-Nov		Homework #4, Lab #7	Homework #4	Solutions Distributed
	F	8-Nov	**TEST #4**			
12	T	12-Nov	Lab #9, Homework #5			
	R	14-Nov		Lab #8	Lab #7	
	F	15-Nov				
13	T	19-Nov				
	R	21-Nov	Thanksgiving Holiday >>>>>>>>>>>>>>>>>>>>>>>>>			
	F	22-Nov	Thanksgiving Holiday >>>>>>>>>>>>>>>>>>>>>>>>>			
14	T	26-Nov	Lab #10			
	R	28-Nov		Homework #5, Lab #9	Homework #5Lab #8	Solutions Distributed
	F	29-Nov	**TEST #5**			
15	T	3-Dec	No Lab			
	R	5-Dec				
	F	6-Dec		Lab #10	Lab #9, Lab #10	
16	M	9-Dec	<<<<<<Finals Week>>>>>>>			

Note: Labs and homework are due at beginning of class period.
Labs must be checked off in lab before due date for credit.
No Checkoff == No Grade

Course: ECNS-424 Advanced Digitals II

Credits: 4 Hours

Contacts: 3 Lecture, 3 Lab Hours per Week

Time:

Lecture:	TR	1:30 – 2:45PM	SWN 502
Lab:	F	1:00 – 3:50PM	SWN 411

Course Description: *This course is the culmination of microprocessor application with digital electronics. Emphasis will be given in embedded real time applications, both in hardware and software. Software applications will be analyzed using an in-circuit debugger, using high level C programming algorithms. RISC based microcontroller architecture will be explored using the Microchip PIC series Flash based devices.*

Course Prerequisites: EEET 412 (Minimum 70 required)

Course Outline: The official course outline is located in the EET/CNS office

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Required Textbooks: Microchip PIC18F4520 PDF – 390 pages, free download

Course Web Site: Reference materials, homework, handouts and updates can be found under this course in MyFSU through the Ferris State University home page.

Required Materials: Electronics kits for lab, Microchip PICDEMO2+ board.

Faculty: Professor Robert Most

Office: Johnson – 415
Phone: (231) 591 – 3044
Email: robertmost@ferris.edu

Office Hours*:

Day	Times	Day	Times
Tue	8:30-9:20	Thurs	8:30-9:20
Fri	9-9:50AM, 4-4:50PM		

*Note: May be in lab.

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. RISC based Harvard architecture using the PIC18F4520
2. PIC18F4520 assembly and C language
3. PIC18F4520 peripherals – A/D, I/O, I²C, RS-232, LCD panel
4. Final project designing a C based RTOS using all peripherals with PC interface

Course Assessments

Student learning outcomes will be assessed as follows:

- Five Exams through the semester
- Graded Lab Reports
- Formal Lab Report and Presentation

Course Policies

Attendance:	Attendance is not graded; however, students are responsible for all material that is presented in class, as well as homework.
Homework:	Homework will be due the week after assigned and collected in class. Late assignments will incur a 20% penalty. Late assignments will not be accepted after homework solutions have been distributed. All work must be shown for credit.
Lab Safety & Conduct:	Students must follow safety guidelines for lab. Unsafe behavior will result in expulsion from lab and a forfeiture of the week's lab grade. Students are encouraged to use web resources and tools to aid in reports, calculations and data sheets. Inappropriate websites visited during lab may result in expulsion from lab and a forfeiture of the week's lab grade.
Exams and quizzes:	Exams will be given at times listed in the class scheduled. Students that cannot attend regular exams must make prior arrangements, or otherwise forfeit the exam grade.
Grading:	In accordance with established policy in the Ferris State University catalog and student handbook. 90 =< [A-] < 93, A >= 93 80 =< [B-] < 83, 83 =< [B] < 87, 87 =< [B+] < 90 70 =< [C-] < 73, 73 =< [C] < 77, 77 =< [C+] < 80 60 =< [D-] < 63, 63 =< [D] < 67, 67 =< [D+] < 70 60 > [F]
Weighting:	Labs 15% In Depth Labs 20% Lab Presentations 5% Exams (5) 60%
Integrity:	All of your assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.
Student Responsibilities:	Scheduling changes may occur and will be announced with advanced notice. Writing ability, correct use of grammar and spelling will be considered in the

	grading of homework, project reports and essay questions on examinations. Students are encouraged to participate in lecture discussion for maximum interaction.
Miscellaneous:	Students with disabilities that may restrict their full participation in course activities are encouraged to meet with the instructor or contact the FSU Office of Disability Services, Arts & Sciences Common 1017K (x3772) for assistance.

Course Schedule

Winter 2014 Events Schedule ECNS-424						
Week		Date	Assignment	Due	Last day to turn in for credit	Notes
1	T	14-Jan				
	R	16-Jan				Lab #1 is not turned in
	F	17-Jan	Lab #1			
2	T	21-Jan				
	R	23-Jan				
	F	24-Jan	Lab #2			
3	T	28-Jan				
	R	30-Jan				
	F	31-Jan	Lab #3	Lab #2 Report		
4	T	4-Feb	**Test #1**			
	R	6-Feb				
	F	7-Feb	Lab #4	Lab #3 Report	Lab #2	
5	T	11-Feb				
	R	13-Feb				
	F	14-Feb	Lab #5	Lab #4 Report	Lab #3	
6	T	18-Feb				
	R	20-Feb				
	F	21-Feb	**IDL #1**	Lab #5 Report	Lab #4	
7	T	25-Feb	**Test #2**			
	R	27-Feb				
	F	28-Feb			Lab #5	
8	T	4-Mar				
	R	6-Mar				
	F	7-Mar	**IDL #2**	**IDL #1 Report**		
SPRING BREAK March 8th thru March 17th						Midterm grades due 3/10
9	T	18-Mar		**>IDL #1 Presentation<**	**IDL1**	
	R	20-Mar				
	F	21-Mar	Lab Cancelled - Robotics Competition			
10	T	25-Mar	**Test #3**			
	R	27-Mar				Last day for "W" grades 3/28
	F	28-Mar	**IDL #3**	**IDL #2 Report**		
11	T	1-Apr	Lecture and Lab Cancelled			
	R	3-Apr	Conference			
	F	4-Apr				
12	T	8-Apr		**>IDL #2 Presentation<**	**IDL2**	
	R	10-Apr				
	F	11-Apr	**IDL #4**	**IDL #3 Report**		
13	T	15-Apr		**>IDL #3 Presentation<**	**IDL3**	
	R	17-Apr	Easter Recess April 17th - 20th			
	F	18-Apr				
14	T	22-Apr	**Test #4**			
	R	24-Apr				
	F	25-Apr	Senior Project			
15	T	29-Apr		**IDL #4 Report**		
	R	1-May		**>IDL #4 Presentation<**	**IDL4**	
	F	2-May	**Test #5 (optional)**			
16	M	5-May	<<<<<<Finals Week>>>>>>>			

Course: ECNS 425 Network Security Theory - Technology

Credits:	3 Hours
Contacts:	2 Lecture, 2 Lab Hours per Week
Course Description:	This course provides an in-depth study of the technical aspects of security. Theory and technology of network security in both wired and wireless systems are examined. Topics such as: types of network attacks; how compromise through software or hardware devices occur; encryption theory and network design, and technologies to detect compromise and limited vulnerability are studied.
Course Prerequisites:	ECNS 315 or Department Approval.
Course Outline:	http://btclx1.ferris.edu/nstt/syllabi/ECNS_425_Outline.pdf
Required Textbooks:	Data & Computer Communications, 9th Ed.; William Stallings; Prentice Hall
Course Web Site:	http://btclx1.ferris.edu/nstt/
Required Materials:	
Reference Materials:	Many excellent books exist on networking and make useful references to go beyond the basics. Some will be discussed throughout the semester.

Faculty: Professor Keith R. Jewett

Office: SWN 403
Phone: (231) 591 – 2954 Alt. Phone: (231) 832 - 0483
Email: jewettk@ferris.edu Alt. Email:

Office Hours:

Day	Times	Day	Times
Tuesday	1200-1250	Thursday	1400-1450
Tuesday	1400-1520		

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate…:

A competent student will be able to perform the following tasks:

1. Demonstrate an understanding of the foundation theories of information assurance and data network security.
2. Achieve a broad understanding of the information security process.
3. Demonstrate awareness of the importance of information security policies and legislation.
4. Demonstrate an understanding of the importance of the human factor – social engineering in the planning of security policy and systems.
5. Acquire a structural understanding of the various layers of security vulnerabilities.
6. Prepare, organize, and write a detailed, technical report with a group.
7. Relay the main points of their semester lab successfully to the rest of the class in a presentation.
8. Demonstrate an understanding of how to perform research to learn more about unknown equipment.

Course Assessments

Grading will be based on points received for various activities to include tests, quizzes, labs, etcetera. Keep all of your returned papers for review and to determine your grade at any point in the semester. Students will be penalized for late work.

1. Homework/Quizzes: [40%]
2. Projects: [30%]
3. Attendance/attitude/neatness [5%]
4. Final: [25%]
   Given at the time specified in class schedule book, unless other arrangements made.
   Covers all material in class i.e. cumulative!

Course Policies

Attendance:	**Lecture:** Students are expected to be present for every class meeting. Attendance sheets will be passed around in class and the results recorded. Civil behavior to include language is mandatory. **Late work will be accepted only for documented excused absences or when prior arrangements have been made.** **Lab:** Students must be **on time** to **all lab sessions** and if late, you may be required to **make up** the lab at another session. If you are going to miss a lab, you must inform the instructor and make arrangements to attend another section (if space is available). If you did not complete a lab in the allotted time, you may attend an "**open lab**" or possibly attend another session if space is available. The report must still come in on time. If handed in late but before 5 p.m. of the due day, 20% penalty. No points for anything later, but hand in report so instructor knows you did perform the lab. **If more than three lab sessions are not attended and no documentation provided, student will receive an F even if other scores are at a passing level. A student attending an open lab must get a signoff from the open-lab instructor. Attendance will be taken.**
Assignments:	***Prior to each lecture, reading assignments must be completed.*** All assignments must be submitted prior to the beginning of class in the designated location. Late or improperly prepared work will not be accepted.
Behavior:	Disruptive behavior, vulgar language, sexual innuendo and/or harassment, safety violations, horseplay, etc. will not be tolerated in the classroom or laboratory. In the lab, students are not permitted to wander about the lab or compare their results with others. Work only with your partner. No eating or drinking is permitted in classrooms or laboratories per EEET department policies. All cell phones must be turned off during lecture and lab periods.
Exams and quizzes:	Exams will be given at times listed in the class schedule. All exams are cumulative. The final exam will be given at a time to be determined by the University during finals week. Quizzes may be given at any time during the course as required by the instructor. No advanced notice will be given for quizzes and all quizzes will be given during a regularly scheduled lecture or lab period. No makeup for missed quizzes.
Grading Percentage: **(Earned Points/Total Points) * 100**	93-100 A, 90-92.9 A- 87-89.9 B+, 83-86.9 B, 80-82.9 B- 77-79.9 C+, 73-76.9 C, 70-72.9 C- <70 F
Integrity:	All of your assignments must be developed independently. Cheating of any type will result in loss of credit or more serious consequences.
Student Responsibilities:	Assistance in this course is available to help you with academic and other difficulties you may be experiencing. It is your responsibility to seek help. 1. Office hours – I will be happy to work with you during regularly scheduled office hours. 2. Pre-scheduled assistance outside of normal office hours (as my schedule permits). 3. Meet with your Academic advisor. 4. Meet with an educational counselor. College Educational Counselor –

	Mike Ropele x 2890, JHN 200 5. The ACADEMIC SUPPORT SERVICES CENTER offers free tutoring and assistance for test anxiety, study skills, writing skills, exam preparation, content reading, personal growth, and classroom skills. The Center is located in Room 1017 of the Arts and Sciences Commons Buildings and they can be reached at 591-3543.

Course Schedule 9th Edition

Date	Lecture Topic	Assignment (Chapter HW Due*)
Week 1	Overview of Networking, TCP/IP: The Language of the Internet, Risk Management	‡
Week 2	Risk Management, Types And Sources of Network Threats, Firewalls	‡ (Introduction to Network Security)
Week 3	Secure Network Devices / Conclusions	‡
	CHP 1 – Next Generation Firewalls: Understanding the Evolution of Network Security, CHP 2- Next Generation Firewalls: Defining the Application and Threat Landscape	‡ (Next Generation Firewalls Chapter 1 & 2)
Week 4	CHP 3 – Next Generation Firewalls: Recognizing the Challenges of Legacy Security Infrastructure, CHP 4 – Next Generation Firewalls: Solving the Problem with Next-Generation Firewalls	‡ (Next Generation Firewalls Chapter 3 & 4)
Week 5	CHP 5 – Next Generation Firewalls: Deploying Next Generation Firewalls, CHP 6 – Next Generation Firewalls: Ten Evaluation Criteria for Next Generation Firewalls	‡ (Next Generation Firewalls Chapter 5 & 6)
Week 6	CHP 6 – Next Generation Firewalls: Ten Evaluation Criteria for Next Generation Firewalls	‡
Week 7	Protocol Architecture, TCP/IP, and Internet-Based Applications	‡ (DCC2Q.All, P.3,5,8,11
Week 8	Internet Protocol (18.5)	‡
Week 9	Computer and Network Security Threats	‡ (DCC23Q.All, P.1,3,5,6,9,10)
Week 10	Computer and Network Security Techniques	‡ (DCC24Q.All, P.2,3,6,7,9)
Week 11	Appendix Q	‡ (Appendix Q)
Week 12	CHP 2 - Mobile Working – the Good, the Bad, and the Not So Good, CHP 3 - Keeping Your Mobile Devices, Data and Applications Safe and Secure	‡ (Securing Smartphones & Tablets Chapter 2 & 3)
Week 13	CHP 3 - Keeping Your Mobile Devices, Data and Applications Safe and Secure, CHP 4 - You Can Lead a (Mobile) Horse to Water	‡ (Securing Smartphones & Tablets Chapter 4)
Week 14	CHP 5 - Ten (Okay, Seven) Tips for Securing Your Mobile Devices	‡ (Securing Smartphones & Tablets Chapter 5)
Week 15	Lab Reports	Lab Report Presentation
Week 16	Final Exam	

‡ Refer to Minimum Required Student Laboratory Activities in Course Outline for discussion of lab assignments.
*Most chapters will have homework problems assigned and due at the beginning of first class period of week.

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Email: john.wilson@ni.com

Faculty Vitae

The following are the Curriculum Vitae for the faculty in the CNS Program:

1. Keith Jewett – Professor Emeritus

    Keith Jewett retired at the end of the spring 2014 semester. However, since he has been the primary CNS instructor for the past 5 years, his CV has been included for reference information. Keith Jewett is a Cisco CCNA instructor.

2. Ronald Mehringer - Professor

    Ronald Mehringer is the Program Coordinator and also teaches courses in the IET/EET program as well as various courses in the CNS program. Ronald Mehringer is a Cisco CCNA instructor.

3. Robert Most – Associate Professor

    Robert Most teaches many courses in the IET/EET program but also teaches ECNS-414 and ECNS-424 for the CNS program.

4. Steve Johnson – Adjunct Professor

    Steve Johnson teaches ECNS-311 and ECNS-323 in the CNS curriculum. Steve Johnson is a Cisco CCNA instructor.

Students in the CNS program take a number of courses from the IET/EET curriculum. The following are instructors in the IET/EET program. Their names are included for reference, however, their CVs have not been included for brevity.

5. Warren Klope – Professor

6. Gary Todd – Associate Professor

7. Murry Stocking – Assistant Professor

8. Jeff Pedelty – Adjunct Professor

Keith R. Jewett

Rank: Professor Emeritus

Tenure/Non-Tenure: Tenure/Retired

Department or Division: College of Engineering Technology - Electrical/Electronics Engineering Technology & Computer Networks and Systems

Teaching Experience:
Areas of Involvement (in teaching)

1976 – 1996: United States Navy: 5+ years of instructor duty and 6+ years of shipcommittee training responsibility, in the Naval Nuclear Power Program. Master Training Specialist.

1996 – 1998: Ferris State University, Instructor (Adjunct): Basic Internet, Principles of Information Systems, Introduction to UNIX, Microcomputer Hardware Support, Advanced Internet (Masters), Survey of Information Systems (Masters), Hardware/Software (Masters).

1998 – 2001: Ferris State University, Assistant Professor: UNIX for Managers (Masters), Introduction to Programming, Microcomputer Hardware Support, Telecommunications, Introduction to UNIX, Hardware/Software (Masters), Principles of Information Systems, Advanced UNIX.

2001 – 2014: Ferris State University, Professor: IET Technical Preparation, C/C++ Programming Applications, High Level Programming, Electrical Circuits II (AC), Networks I-IV (Cisco), Network Theory and Test, Digital 1, Wireless Networks, Real Time Operating Systems, Special Studies in ECNS, Network Security Theory and Technology.

B. Education Background

1998 M.S., Ferris State University - Major: Information Systems Management
Associate Diploma, Government Institutes, Inc. - Major: Environmental, Health & Safety
1986 B.S., New School for Social Research - Major: Human Resources Management

C. Prior Experience not in Education

1976 – 1996: United States Navy: Submarine Nuclear Propulsion Plant Supervisor, Nuclear Propulsion Plant Maintenance Supervisor – Electronics. Last Position Held: Drug and Alcohol Program Advisor and Hazardous Waste Coordinator. Security Clearance: Top Secret.

1995 – 1996: A World of Difference, Charleston SC: Webmaster.
1993 – 2014: Independent Computer Consultant, programming and networking.
1996 – 2002: MultiMag, Inc, Reed City MI: Production Manager.

D. Professional Memberships

I.E.E.E. (Institute of Electrical and Electronic Engineers)

E. Professional Meetings Attended

Internet World Summer '97.
MACUL, 2001.
COMDEX, 2001.
Cisco Networking Academy Conference, 2007.

F. Papers Presented

Presented a paper on "Teach Your Students How to Build Their Own PC" at Michigan Association for Computer-related technology Users in Learning 2001: A Tech Odyssey in Detroit on March 16, 2001.

G. Publications - None.

H. Other Research Activity - None.

I. Consulting

Computer system design consulting for Peter S. VanDeMark, M.D. Internal Medicine.
Computer system design consulting for Family Optometric Centers.
Website (database) design, programming and maintenance for RMLS Multi-List (www.realestate-mls.com).

J. Professional Growth Activities

Attendance at numerous seminars and workshops including: Grant Writing for New Faculty, Legal Issues for Educators Panel Discussion, and Extended Orientation Program for New Faculty Training conducted by the Center for Teaching, Learning, and Faculty Development (including training on: Teaching Styles, Teaching in a Lab Setting, Integration of Study Strategies Teaching Critical Thinking Skills and Asking the Right Questions, How College Students Learn Cognitive Theories and Learning Styles, Academic Advising, Strategies for Evaluating Teaching Effectiveness, Questions to Promote Discussion Critical Thinking and Metacognitive Development, Use of Media Tools/Internet in Teaching, Grant Writing/Scholarly Writing, and Diversity and Teaching).

Lilly West Conference on College & University Teaching.

Understanding Voice/Data Communications, Alexander Hamilton Institute Incorporated, 1998.

Telecommunications Technologies for the Non-Engineering Professional, Data-Tech Institute, 1998.

Reading of related professional materials published by T.H.E. Journal, Performance Computing, Network Magazine, PC Week, Enterprise Solutions, Electronic Systems Technology & Design, Computer Technology, Intelligent Enterprise, Computer Telephony, InTelligence, ComputerWorld.

Consulting activities.
CCNA (Cisco Certified Network Associate) and CCAI (Cisco Certified Academy Instructor) certified.

K. Seminars, Training Programs, etc., Conducted for Business and Industry - None.

L. Professional Presentations, Speeches, etc.

Presented a paper on "Teach Your Students How to Build Their Own PC" at Michigan Association for Computer-related technology Users in Learning 2001: A Tech Odyssey in Detroit on March 16, 2001.

M. Institutional Services Performed

Campus-Wide Committees: University Committee on Discipline, University Committee on Security

Management, Academic Senate, Senate Student Life Committee, Senate Health Promotion and Substance Abuse Prevention Committee, Academic Affairs Representative to Banner Data Security Team, Radiation Safety Committee, Senate Executive Committee.

College-Wide Committees: With College of Business: Computer Usage Committee, Recruiting and Retention Committee.
With College of Engineering Technology: Promotion and Merit.

Department-Wide Committees: With CIS/College of Business: Academic Program Review Panel, Online Standards Committee, Summer Computer Institute Planning Committee.
With EEET & CNS: CNS Program Curriculum Development, Tenure.

Other: With CIS/College of Business: Advisor to the Computer Information Systems Association (C.I.S.A.) Student Association.
With EEET & CNS: Advisor to the Student IEEE Association.

N. Recognition and Honors

Memos of Recognition from President Sederburg for being singled out by students as a faculty who "made a difference."

Recipient of "2001 Outstanding Student Affairs Partner Honoree" award.

O. Professionally Related Community Activities
Served on Advisory Committee for the Mecosta-Osceola Career Center

II. Educational Background to document graduate course work in the field of Computer Network Systems to support doctoral level preparation.

The following specific courses are presented to document graduate course work in the field of Computer Network Systems / Telecommunications sufficient to support doctoral level preparation:

A. Coursework taken as part of Ph.D. in Organization and Management (Emphasis in Communications Technology) from Capella University:

1. Survey of Research Methodology (4 credits)
2. Computerized Management Information Systems (4 credits)
3. Special Topics in Organization and Management (36 credits)
4. Survey of Research in Organization and Group Dynamics (4 credits)
5. Network Technology (4 credits)
6. Telephony I (4 credits)
7. Network Management (4 credits)
8. Strategic Planning (4 credits)
9. Ethics and Social Responsibility (4 credits)
10. Marketing Strategy and Practice (4 credits)
11. Accounting and Financial Management (4 credits)
12. Proseminar (4 credits)
13. Introduction to Object-Oriented Design (4 credits)
14. Fundamentals of E-Business (4 credits)
15. Introduction to Digital Transmission (4 credits)

III. Teaching Experience sufficient to document doctoral level expertise

Curriculum development activities include the following: Participating in the academic program review of the Computer Information Systems degree program, participating in the new Computer Information Systems major, participating in the new Management Information Systems major.

Course development activities include the following: Leading the conversion of ISYS 300 (formerly ISYS 405), ISYS 310, and ISYS 350; and new course development of ISYS 275 (formerly ISYS

369), ISYS 325, and ISYS 375.

Courses taught include the following: Basic Internet, Principles of Information Systems, Introduction to UNIX, Microcomputer Hardware Support, Advanced Internet (Masters), Survey of Information Systems (Masters), Hardware/Software (Masters), UNIX for Managers (Masters), Introduction to Programming, Telecommunications, Advanced UNIX, IET Technical Preparation, C/C++ Programming Applications, High Level Programming.

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Teaching techniques include the following: Emphasizing active learning by employing a variety of techniques, including teams, portfolios, student presentations of research projects, web site development projects, discussions of current events related to course opportunities for self-analysis and application of course concepts; employing “hands-on” processes and assignments including computer construction; inviting guest speakers; organizing field trips; supervising independent studies for academic credit.

IV. Documented Practical Experience

CCNA (Cisco Certified Network Associate) and CCAI (Cisco Certified Academy Instructor) certified.

V. Consulting Experience

Consulting experience ties into teaching in the classroom as follows: computer consulting for various companies directly relates to the classroom experience in that allows the instructor to bring into the classroom the processes, techniques, experiences, and the like of real-life organizations – specifically current state of the UNIX platform, PC hardware, and Networks.

VI. Scholarly Activity - None.

Ronald A. Mehringer

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E-mail: RonaldMehringer@ferris.edu

Professional Objective

My personal and professional objective is to be the best teacher that I can be. I will always strive to provide my students with a learning centered education that will prepare them with the skills and knowledge they will need to be successful. I will always continue my educational and professional development to ensure the quality of the education that I provide to my students,

Education

- Master of Science, Industrial Engineering, University of Pittsburgh, Pittsburgh, PA
- Master of Science, Electrical Engineering, Carnegie Mellon University, Pittsburgh, PA
- Bachelor of Science, Electrical Engineering, Case Western Reserve University, Cleveland, OH

Teaching Experience

- Assistant Professor, EET & CNS Department, College of Engineering Technology, Ferris State University, Big Rapids, Michigan, 2004 to present.
- Developed and Taught EEET-111 Mobile Robots
- Taught the following:
    - EEET-114 Electric Circuits 1
    - EEET-124 Electric Circuits 2
    - EEET-115 Electronics for HVAC/R
    - EEET-201 Electrical Fundamentals
    - ECNS-125 Networks 2
    - EEET-224 Industrial Automation and Controls

Professional Societies

- Member of Association of Engineering Educators (ASEE)
- Member of the Institute of Electronic and Electrical Engineering (IEEE)

Additional Educational Studies

- Doctor of Philosophy (Not Completed), Electrical Engineering, University of Pittsburgh, Pittsburgh, PA – Course work completed and comprehensive examination passed, dissertation (not completed) investigated laser beam combination utilizing Brillouin scattering
- Cisco Systems, Inc. CCNA Instructor Training, Davenport University
- CCNA1, CCNA2, CCNA3 and CCNA4 completed.
- Faculty Center for Teaching and Learning (FCTL) WebCT Instruction
- Faculty Center for Teaching and Learning (FCTL) Learning Institution Seminars
- Ferris State University Seminar (FSUS) Training Program
- FerrisConnect Training by FerrisConnect Training Committee
- Independent Study in Physics – I have pursued many areas of physics through a program of independent study and research. My main areas of interest include quantum mechanics, general relativity, photonics, quantum field theory, mathematical physics and quantum electronics.

University Associations

- Former Member of the University Professional Development Committee
- Member of the University Committee on Discipline
- Member of the University Academic Policy and Standards Committee
- Member of the Institutional Strategic Planning Council
- Member of the Academic Program Review Council
- Chairperson of the Curriculum Committee for the EET/CNS Department

Awards

- 2005 Recipient of Ferris Foundation Exceptional Merit Grant

Referred Publication

- "A Statistical Description of Stimulated Brillouin Scattering Beam Combination Efficiency," Raijun Chu, Xuelei Hua, Ronald Mehringer, Paul Suni, Morton Kanefsky and Joel Falk, IEEE Journal Of Quantum Electronics, Volume 28, June 1992.

Research Paper

- "A Brief Discussion of the Analogy between Gravitational Field Theory and Electromagnetic Field Theory," Ronald A. Mehringer, PhD Application Paper submitted to and accepted by the Doctoral Candidate Acceptance Committee at the University of Pittsburgh.

Research Studies

- Participated in research at the University of Pittsburgh that investigated the mutual coherence between two stimulated Brillouin signals produced by undepleted pump beams that are partially overlapped and the statistical properties of the mutual coherence at the University of Pittsburgh with Dr. Joel Falk, Dr. Morton Kanefsky, Raijun Chu and Paul Suni.

Professional Conferences

- Lilly West Conference on Teaching and Learning, Pomona, CA, 2005.

Industrial Experience

- Vice President, Marshall Electronics Division, Pittsburgh, PA
- Project Manager, Marshall Electronics Division, Pittsburgh, PA
- Field Service Engineer, Marshall Electronics Division, Pittsburgh, PA
- (Marshall Electronics Division manufactures industrial communications systems, data transmission systems, factory automation systems and remote control systems)

Industrial Project Experience

- Designed transmission tower elevator control and communications systems for special manlift systems in tower structures up to 2,000 feet tall.
- Designed embedded controller systems for automated applications including real time robotic and vehicle control.
- Designed and implemented an automated warehouse system for Caterpillar in Peoria, IL and Lands' End in Dodgeville, WI.
- Designed and implemented a remote control and monitoring system for emergency ventilation fans in the New York City subway system.
- Designed and implemented several communications systems for Formosa Plastics Corp. in Taiwan, ROC.
- Designed and implemented a remote control system for an overhead crane used on the Semac II, an oil pipe-laying vessel in the North Sea.

- Designed and implemented a remote control system for overhead transport cranes used by Amoco Oil in Texas.

References:

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EDUCATION

Master of Science, Electrical Engineering, Cornell University, Ithaca, NY 1988
(Admitted into in PhD program, full Research Assistantship)
Bachelor of Science, Electrical Engineering (5 year + Thesis),
GMI Engineering and Management Institute, Flint, MI 1987

PROFESSIONAL EMPLOYMENT HISTORY

FERRIS STATE UNIVERSITY 2004-Present
Assistant Professor (tenure track), College of Engineering Technology, Electronics / CNS Department

SAGINAW VALLEY STATE UNIVERSITY 1999-2004
Adjunct, Faculty Member, Department of Electrical and Computer Engineering

ALAMANDO ENTERPRISES 1999-Present
DBA, Self-employed Electronics Consulting

DOW CORNING CORPORATION 1996-2004
1988-1990
Associate Engineering Specialist 2001-2004
Senior Project Engineer 1996-2001
Electrical Engineer 1988-1990

SAGIAN CORPORATION 1994-1996
Lead Hardware Engineer

THE DOW CHEMICAL COMPANY 1990-1994
Senior Research Engineer

GENERAL MOTORS CORPORATION, OLDSMOBILE DIVISION 1982-1987
Cooperative Education Student, Engineering

SELECTED ACCOMPLISHMENTS

UNIVERSITY:

- Member of the Faculty Center for Teaching and Learning's Faculty Advisory Group (member since 11/2006).
- Ferris State University Student Judicial Services faculty (volunteer since 9/2006).
- FSU Grant Writing Workshop (1/2006)

COLLEGE OF ENGINEERING TECHNOLOGY:

- COT Curriculum Committee member (appointed 8/2007).
- Recipient of Timme Funding for the Embedded Systems Conference (4/2007).
- Recipient of a Faculty Development Grant for the Embedded Systems Conference (4/2007).

EET/CNS DEPARTMENT:

- EET/CNS Academic Program Review Chairman (since 3/2007).
- EET/CNS Curriculum Committee member (since 1/2005).
- Webmaster / creator of http://www.seniordesignprojects.com

TEACHING EXPERIENCE:

- ECE-355 **Microprocessors I (SVSU)**
  - Authored 12 original labs
- FSUS-100 **Freshman Seminar**
- EEET-124 (Lab)
- EEET-210 **Electronic Communications**
  - Authored 13 original labs
- EEET-211 **Electronics**
  - Authored 10 original labs
- EEET-212 **Digital Electronics II**
  - Authored 12 original labs
- EEET-221 **Troubleshooting**
  - Authored 10 original labs
- EEET-222 **Microprocessor Applications**
  - Authored 13 original labs
- EEET-411 **Advanced Communications I**
  - Authored 12 original labs
- EEET-418 **Project Management**
- EEET-422 **Advanced Digital Design II**
  - Authored 10 original labs
- EEET-428 **Senior Design**

PATENT DISCLOSURES:

1. Hardware Driving Scheme for Flexible Printable Electrochromic Displays, Aveso Inc., 2005.
2. Planar Pixel Timers Using Electrochromic Ink, Aveso Inc., 2005.

EXTERNAL PUBLICATIONS:

1. Hall Effect IC Doubles as Spark Detector, **Electronic Design**, (pending)
2. Circuit Provides Synchronization for Flashing LEDs, **Electronic Design**, October 28, 2004

3. Plasma Impacts to an Oxygen Doped Silicon Carbide Low-k Barrier Film, **Journal of the Electrochemical Society**, (co-author – August, 2004)
4. Circuit Provides 4-20mA Loop for Microcontrollers, **EDN**, May 27, 2004
5. Scalable Latch Requires no Capacitor or Clock, **EDN**, August, 2004
6. Hall Effect IC Doubles as Spark Detector, **Electronic Design**, (under review)
7. The Physics of Dielectric Films, **Semiconductor International**, June 2004
8. Single Diode Increases Bandpass Filter's Q, **Electronic Design**, October, 2000
9. Pyroluminescent Regulometer, **Saginaw Valley State University**, ECE-355 Design Paper, March, 1999
10. C Routine Reads Values from 3 Wire Serial A/Ds, **Electronic Design**, January 1995
11. AM Radio Transmission, **Modern Electronics**, March, 1991
12. Program Calculates BPF Component Values, **EDN**, May 1989
13. Circuit Selects Single or Multiple Lines, **EDN**, September 1987
14. Using Current Differencing Operational Amplifiers, **Modern Electronics**, September 1987
15. TTL Master Mind Game, **Electronics Special Projects** Radio, June 1985
16. TTL Slot Machine Game, **Radio Electronics Special Projects**, December 1983
17. TTL Laser Game, **Radio Electronics Special Projects**, March 1983
18. CMOS Plant Water Gauge, **Radio Electronics**, January 1981

INTERNAL PUBLICATIONS:

1. Analysis of Dielectric Stacks on Semiconductor Wafers, **Dow Corning** TIS Report 2004-I0000-53778, 2004
2. Dielectric Spectroscopy of Amorphous Hydrogenated Silicon Carbide Thin Films, **Dow Corning** TIS Report 2004-I0000-53687, 2004
3. Measurement of Thin Film Dielectric Properties, **Dow Corning** TIS Report 2003-I0000-53016, 2003
4. Analysis of Parasitic Capacitive Effects in Measuring Dielectric Constant for Series MIS Capacitor Structures, **Dow Corning** TIS Report 2002-I0000-52167, 2002
5. Application Guide for Process Control Equipment Grounding, **Dow Corning** EMTN 16.020.003, June 1998
6. Facilities Engineering Process Information and Control Design Criteria, Dow Corning EMTN 13.403.004, January 2000
7. CAMILE TG Hardware Port I/O Committee Level Design 32 Channel Analog Input, **Dow Chemical**, Central Research report CREL-435, 1994
8. CAMILE TG Hardware Port I/O Committee Level Design Multisensor Analog Input, **Dow Chemical**, Central Research report CREL-434, 1994
9. CAMILE TG Hardware Port I/O Committee Level Design 32 Channel Digital Input/Output, **Dow Chemical**, Central Research report CREL-433, 1994
10. CAMILE TG Hardware Port I/O Committee Level Design 8 Channel Analog Output, **Dow Chemical**, Central Research report CREL-432, 1994

THESES:

1. Application of the TMS320C25 Digital Signal Processor to Doppler Shift Ultrasonic Fluid Flow Measurements, **Cornell University** Master's Thesis, 1988
2. Maintenance of Equipment Using Vibration Analysis, **GMI** 5th Year Baccalaureate Thesis, 1987
3. The Electrical Engineer's Toolbox, **GMI** supplemental 5th Year Thesis, 1987

EXTRACURRICULAR ACTIVITIES

- Textbook Review Panelist: Communication Electronics, Louis E. Frenzel - McGraw-Hill Science, ISBN: 0028048377 (2006)
- Embedded Systems Conference (3/2007, 1992)
- Instrument Society of America Conference (1991, 1993)
- Pittsburg Conference (1993)
- Society of Automotive Engineers Conference (1992)
- Analog Devices Seminar (1990, 1991, 1993, 1995, 1998, 2004)
- National Semiconductor Seminar (1992, 1994, 1998, 2003)
- Microchip Seminar (1990, 1995, 1997, 2001, 2004)

- Linear Technology Seminar (1996)
- Xilinx Seminar (1995)
- Altera Seminar (1990, 1993)

AWARDS

- 2003 – Dow Corning – Project Engineering Special Recognition Award
- 1992 – Dow Chemical Special Recognition Award – Central Research Engineering Laboratory
- Electronic Design Magazine– Best Design Idea 1995 "C Routine Reads Values from 3 Wire Serial A/Ds"

ADDITIONAL SELECTED ACCOMPLISHMENTS

PROJECT ENGINEERING

- Led capital project engineering team that designed, procured and installed electrical, instrument and process control automation equipment resulting in streamlined operations, reduced environmental emissions and a corporate award for supply chain excellence.
- Designed automation infrastructure and written specifications for automating a line of batch mixers resulting in a 30% improvement in up-time, new data trending and analysis reducing the need for 1 operator.
- Implemented a newly standardized Safety Instrumented System (SIS) for autonomous and redundant process safety shutdown automation for OSHA targeted hazardous plants, which resulted in governmental compliance and reduced environmental risks.
- Authored corporate-wide design criteria for process automation, which eliminated duplication of effort between manufacturing sites standardizing materials and methods applied.

ELECTRONICS ENGINEERING AND RESEARCH

- Designed circuits and firmware for a new generation of data acquisition and control products, which resulted in increased market base and improved applications' speed by
  10 times generating $1 MM in sales.

- Developed a standard test methodology for dielectric spectroscopy of thin film PECVD materials which resulted in a never before seen correlation between dielectric constant and refractive index change over time.

- Constructed a heater control system for liquid delivery of a low-K PECVD precursor in a clean room environment that provided uniform film deposition and properties.
- Implemented an in-circuit reprogrammed FLASH-EPROM based circuit for data acquisition committees, which resulted in elimination of manual calibrations and enabled customers to automatically download the latest software without the need of a service call.
- Designed, tested and prototyped a battery operated variable frequency power supply used in a privacy glass product, which enabled marketing personnel to take functioning samples directly to customers.

Steve Johnson

Rank: Adjunct Professor

Experience

2012-present **Ferris State University** **Big Rapids, MI**

Adjunct Professor, Computer Networks and Systems Department

- Teach C/C++ programming and Realtime Operating Systems courses. Develop lecture and lab material to emphasize key concepts, develop labs, quizzes and exams for student assessments. Taught Theory of Electricity through Ferris State University Corporate & Professional Development and Technology/Energy summer camps.

2005-present **Ferris State University** **Big Rapids, MI**

Equipment Repair Technician, Electronics & Surveying Department

- Repair/calibrate laboratory equipment in the electronics department. Equipment includes power supplies, function generators, oscilloscopes, DMMs, VOMs, decade boxes, relay trainers, and motor trainers. Troubleshoot hardware and software issues relating to data acquisition units and PLCs. Troubleshoot PLC network configurations of Ethernet, Controlnet , and Devicenet. Assist faculty and students with equipment usage, part specifications, and project feasibilities. Purchase and maintain a parts inventory as well as recommend the purchase of new equipment.
- Assist with surveying equipment issues; aid in repairs of Leica Geosystems and Trimble consigned equipment. Work with MDOT on the Continuous Operating Reference Station (CORS) and Trimble's counterpart.

2003-2005 **Ferris State University** **Big Rapids, MI**

Network Infrastructure Team, Wireless Infrastructure Team

- Maintain the reliability of the Ferris State University campus network through an on-call weekend rotational status. Repair downed networks and network services.
- Install, setup, and configure network equipment including switches, routers, passport systems (layer 3 switch), and other network equipment.
- Wire patch panels, pull network cable, and verify network connections.
- Develop, install, configure, and document the Ferris State University's wireless network.

1986-2005 **Ferris State University** **Big Rapids, MI**

Instrument Repair Technician, Telecommunications

- Facilitate repairs of the laboratory equipment for the following colleges/departments: Dental, Clinical Lab Science, Nuclear Medicine, Nursing, Pharmacy, Optometry, Biology, Chemistry, and Physics. Includes maintenance and repair of dental chairs, ultrasonic cleaners, hand pieces, incubators, scales, vacuum pumps, gamma cameras, X-ray machines, nuclear magnetic resonance (NMR's), infrared and flame spectrophotometers, power supplies, resistance boxes, computer controlled experimentation and simulation, lensometers, and slit lamps.
- Repair computer equipment throughout campus including CPU's, monitors, printers, scanners, and laptops. Also networking equipment including concentrators, hubs, network interface cards, and uninterrupted power supplies.
- Maintain Microsoft Windows NT 4.0 servers for dial-in access, website publishing, and FTP file sharing. Produced the Instrument Repair website.

Education

2010-2014 **Ferris State University** **Big Rapids, MI**

Bachelor of Science Degree in Computer Networks and Systems

Courses include Networks 1, 2, 3, 4 (Cisco Routing and Switching); Real-time Operating systems; Network Theory and Test; Network Security Theory – Technology.

2007-2010 **Ferris State University** **Big Rapids, MI**

Bachelor of Science Degree in Electrical/Electronics Engineering Technology

Courses include Advanced Digital Systems, Advanced Digital Design, Network Analysis, Industrial Communication, Industrial Motion Control, Project Management, and Senior Projects.

1993-2007 **Ferris State University** **Big Rapids, MI**

Completed coursework toward Associate Degree in Pre-Engineering

Courses complete include Linear Algebra; Calculus 1, 2, 3, 4; Differential Equations; Calculus-based Physics 1, 2, 3; Statics; and Dynamics.

1987-1993 **Ferris State University** **Big Rapids, MI**

Minor in Computer Science

Courses include Basic, Pascal, FORTRAN, Assembly Language, C++, Borland C++ OWL (Windows programming), Borland C++ DBE (SQL), Data Structures, Computer Simulation, Computer Graphics, and Numerical Methods.

1983-1986 **Ferris State University** **Big Rapids, MI**

Associate Degree in Industrial Electronics

Courses included DC circuits, AC Circuits, Digital Circuits, Microprocessors, A-D/D-A Converters, Transducers, Relay Logic, and Programmable Controllers.

Certifications and other Training

Sept 2013 **Cisco** **Cisco Systems, Inc.**

Cisco CCNA Instructor Fast Track training

Cisco's validation to instruct the CCNA Routing and Switching courses.

June 2013-2016 **Cisco** **Cisco Systems, Inc.**

Cisco Certified Network Associate Routing and Switching

Cisco's certification for entry-level network engineers validating the ability to install, configure, operate, and troubleshoot medium-size routed and switched networks.

Achievements

Ferris State University Distinguished Staff Award, 2009. Article published in Circuit Cellar, January 2012, **The SMD Air Bath** A DIY PCB Preheating Setup.