Attachment 2

Academic Affairs

Consent Agenda Supplemental Information - Curriculum Proposals

FS Exec Committee Review – April 30, 2019 Meeting

In order by College, not by the Curriculog Agenda

https://kstate.curriculog.com/agenda:709/form

Arts and Sciences

Political Science Minor

RATIONALE: We would like to change the number of required courses for a minor in political science. The existing minor in political science requires that students take all four introductory courses (POLSC 115; POLSC 135; POLSC 333; POLSC 301). However, we revised our major requirements a few years ago to allow our majors to take just three of these four courses. We would like to change the minor to be consistent on the requirement across programs. Many of our minors have pointed out the inconsistency that majors do not have to take all the intro courses while minors are required to do so. This difference is difficult to justify. As a result of this change, we would also like to change the number of credit hours the political science minor requires. Students are currently required to complete 21 credit hours to complete the minor. This change would allow students to complete the minor with 18 credit hours. This also brings us more in line with the average minor in the College of Arts and Sciences.

IMPACT – This change should not directly impact any other program. The current course offerings for the minor are all offered by the Department of Political Science.

Core Courses (~~12 Credits~~) POLSC 115: U.S. Politics POLSC 135 Introduction to Comparative Politics POLSC 301: Introduction to Political Thought POLSC 333: World Politics Electives (9 Credits): two courses must be at the 500 level or above. POLSC 350 cannot fulfill this requirement. Total Credit Hours : ~~21~~	Core Courses (9 Credits): Students must take three of the following four introductory courses: POLSC 115: U.S. Politics POLSC 135 Introduction to Comparative Politics POLSC 301: Introduction to Political Thought POLSC 333: World Politics Electives (9 Credits of POLSC courses): two courses must be at the 500 level or above. POLSC 350 cannot fulfill this requirement. Total Credit Hours : 18

Social Work (BS or BA)

RATIONALE: While the KSU Social Work Program prepares students for direct generalist social work practice at the BSW level, the profession has a number of sub-fields and currently the curriculum does not fully expose students to knowledge and skill development specific to social work specializations and populations. Adding courses unique to specializations in social work will expose students to unique populations and also increase specific skills and marketability to meet state, regional, and national employment needs relative specific subfields. Faculty course rotations of restricted social work electives on a multi-year circuit will offer greater exposure to specific topics and subfields and faculty expertise.

IMPACT STATEMENT: This change should not impact other departments or units. We will development new courses to rotate over the next few years but these should also not negatively impact other units.

Social Work B.A./B.S. Social work is concerned with the interaction between people and their social environments. Social workers help people deal with other people, cope with the many social and environmental forces that affect and control daily life, and help solve problems that inhibit growth and development. The undergraduate social work program is accredited by the Commission on Accreditation of the Council on Social Work Education to educate entry-level, generalist social work practitioners. The social work major is required for students who intend to pursue a career in social work in Kansas and in many other states. The bachelor's degree in social work is recognized as a beginning-level professional degree. Students graduating from the social work program are eligible for licensure as bachelor degree social workers in Kansas and numerous other states. No other bachelor's degree is recognized, or necessary, for such eligibility. Students who wish to pursue graduate studies in social work will be eligible for advanced standing in many masters of social work programs throughout the United States. The intervention tasks performed by social workers are derived from a common base of knowledge, values, and skills. Thus, social	Social Work B.A./B.S. Social work is concerned with the interaction between people and their social environments. Social workers help people deal with other people, cope with the many social and environmental forces that affect and control daily life, and help solve problems that inhibit growth and development. The undergraduate social work program is accredited by the Commission on Accreditation of the Council on Social Work Education to educate entry-level, generalist social work practitioners. The social work major is required for students who intend to pursue a career in social work in Kansas and in many other states. The bachelor's degree in social work is recognized as a beginning-level professional degree. Students graduating from the social work program are eligible for licensure as bachelor degree social workers in Kansas and numerous other states. No other bachelor's degree is recognized, or necessary, for such eligibility. Students who wish to pursue graduate studies in social work will be eligible for advanced standing in many masters of social work programs throughout the United States. The intervention tasks performed by social workers are derived from a common base of knowledge, values, and skills. Thus, social

workers are uniquely qualified to provide resources, services, and opportunities to individuals, groups, families, organizations, and communities. Students are required to complete a field practice placement during their senior year to integrate classroom material with practice experience in a professional setting. Students wishing to declare a major in social work may enroll directly in curriculum SOCWK. This is a provisional admission to the social work program. Students must complete SOCWK 100, ~~SOCWK 200~~, SOCWK 315, and SOCWK 510 before formal evaluation and admission to the program can occur. Formal evaluation occurs prior to admission to SOCWK 560 Social Work Practice I, taken during the junior year. At that time each student completes a personal statement and undergoes a formal review of academic and classroom performance by the program admissions committee. Students must have a 2.5 overall GPA and a 3.0 GPA in the core courses. Students successfully passing this review may enter the first course in the practice sequence, SOCWK 560. Students must maintain the admissions GPA standards throughout the three semester practice sequence and must have a C or better in core Social Work classes to move forward in each of their 3 final semesters in the program. Failure to meet and maintain the standards of the program will result in dismissal from the social work major. A student may be allowed to remain in the major on conditional or probationary status, but he or she must meet the standards of the program to complete the major. For complete details on the admissions requirements and procedure, see the program admissions policy and procedures in the student handbook. Appeals of program faculty	workers are uniquely qualified to provide resources, services, and opportunities to individuals, groups, families, organizations, and communities. Students are required to complete a field practice placement during their senior year to integrate classroom material with practice experience in a professional setting. Students wishing to declare a major in social work may enroll directly in curriculum SOCWK. This is a provisional admission to the social work program. Students must complete SOCWK 100, ~~SOCWK 200~~, SOCWK 315, and SOCWK 510 before formal evaluation and admission to the program can occur. <u>It is also recommended that students complete at least one of the two restricted Social Work electives (3 credits) prior to formal evaluation and admission to the program.</u> Formal evaluation occurs prior to admission to SOCWK 560 Social Work Practice I, taken during the junior year. At that time each student completes a personal statement and undergoes a formal review of academic and classroom performance by the program admissions committee. Students must have a 2.5 overall GPA and a 3.0 GPA in the core courses. Students successfully passing this review may enter the first course in the practice sequence, SOCWK 560. Students must maintain the admissions GPA standards throughout the three semester practice sequence and must have a C or better in core Social Work classes to move forward in each of their 3 final semesters in the program. Failure to meet and maintain the standards of the program will result in dismissal from the social work major. A student may be allowed to remain in the major on conditional or probationary status, but he or she must meet the standards of the program to complete the major.

decisions may be made through established departmental procedures. A student earning a BA or BS in social work must complete 120 credit hours including SOCWK 100 Social Work: The Helping Profession; ~~48~~ additional credit hours of major courses; and 19 credit hours of required social work foundation courses. Bachelor's degree requirements Required Social Work Foundation Courses (19 credit hours) ANTH 200 - Introduction to Cultural Anthropology Credits: 3 or ANTH 204 - A General Education Introduction to Cultural Anthropology Credits: 3 BIOL 198 - Principles of Biology Credits: 4 PSYCH 110 - General Psychology Credits: 3 SOCIO 211 - Introduction to Sociology Credits: 3 ECON 110 - Principles of Macroeconomics Credits: 3 or ECON 120 - Principles of Microeconomics Credits: 3 POLSC 110 - Introduction to Political Science Credits: 3 or POLSC 115 - U.S. Politics Credits: 3 or POLSC 301 - Introduction to Political Thought Credits: 3 **Human behavior and the social environment content (3 hours)** SOCWK 315 - Human Behavior in the Social Environment I Credits: 3 **Social work practice content (18 credit hours)**	For complete details on the admissions requirements and procedure, see the program admissions policy and procedures in the student handbook. Appeals of program faculty decisions may be made through established departmental procedures. A student earning a BA or BS in social work must complete 120 credit hours including SOCWK 100 Social Work: The Helping Profession; <u>51</u> additional credit hours of major courses; and 19 credit hours of required social work foundation courses. Bachelor's degree requirements Required Social Work Foundation Courses (19 credit hours) ANTH 200 - Introduction to Cultural Anthropology Credits: 3 or ANTH 204 - A General Education Introduction to Cultural Anthropology Credits: 3 BIOL 198 - Principles of Biology Credits: 4 PSYCH 110 - General Psychology Credits: 3 SOCIO 211 - Introduction to Sociology Credits: 3 ECON 110 - Principles of Macroeconomics Credits: 3 or ECON 120 - Principles of Microeconomics Credits: 3 POLSC 110 - Introduction to Political Science Credits: 3 or POLSC 115 - U.S. Politics Credits: 3 or POLSC 301 - Introduction to Political Thought Credits: 3 **Human behavior and the social environment content (3 hours)** SOCWK 315 - Human Behavior in the Social Environment I Credits: 3

SOCWK 100 - Social Work: The Helping Profession Credits: 3 ~~SOCWK 200 - Basic Skills for Working with People Credits: 3~~ SOCWK 560 - Social Work Practice I Credits: 3 SOCWK 561 - Social Work Practice II Credits: 3 SOCWK 568 - Macro Practice and Theory Credits: 3 SOCWK 570 - Social Work with Groups Credits: 3 **Research content (9 credit hours)** MATH 100 - College Algebra Credits: 3 SOCWK 330 - Social Work Research Methods and Analysis I Credits: 3 SOCWK 530 - Social Work Research Methods and Analysis II Credits: 3 **Social policy content (6 credit hours)** SOCWK 510 - Social Welfare as a Social Institution Credits: 3 SOCWK 565 - Social Policy Credits: 3 **Field Practicum (15 credit hours)** SOCWK 550 - Field Practicum Preparation Credits: 3 SOCWK 562 - Field Experience Credits: 10 SOCWK 564 - Social Work Professional Seminar Credits: 2 Total credit hours required for graduation: (120)	**Social work practice content (15 credit hours)** SOCWK 100 - Social Work: The Helping Profession Credits: 3 SOCWK 560 - Social Work Practice I Credits: 3 SOCWK 561 - Social Work Practice II Credits: 3 SOCWK 568 - Macro Practice and Theory Credits: 3 SOCWK 570 - Social Work with Groups Credits: 3 **Research content (9 credit hours)** MATH 100 - College Algebra Credits: 3 SOCWK 330 - Social Work Research Methods and Analysis I Credits: 3 SOCWK 530 - Social Work Research Methods and Analysis II Credits: 3 **Social policy content (6 credit hours)** SOCWK 510 - Social Welfare as a Social Institution Credits: 3 SOCWK 565 - Social Policy Credits: 3 **Social Work Restricted Electives (6 Credits)** Two Social Work Restricted Electives (6 Credits total) from SocWk 200, SocWk 320, SocWk 340-501, SocWk 610-700. **Field Practicum (15 credit hours)** SOCWK 550 - Field Practicum Preparation Credits: 3 SOCWK 562 - Field Experience Credits: 10 SOCWK 564 - Social Work Professional Seminar Credits: 2 Total credit hours required for graduation: (120)

Engineering

Computer Science B.S.
http://catalog.k-state.edu/preview_program.php?catoid=42&poid=13859

Rationale: The number of credits for CIS 415 is being changed from 1 to 3, and its title is being changed. To accommodate the change in credit hours, the number of credits of Humanities / Social Science Electives is being changed from 15 to 12, and the number of unrestricted electives is being increased by 1 credit. The additional coverage of ethics in CIS 415 compensates for the removal of one 3-credit Humanities / Social Science Elective. The only other changes involve moving a few courses to different semesters.

Impact (i.e. if this impacts another unit) – Statement should include the date when the head of a unit was contacted, and the response or lack of: The removal of a Humanities / Social Science Elective impacts the College of Arts and Sciences. As the Humanities / Social Science Electives are mainly in the College of Arts and Sciences, reducing the number of hours required impacts that college. Prof. Louise Benjamin, Associate Dean for Academic Affairs in the College of Arts and Sciences, was contacted by email on Feb. 7, 2019.

Freshman year	**Freshman year**
Fall semester (15-16 credit hours)	**Fall semester (15-16 credit hours)**
~~Humanities/social science elective (first of five)~~ **~~Credits:~~** ~~3~~ • CIS 015 - Undergraduate Seminar **Credits:** 0 • CIS 115 - Introduction to Computing Science **Credits:** 3 • COMM 105 - Public Speaking IA **Credits:** 2 or • COMM 106 - Public Speaking I **Credits:** 3 • ENGL 100 - Expository Writing I **Credits:** 3 • MATH 220 - Analytic Geometry and Calculus I **Credits:** 4	• CIS 015 - Undergraduate Seminar **Credits:** 0 • CIS 115 - Introduction to Computing Science **Credits:** 3 • COMM 105 - Public Speaking IA **Credits:** 2 or • COMM 106 - Public Speaking I **Credits:** 3 • ECON 110 – Principles of Macroeconomics **Credits:** 3 • ENGL 100 - Expository Writing I **Credits:** 3 • MATH 220 - Analytic Geometry and Calculus I **Credits:** 4
Spring semester (15 credit hours)	**Spring semester (15 credit hours)**
• Math/Science elective with laboratory (first of five) **Credits:** 4 • CIS 200 - Programming Fundamentals **Credits:** 4 • ECE 241 - Introduction to Computer Engineering **Credits:** 3 • MATH 221 - Analytic Geometry and Calculus II **Credits:** 4	• Math/Science elective with laboratory (first of five) **Credits:** 4 • CIS 200 - Programming Fundamentals **Credits:** 4 • ECE 241 - Introduction to Computer Engineering **Credits:** 3 • MATH 221 - Analytic Geometry and Calculus II **Credits:** 4
Sophomore year	**Sophomore year**
Fall semester (~~15~~ credit hours)	**Fall semester (13 credit hours)**

- ~~Humanities/social science elective (second of five) **Credits:** 3~~
- CIS 300 - Data and Program Structures **Credits:** 3
- CIS 301 - Logical Foundations of Programming **Credits:** 3
- ~~ECON 110 - Principles of Macroeconomics **Credits:** 3~~
- ENGL 200 - Expository Writing II **Credits:** 3

Spring semester (15 credit hours)

- Humanities/social science elective (~~third~~ of ~~five~~) **Credits:** 3
- Math/Science elective (~~second~~ of five) **Credits:** 3
- *Communication elective **Credits:** 3
- CIS 400 Object-Oriented Design, Implementation, and Testing **Credits:** 3
- MATH 510 - Discrete Mathematics **Credits:** 3

Junior year

Fall semester (~~15~~ credit hours)

- Humanities/social science elective (~~fourth~~ of ~~five~~) **Credits:** 3
- ~~Math/Science elective with laboratory (third of five) **Credits:** 4~~
- CIS 501 Software Architecture and Design **Credits:** 3
- CIS 308 - C Language Laboratory **Credits:** 1
- CIS 415 - Ethics and Computing ~~Technology~~ **Credits:** ~~1~~
- ~~CIS 560 - Database System Concepts **Credits:** 3~~

Spring semester (15 credit hours)

- ~~Unrestricted elective **Credits:** 3~~
- CIS 450 - Computer Architecture and Operations **Credits:** 3
- CIS 575 - Introduction to Algorithm Analysis **Credits:** 3
- ENGL 415 - Written Communication for Engineers **Credits:** 3
- or
- ENGL 516 - Written Communication for the Sciences **Credits:** 3
- STAT 510 - Introductory Probability and Statistics I **Credits:** 3

Senior year

Fall semester (~~14~~ ~~15~~ credit hours)

- Math/Science elective with laboratory (second of five) **Credits:** 4
- CIS 300 - Data and Program Structures **Credits:** 3
- CIS 301 - Logical Foundations of Programming **Credits:** 3
- ENGL 200 - Expository Writing II **Credits:** 3

Spring semester (15 credit hours)

- Humanities/social science elective (first of four) **Credits:** 3
- Math/Science elective (third of five) **Credits:** 3
- *Communication elective **Credits:** 3
- CIS 400 Object-Oriented Design, Implementation, and Testing **Credits:** 3
- MATH 510 - Discrete Mathematics **Credits:** 3

Junior year

Fall semester (16 credit hours)

- Unrestricted elective **Credits:** 3
- Humanities/social science elective (second and third of four) **Credits:** 6
- CIS 501 Software Architecture and Design **Credits:** 3
- CIS 308 - C Language Laboratory **Credits:** 1
- CIS 415 - Ethics and Conduct for Computing Professionals **Credits:** 3

Spring semester (15 credit hours)

- CIS 450 - Computer Architecture and Operations **Credits:** 3
- CIS 560 – Database System Concepts **Credits:** 3
- CIS 575 - Introduction to Algorithm Analysis **Credits:** 3
- ENGL 415 - Written Communication for Engineers **Credits:** 3
- or
- ENGL 516 - Written Communication for the Sciences **Credits:** 3
- STAT 510 - Introductory Probability and Statistics I **Credits:** 3

Senior year

Fall semester (15-16 credit hours)

- Technical elective (first and second of four) **Credits:** 6
- CIS 505 - Introduction to Programming Languages **Credits:** 3
- Unrestricted elective **Credits:** ~~2~~ 3
- Math/Science elective (fourth of five) **Credits:** 3

Spring semester (15 credit hours)

- Technical elective (third and fourth of four) **Credits:** 6
- Math/Science elective (fifth of five) **Credits:** 3
- Unrestricted elective **Credits:** 3
- Humanities/social science elective (~~fifth of five~~) **Credits:** 3

Notes

A grade of C or better is required for all graded courses listed by specific course number above.

All students new to the CS department must complete CIS 015.

Math/Science electives must have departmental approval.

Humanities/social science electives must be taken from the list approved by the College of Engineering.

*Communications Elective **Credits:** (3) The Communications Elective must be chosen from:

- COMM 322 - Interpersonal Communication **Credits:** 3
- COMM 323 – Nonverbal Communication **Credits:** 3
- COMM 326 - Small Group Discussion Methods **Credits:** 3
- MANGT 420 - Principles of Management **Credits:** 3
- THTRE 261 - Fundamentals of Acting **Credits:** 3
- THTRE 265 - Fundamentals of Improvisation I, II **Credits:** 3

Technical electives must be comprised of the following:

- C or better in either CIS 520-Operating Systems I or CIS 625-Concurrent Software Systems.
- A capstone experience consisting of a C or better in either CIS 598-Computer Science Project or the two-semester course consisting of CIS 642-Software Engineering Project I and CIS 643-Software Engineering Project II.

- Technical elective (first and second of four) **Credits:** 6
- CIS 505 - Introduction to Programming Languages **Credits:** 3
- Unrestricted elective **Credits:** 3-4
- Math/Science elective (fourth of five) **Credits:** 3

Spring semester (15 credit hours)

- Technical elective (third and fourth of four) **Credits:** 6
- Math/Science elective (fifth of five) **Credits:** 3
- Unrestricted elective **Credits:** 3
- Humanities/social science elective (fourth of four) **Credits:** 3

Notes

A grade of C or better is required for all graded courses listed by specific course number above.

All students new to the CS department must complete CIS 015.

Math/Science electives must have departmental approval.

Humanities/social science electives must be taken from the list approved by the College of Engineering.

*Communications Elective **Credits:** (3) The Communications Elective must be chosen from:

- COMM 322 - Interpersonal Communication **Credits:** 3
- COMM 323 – Nonverbal Communication **Credits:** 3
- COMM 326 - Small Group Discussion Methods **Credits:** 3
- MANGT 420 - Principles of Management **Credits:** 3
- THTRE 261 - Fundamentals of Acting **Credits:** 3
- THTRE 265 - Fundamentals of Improvisation I, II **Credits:** 3

Technical electives must be comprised of the following:

- C or better in either CIS 520-Operating Systems I or CIS 625-Concurrent Software Systems.
- A capstone experience consisting of a C or better in either CIS 598-Computer Science Project or the two-semester course consisting of CIS 642-Software Engineering Project I and CIS 643-Software Engineering Project II.

- Additional 500-level or higher CIS courses or other approved computing-related courses to bring the total number of technical elective credits to 12.

Entrepreneurship Option:

For this option, the 12 credits of technical electives must be comprised of the following:

- C or better in either CIS 520-Operating Systems I or CIS 625-Concurrent Software Systems.
- C or better in CIS 596-Entrepreneurial Computer Science Project.
- ENTRP 340-Introduction to Entrepreneurship
- ENTRP 350-Technology and Innovation Management (to be taken the semester immediately following CIS 598)

In addition, the unrestricted electives must be satisfied by 9 credits taken from the following:

- ENTRP 466 Digital Business
- ENTRP 520 Social Entrepreneurship
- ENTRP 540 Entrepreneurial Consulting
- ENTRP 497 Topics in Entrepreneurship
- FINAN 561 Finance for Entrepreneurs
- MANGT 390 Business Law
- MANGT 520 Organization Behavior
- MANGT 531 Human Resources Management

Cybersecurity Option:

For this option, the 12 credits of technical electives must be comprised of the following:

- C or better in either CIS 520-Operating Systems I or CIS 625-Concurrent Software Systems.
- C or better in CIS 599-Cybersecurity Project.
- CIS 551 Fundamentals of Computer and Information Security.
- CIS 553 Fundamentals of Cryptography.

In addition, 6 of the 15 hours of Humanities and Social Science electives must be:

- SOCIO 211-Introduction to Sociology.
- SOCIO 550-Technocrime, Security, and Society.

Finally, the unrestricted electives must include 2 of the following:

- CIS 525 Introduction to Computer Networks.
- CIS 655 Security and Reliability of Computing Systems.
- CIS 755 Systems Security.

NOTE: K-State 8 General Education Requirements

- Additional 500-level or higher CIS courses or other approved computing-related courses to bring the total number of technical elective credits to 12.

Entrepreneurship Option:

For this option, the 12 credits of technical electives must be comprised of the following:

- C or better in either CIS 520-Operating Systems I or CIS 625-Concurrent Software Systems.
- C or better in CIS 596-Entrepreneurial Computer Science Project.
- ENTRP 340-Introduction to Entrepreneurship
- ENTRP 350-Technology and Innovation Management (to be taken the semester immediately following CIS 598)

In addition, the unrestricted electives must be satisfied by 9 credits taken from the following:

- ENTRP 466 Digital Business
- ENTRP 520 Social Entrepreneurship
- ENTRP 540 Entrepreneurial Consulting
- ENTRP 497 Topics in Entrepreneurship
- FINAN 561 Finance for Entrepreneurs
- MANGT 390 Business Law
- MANGT 520 Organization Behavior
- MANGT 531 Human Resources Management

Cybersecurity Option:

For this option, the 12 credits of technical electives must be comprised of the following:

- C or better in either CIS 520-Operating Systems I or CIS 625-Concurrent Software Systems.
- C or better in CIS 599-Cybersecurity Project.
- CIS 551 Fundamentals of Computer and Information Security.
- CIS 553 Fundamentals of Cryptography.

In addition, 6 of the 15 hours of Humanities and Social Science electives must be:

- SOCIO 211-Introduction to Sociology.
- SOCIO 550-Technocrime, Security, and Society.

Finally, the unrestricted electives must include 2 of the following:

- CIS 525 Introduction to Computer Networks.
- CIS 655 Security and Reliability of Computing Systems.
- CIS 755 Systems Security.

NOTE: K-State 8 General Education Requirements

For additional information about the University General Education program, check the requirements specified by the College of Engineering. **Total hours required for graduation (120 credit hours)**	For additional information about the University General Education program, check the requirements specified by the College of Engineering. **Total hours required for graduation (120 credit hours)**

Computer Science Certificate (new) - Undergraduate

New courses are proposed to support this curriculum, as listed here: CC 310, CC 315, CC 410

Computer Science Certificate

Department of Computer Science
College of Engineering
Kansas State University

Purpose (clear and appropriate educational objective)

Computers have become central to many activities of everyday human life. They power everything from coffee makers that help wake us in the morning, to phones that provide access to data and information critical to our functioning, to personal digital assistants such as Alexa who plays soft music and nature sounds while we drift off to sleep. The revolution is over -- computers are the core technology of our society. However, there is currently a vast shortage of skilled software developers.

There are two basic solutions to the lack of qualified computer scientists: force more students into computer science or introduce more computer science into other fields of study. Given the fact that 70% of computer related jobs are in other fields, it would seem to make sense that introducing the core computer science skill set into other fields and majors would be a logical and scalable solution. This is the main thought process behind the Computer Science Certificate program -- to provide a scalable mechanism to educate a wide variety of students in the core knowledge of computer science. To make the program accessible, the Computer Science Certificate will be based on college algebra as opposed to calculus, which is required for the computer science major. The benefits to the students are many. First, the Computer Science Certificate will provide an additional skill set that is very marketable and - when combined with knowledge from their major - will enhance their value to employers. Second, a Computer Science Certificate based education will better prepare these students to move into multi-disciplinary jobs and career fields. Finally, these students will be able to think computationally. Understanding how computers work, their potential and their limitations, will allow students to be creative yet realistic when crafting solutions to problems.

The courses in this certificate will prepare the students to work with or as software developers in a wide variety of fields and industries. The main focus of the courses is to develop the programming skills and insight required for such jobs. CC 210 introduces students to computer programming using one of

several programming languages and covers the basic programming concepts from variables and control flow to functions, objects, and simple algorithms. CC 310 and CC 315 introduce students to simple and complex data structures and the algorithms to manipulate those structures and the data in them. Finally, CC 410 provides students with experience writing advanced programs in a variety of application domains and using a variety of technologies like what they will see in industry. Students who complete these four courses will have the same basic skill set that computer science majors gain in their first computer science courses. The difference between the computer science and the computational core courses would mainly be regarding the depth of understanding the students have of the formal theoretical underpinnings of computer programming as developed in courses such as CIS 301.

This certificate program is significantly different from the current Computer Science Minor. The minor is focused towards engineering students. While the certificate is focused on practical applications of computer programming, the minor is calculus based, includes an introduction to the logical formalisms used to model and reason about computer systems, and includes an introduction to computer engineering.

Evidence of demonstrated need and demand

The importance of the software that drives these computers cannot be overstated, and the demand for qualified people to create that software is undeniable. According to a White House fact sheet (January 30, 2016), there are currently over 600,000 computing related job openings in the United States, while there are fewer than 50,000 computer science graduates produced each year (code.org). Obviously, computer science graduates are in high demand. In addition, 51% of all STEM jobs are now in computer science related fields, although 70% of those jobs are outside the traditional tech sector (Facebook, Apple, Microsoft, etc.).

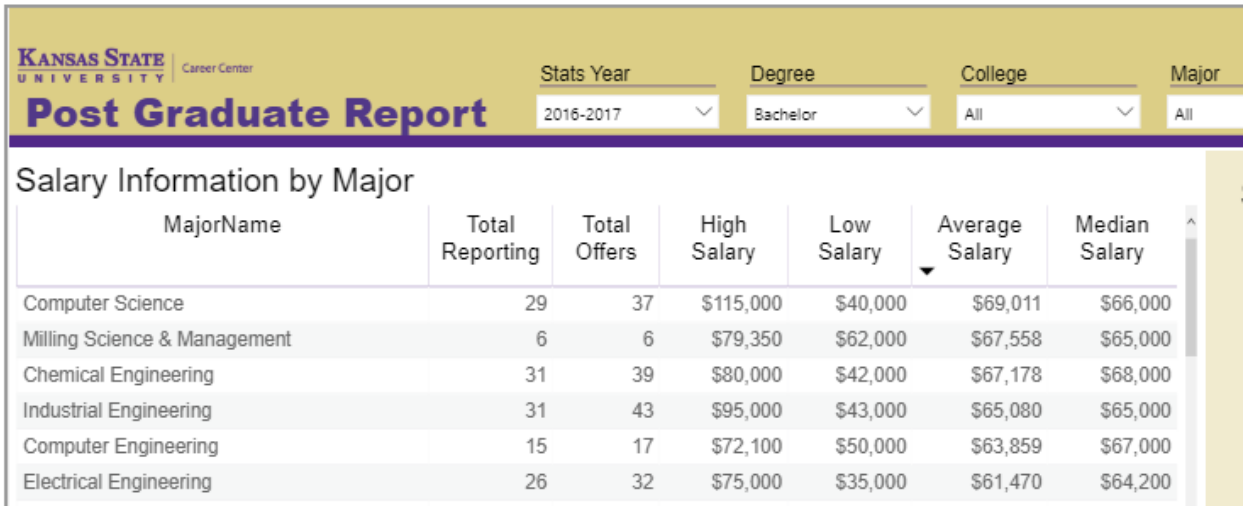
As shown in the table below from the Bureau of Labor Statistics, software developers make an excellent average salary and the job growth through 2026 is expected to be 24%. Given the number of current job openings coupled with the growth in demand makes having the core skills necessary an excellent way to get into high paying jobs with great future potential.

Bureau of Labor Statistics for Software Developers [1]

2017 Median Pay	$103,560 per year ($49.79 per hour)
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2016	1,256,200
Job Outlook, 2016-26	24% (Much faster than average)
Employment Change, 2016-26	302,500

One might ask whether most of these jobs would be open to students with a computer science certificate or whether they require a computer science degree. The answer to this question is that students with a computer science certificate would be able to obtain and be successful in these jobs [2]. The plethora of new online computer science programs, coding bootcamps, and other short-form computer science based educational programs demonstrate both the demand from industry and students for such education. In a meeting at the Manhattan Chamber of Commerce in August, our proposed program was presented and was received with great interest by several local companies. Phillip Sears from Xpanxion (a national level software development company with offices in Manhattan) was very interested and thought that Xpanxion would be very interested in students with this skill set and would also be interested in sending existing employees to such courses. At the same meeting, Steve Lee, partner at S&N Designs was also very interested in the program, not because he needs programmers, but because he needs designers who understand what is possible and can talk with programmers.

Today, 43% college graduates end up under-employed after graduation. Worse yet, 66% of those are still underemployed after five years and 50% are still underemployed after 10 years [3]. Providing graduates with 21st century skills such as computer programming can only increase their odds of gaining employment consistent with their degrees and skills. Salaries for those students are also likely to be higher as computer science graduates earn the top salaries at Kansas State [4].



KANSAS STATE UNIVERSITY | Career Center

Post Graduate Report

Stats Year	Degree	College	Major
2016-2017	Bachelor	All	All

Salary Information by Major

MajorName	Total Reporting	Total Offers	High Salary	Low Salary	Average Salary	Median Salary
Computer Science	29	37	$115,000	$40,000	$69,011	$66,000
Milling Science & Management	6	6	$79,350	$62,000	$67,558	$65,000
Chemical Engineering	31	39	$80,000	$42,000	$67,178	$68,000
Industrial Engineering	31	43	$95,000	$43,000	$65,080	$65,000
Computer Engineering	15	17	$72,100	$50,000	$63,859	$67,000
Electrical Engineering	26	32	$75,000	$35,000	$61,470	$64,200

Requirements

The Computer Science Certificate program will consist of four courses totaling 14 credits. These courses will be offered online and will be offered every semester (fall, spring, summer).

To receive the Computer Science Certificate, a student must complete the following courses:

- CC 210 - Fundamental Computer Programming Concepts (4 credits)
- CC 310 - Data Structures & Algorithms 1 (3 credits)
- CC 315 - Data Structures & Algorithms 2 (3 credits)
- CC 410 - Advanced Programming (4 credits)

All of these courses will be delivered through a state-of-the-art online computer science educational platform called Codio (http://codio.com). Codio is an online learning platform for teaching computer

science and allows students to work with a variety of programming tools and languages directly in a web browser. Within Codio, instructors can develop interactive guides that students follow to learn the material. The guides will include videos, images, text, questions, and interactive coding examples. In addition, student projects can be developed in Codio, where instructors provide students with the project requirements and starter files. Once the student has completed the project, Codio can use instructor-developed tests to automatically score the project and return the score to Canvas.

Using the Codio based module prerequisite mechanism, students can choose the topics they plan to work on next based on the modules they have completed. The four courses proposed below will be integrated into a single module structure which will allow students to potentially take all four courses at the same time. The Codio module prerequisite structure will ensure the students complete the appropriate modules in current or previous courses before they can move on to the more advanced topics of the higher-level course. This leads to the novel co-requisite structure shown below in the course descriptions.

CC 210 - Fundamental Computer Programming Concepts

Credits: 4

Basic concepts in developing computer programs: program structure and syntax, primitive data types, variables, control flow, iteration, simple algorithms, debugging, and good software development practices. Introduction to object-oriented programming.

The course introduces students to computer programming using one of several programming languages. Interactive lessons and engaging projects reinforce new skills and concepts while relating programming fundamentals to the real world. This course covers the basic concepts of programming, from variables and control flow to functions, objects, and simple algorithms.

CC 310 - Data Structures & Algorithms 1

Credits: 3 Co-Requisites: CC 210

Exploration of simple data structures & related algorithms in computer programming. Basic concepts of complexity analysis. Object-oriented design concepts.

This course introduces simple data structures such as sets, lists, stacks, queues, and maps. Students learn how to create data structures and the algorithms that use them. Students are introduced to algorithm analysis to determine the efficiency of algorithms.

CC 315 - Data Structures & Algorithms 2

Credits: 3 Co-Requisites: CC 310

The course covers more advanced data structures & related algorithms. More focus is placed on formal software development methods and software engineering fundamentals. The course also includes an introduction to requirements analysis processes that provides the specification of algorithmic requirements.

This course introduces advanced data structures, such as trees, graphs, and heaps. Several new algorithms using these data structures are covered. Students also learn software development methods and software engineering fundamentals and use those skills to develop projects of increasing size and scope effectively.

CC 410 - Advanced Programming

Credits: 4 Co-Requisites: CC 315

Advanced programming techniques and projects. Concepts from simulation and modeling, media applications, secure design, information management, parallelism, and networking. Software development methodologies, processes, and design patterns. Practical experience with professional communication and collaboration.

In this course students gain experience writing programs using a variety of advanced programming techniques. Projects cover a variety of application domains and use a variety of technologies to help students master advanced computer programming concepts.

Admissions Procedure

The certificate program will be open to any students admitted to a K-State degree program. The program will also be open to non-degree seeking students who apply to K-State as a non-degree seeking students.

- Non-K-State Students must apply to K-State as a non-degree seeking undergraduate by completing the online application form.
- Students currently enrolled in a K-State degree program must complete the online Application for Undergraduate Certificate Program on the Computer Science webpage, similar to a minor declaration (see https://www.cs.ksu.edu/undergraduate/minor/).

Desired outcomes

Upon completion of this certificate program, students should achieve the following outcomes, based on Kansas State's undergraduate student learning outcomes:

Knowledge

1. Students will demonstrate the ability to design and implement a computer program to fit a desired use case or specification
2. Students will demonstrate the ability to select appropriate data structures and algorithms to represent and manipulate real-world data to perform a desired task

Critical Thinking

1. Students will demonstrate the ability to debug programs by identifying and resolving issues while developing new software

2. Students will demonstrate the ability to analyze real world problems and design appropriate use cases and specifications for software to address the problem

Assessment procedures

Knowledge and critical thinking student learning outcomes (SLOs) will be assessed through the final project in CC 410. This project will be of substantial scope and complexity and will require students to develop an effective software solution to a real-world problem. By completing this project, students will have demonstrated their ability to perform critical thinking by designing use cases and specifications for computer software that will address the problem. In addition, through the process of developing new software, students will perform substantial amounts of critical thinking to debug the software and verify that it works as intended. Students will demonstrate their knowledge of computer programming by developing a program to meet the specifications they create. In addition, they will show their knowledge of data structures and algorithms through the selection and use of appropriate structures and algorithms to fit the data available and the desired result.

The project's grading rubric will contain items addressing each aspect of each SLO. Any student receiving a score of 70% or higher on each of the rubric items associated with an SLO will have demonstrated sufficient knowledge or critical thinking skills to meet that SLO.

As long as 80% of the students in this certificate program receive an acceptable rating or better on each SLO, then these SLO are being met.

Estimated budget and staff

To be truly successful, the Computer Science Certificate must be high quality, scalable, and self-sustaining. To provide a high quality, scalable education, the courses will use the Codio computer science education framework that allow students to work at their own pace, require students to master basic concepts before advancing, provide immediate feedback and guidance, and retain personal interaction with teaching faculty and teaching assistants. To be scalable and self-sustaining, we propose to offer the courses online through Global Campus and use the generated funds to finance the instructors and graduate students necessary to develop and deliver the courses. Experiences with CIS 111 (an introductory programming course for non-majors) show that many students already prefer online courses and are willing to pay additional fees.

The current budget model for Global Campus produces $452 per credit hours to the Carl R. Ice College of Engineering. These funds are split between the department and the college - $322 to the department and $130 to the college. The new Kansas State University budget model as currently proposed will generate $457 per credit hour to the college, an increase of $5 per credit hour. According to Dean Dawson, the internal distribution of Global Campus funds within the college will not change and thus the department will receive $327 per credit hour while the college will continue to receive $130 per credit hour. (In addition, $66 per credit hour will be distributed to the home department of the certificate program students.)

The Codio platform itself is not free. It typically costs $40 per student per semester, billed to the department. We currently plan to absorb that cost in our department using the Engineering equipment

fee applied to all credit hours in our department. So, these resources will be available to students at no additional cost.

Given these costs, we have created a revenue model that shows that the program will be paying for itself within five years and has the real potential for generating significant revenue beyond costs.

Students and Revenue

Courses	Credits	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
210	4	30	45	68	101	127
215	3	26	38	57	86	108
310	3		22	33	49	73
410	4		18	28	41	62
Total		56	123	185	278	369

Courses	Credits	1	2	3	4	5
210	4	$ 39,718	$ 60,173	$ 88,482	$ 132,722	$ 165,903
215	3	$ 25,320	$ 37,605	$ 56,407	$ 84,610	$ 105,763
310	3	$ -	$ 21,309	$ 31,964	$ 47,946	$ 71,919
410	4	$ -	$ 24,151	$ 36,226	$ 54,339	$ 81,508
Total		$ 65,039	$ 143,238	$ 213,078	$ 319,617	$ 425,093

Budget

Category	1	2	3	4	5
Instructors	2	2	2	2	2
GTAs	0	1	1	2	3

Category	1	2	3	4	5
Instructor	$ 224,400	$ 224,400	$ 224,400	$ 224,400	$ 224,400
GTAs	$ -	$ 34,980	$ 34,980	$ 69,960	$ 104,940
Codio	$ 2,220.00	$ 4,933.95	$ 7,400.93	$ 11,101.39	$ 14,778.96
Total	$ 226,620	$ 264,314	$ 266,781	$ 305,461	$ 344,119

Investments	1	2	3	4	5
Engineering	$ 84,150	$ 56,100	$ 28,050		
Computer Science	$ 32,844	$ 28,452	$ 25,653		
Global Campus	$ 44,587	$ 36,524			
Total	$ 161,581	$ 121,076	$ 53,703	$ -	$ -
Profit	$0	$0	$0	$14,156	$80,974

As presented, we assume that we will start with approximately 30 students in year 1, with a 50% increase each year in the number of *new* students entering the program (through year 4 when the growth starts to slow). (See section on Support for Student Number Estimates below for more information about the expected demand for these courses.) We also assume 85% of the students will choose to continue in the program after each course (15% drop rate per course) and that students take 2 courses per year. With these assumptions, the number of students is shown in the top table (yellow) and the revenue generated to the department of computer science is shown in the 2nd (green) table. The investments required by the College of Engineering (promised), Computer Science department (promised), and Global Campus (requested) is shown in the purple table.

To determine our budget, we estimate it will take 1 instructor and 3 GTAs for each 300 students in the program as shown in the third (blue) table. This number assumes that all students take the course online and that the instructors oversee the operation, maintenance and continual update of the courses and that the GTAs do much of the direct student interaction through office hours, open labs, etc. However, we will have two instructors to handle continued development and teaching to start with. Other administrative tasks associated with the program (scheduling, registration, accounting, etc.) will be handled by the current computer science staff as part of their normal duties.

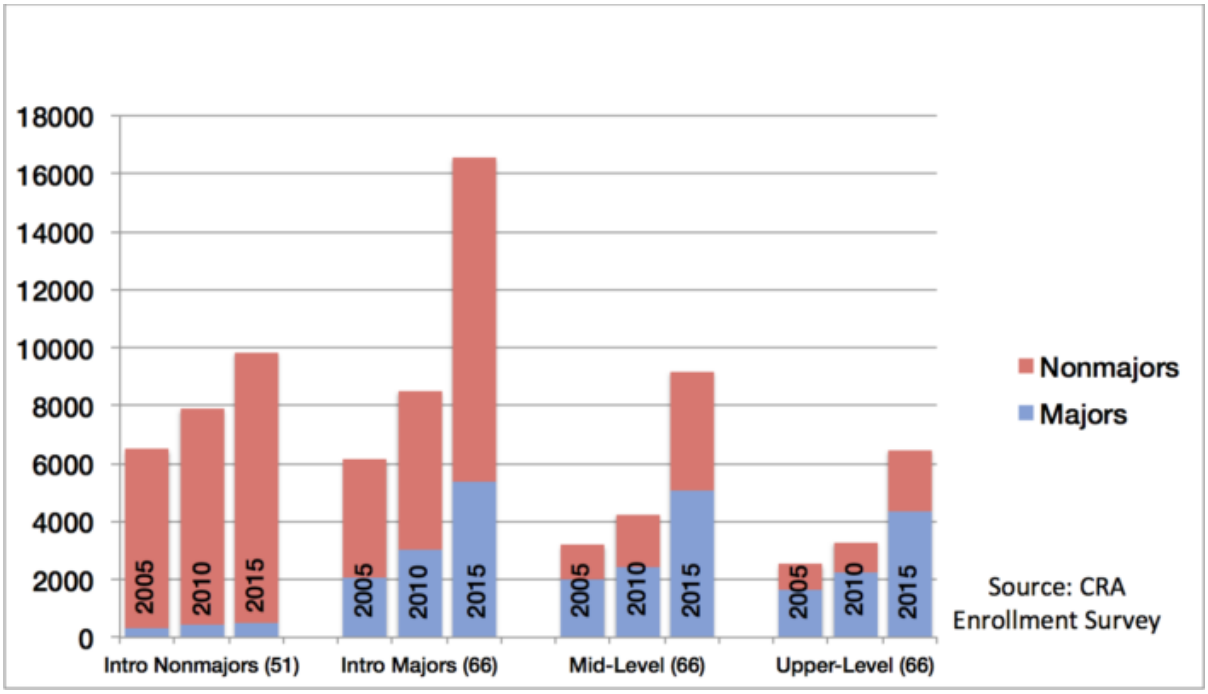
The costs for the program are shown in the bottom (orange) table. We assume 12-month term instructor salaries to be approximately $85K per year (average in computer science) with GTAs costing approximately $35K per year (this includes stipend plus tuition and fees). The final cost is for the Codio platform itself, which costs $40 per student per semester.

As shown in the bottom table, the program will require a $ $336K investment from years 1 to 3. These funds will be supplied from the College of Engineering ($168KK) and Global Campus ($81K) and the department of computer science ($86,949K). Computer science will provide funds from the salary savings generated by a phased retirement through year 3. The program will be reviewed each year to ensure the program is moving towards profitability.

Support for Student Number Estimates

We believe this is a very conservative estimate for the students wanting to take the Computer Science Certificate program. As shown in the following graph from the Computing Research Association [5] shows the long-term growth of non-computer science majors taking computer science courses. From 2005 to 2015, in courses primarily intended for computer science majors, the number of non-majors increased faster than the number of majors. For the intro courses for majors, the number of majors increased 152% while the number of non-majors increased by 177%. Similar statistics are also evident for mid-level computer science courses (majors increased by 152%; non-majors by 251%) and for upper-level computer science courses (majors increased by 165%; non-majors by 143%).

We have not seen these types of overall growth numbers since, due to budgetary restrictions, the department of computer science instituted limits on the number of non-majors allowed in computer sciences course due to the 137% growth in computer science majors from 2010 to 2018. Basically, all computer science students can enroll and be place in a course before any non-majors are allowed in. In most cases, only a handful of seats (at most) are available to non-majors. The one exception to this is CIS 115, our introductory computer science course, where we provide enough sections for a significant number of non-majors. Over the last 5 years, 495 non-majors have taken this course, accounting for 35% of those in the course. However, this number could be much higher as the number of seats in CIS 115 has been capped at around 280 for the past several years.



We have contingency plans for the number of students enrolled in the Computer Science Certificate program to be much greater than the estimates described above. Due to our approach of using individualized, online, self-paced instruction, the program can be expanded (or shrunk) very quickly. Instructors will be hired on term appointments and GTAs (and possibly UTAs) will be hired one semester at a time.

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[1] https://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm

[2] https://insights.dice.com/2017/12/14/do-you-need-computer-science-degree-today-market/

[3] https://www.forbes.com/sites/prestoncooper2/2018/06/08/underemployment-persists-throughout-college-graduates-careers/#3b334a537490

[4] http://www.k-state.edu/careercenter/about/stats/kstatepostgradstats/salary.html

[5] https://cra.org/data/generation-cs/impact-nonmajors-enrollments/

Template for the Assessment of Student Learning Plan

Complete the following for each student learning outcomes (*copy as many times as needed*)

Student Learning Outcome:

SLO 1 - Knowledge: Students will demonstrate the ability to design and implement a computer program to fit a desired use case or specification

Assessment Measure(s): (*must include at least one direct measure)*

Knowledge and critical thinking student learning outcomes (SLOs) will be assessed through the final project in CC 410. The project's grading rubric will contain items which assess how well the student's program fits the specification, the quality of the program's design, and the correctness of the code used to implement the design. Any student receiving a score of 70% or higher on these rubric items will have demonstrated sufficient knowledge and critical thinking skills to meet each SLO.

Assessment timeline: *(when, where, and how often the outcome will be measured)*

Each SLO will be assessed every two years. The faculty coordinator for CC 410 will collect all final project submissions, which will be evaluated as described above by Computational Core program faculty.

Student Learning Outcome:

SLO 2 - Knowledge: Students will demonstrate the ability to select appropriate data structures and algorithms to represent and manipulate real-world data to perform a desired task

Assessment Measure(s): (*must include at least one direct measure)*

Knowledge and critical thinking student learning outcomes (SLOs) will be assessed through the final project in CC 410. The project's grading rubric will contain items which assess how well the student's chosen data structures represent the real-world data used in the program, the appropriateness of the chosen algorithms used to manipulate the data, the correctness of the implementation, and the efficiency of the implementation of the chosen algorithms. Any student receiving a score of 70% or higher on these rubric items will have demonstrated sufficient knowledge and critical thinking skills to meet each SLO.

Assessment timeline: *(when, where, and how often the outcome will be measured)*

Each SLO will be assessed every two years. The faculty coordinator for CC 410 will collect all final project submissions, which will be evaluated as described above by Computational Core program faculty.

Student Learning Outcome:

SLO 3 - Critical Thinking: Students will demonstrate the ability to debug programs by identifying and resolving issues while developing new software

Assessment Measure(s): (*must include at least one direct measure)*

Knowledge and critical thinking student learning outcomes (SLOs) will be assessed through the final project in CC 410. The project's grading rubric will contain items which assess how well the student was able to eliminate bugs resolve issues in the program's code, and how robustly the program handles unforeseen situations and input. Any student receiving a score of 70% or higher on these rubric items will have demonstrated sufficient knowledge and critical thinking skills to meet each SLO.

Assessment timeline: *(when, where, and how often the outcome will be measured)*

Each SLO will be assessed every two years. The faculty coordinator for CC 410 will collect all final project submissions, which will be evaluated as described above by Computational Core program faculty.

Student Learning Outcome:

SLO 4 - Critical Thinking: Students will demonstrate the ability to analyze real world problems and design appropriate use cases and specifications for software to address the problem

Assessment Measure(s): (*must include at least one direct measure)*

Knowledge and critical thinking student learning outcomes (SLOs) will be assessed through the final project in CC 410. The project's grading rubric will contain items which assess how well the student's overall program design meets the given real-world problem, and how each use case and specification produced builds from that design toward implementable code. Any students receiving a score of 70% or higher on these rubric items will have demonstrated sufficient knowledge and critical thinking skills to meet each SLO.

Assessment timeline: *(when, where, and how often the outcome will be measured)*

Assessments will be performed at the end of each semester. The faculty coordinator for CC 410 will collect all final project submissions, which will be evaluated as described above by Computational Core program faculty.

Complete the following for the overall assessment plan

Plan for annual faculty review of outcome data:

Assessment outcome data will be reviewed by the Assessment Committee in the Computer Science department. After review, the committee will decide whether any further actions are required.

Attach a Curricular/Assessment Matrix

Computational Core Curriculum Assessment Matrix

Key:
I = Introduced,
R = Reinforced & opportunity to practice
M = Mastery at the exit level
A = Assessment evidence collected

Courses	SLO 1	SLO 2	SLO 3	SLO 4
CC 210: Fundamental Computer Programming Concepts	I		I	
CC 310: Data Structures & Algorithms 1	R	I	R	I
CC 315: Data Structures & Algorithms 2	R	R	R	R
CC 410: Advanced Programming	M, A	M, A	M, A	M, A

Industrial Engineering B.S. Program
http://catalog.k-state.edu/preview_program.php?catoid=42&poid=13857&returnto=7421

Rationale: The main changes of the curriculum convert the lists of computer elective, engineering electives, and professional electives in the Notes session from specific courses to "see the departmental list." Department faculty maintains these lists that do not require the approval of the college or faculty senate. However, any changes require a departmental vote. A new statistics list is also added to the note section. As a result, a minor adjustment was made in the curriculum to the order of a couple of classes. ACCTG 231 is now in the first semester of junior year. The computer elective is now the first semester of sophomore year.

Impact (i.e., if this impacts another unit): No department outside IMSE will be impacted by this change

FRESHMAN First Semester Courses	**HRS**
IMSE 201 Introduction to Industrial Engineering	3
MATH 220 Anal. Geom. & Calc I	4
CHM 210 Chemistry I	4
ENGL 100 Expository Writing I*	3
COMM 105 Public Speaking 1A	3
IMSE 015 Engineering Assembly	0
TOTAL	**16**

FRESHMAN First Semester Courses	**HRS**
IMSE 201 Introduction to Industrial Engineering	3
MATH 220 Anal. Geom. & Calc I	4
CHM 210 Chemistry I	4
ENGL 100 Expository Writing I*	3
COMM 105 Public Speaking 1A	3
IMSE 015 Engineering Assembly	0
TOTAL	**16**

FRESHMAN Second Semester Courses	**HRS**
IMSE 250 Intro. to Manufacturing Processes	2
IMSE 251 Intro. to Manufacturing Processes Lab	1
MATH 221 Anal. Geom. & Calc. II	4
ECON 110 (or 120) Principles of Macroeconomics (Microeconomics)	3
Humanities or Social Science	3
ME 212 Engineering Graphics	3
IMSE 015 Engineering Assembly	0
TOTAL	**15**

FRESHMAN Second Semester Courses	**HRS**
IMSE 250 Intro. to Manufacturing Processes	2
IMSE 251 Intro. to Manufacturing Processes Lab	1
MATH 221 Anal. Geom. & Calc. II	4
ECON 110 (or 120) Principles of Macroeconomics (Microeconomics)	3
Humanities or Social Science	3
ME 212 Engineering Graphics	3
IMSE 015 Engineering Assembly	0
TOTAL	**15**

SOPHOMORE First Semester Courses	**HRS**
MATH 222 Anal. Geom. & Calc. III	4
STAT 510 Introduction to Probability & Statistics I	3
PHYS 213 Engineering Physics I	5
~~ACCTG 231 Accounting for Business Operations~~	3
IMSE 015 Engineering Assembly	0
TOTAL	**15**

SOPHOMORE First Semester Courses	**HRS**
MATH 222 Anal. Geom. & Calc. III	4
STAT 510 Introduction to Probability & Statistics I	3
PHYS 213 Engineering Physics I	5
Computer Programming Elective	3
IMSE 015 Engineering Assembly	0
TOTAL	**15**

SOPHOMORE Second Semester Courses	**HRS**
MATH 551 Applied Matrix Theory	3
~~STAT 511 Introduction to Probability & Statistics II~~	3
PHYS 214 Engineering Physics II	5
IMSE 530 Engineering Economic Analysis	2
IMSE 532 Industrial Project Evaluation	1
Humanity or Social Science	3
IMSE 015 Engineering Assembly	0
TOTAL	**17**

SOPHOMORE Second Semester Courses	**HRS**
MATH 551 Applied Matrix Theory	3
Statistics Elective	3
PHYS 214 Engineering Physics II	5
IMSE 530 Engineering Economic Analysis	2
IMSE 532 Industrial Project Evaluation	1
Humanity or Social Science	3
IMSE 015 Engineering Assembly	0
TOTAL	**17**

JUNIOR First Semester Courses	HRS
IMSE 560 Operations Research I	3
IMSE 541 Statistical Quality Control	3
IMSE 623 Industrial Ergonomics	3
~~Computer Programming Elective~~	3
Engineering Elective	3
IMSE 015 Engineering Assembly	0
TOTAL	**15**

JUNIOR First Semester Courses	HRS
IMSE 560 Operations Research I	3
IMSE 541 Statistical Quality Control	3
IMSE 623 Industrial Ergonomics	3
ACCTG 231 Accounting for Business Operations	3
Engineering Elective	3
IMSE 015 Engineering Assembly	0
TOTAL	**15**

JUNIOR Second Semester Courses	HRS
IMSE 660 Operations Research II	3
IMSE 555 Industrial Facility Layout and Design	3
MNGT 420 Management Concepts or LEAD 350 Culture and Context in Leadership	3
Engineering Elective	3
ENGL 415 Written Communication for Engineers	3
IMSE 050 Industrial Plant Studies	0
IMSE 015 Engineering Assembly	0
TOTAL	**15**

JUNIOR Second Semester Courses	HRS
IMSE 660 Operations Research II	3
IMSE 555 Industrial Facility Layout and Design	3
MNGT 420 Management Concepts or LEAD 350 Culture and Context in Leadership	3
Engineering Elective	3
ENGL 415 Written Communication for Engineers	3
IMSE 050 Industrial Plant Studies	0
IMSE 015 Engineering Assembly	0
TOTAL	**15**

SENIOR Second Semester Courses	HRS
IMSE 580 Manufacturing System Design & Analysis	4
IMSE 685 Manufacturing Information Systems	3
IMSE Elective	3
Professional Elective	3
Professional Elective	3
IMSE 015 Engineering Assembly	0
TOTAL	**16**
Number of Hours Required for Graduation is	**124**

SENIOR Second Semester Courses	HRS
IMSE 580 Manufacturing System Design & Analysis	4
IMSE 685 Manufacturing Information Systems	3
IMSE Elective	3
Professional Elective	3
Professional Elective	3
IMSE 015 Engineering Assembly	0
TOTAL	**16**
Number of Hours Required for Graduation is	**124**

IMSE CURRICULUM NOTES:

Computer Programming Elective: ~~The computer programming elective consists of 3 hours taken from CIS 200, CIS 209 or ME 400.~~

Engineering Electives: ~~The 9 hours of basic engineering credit may not include more than 6 hours from a single department and the 9 hours must be selected from the following courses. Note, a student planning to take the FE exam is advised to take their 9 hours from classes with an *.~~

~~BAE 345; CE 333, 530* (at most one of 333 and 530) and 533; CHE 354*, 355*, 356*, 520 and 521; ECE 410, 511, 519* and 571; ME 512*, 513, 571; IMSE 562.~~

Professional Electives: ~~The 9 credit hours of professional electives are designed so that the student may specialize in an area of interest. Any of the following classes may count toward the professional elective requirement. Any IMSE class; any engineering class above 300 level; any CIS class above 200 level; MATH 240 and any Mathematics class above 500 level except MATH 570 and 591; any Statistics class above 500 level except STAT 702, 703, 706 and 710; BIOL 198, BIOL 201, CHEM 230; FINAN 450, 510, 520, 520, 643, and 654; ACCTG 241, 331, 342 and 433; ECON 510, 520, 530, and 540; AGEC 680, 750.~~

IMSE CURRICULUM NOTES:

Elective courses: The list of departmentally approved elective courses is available at: http://www.imse.ksu.edu/undergraduate/current/

Statistics Elective: Choose one course from the approved department elective list.

Computer Programming Elective: Choose one course from the approved department elective list.

Engineering Electives: The 9 hours of basic engineering credit may not include more than 6 hours from a single department and the 9 hours must be selected from the approved departmental list.

Professional Electives: The 9 credit hours of professional electives are designed so that the student may specialize in an area of interest. Any class in the approved departmental list may count toward the professional elective requirement.

IMSE Electives IMSE electives are chosen from any IMSE course that is not already required in the curriculum.

Substitutions: ECON 120 can substitute for ECON 110. LEAD 350 can substitute for MGMT 420; IMSE 591 and IMSE 592 can substitute for IMSE 580. Concurrent or prerequisite requirement for both IMSE 580 and IMSE 591 is 24 credit hours of IMSE courses above the 500 level.

Humanities and Social Science electives: H&SS are to be selected from the college of engineering H&SS list.

IMSE Electives: ~~The IMSE electives must be selected from the IMSE department. Each class must also be at least 3 credit hours~~. **Substitutions:** ~~ECON 120 can substitute for ECON 110; LEAD 350 can substitute for MGMT 420; IMSE 591 and IMSE 592 can substitute for IMSE 580. Concurrent or prerequisite requirement for IMSE 591 is 24 credit hours of IMSE courses.~~ **Humanities and Social Science electives**: H&SS are to be selected from the college of engineering H&SS list. **K-State 8:** The courses required from a BSIE degree satisfy five of the K-State 8 areas. The student must fulfill the aesthetic experience, global perspectives, and historical perspectives tags. Most students will fill these tags with their humanities, social science or professional electives. ECON 110 fulfills the global perspective area. For additional information about the General Education K-State 8 program, check the requirements specified by the College of Engineering. **IMSE Graduation Criterion:** At most 6 credit hours of IMSE 500+ courses that earned a D may be applied to a student's B.S.I.E. graduation requirements. **IMSE Course Retake Criterion:** Any IMSE course being taken for a third time in any five-year period may not be used to fulfill a student's B.S.I.E. graduation requirements. **IMSE Assembly Requirement:** Each semester a student must enroll in IMSE 015 unless he/she is a concurrent B.S./M.S.I.E. student in which case he/she must enroll in either IMSE 015 or IMSE 892. * Prerequisite for ENGL 415 is a "B" or better in ENGL 100. ENGL 200 must be taken if ENGL 100's grade ≤ "C".		**K-State 8:** The courses required from a BSIE degree satisfy five of the K-State 8 areas. The student must fulfill the aesthetic experience, global perspectives, and historical perspectives tags. Most students will fill these tags with their humanities, social science or professional electives. ECON 110 fulfills the global perspective area. For additional information about the General Education K-State 8 program, check the requirements specified by the College of Engineering. **IMSE Graduation Criterion:** At most 6 credit hours of IMSE 500+ courses that earned a D may be applied to a student's B.S.I.E. graduation requirements. **IMSE Course Retake Criterion:** Any IMSE course being taken for a third time in any five-year period may not be used to fulfill a student's B.S.I.E. graduation requirements. **IMSE Assembly Requirement:** Each semester a student must enroll in IMSE 015 unless he/she is a concurrent B.S./M.S.I.E. student in which case he/she must enroll in either IMSE 015 or IMSE 892. * Prerequisite for ENGL 415 is a "B" or better in ENGL 100. ENGL 200 must be taken if ENGL 100's grade ≤ "C".	

Veterinary Medicine

Master of Public Health (M.P.H.)

Strike through the deleted courses or wording within the curriculum description or admission criteria.	Underline new courses, edited version of the curriculum description or admission criteria.
FROM: (Current list of courses for the curriculum, curriculum description, and admission criteria. Be sure to use current catalog information)	TO: To: (Proposed list of courses for the curriculum, curriculum description, and admission criteria.)
Infectious Diseases and Zoonoses **Required courses (12 hours):** • BIOL 530 - Pathogenic Microbiology **Credits**: 3 OR • DMP 812 - Veterinary Bacteriology and Mycology **Credits:** 4 • BIOL 670 - Immunology **Credits:** 4 OR • DMP 705 - Principles of Veterinary Immunology **Credits:** 3 • DMP 710 Introduction to One Health **Credits:** 2 • DMP 815 - Multidisciplinary Thought and Presentation **Credits:** 3 OR • ~~AAI 801 – Interdisciplinary Process **Credits**: 3~~ **Select any remaining credits needed for the degree from the list below:** • ASI 540 - Principles of Animal Disease Control **Credits:** 3 • BIOL 529 - Fundamentals of Ecology • BIOL 545 - Human Parasitology **Credits:** 3 • BIOL 546 - Human Parasitology Laboratory **Credits:** 1 • BIOL 604 - Biology of the Fungi **Credits:** 3 • BIOL 671 – Immunology Lab **Credits:** 1 • BIOL 675 - Genetics of Microorganisms **Credits:** 3 • BIOL 687 - Microbial Ecology **Credits:** 3 • BIOL 730 - General Virology **Credits:** 3 • DMP 718 - Veterinary Parasitology **Credits:** 4 • DMP 753 - Veterinary Public Health **Credits:** 2 • DMP 770 - Emerging Diseases **Credits:** 3 • DMP 801 - Toxicology **Credits:** 2 • DMP 806 - Environmental Toxicology **Credits:** 2 • DMP 816 - Trade and Agricultural Health **Credits:** 2 • DMP 822 - Veterinary Virology **Credits:** 3 • DMP 830 - Quantitative Analysis in Food Production Veterinary Medicine **Credits:** 3 • DMP 844 - Global Health Issues **Credits:** 3 • DMP 850 - Immunology of Domestic Animals **Credits:** 3 • DMP 854 - Intermediate Epidemiology **Credits:** 3 • DMP 855 - Disease Detection, Surveillance and Risk Assessment **Credits:** 3 • DMP 860 – Bacterial Pathogenesis and Host Response **Credits:** 3	**Infectious Diseases and Zoonoses** **Required courses (12 hours):** • BIOL 530 - Pathogenic Microbiology **Credits**: 3 OR • DMP 812 - Veterinary Bacteriology and Mycology – **Credits:** 4 OR • DMP 814 – Veterinary Bacteriology and Mycology Lecture **Credits:** 3 • BIOL 670 - Immunology **Credits:** 4 OR • DMP 705 - Principles of Veterinary Immunology **Credits:** 3 • DMP 710 Introduction to One Health **Credits:** 2 • DMP 815 - Multidisciplinary Thought and Presentation **Credits:** 3 **Select any remaining credits needed for the degree from the list below:** • AAI 801 – Interdisciplinary Process **Credits**: 3 • ASI 540 - Principles of Animal Disease Control **Credits:** 3 • BIOL 529 - Fundamentals of Ecology • BIOL 545 - Human Parasitology **Credits:** 3 • BIOL 546 - Human Parasitology Laboratory **Credits:** 1 • BIOL 604 - Biology of the Fungi **Credits:** 3 • BIOL 671 – Immunology Lab **Credits:** 1 • BIOL 675 - Genetics of Microorganisms **Credits:** 3 • BIOL 687 - Microbial Ecology **Credits:** 3 • BIOL 730 - General Virology **Credits:** 3 • DMP 718 - Veterinary Parasitology **Credits:** 4 • DMP 753 - Veterinary Public Health **Credits:** 2 • DMP 770 - Emerging Diseases **Credits:** 3 • DMP 801 - Toxicology **Credits:** 2 • DMP 806 - Environmental Toxicology **Credits:** 2 • DMP 816 - Trade and Agricultural Health **Credits:** 2 • DMP 822 - Veterinary Virology **Credits:** 3 • DMP 830 - Quantitative Analysis in Food Production Veterinary Medicine **Credits:** 3 • DMP 844 - Global Health Issues **Credits:** 3 • DMP 850 - Immunology of Domestic Animals **Credits:** 3 • DMP 854 - Intermediate Epidemiology **Credits:** 3 • DMP 855 - Disease Detection, Surveillance and Risk Assessment **Credits:** 3

• DMP 871 - Molecular Diagnostics of Infectious Diseases **Credits:** 3 • DMP 880 – Problems in Pathobiology **Credits:** 1-6 • DMP 888 - Globalization, Cooperation, & the Food Trade **Credits:** 1 • DMP 954 - Advanced Epidemiology **Credits:** 4 • ENTOM 849 - Biology of Disease Vectors of Human and Veterinary Importance **Credits:** 3 • FDSCI 690 - Principles of HACCP and HARPC **Credits:** 3 • FDSCI 730 - A Multidisciplinary Overview of Food Safety and Security **Credits:** 2 • FDSCI 731 - Food Protection and Defense–Essential Concepts **Credits:** 2 • GEOG 508 - Geographic Information Systems I **Credits:** 4 • GEOG 608 - Geographic Information Systems II **Credits:** 3 • MC 750 - Strategic Health Communication **Credits:** 3 • MC 760 - Communication and Risk **Credits:** 3 • STAT 705 - Regression and Analysis of Variance **Credits:** 3 • STAT 716 - Nonparametric Statistics **Credits:** 3 • STAT 717 - Categorical Data Analysis **Credits:** 3 • STAT 720 - Design of Experiments **Credits:** 3 • STAT 730 - Multivariate Statistical Methods **Credits:** 3 **Plus any graduate course approved by the graduate committee and the program director.**	• DMP 860 – Bacterial Pathogenesis and Host Response **Credits:** 3 • DMP 871 - Molecular Diagnostics of Infectious Diseases **Credits:** 3 • DMP 880 – Problems in Pathobiology **Credits:** 1-6 • DMP 888 - Globalization, Cooperation, & the Food Trade **Credits:** 1 • DMP 954 - Advanced Epidemiology **Credits:** 4 • ENTOM 849 - Biology of Disease Vectors of Human and Veterinary Importance **Credits:** 3 • FDSCI 690 - Principles of HACCP and HARPC **Credits:** 3 • FDSCI 730 - A Multidisciplinary Overview of Food Safety and Security **Credits:** 2 • FDSCI 731 - Food Protection and Defense–Essential Concepts **Credits:** 2 • GEOG 508 - Geographic Information Systems I **Credits:** 4 • GEOG 608 - Geographic Information Systems II **Credits:** 3 • MC 750 - Strategic Health Communication **Credits:** 3 • MC 760 - Communication and Risk **Credits:** 3 • STAT 705 - Regression and Analysis of Variance **Credits:** 3 • STAT 716 - Nonparametric Statistics **Credits:** 3 • STAT 717 - Categorical Data Analysis **Credits:** 3 • STAT 720 - Design of Experiments **Credits:** 3 • STAT 730 - Multivariate Statistical Methods **Credits:** 3 **Plus any graduate course approved by the graduate committee and the program director.**