

SUBCOMMITTEE A – AGENDA

**437 Administration Building**  
January 17, 2019  
1:30 p.m.

**PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES**

**COLLEGE OF AGRICULTURE AND NATURAL RESOURCES**

1. Request to change the requirements for the **Bachelor of Science** degree in **Horticulture** in the Department of Horticulture.

*The concentrations in the Bachelor of Science degree in Horticulture are noted on the student's academic record when the requirements for the degree have been completed.*

- a. Under the heading **Requirements for the Bachelor of Science Degree in Horticulture** make the following changes:

- (1) In item 3. a. make the following changes:

- (a) Change the total credits from '34' to '39'.

- (b) Delete the following courses:

HRT	204	Plant Propagation	2
HRT	206	Training and Pruning Plants	1
HRT	362	Applied Crop Improvement	1

Add the following courses:

CSS	350	Introduction to Plant Genetics	3
HRT	204	Plant Propagation and Use	3
STT	200	Statistical Methods	3

- (2) In item 3. b. under **Horticultural Science** make the following changes:

- (a) Change the total credits from '33' to '30'.

- (b) In item (1) change the total credits from '12' to '9' and delete the following course:

CSS	350	Introduction to Plant Genetics	3
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- (c) Replace items (2) and (3) with the following:

Complete 12 credits from the following:

CSS	226L	Weed Science Laboratory	1
CSS	326	Weed Science	3
HRT	211	Landscape Plants I	3
HRT	212	Landscape Plants II	3
HRT	218	Irrigation Systems for Horticulture	2
HRT	218L	Irrigation Systems for Horticulture Laboratory	1
HRT	242	Passive Solar Greenhouses for Protected Cultivation	1
HRT	243	Organic Transplant Production	1
HRT	253	Compost Production and Use	1
HRT	310	Nursery Management	3
HRT	323	Floriculture Production: Herbaceous Perennials and Annuals	3
HRT	332	Tree Fruit Production and Management	3
HRT	336	Viticulture and Berry Production	2
HRT	341	Vegetable Production and Management	3
HRT	405	Sustainable Practices for Horticultural Food Crop Production	1
HRT	475	International Studies in Horticulture	3

- (d) Renumber item (4) to item (3).

(3) In item 3. b. under **Sustainable and Organic Horticulture** make the following changes:

(a) In item (2) delete the following course:

CSS	288	Principles of Weed Management	3
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Add the following courses:

CSS	226L	Weed Science Laboratory	1
CSS	326	Weed Science	3
HRT	218	Irrigation Systems for Horticulture	2
HRT	218L	Irrigation Systems for Horticulture Laboratory	1
HRT	405	Sustainable Practices for Horticultural Food Crop Production	1

(4) In item 3. b. under **Horticulture Landscape Design, Construction, and Management** make the following changes:

(a) Change the total credits from '37' to '34'.

(b) In item (1) change the credits from '22' to '25' and delete the following course:

HRT	218	Irrigation Systems for Horticulture	3
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Add the following courses:

HRT	213	Landscape Maintenance	2
HRT	213L	Landscape Maintenance Field Laboratory	1
HRT	218	Irrigation Systems for Horticulture	2
HRT	218L	Irrigation Systems for Horticulture Laboratory	1

(c) In item (2) change the credits from '15' to '9' and delete the following courses:

CSS	288	Principles of Weed Management	3
HRT	213	Landscape Maintenance	2
HRT	213L	Landscape Maintenance Field Laboratory	1
HRT	220	Annual and Aquatic Landscape Plants	3
HRT	415	Natural Landscapes, Native Plants, and Landscape Restoration	3
HRT	460	Green Roofs and Walls	1

Add the following courses:

CSS	226L	Weed Science Laboratory	1
CSS	326	Weed Science	2
HRT	460	Green Roofs and Walls	2

2. Request to change the requirements for the **Minor in Horticulture** in the Department of Horticulture.
- a. Under the heading **Requirements for the Minor in Horticulture** make the following changes:

- (1) Change the credits required for the minor from '17' to '18'.
- (2) In item 1. change the credits of HRT 204 from '2' to '3'.
- (3) In item 2., delete the following courses:

HRT	206	Training and Pruning Plants	1
HRT	218	Irrigation Systems for Horticulture	3
HRT	220	Annual and Aquatic Landscape Plants	3
HRT	362	Applied Crop Improvement	1
HRT	415	Natural Landscape, Native Plants, and Landscape Restoration	3

Add the following courses:

HRT	218	Irrigation Systems for Horticulture	2
HRT	218L	Irrigation Systems for Horticulture Laboratory	1

Effective Fall 2019.

### **COLLEGE OF ENGINEERING**

1. Request to change the requirements in the **Bachelor of Science** degree in **Computer Science** in the Department of Computer Science and Engineering.
- a. Under the heading **Requirements for the Bachelor of Science Degree in Computer Science** make the following changes:

- (1) In item 3. b. delete the following course:

CSE	410	Operating Systems	3
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Add the following course:

CSE	325	Computer Systems	3
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- (2) In item 3. c. delete the following course:

CSE	484	Information Retrieval	3
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Add the following course:

CSE	410	Operating Systems	3
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Effective Fall 2019.

2. Request to change the requirements in the **Bachelor of Science** degree in **Computer Engineering** in the Department of Electrical and Computer Engineering.

*The optional concentration in the Bachelor of Science degree in Computer Engineering is noted on the student's academic record when the requirements for the degree have been completed.*

- a. Under the heading **Requirements for the Bachelor of Science Degree in Computer Engineering** make the following changes:

(1) In item 3. b. change the total credits to '43'.

(2) In item 3. b. delete the following course:

CSE	410	Operating Systems	3
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Add the following courses:

CSE	325	Computer Systems	3
ECE	366	Introduction to Signal Processing	3

(3) Replace item 3. d. with the following:

**Electives**

Complete 21 credits of electives as specified below. At least 15 credits must be from the focus track electives and at least 6 credits from the core, with at least one course with a laboratory. Additional credits to meet the 21 credit requirement may be taken from other courses listed below, any 400-level Computer Science and Engineering (CSE) or Electrical and Computer Engineering (ECE) courses, or by completing an approved 3 or 4 credit experiential, out-of-classroom education experience obtained through engineering cooperative education or independent study.

**Core**

(1) At least 6 credits from the following:

CSE	335	Object-oriented Software Design	4
CSE	420	Computer Architecture	3
CSE	422	Computer Networks	3
or			
ECE	442	Introduction to Communication Networks	3
ECE	430	Embedded Cyber-Physical Systems	4
CSE	425	Introduction to Computer Security	3
or			
ECE	456	Introduction to Communication and Network Security	3

Both CSE 422 and ECE 442 or CSE 425 and ECE 456 may not be used to fulfill this requirement.

**Focus Track**

At least 15 credits from the following:

**Hardware**

ECE	402	Applications of Analog Integrated Circuits	4
ECE	410	VLSI Design	4
ECE	411	Electronic Design Automation	4
ECE	431	Smart Sensor Systems	3
ECE	445	Biomedical Instrumentation	3

**Software Systems**

CSE	410	Operating Systems	3
CSE	415	Introduction to Parallel Programming	3
CSE	435	Software Engineering	3
CSE	450	Translation of Programming Languages	3
CSE	476	Mobile Application Development	3

**Intelligent Systems**

ECE	446	Biomedical Signal Processing	3
ECE	466	Digital Signal Processing and Filter Design	3
CSE	440	Introduction to Artificial Intelligence	3

**Electrical Systems**

ECE	305	Electromagnetic Fields and Waves I	4
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ECE	313	Control Systems	3
ECE	377	Principles of Electronic Devices	3
ECE	404	Radio Frequency Electronic Circuits	4
ECE	417	Robotics	4

b. Under the heading **Biomedical Engineering Concentration** make the following changes:

(1) Add the following statement:

NOTE: Completing the Bachelor of Science degree in Computer Engineering with a concentration may require more than 128 credits.

(2) Under the heading **Biomedical Engineering** make the following changes:

(a) Change the credits of item 2. from '6' to '9' and add the following course:

BE	444	Biosensors for Medical Diagnostics	3
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(b) Delete item 3.

(c) Add the following note to item 2.:

Students may enroll in 3 or 4 credits of ECE 490 or 491 with biomedical engineering content as approved by the student's advisor for partial fulfillment of this requirement.

Effective Fall 2019.

3. Request to change the requirements in the **Bachelor of Science** degree in **Electrical Engineering** in the Department of Electrical and Computer Engineering.

*The optional concentration in the Bachelor of Science degree in Electrical Engineering is noted on the student's academic record when the requirements for the degree have been completed.*

a. Under the heading **Requirements for the Bachelor of Science Degree in Electrical Engineering** make the following changes:

(4) In item 3. b., add the following course:

ECE	377	Principles of Electronic Devices	3
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(5) In item 3. b. change the total credits to '41'.

(6) Delete item 3. d.

(7) Replace item 3. e. with the following as 3. d.:

Complete a minimum of 18 credits including at least 12 credits from the focus areas below. The 12 credits must include at least one laboratory course (ECE 402, 404, 405, 407, 410, 415, 417, 420, 430, 431, 445, 458, 476, 477) and at least one 3 or 4 credit course from two different focus areas. Additional credits to meet the 18 credit requirement may be taken from any 400-level engineering course or by completing an approved 3 or 4 credit experiential education experience obtained in a minimum of three out-of-classroom experiences through engineering cooperative education or independent study. Students interested in the experiential education experience must contact the department for approval. Courses at the 400-level outside of Electrical and Computer Engineering may have restrictions or require additional prerequisites not included within this degree program.

**Computing and Electronics**

ECE	402	Applications of Analog Integrated Circuits	4
ECE	410	VLSI Design	4

ECE	430	Embedded Cyber-Physical Systems	4
ECE	431	Smart Sensor Systems	3
ECE	442	Introduction to Communication Networks	3
ECE	445	Biomedical Instrumentation	3
ECE	456	Introduction to Communication and Network Security	3
<b>Electrosiences</b>			
ECE	404	Radio Frequency Electronic Circuits	4
ECE	405	Electromagnetic Fields and Waves II	4
ECE	407	Electromagnetic Compatibility	4
ECE	447	Introduction to Biomedical Imaging	3
ECE	449	Fundamentals of Acoustics	3
ECE	476	Electro-Optics	4
ECE	477	Microelectronic Fabrication	3
<b>Systems</b>			
ECE	415	Computer Aided Manufacturing	3
ECE	416	Digital Control	3
ECE	417	Robotics	4
ECE	420	Machines and Power Laboratory	1
ECE	423	Power System Analysis	3
ECE	425	Solid State Power Conversion	3
ECE	446	Biomedical Signal Processing	3
ECE	448	Modeling and Analysis of Bioelectrical Systems	3
ECE	457	Communication Systems	3
ECE	458	Communication Systems Laboratory	1
ECE	466	Digital Signal Processing	3

(8) Under the **Biomedical Engineering Concentration** make the following changes:

- (a) Delete item 3.
- (b) Change item 2. to 'Complete 9 credits from the following courses or 3 or 4 credits of ECE 490 or 491 with biomedical engineering content as approved by the student's academic advisor'.
- (c) In item 2. add the following course:
 

BE	444	Biosensors for Medical Diagnostics	3
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Effective Fall 2019.

## **PART II - NEW COURSES AND CHANGES**

### **COLLEGE OF AGRICULTURE AND NATURAL RESOURCES**

~~CSUS 452~~

AE 452

Watershed Concepts

Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~Interdepartmental with Biocystems Engineering and Crop and Soil Sciences and Forestry and Fisheries and Wildlife. Interdepartmental with Crop and Soil Sciences and Forestry and Fisheries and Wildlife.~~ ~~P: CSUS~~

~~354~~ RB: Organic chemistry

Watershed hydrology and management. The hydrologic cycle, water quality, aquatic ecosystems, and social systems. Laws and institutions for managing water resources.

~~SA: RD 452, ESA 452~~ SA: ESA 452, RD 452

~~Effective Fall 2014~~ Effective Fall 2018

~~CSUS 841~~

AE 841

Building and Implementing Watershed Management Plans

Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~RB: CSUS 452~~ ~~RB: AE 452~~  
Developing and implementing watershed management plans. Problem definition, data collection, public consultation, and program evaluation.

~~SA: ACR 841, RD 881~~ SA: ACR 841, CSUS 841, RD 881

~~Effective Fall 2014~~ Effective Fall 2018

~~CSUS 842~~

AE 842

Watershed Assessments and Tools

Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~RB: CSUS 452 or CSUS 841~~  
~~RB: AE 452 or AE 841~~

Assessing and predicting physical, chemical, biological and socioeconomic conditions within watersheds. Tools and techniques for identifying, evaluating, and prioritizing problems.

~~SA: ACR 842, RD 882~~ SA: ACR 842

~~Effective Fall 2014~~ Effective Fall 2018

~~CSUS 843~~

AE 843

Legal, Financial and Institutional Frameworks in Watershed Management

Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~RB: CSUS 452 or CSUS 841~~  
~~or CSUS 842~~ ~~RB: AE 452 or AE 841 or AE 842~~

Watershed management laws and regulations. Resolving financial and human conflicts arising from regulation.

SA: ACR 843

~~Effective Fall 2014~~ Effective Fall 2018

FSC 843

Exposure Science and Environmental Epidemiology

Spring of odd years. 3(3-0) RB: Statistics, basic biological and chemical science

NEW

Human exposure to chemicals in food and the environment and its relationship to health and illness. Applied concepts in toxicology, exposure assessment, environmental epidemiology, and risk assessment.

Effective Fall 2019

FSC 844

Risk Assessment of Foodborne Chemicals and Toxins

Spring of even years. 3(3-0) RB: Calculus, basic biological and chemical sciences, toxicology

NEW

Human health risk assessment, including hazard identification, dose-response and exposure assessment, and risk characterization. Application to food safety and environmental risks.

Effective Fall 2019

~~FW 419~~  
~~FOR 419~~

Applications of Geographic Information Systems to Natural Resources Management  
Spring of every year. 4(2-4) ~~Interdepartmental with Biosystems Engineering and Forestry and Geography.~~ Interdepartmental with Biosystems Engineering and Fisheries and Wildlife and Geography RB: GEO 221  
Application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.  
~~Effective Fall 2014~~ Effective Summer 2019

HRT 203

~~Principles of Horticulture~~  
~~Introduction to Horticulture~~  
Fall of every year. 3(2-2)

~~Basics of horticulture. Plant growth including crop selection and management, cultivar development, crop geography, environmental factors affecting plant growth and development, and reproductive development. Field trip required. An introduction to the concepts and practices of horticulture. Crop selection and management, factors affecting plant growth and development, and an introduction to plant identification. Field trip required.~~  
SA: HRT 201  
~~Effective Fall 2014~~ Effective Fall 2019

HRT 204

~~Plant Propagation~~  
~~Plant Propagation and Use~~  
Spring of every year. ~~2(2-3)~~ 3(2-2)

~~Asexual propagation including rooting of cuttings, micropropagation, grafting, layering, and underground structures. Sexual propagation including seed germination, storage, and production. Offered first 10 weeks of the semester. Asexual (rooted cuttings, micropropagation, grafting, layering, underground structures) and sexual (seed collection, quality, storage, germination) propagation. Genetic variation and plant selection/breeding. Plant production and use. Introduction to plant identification. Field trip required.~~  
SA: HRT 204L, HRT 104  
~~Effective Fall 2014~~ Effective Fall 2019

HRT 218

Irrigation Systems for Horticulture  
Spring of every year. ~~3(2-2)~~ 2(2-0) R: Open to undergraduate students or agricultural technology students.

~~Design, installation and maintenance of irrigation systems for turfgrass and landscape plants. Design hydraulics, equipment selection, pump stations, water features, water quality and conservation. Design, installation and maintenance of irrigation systems for horticultural crops. Irrigation system hydraulics, irrigation equipment and component selection, pumps, troubleshooting, best management practices, water quality and conservation.~~  
~~Effective Spring 2015~~ Effective Fall 2019

HRT 218L

Irrigation Systems for Horticulture Laboratory  
Spring of every year. 1(0-2) P: HRT 218 or concurrently R: Open to undergraduate students or agricultural technology students.

NEW

Design, installation and maintenance practices of irrigation systems for horticultural crops. Irrigation system hydraulics, programming and assembly of irrigation equipment and components, electrical and hydraulic troubleshooting.  
Effective Fall 2019

HRT 332

Tree Fruit Production and Management  
Fall of every year. 3(2-2) ~~P: HRT 203 or HRT 251~~ P: HRT 203 or PLB 105 or PLB 203  
Commercial apple, cherry, peach, and pear production. Cultural practices to manipulate growth and development and optimize fruit yields and quality. Field trips required.  
~~Effective Fall 2017~~ Effective Fall 2019



HRT 812 Laboratory Research Techniques  
~~Fall of every year.~~ Fall of even years. 2(1-3) R: Open to graduate students in the Department of Horticulture.

Demonstration and experience using various research techniques.

~~Effective Summer 2014~~ Effective Fall 2019

PLP 805 Principals in Plant Pathology  
Fall of every year. 2(2-0) RB: (PLP 405) or equivalent course R: Open to graduate students.  
NEW Biodiversity of plant pathogens, molecular plant microbe interactions, microbial ecology, epidemiology, and population genetics of plant pathogens.  
Effective Fall 2019

### **COLLEGE OF ENGINEERING**

MSE 425 Biomaterials and Biocompatibility  
~~Fall of every year.~~ ~~Spring of every year.~~ 3(3-0) Interdepartmental with Biomedical Engineering. P: MSE 250 RB: PSL 250 R: Open to juniors or seniors in the College of Engineering.

Materials science of human implants. Design requirements imposed by the human body, and need for bodily protection.

SA: BME 424, MSE 324

~~Effective Fall 2015~~ Effective Fall 2019

CSE 102 Algorithmic Thinking and Programming  
Fall of every year. Spring of every year. Summer of every year. 3(1-4) P: (MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 152H or LB 118) or designated score on Mathematics Placement test Not open to students with credit in CSE 231.

NEW Problem solving using a computer. The fundamentals of computing, algorithms and programming. Programming and problem solving using a high-level language such as Python. Algorithmic topics including repetition and decision structures, functions, and data structures. Integrating programs with other applications such as spreadsheets.  
Effective Fall 2019

CSE 325 Computer Systems  
Fall of every year. Spring of every year. Summer of every year. 3(3-0) P: CSE 320 or ECE 331 R: Open to students in the College of Engineering or in the Computer Engineering Major or in the Computer Science Minor or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major.

NEW Process and processor management. Concurrent processes and threads. Memory management and the memory hierarchy. Networking and network protocols. Secure programming and communication methods.  
Effective Fall 2019

CSE 410 Operating Systems  
Fall of every year. ~~Spring of every year.~~ 3(3-0) ~~P: (CSE 232 and CSE 260) and (CSE 320 or ECE 331)~~ P: (CSE 232 and CSE 260) and CSE 325 R: Open to juniors or seniors in the College of Engineering or in the Computer Science Minor or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major or in the Computer Science Disciplinary Teaching Minor.

Principles and evolution of operating systems. Process and processor management. Concurrent processes and threads. Primary and secondary storage management. Case studies of modern operating systems.

SA: CPS 410

~~Effective Fall 2017~~ Effective Fall 2019

- CSE 422 Computer Networks  
Fall of every year. Spring of every year. 3(3-0) ~~P: (STT 351 or ECE 280) and (CSE 410 or concurrently) P: (STT 351 or ECE 280 or STT 430 or STT 441) and CSE 325~~ R: Open to juniors or seniors in the College of Engineering or in the Computer Science Minor or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major.  
Computer network architectures and models. Physical media and signaling. Data link protocols. Medium access control. Routing and IP. Transport services including TCP/UDP. Network applications. Local-area and wide-area networks.  
SA: CPS 422  
~~Effective Fall 2017~~ Effective Fall 2019
- CSE 498 Collaborative Design (W)  
Fall of every year. Spring of every year. 4(2-4) ~~P: ((CSE 420 or CSE 422 or CSE 425 or CSE 435 or CSE 440 or CSE 450) or (CSE 460 or CSE 471 or CSE 472 or CSE 473 or CSE 480 or CSE 484)) and ((CSE 335 and CSE 410) and completion of Tier I writing requirement)~~ ~~P: (CSE 402 or CSE 415 or CSE 422 or CSE 431 or CSE 440 or CSE 450 or CSE 471 or CSE 476 or CSE 477 or CSE 482) and (CSE 402 or CSE 420 or CSE 425 or CSE 435 or CSE 440 or CSE 460 or CSE 472 or CSE 477 or CSE 480 or CSE 482) and (CSE 335 and completion of Tier I writing requirement) and (CSE 325 or CSE 410)~~ R: Open to students in the Computer Science Major or in the Lyman Briggs Computer Science Coordinate Major.  
Development of a comprehensive software and/or hardware solution to a problem in a team setting with emphasis on working with a client. Participation in a design cycle including specification, design, implementation, testing, maintenance, and documentation. Issues of professionalism, ethics, and communication.  
SA: CSE 449, CSE 478, CSE 479  
~~Effective Fall 2016~~ Effective Fall 2019
- ECE 377 Principles of Electronic Devices  
Fall of every year. Spring of every year. 3(3-0) P: PHY 184 and ECE 202 R: Open to students in the Department of Electrical and Computer Engineering. Not open to students with credit in ECE 474.
- NEW Basic principles required to understand the operation of solid state devices. Semiconductor device equations developed from fundamental concepts. P-N junction theory developed and applied to the analysis of diodes, bipolar transistors, field effect transistors.  
Effective Fall 2019
- ECE 410 VLSI Design  
Spring of every year. 4(3-3) ~~P: ECE 302 and ECE 303 and ECE 230~~ P: ECE 230 and ECE 303 and ECE 377 R: Open to juniors or seniors or graduate students in the College of Engineering.  
~~Digital integrated circuit design fundamentals. Design specifications: functionality, performance, reliability, manufacturability, testability, cost. Standards, silicon compilers, foundries. Design layout rules, rule checking. Circuit extraction, simulation, verification. Team-based design.~~ Integrated circuit design fundamentals. Design specifications: functionality, performance, reliability, manufacturability, testability, cost. Standards and foundries. Design layout rules, rule checking. Circuit extraction, simulation, verification. Team-based design.  
SA: EE 410  
~~Effective Fall 2013~~ Effective Fall 2019
- ECE 417 Robotics  
Spring of every year. 4(3-3) P: ECE 313 or ME 451 R: Open to undergraduate students or graduate students in the Department of Electrical and Computer Engineering.
- NEW Robot modeling, kinematics, dynamics, planning, trajectory generation, and control. Robotics laboratory.  
Effective Fall 2019

- ECE 430 Embedded Cyber-Physical Systems  
Fall of every year. 4(3-3) P: ECE 331 R: Open to students in the Department of Electrical and Computer Engineering.
- NEW Modeling continuous and discrete dynamics of embedded cyber-physical systems (CPS). Hybrid systems. Composition of state machines. Concurrent models of computation. Design and implementation of CPS including sensors and actuators, embedded processors, Internet of Things (IoT), cloud IoT, multitasking, and scheduling. Analysis and verification of CPS. Emerging topics in CPS. Labs in support of lecture material.  
Effective Fall 2019
- ECE 431 Smart Sensor Systems  
Spring of odd years. 3(2-3) P: ECE 303 and ECE 331 R: Open to students in the Department of Electrical and Computer Engineering.
- NEW Architecture and design of microcontroller-based embedded smart sensor systems consisting of signal transducers, instrumentation circuits, digital controllers, and signal processing algorithms. Terminology, theory and techniques of instrumentation and smart system implementation. Hands-on experience with microcontroller peripherals, sensors and actuators, instrumentation circuits, and signal processing algorithms.  
Effective Fall 2019
- ECE 446 Biomedical Signal Processing  
Fall of odd years. 3(3-0) P: ECE 366 RB: Basic linear systems and probability theory. ~~R: Open to students in the College of Engineering. R: Open to students in the Department of Electrical and Computer Engineering. Not open to students with credit in ECE 466.~~
- Deterministic and random digital signal processing theory in the context of biomedical applications with computer projects on the analysis of real physiologic signals.  
~~Effective Fall 2013~~ Effective Fall 2019
- ECE 466 ~~Digital Signal Processing and Filter Design~~  
Digital Signal Processing  
~~Fall of every year. Spring of every year. 3(3-0) P: ECE 366 R: Open to seniors or graduate students in the College of Engineering. Not open to students with credit in ECE 446.~~  
Discrete Fourier transforms, sampling theorem, circular convolution, Z-transforms. Design of infinite impulse response filters using prototypes and algorithmic methods. Design of finite impulse response filters by windowing, frequency sampling. Discrete Fourier transforms, sampling theorem, circular convolution, Z-transforms. Design of finite impulse response filters by windowing, frequency sampling. Applications of digital signal processing to multidimensional signals and machine learning.  
SA: EE 466  
~~Effective Fall 2013~~ Effective Fall 2019
- ECE 477 Microelectronic Fabrication  
Fall of every year. 3(2-3) ~~P: ECE 303~~ P: ECE 303 and ECE 377 R: Open to juniors or seniors in the College of Engineering.
- Microelectronic processing fundamentals and simulations. Comparison of current microfabrication technologies and their limitations.  
SA: ECE 483  
~~Effective Fall 2016~~ Effective Fall 2019
- ECE 822 Power System Analysis  
Spring of every year. 3(3-0) P: ECE 320 or concurrently R: Open to graduate students in the Department of Electrical and Computer Engineering. Not open to students with credit in ECE 423.
- NEW Synchronous machines. Models and measurements of power components. Symmetrical components. Short-circuit analysis and equipment protection. Load flow analysis and optimization. Voltage and frequency control. Operation and planning of power systems. Transient stability.  
Effective Spring 2018

- ECE 824 Power System Reliability  
Fall of odd years. 3(3-0) RB: STT 441
- NEW Fundamentals of stochastic processes. Modeling of components and systems for reliability analysis of engineering systems. Monte Carlo simulation. Concepts in reliability of electric power systems; power system reliability metrics. Methods of reliability analysis of large power systems.  
Effective Fall 2017
- EGR 100 Introduction to Engineering Design  
Fall of every year. Spring of every year. ~~Summer of every year.~~ 2(1-2) ~~P: ((MTH 116 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 118 or concurrently)) and (WRA 1004 or designated score on English Placement test.)~~ ~~P: ((MTH 116 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 117 or concurrently) or (LB 118 or concurrently)) and (WRA 1004 or designated score on English Placement test.)~~ ~~R: Open to students in the College of Engineering or in the Entrepreneurship & Innovation Minor and open to students in the Lyman Briggs College.~~ R: Open to students in the College of Engineering or in the Entrepreneurship and Innovation Minor and open to students in the Lyman Briggs College.  
Engineering design process as modeled by team-based, interdisciplinary design projects. Roles of engineers and the contributions of engineering in society. Project management, creativity and design of products and processes to specified outcomes under specified constraints. Introduction to computing tools and physical equipment in support of engineering design. Engineering ethics. Oral and written technical communications.  
~~Effective Spring 2016~~ Effective Fall 2019

### COLLEGE OF NATURAL SCIENCE

- IBIO 303 Oceanography  
Fall of every year. 4(4-0) Interdepartmental with Geological Sciences. ~~P: (CEM 141 or CEM 181H or LB 171 or CEM 151) and (PHY 231 or PHY 183 or PHY 193H or LB 273 or PHY 183B or PHY 231C)~~ P: (CEM 141 or CEM 181H or LB 171 or CEM 151) and (PHY 231 or PHY 183 or PHY 193H or LB 273 or PHY 183B or PHY 231C or PHY 241)  
Physical, chemical, biological, and geological aspects of oceanography: ocean circulation, waves, tides, air-sea interactions, chemical properties of ocean water, ocean productivity, shoreline processes, and sediments.  
SA: ZOL 303  
~~Effective Fall 2016~~ Effective Spring 2018
- IBIO 368 Zoo Animal Biology and Conservation  
Summer of every year. 3(3-0) Interdepartmental with Animal Science and Fisheries and Wildlife and Landscape Architecture. ~~P: BS 162 or approval of department~~ P: BS 162 or LB 144 or BS 182H or approval of department RB: Previous work in biology  
Captive animal biology including illustrated examples of care, behavioral welfare and conservation work.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.  
~~Effective Summer 2018~~ Effective Spring 2018
- MTH 100E Intermediate Algebra Workshop for the Mathematics Enrichment Program  
Fall of every year. Spring of every year. 1(0-4) R: Approval of department. C: MTH 1825 concurrently.  
Enrichment topics in intermediate algebra for students in the Mathematics Enrichment Program.  
Request the use of the Pass-No Grade (P-N) system.  
DELETE COURSE  
Effective Fall 2018

- MTH 103E College Algebra Workshop for the Mathematics Enrichment Program  
Fall of every year. Spring of every year. 1(0-4) R: Approval of department. C: MTH 103 concurrently.  
Enrichment topics in college algebra for students in the Mathematics Enrichment Program.  
Request the use of the Pass-No Grade (P-N) system.  
DELETE COURSE  
Effective Fall 2018
- MTH 110 Finite Mathematics and Elements of College Algebra  
Fall of every year. Spring of every year. Summer of every year. 5(5-0) P: (MTH 1825) or designated score on Mathematics Placement test Not open to students with credit in MTH 112.  
Functions and graphs. Equations and inequalities. Systems of equations. Matrices. Linear programming. Simplex algorithm. Probability and statistics.  
DELETE COURSE  
Effective Fall 2018
- MTH 112 Finite Mathematics: Applications of College Algebra  
Fall of every year. Spring of every year. Summer of every year. 3(3-0) P: (MTH 103) or designated score on Mathematics Placement test Not open to students with credit in MTH 110.  
Combinatorics, probability and statistics, mathematics of finance, geometry, transition matrices, and linear programming. The course emphasizes applications and includes work using spreadsheets.  
SA: MTH 106  
DELETE COURSE  
Effective Fall 2018
- MTH 1825 Intermediate Algebra  
Fall of every year. Spring of every year. Summer of every year. 3(3-0)  
Properties of real numbers. Factoring. Roots and radicals. First and second degree equations. Linear inequalities. Polynomials. Systems of equations.  
DELETE COURSE  
Effective Fall 2018
- MTH 201 Elementary Mathematics for Teachers I  
Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~P: (MTH 103 or MTH 110 or MTH 116 or MTH 124 or MTH 132 or MTH 152H or LB 118) or designated score on Mathematics Placement test~~ P: (MTH 103 or MTH 110 or MTH 116 or MTH 124 or MTH 132 or MTH 152H or LB 118 or MTH 101 or MTH 102) or designated score on Mathematics Placement test R: Open to students in the Child Development major or in the Education Major or in the Special Education-Learning Disabilities Major or in the Teacher Certification Internship Year Studies Program.  
Mathematics needed for K-8 teaching. Place value and models for arithmetic, mental math, word problems, and algorithms. Factors, primes, proofs, and prealgebra. Fractions, ratios, rates, and percentages. Negative, rational, and real numbers. Special emphasis on the appropriate sequential order for teaching.  
~~Effective Fall 2018~~ Effective Spring 2019

### COLLEGE OF NURSING

- NUR 930 Methods In Clinical Research  
~~Fall of every year.~~ Summer of every year. 3(3-0) P: NUR 924 and NUR 939 or approval of college R: Open to doctoral students in the College of Nursing or approval of college.  
Advanced research designs, measurement and data collection strategies for a broad range of behavioral and health disciplines relevant to wellness, risk reduction, and chronic illness.  
~~Effective Fall 2018~~ Effective Summer 2019

- NUR 975 Clinical Anesthesia Practicum I  
Fall of every year. ~~2(0-16)~~ 3(0-24) P: NUR 974 R: Open to doctoral students in the College of Nursing or in the Nursing Practice Major.  
Integration of theory with practice in a clinical and simulated setting with emphasis on basic principles of anesthesia and professional standards of practice for the certified registered nurse anesthetist.  
Request the use of the Pass-No Grade (P-N) system.  
~~Effective Fall 2018~~ Effective Spring 2019
- NUR 976 Clinical Anesthesia Practicum II  
Spring of every year. ~~3(0-24)~~ 2(0-16) P: NUR 975 R: Open to doctoral students in the College of Nursing or in the Nursing Practice Major.  
Supervised instruction in the clinical management of patients receiving all types of anesthesia in a variety of clinical settings.  
Request the use of the Pass-No Grade (P-N) system.  
~~Effective Fall 2018~~ Effective Spring 2019
- NUR 998 Application of Scientific Knowledge in a Clinical Practicum  
On Demand. 1 to 3 credits. R: Open to doctoral students in the College of Nursing or in the Nursing Major.
- NEW Systematic approach to acquiring advanced clinical and research knowledge and skills needed to identify clinical problems and develop research questions to advance science related to improving health outcomes.  
Request the use of the Pass-No Grade (P-N) system.  
Effective Spring 2019

### **COLLEGE OF OSTEOPATHIC MEDICINE**

- OST 582 ~~Transitions: From the Classroom to the Bedside~~  
Transitions I: Board Preparation  
Summer of every year. ~~5 credits~~ 6 credits. R: Open to graduate-professional students in the College of Osteopathic Medicine.  
~~Selected topics in preparation for clinical education~~ Selected topics in preparation for Licensure Boards  
Request the use of the Pass-No Grade (P-N) system.  
~~Effective Summer 2018~~ Effective Summer 2019
- OST 598 Biostatistics and Epidemiology Foundations  
Summer of every year. 1(1-0) R: Open to graduate-professional students in the College of Osteopathic Medicine.
- NEW This course introduces biostatistical and epidemiologic principles and their application to the scientific method, population health, critical review of literature, and research design.  
Request the use of the Pass-No Grade (P-N) system.  
Effective Summer 2019
- OST 601 Transitions II: Classroom to Bedside  
Summer of every year. 5 credits. R: Open to graduate-professional students in the College of Osteopathic Medicine.
- NEW Selected topics designed to assist the COM student in transitioning from the classroom learning environment to the clinical learning environment.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.  
Effective Summer 2019

- OST 686 ~~Clinical Clerkship in Merida, Mexico~~  
Global Health: Mexico - Community Medicine and Mayan Culture in the Yucatan  
Fall of every year. Spring of every year. Summer of every year. ~~1 to 20 credits.~~ 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course. P: IM 618 or approval of college RB: Fluency in Spanish to interact with patients ~~R: Open to graduate professional students in the College of Osteopathic Medicine.~~ R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.  
Clerkship experiences in Mexican healthcare institutions and healthcare delivery systems. Includes introduction to common diseases and treatments, as well as cultural aspects of Mexican health care.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
~~The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment. The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.~~  
~~Effective Summer 2013~~ Effective Summer 2019
- OST 687 ~~Peru Medical Service~~  
Global Health: Peru Medical Service  
Fall of every year. Spring of every year. Summer of every year. ~~3 to 6 credits.~~ 1 to 20 credits. ~~A student may earn a maximum of 18 credits in all enrollments for this course.~~ A student may earn a maximum of 30 credits in all enrollments for this course. RB: Fluency in Spanish to interact with patients ~~R: Open to graduate professional students in the College of Osteopathic Medicine.~~ R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.  
Healthcare services under the supervision of licensed U.S. physicians working in tandem with local providers. Offered second half of semester.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
~~Effective Fall 2016~~ Effective Summer 2019
- OST 688 ~~Cuban Health Care System and Culture~~  
Global Health: Cuban Healthcare Delivery System  
Fall of every year. Spring of every year. Summer of every year. ~~3 to 6 credits.~~ 1 to 20 credits. ~~A student may earn a maximum of 18 credits in all enrollments for this course.~~ A student may earn a maximum of 30 credits in all enrollments for this course. ~~R: Open to graduate professional students in the College of Osteopathic Medicine.~~ R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.  
~~On site observation of healthcare delivery in community health clinics, maternal health, pediatric care, and geriatric care. In patient care in teaching hospitals in Havana, Cuba. Offered second half of semester.~~ On site observation of healthcare delivery in community health clinics, maternal health, pediatric care, and geriatric care. In patient care in teaching hospitals in Havana, Cuba.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
~~Effective Spring 2017~~ Effective Summer 2019

- OST 689      ~~Global Health and Culture in Haiti~~  
Global Health: Haiti - Intro to Global Health and Culture  
Fall of every year. Spring of every year. Summer of every year. ~~3 to 6 credits. 1 to 20 credits.~~ A student may earn a maximum of 12 credits in all enrollments for this course. A student may earn a maximum of 30 credits in all enrollments for this course. ~~R: Open to graduate professional students in the College of Human Medicine or in the College of Osteopathic Medicine or in the College of Nursing.~~ R: Open to graduate-professional students in the College of Human Medicine or in the College of Osteopathic Medicine or in the College of Nursing or approval of college.  
Introduction to culture and health care delivery in Haiti including rotations in primary care clinics and hospitals. Introduce students to the health care delivery model in Haiti while experiencing the country's rich culture. Through the course of the week, students will explore the healthcare model by spending the first three days of their rotation in a primary care clinic named Pistère Clinic. They will then transition to rotating through Milot hospital for the remaining two days. There will be lectures and presentations by Haitian health care officials and clinicians and opportunities for students to closely observe and participate in the care of patients while learning about Haiti's history and culture.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
~~Effective Fall 2018~~ Effective Summer 2019
- OST 690      Global Health: Dominican Republic - Healthcare Delivery System and Culture  
Fall of every year. Spring of every year. Summer of every year. 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.
- NEW            Enriching students' understanding of Dominican culture and healthcare delivery system in the Dominican Republic. In addition, students should develop an understanding of disease etiology and control of endemic diseases.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
Effective Summer 2019
- OST 691      Global Health: Guatemala - Tropical Medicine and Infectious Diseases  
Fall of every year. Spring of every year. Summer of every year. 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course. RB: Fluency in Spanish to interact with patients R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.
- NEW            Enhances students' understanding of the host country's healthcare system as well as understanding and developing cultural competency. During the Elective students will provide or observe healthcare services, under the supervision of licensed US physicians, to develop an understanding of the regional disease etiology and control of endemic diseases, in particular, infectious/tropical diseases and those associated with the lack of potable water and sanitation.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
Effective Summer 2019



- OST 692 Global Health: Turkish Healthcare Delivery System Culture  
Fall of every year. Spring of every year. Summer of every year. 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.
- NEW To enrich students' understanding of a secular Islamic culture and healthcare delivery system in the Republic of Turkey. In addition, students should develop an understanding of disease etiology and control of endemic diseases.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
Effective Summer 2019
- OST 693 Global Health: Korean Healthcare Delivery Systems  
Fall of every year. Spring of every year. Summer of every year. 1 to 6 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.
- NEW Enrich students' understanding of rich cultures of South Korea and understanding of their healthcare services and delivery system. In addition, students should develop an understanding of disease etiology and control of endemic diseases.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
Effective Summer 2019
- OST 694 Global Health: Nepal - One Health in Nepal  
Fall of every year. Spring of every year. Summer of every year. 1 to 6 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine or approval of college.
- NEW Enriching students' understanding of the One Health concept which is the recognition of the interconnected nature of humans, animals and the environment, and the direct impact each system has on the other. This program will allow students to see and experience the interconnected nature of these systems and then work on a project which involves at least two of the systems. In a broad sense, students will try to understand health and disease through the interdisciplinary lens of One Health while exploring the unique culture of Nepal.  
Request the use of the Pass-No Grade (P-N) system.  
Request the use of ET-Extension to postpone grading.  
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.  
Effective Summer 2019

### **COLLEGE OF VETERINARY MEDICINE**

- PHM 492 Pharmacotherapy of Human Viral Infections  
Summer of every year. 2(2-0) A student may earn a maximum of 2 credits in all enrollments for this course. P: PHM 350 or PHM 483 or approval of department RB: (PHM 350 or PHM 461) or completion of Tier I writing requirement or background in biology, microbiology and / or biochemistry. R: Approval of department.
- NEW An integrated and multidisciplinary approach to human viral infections including disease characteristic, epidemiologic and clinical features, pathology, laboratory diagnosis, case review, and pharmacologic treatment including drug kinetics, dynamics, drug interactions, patient considerations, and in some cases, drug resistant issues and clinical isolates.  
Effective Summer 2019

- VM 410      Veterinary Technology Clerkship in Anesthesiology  
Fall of every year. Spring of every year. Summer of every year. 3 credits. ~~P: VM 270 and VM 275  
and VM 245 and VM 304~~ P: (VM 270 and VM 275 and VM 245 and VM 304) and completion of Tier  
I writing requirement RB: Completion of preclinical coursework.  
Application of principles and techniques in anesthesiology.  
~~Effective Spring 2013~~ Effective Spring 2019
- VM 412      Veterinary Technology Clerkship in Companion Animal Medicine  
Fall of every year. Spring of every year. Summer of every year. 3 credits. ~~P: VM 270 and VM 275  
and VM 245 and VM 304~~ P: (VM 270 and VM 275 and VM 245 and VM 304) and completion of Tier  
I writing requirement RB: Completion of pre-clinical course work.  
Application of principles and techniques in restraint, examination, nursing care,  
monitoring, and preventive medicine of companion animals.  
~~Effective Spring 2013~~ Effective Spring 2019