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 credits from ‘34’ to ‘39’.

          (b) Delete the following courses:
              
              | Course Code | Course Name                  | Credits |
              |-------------|-----------------------------|---------|
              | HRT 204     | Plant Propagation           | 2       |
              | HRT 206     | Training and Pruning Plants | 1       |
              | HRT 362     | Applied Crop Improvement    | 1       |

            Add the following courses:

              | Course Code | Course Name                          | Credits |
              |-------------|--------------------------------------|---------|
              | 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

          (c) Replace items (2) and (3) with the following:

              Complete 12 credits from the following:

              | Course Code | Course Name                                | Credits |
              |-------------|-------------------------------------------|---------|
              | 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

Add the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSS 226L</td>
<td>Weed Science Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CSS 326</td>
<td>Weed Science</td>
<td>3</td>
</tr>
<tr>
<td>HRT 218</td>
<td>Irrigation Systems for Horticulture</td>
<td>2</td>
</tr>
<tr>
<td>HRT 218L</td>
<td>Irrigation Systems for Horticulture Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>HRT 405</td>
<td>Sustainable Practices for Horticultural Food Crop Production</td>
<td>1</td>
</tr>
</tbody>
</table>

(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

Add the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRT 213</td>
<td>Landscape Maintenance</td>
<td>2</td>
</tr>
<tr>
<td>HRT 213L</td>
<td>Landscape Maintenance Field Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>HRT 218</td>
<td>Irrigation Systems for Horticulture</td>
<td>2</td>
</tr>
<tr>
<td>HRT 218L</td>
<td>Irrigation Systems for Horticulture Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

(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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSS 226L</td>
<td>Weed Science Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CSS 326</td>
<td>Weed Science</td>
<td>2</td>
</tr>
<tr>
<td>HRT 460</td>
<td>Green Roofs and Walls</td>
<td>2</td>
</tr>
</tbody>
</table>

Effective Fall 2019.
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

      Add the following course:

      CSE 325 Computer Systems 3

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

      CSE 484 Information Retrieval 3

      Add the following course:

      CSE 410 Operating Systems 3

      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

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
At least 6 credits from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 335</td>
<td>Object-oriented Software Design</td>
<td>4</td>
</tr>
<tr>
<td>CSE 420</td>
<td>Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>CSE 422</td>
<td>Computer Networks</td>
<td>3</td>
</tr>
<tr>
<td>ECE 442</td>
<td>Introduction to Communication Networks</td>
<td>3</td>
</tr>
<tr>
<td>ECE 430</td>
<td>Embedded Cyber-Physical Systems</td>
<td>4</td>
</tr>
<tr>
<td>CSE 425</td>
<td>Introduction to Computer Security</td>
<td>3</td>
</tr>
<tr>
<td>ECE 456</td>
<td>Introduction to Communication and Network Security</td>
<td>3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 402</td>
<td>Applications of Analog Integrated Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ECE 410</td>
<td>VLSI Design</td>
<td>4</td>
</tr>
<tr>
<td>ECE 411</td>
<td>Electronic Design Automation</td>
<td>4</td>
</tr>
<tr>
<td>ECE 431</td>
<td>Smart Sensor Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 445</td>
<td>Biomedical Instrumentation</td>
<td>3</td>
</tr>
</tbody>
</table>

Software Systems

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 410</td>
<td>Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CSE 415</td>
<td>Introduction to Parallel Programming</td>
<td>3</td>
</tr>
<tr>
<td>CSE 435</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CSE 450</td>
<td>Translation of Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td>CSE 476</td>
<td>Mobile Application Development</td>
<td>3</td>
</tr>
</tbody>
</table>

Intelligent Systems

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 446</td>
<td>Biomedical Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>ECE 466</td>
<td>Digital Signal Processing and Filter Design</td>
<td>3</td>
</tr>
<tr>
<td>CSE 440</td>
<td>Introduction to Artificial Intelligence</td>
<td>3</td>
</tr>
</tbody>
</table>

Electrical Systems

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 305</td>
<td>Electromagnetic Fields and Waves I</td>
<td>4</td>
</tr>
</tbody>
</table>
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
   
   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
   
   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**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>ECE 402</td>
<td>Applications of Analog Integrated Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ECE 410</td>
<td>VLSI Design</td>
<td>4</td>
</tr>
</tbody>
</table>
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

**Electrosciences**
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

**Systems**
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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE 444</td>
<td>Biosensors for Medical Diagnostics</td>
<td>3</td>
</tr>
</tbody>
</table>

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 Biosystems 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)
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)
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)
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. 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 PLB 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 2011 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.  
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.  
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. 
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 445) 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 2015 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 330 P: ECE 230 and ECE 303 and ECE 377  R: Open to juniors or seniors or graduate students in the College of Engineering.  
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 446. 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 resistance filters using prototypes and algorithmic methods. Design of finite impulse resistance 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
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.

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.
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)
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 2013 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  
Summar 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. 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. 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
PART II - NEW COURSES AND CHANGES – continued - 17
January 17, 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 coursework.
Application of principles and techniques in restraint, examination, nursing care, monitoring, and preventive medicine of companion animals.
Effective Spring 2013 Effective Spring 2019