PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

COLLEGE OF ENGINEERING

1. Request to change the requirements for the Minor in Energy in the College of Engineering.
   a. Under the heading Requirements for the Minor in Energy replace the note following item 6. with the following:

   A course used to fulfill requirement 4. or 5. above may not be used to fulfill this requirement. Not all courses will be available to all majors and students must meet all course prerequisites and restrictions.

Effective Fall 2017.

COLLEGE OF NATURAL SCIENCE

1. Request to change the requirements for the Bachelor of Arts degree in Mathematics, Advanced in the Department of Mathematics. The Teacher Education Council (TEC) will consider this request at its January 9, 2017 meeting.
   a. Under the heading Requirements for the Bachelor of Arts Degree in Mathematics, Advanced make the following changes:

   (1) Replace item 3. a. (1) with the following:

   One course of at least 3 credits in biological science, entomology, microbiology, physiology, plant biology, or integrative biology.

   (2) In item 3. a. (3) change the credits of PHY 193H from ‘3’ to ‘4’.

   (3) Replace item 3. a. (4) with the following:

   A minimum of 2 credits in laboratory courses in biological science, chemistry, entomology, microbiology, physics, physiology, plant biology, or integrative biology.

   (4) In item 3. c. (2) change the credits of MTH 153H from ‘3’ to ‘4’.

   (5) In item 3. c. (3) change the credits of MTH 254H from ‘3’ to ‘4’.

   (6) In item 3. c. (4) delete the following course:

   MTH 291 Mathematics Snapshots

   (7) In item 3. c. (4) change the credits of MTH 317H from ‘3’ to ‘4’.

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

   A total of 12 credits in electives. Two courses must be selected from group (1) and two courses from group (2). If approved by the Mathematics, Advanced program, any MTH course at the 400-level or above may satisfy the requirement from group (1). Students in the teacher certification program must take MTH 432 to fulfill part of this elective requirement and may not use STT 430 towards fulfillment of this requirement.

   (1) Two of the following courses (6 credits):

   MTH 416 Introduction to Algebraic Coding
2. Request to change the requirements for the Bachelor of Science degree in Mathematics, Advanced in the Department of Mathematics. The Teacher Education Council (TEC) will consider this request at its January 9, 2017 meeting.

a. Under the heading Requirements for the Bachelor of Science Degree in Mathematics, Advanced make the following changes:

   (1) Replace item 3. a. (1) with the following:

   One course of at least 3 credits in biological science, entomology, microbiology, physiology, plant biology, or integrative biology.

   (2) In item 3. a. (3) b. change the credits of PHY 193H from ‘3’ to ‘4’.

   (3) In item 3. a. (3) b. change the credits of PHY 294H from ‘3’ to ‘4’.

   (4) Replace item 3. a. (3) c. with the following:

   Two of the following courses (6 credits):

   CMSE 820 Mathematical Foundations of Data Science 3
   CMSE 821 Numerical Methods for Differential Equations 3
   CMSE 823 Numerical Linear Algebra 3
   CSE 425 Introduction to Computer Security 3
   CSE 450 Translation of Programming Languages 3
   CSE 460 Computability and Formal Language Theory 3
   CSE 472 Computer Graphics 3
   CSE 802 Pattern Recognition and Analysis 3
   CSE 803 Computer Vision 3
   CSE 814 Formal Methods in Software Development 3
   CSE 830 Design and Theory of Algorithms 3
   CSE 835 Algorithmic Graph Theory 3
   CSE 847 Machine Learning 3
   CSE 860 Foundations of Computing 3
   CSE 881 Data Mining 3
   EC 820A Econometrics IA 3
   EC 820B Econometrics IB 3
   PHL 432 Logic and its Metatheory 4
   PHY 410 Thermal and Statistical Physics 3
   PHY 415 Methods of Theoretical Physics 4
   PHY 422 Classical Mechanics II 3
   PHY 471 Quantum Physics I 3
   PHY 472 Quantum Physics II 3
   PHY 480 Computational Physics 3
   PHY 481 Electricity and Magnetism I 3
   PHY 482 Electricity and Magnetism II 3
   STT 861 Theory of Probability and Statistics I 3
   STT 862 Theory of Probability and Statistics II 3
   STT 881 Theory of Probability I 3
   STT 882 Theory of Probability II 3
   STT 886 Stochastic Processes and Applications 3

Effective Fall 2017.
PART I - NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES – continued - 3
January 19, 2017

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB 273</td>
<td>Physics I</td>
<td>4</td>
</tr>
<tr>
<td>LB 274</td>
<td>Physics II</td>
<td>4</td>
</tr>
</tbody>
</table>

(5) Add the following item 3. a. (4):

A minimum of 1 credit in a laboratory course in biological science, chemistry, entomology, microbiology, physics, physiology, plant biology, or integrative biology.

(6) In item 3. c. (2) change the credits of MTH 153H from ‘3’ to ‘4’.

(7) In item 3. c. (3) change the credits of MTH 254H from ‘3’ to ‘4’.

(8) In item 3. c. (4) delete the following course:

MTH 291 Mathematics Snapshots 1

(9) In item 3. c. (4) change the credits of MTH 317H from ‘3’ to ‘4’.

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

A total of 12 credits in electives. Two courses must be selected from group (1) and two courses from group (2). If approved by the Mathematics, Advanced program, any MTH course at the 400-level or above may satisfy the requirement from group (1). Students in the teacher certification program must take MTH 432 to fulfill part of this elective requirement and may not use STT 430 towards fulfillment of this requirement.

(1) Two of the following courses (6 credits):

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<tr>
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<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 416</td>
<td>Introduction to Algebraic Coding</td>
<td>3</td>
</tr>
<tr>
<td>MTH 417</td>
<td>Topics in Number Theory</td>
<td>3</td>
</tr>
<tr>
<td>MTH 441</td>
<td>Ordinary Differential Equations II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 442</td>
<td>Partial Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MTH 451</td>
<td>Numerical Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 452</td>
<td>Numerical Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 461</td>
<td>Metric and Topological Spaces</td>
<td>3</td>
</tr>
<tr>
<td>MTH 481</td>
<td>Discrete Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 482</td>
<td>Discrete Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 492H</td>
<td>Undergraduate Thesis (W)</td>
<td>3</td>
</tr>
</tbody>
</table>

(2) Two of the following courses (6 credits):

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMSE 820</td>
<td>Mathematical Foundations of Data Science</td>
<td>3</td>
</tr>
<tr>
<td>CMSE 821</td>
<td>Numerical Methods for Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>CMSE 823</td>
<td>Numerical Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>CSE 425</td>
<td>Introduction to Computer Security</td>
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</tr>
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<td>Computer Graphics</td>
<td>3</td>
</tr>
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<td>CSE 835</td>
<td>Algorithmic Graph Theory</td>
<td>3</td>
</tr>
<tr>
<td>CSE 847</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>CSE 860</td>
<td>Foundations of Computing</td>
<td>3</td>
</tr>
<tr>
<td>CSE 881</td>
<td>Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>EC 820A</td>
<td>Econometrics IA</td>
<td>3</td>
</tr>
<tr>
<td>EC 820B</td>
<td>Econometrics IB</td>
<td>3</td>
</tr>
<tr>
<td>PHL 432</td>
<td>Logic and its Metatheory</td>
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<td>Classical Mechanics II</td>
<td>3</td>
</tr>
<tr>
<td>PHY 471</td>
<td>Quantum Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHY 472</td>
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</tr>
<tr>
<td>STT 861</td>
<td>Theory of Probability and Statistics I</td>
<td>3</td>
</tr>
</tbody>
</table>
Effective Fall 2017.

3. Request to establish a **Doctor of Philosophy** degree in **Physiology-Environmental Toxicology** in the Department of Physiology as a program affiliated with the Program in Environmental and Integrative Toxicological Sciences. The University Committee on Graduate Studies (UCGS) approved this request at its October 10, 2016 meeting.

Students in this program follow currently established admission and degree requirements. Refer to the statement on **Program in Environmental and Integrative Toxicological Sciences** in **The Graduate School** section of the catalog.

Effective Summer 2017.
**PART II - NEW COURSES AND CHANGES**

**COLLEGE OF AGRICULTURE AND NATURAL RESOURCES**

**ANS 407  Food and Animal Toxicology**

*Fall of every year. Spring of every year. 3(3-0) P: BS 161 or LB 145 or BS 181H R: Not open to freshmen or sophomores. R: Open to juniors or seniors.*


*Effective Spring 2014 Effective Spring 2018*

**ANS 885  Animal Science Seminar**

*Spring of every year. 1(1-0) A student may earn a maximum of 2 credits in all enrollments for this course. RB: At least one year of graduate coursework and research experience. R: Open to graduate students in the Department of Animal Science.*

NEW

Critical review of relevant literature and organization of communication of scientific data in animal science. 

*Effective Spring 2017*

**FW 813  Democracy and Environment**

*Natural Resources and Environmental Governance*

*Fall of odd years. 3(3-0) RB: Exposure to social science or legal approaches to the environment, Relationship between democracy and environmental protection and management. Effects of democratic institutions on natural resource management. Relationship between governance frameworks and environmental protection and management. Assessment of political actors' impacts on natural resource management.*

*Effective Fall 2009 Effective Fall 2017*

**FW 854  Adaptive Management of Natural Resource Systems**

*Uncertainty in Natural Resource Management*

*Fall of odd years. Spring of odd years. 3(2-2) RB: ZOL 355 RB: IBIO 355* 

Principles and practices of adaptive environmental assessment and management. Applications to ecosystem and natural resource management. Methods and challenges associated with accounting for uncertainty in natural resource decision making. Decision analysis, structured decision making, and adaptive management. 

*Effective Spring 2015 Effective Fall 2016*

**FOR 412  Wildland Fire**

*Spring of every year. 2(2-0) P: (FOR 404 or concurrently) or (ZOL 355 or concurrently) P: (FOR 404 or concurrently) or (IBIO 355 or concurrently) R: Not open to freshmen or sophomores.*

Fire in wildland forest and grassland communities as a physical and ecological process. Fire history, culture, and management. Global perspectives, strategies for prevention and suppression of wildfires. Techniques for using prescribed fire. Field trips required. 

*Effective Fall 2013 Effective Spring 2017*

**HRT 332  Tree Fruit Production and Management**

*Fall of every year. 2(4-2) 3(2-2) P: HRT 203 or HRT 251*

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 2014 Effective Fall 2017*

**COLLEGE OF ENGINEERING**

**EGR 440  Engineering Entrepreneurship**

*Fall of every year. 3(3-0) R: Open to juniors or seniors in the College of Engineering.*

NEW

Technical skills to enable and engage in engineering related entrepreneurship at all levels. Discovery, evaluation, and engagement of entrepreneurial opportunities starting with technology development to solve a problem, bring about desired change that is scalable, and the application of engineering principles in business related endeavors. 

*Effective Fall 2017*
EGR 840  
**Engineering Entrepreneurship**  
Fall of every year. 3(3-0) R: Open to graduate students in the College of Engineering.  
**NEW**  
Technical skills to enable and engage in engineering related entrepreneurship at all levels. Discovery, evaluation, and engagement of entrepreneurial opportunities starting with technology development to solve a problem, bring about desired change that is scalable, and the application of engineering principles in business related endeavors.  
Effective Fall 2017  

**COLLEGE OF NATURAL SCIENCE**

BS 191H  
Honors Cell and Molecular Biology Laboratory  
Spring of every year. 2(1-3) Interdepartmental with Biochemistry and Molecular Biology and Lyman Briggs and Microbiology and Molecular Genetics. P: BS 181H or concurrently Not open to students with credit in BS 171 or LB 145. Not open to students with credit in LB 145.  
Basic techniques of cellular and molecular biology including experimental design and hypothesis formulation; biochemistry, molecular biology and genetics.  
SA: BS 159H, BS 111L, SA: BS 159H  
Effective Fall 2013 Effective Summer 2017

IBIO 328  
Comparative Anatomy and Biology of Vertebrates  
Spring of every year. 4(3-3) P: (BS 162 or LB 144 or BS 182H) and completion of Tier I writing requirement P: BS 162 or LB 144 or BS 182H  
Comparative morphology and natural history of vertebrates. Dissection of representatives of most vertebrate classes. Comparative morphology, evolution and biodiversity of vertebrates. Dissection of representatives of most vertebrate classes.  
SA: ZOL 228, ZOL 328  
Effective Fall 2016 Effective Summer 2017

IBIO 341  
Fundamental Genetics  
Fall of every year. Spring of every year. Summer of every year. 4(4-0) Interdepartmental with Plant Biology. P: BS 161 or BS 181H or LB 145 P: (BS 161 or BS 181H or BS 181H) and (BS 162 or LB 144 or BS 182H)  
Principles of heredity in animals, plants and microorganisms. Classical and molecular methods in the study of gene structure, transmission, expression and evolution.  
SA: ZOL 341  
Effective Fall 2016 Effective Spring 2017

PSL 331  
Concepts and Critical Thinking in Physiology  
Fall of every year. Spring of every year. 3(3-0) P: BS 161 or BS 181H or LB 145 RB: (PSL 101) and (BS 162 or BS 182H or LB 144) R: Open to sophomores or juniors in the Physiology Major or in the Lyman Briggs Physiology Coordinate Major. Approval of department.  
**NEW**  
Knowledge, skills, and approaches necessary to create deep understanding of biological concepts for success in advanced physiology courses  
Effective Fall 2017

PSL 421  
Adult and Embryonic Stem Cells (W)  
Spring of every year. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.  
Topics in the physiology, cell biology, genetics, and developmental potential of adult and embryonic stems cells.  
DELETE COURSE  
Effective Summer 2017
PSL 438  
Topics in the Biology and Cellular Physiology of Cancer (W)
Fall of every year. Spring of every year. 2(2-0) P: (BS 161 or BS 181H or LB 145) and (PSL 431 and completion of Tier I writing requirement) RB: BMB 461 and BMB 462 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.
Topics in the biology and physiology of cancer, selected from areas such as regulation of the cell cycle, oncogenes and tumor suppressors, cancer cell signal transduction, tumor progression and metastasis, and cancer genetics and genomics.
DELETE COURSE
Effective Summer 2017

PSL 439  
Special Topics in Physiology (W)
Spring of every year. 2(2-0) P: Completion of Tier I Writing Requirement RB: PSL 431 and PSL 432 R: Open to seniors in the Lyman Briggs Physiology Coordinate Major or in the Physiology major.
Special topics in physiology, focusing on the process of biomedical discovery, alternative medicine, autoimmunity, or other selected topics of interest related to careers in health care or biomedical research.
DELETE COURSE
Effective Summer 2017

PSL 440  
Topics in Cell Physiology (W)
Spring of every year. 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.
Selected topics in mammalian cell physiology related to cell energetics and metabolism, molecular and cellular biology, cell growth and differentiation, or molecular physiology and functional genomics.
DELETE COURSE
Effective Summer 2017

PSL 441  
Topics in Endocrinology (W)
Fall of every year. 2(2-0) P: (PSL 431 and PSL 432) and completion of Tier I writing requirement R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.
Selected topics on the role of hormones in the regulation of growth, metabolism, differentiation, and physiological homeostasis.
DELETE COURSE
Effective Summer 2017

PSL 443  
Topics in Respiratory Physiology (W)
Spring of odd years. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.
Contemporary topics in lung airway, alveolar, and general respiratory physiology.
DELETE COURSE
Effective Summer 2017

PSL 444  
Topics in Reproductive Physiology (W)
Spring of every year. 2(2-0) P: (PSL 431 and PSL 432) and completion of Tier I writing requirement R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.
Selected topics in the physiology and development of the reproductive system.
DELETE COURSE
Effective Summer 2017

PSL 445  
Topics in Environmental Physiology (W)
On Demand. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.
Selected topic in environmental physiology with an emphasis on thermoregulation.
DELETE COURSE
Effective Summer 2017
PSL 446  Topics in Sensory Physiology (W)
On Demand. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL 432 R:
Open to seniors in the Physiology Major or in the Lyman Briggs Physiology Coordinate Major.
Selected topic in the functioning of the visual system, auditory system, or other sensory
systems in health and disease.
DELETE COURSE
Effective Summer 2017

PSL 447  Topics in Brain Function (W)
Summer of every year. 2(2-0) P: (PSL 431) and completion of Tier I writing requirement RB: PSL
432 R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate
Major.
Selected topics on structure and function of the mammalian brain.
DELETE COURSE
Effective Summer 2017

PSL 448  Topics in Gastrointestinal Physiology (W)
Spring of odd years. 2(2-0) P: (PSL 431 and PSL 432) and completion of Tier I writing requirement
R: Open to seniors in the Physiology major or in the Lyman Briggs Physiology Coordinate Major.
Selected topics in the physiology of the digestive system.
DELETE COURSE
Effective Summer 2017

PSL 460  Topics in Physiology (W)
Fall of every year. Spring of every year. 2(2-0) A student may earn a
maximum of 4 credits in all enrollments for this course. P: (PSL 431 and (PSL 432 or concurrently))
and completion of Tier I writing requirement R: Open to seniors or juniors in the Physiology Major
or in the Lyman Briggs Physiology Coordinate Major.
NEW
In-depth exploration of contemporary areas of physiology and human disease,
emphasizing scientific literacy and effective written and oral communication.
SA: PSL 421, PSL 438, PSL 439, PSL 440, PSL 441, PSL 442, PSL 443, PSL 444, PSL
445, PSL 446, PSL 447, PSL 448, PSL 449
Effective Fall 2017

PLB 416L  Plant Physiology Laboratory
Spring of every year. 2(1-3) P: (CEM 143 or CEM 351 or CEM 251) and (BS 161 or LB 145 or BS
181H) and (PLB 415 or concurrently) P: (CEM 143 or CEM 351 or CEM 251) and (BS 161 or LB
145 or BS 181H) and (PLB 415 or concurrently) and (BS 171 or BS 191H or approval of
department)
Experimental methods and experiment design in plant physiology and molecular biology,
with emphasis in photosynthesis, water relations, plant growth, plant development,
genetics and gene regulation. Communication of scientific information in written and
graphical format.
Effective Fall 2015 Effective Fall 2017

COLLEGE OF VETERINARY MEDICINE

PHM 350  Introductory Human Pharmacology
Fall of every year. Spring of every year. Summer of every year. 3(3-0) P: (PSL 250 or PSL 310) or
(PSL 431 and PSL 432) R: Not open to freshmen. Not open to students with credit in PHM 430 or
PHM 440.
General principles of pharmacology. Central nervous system, autonomic nervous system,
cardiovascular, renal, cancer, microbial, and endocrine pharmacology.
Effective Spring 2014 Effective Summer 2017
PHM 450  Introduction to Chemical Toxicology
Fall of every year. Spring of every year. Summer of every year. 3(3-0)  P: BS 161 and BS 162 and CEM 251  R: Not open to freshmen or sophomores. Mammalian toxicology. Disposition of chemicals in the body, detoxication, elimination, and mechanisms of toxicity in major organ systems. Selected toxic agents. Effective Fall 2014 Effective Spring 2017

PHM 461  Tropical Medicine Pharmacology
Fall of every year. Spring of every year. Summer of every year. 2(2-0) P: PHM 350 or concurrently R: Open to juniors or seniors or master's students. Tropical diseases, epidemiologic and clinical features, and pharmacologic treatments. Multidisciplinary and interdisciplinary approaches, especially in poverty settings. Effective Fall 2016 Effective Spring 2017

PHM 802  Cellular, Molecular and Integrated Systems Pharmacology
Spring of every year. 4(4-0)  3(3-0) P: (BMB 801 or BMB 802) and (PHM 827 or PSL 828 or PSL 829) R: Open to doctoral students or approval of department. Cellular and molecular mechanisms of drug actions on organ systems of humans and other mammals. Effective Spring 2015 Effective Spring 2018

PHM 803  Chemical disposition in mammals
Fall of every year. 1(1-0) R: Open to doctoral students. Not open to students with credit in PHM 801 or PHM 819. NEW Principles of drug/toxicant absorption, distribution, metabolism, elimination, and kinetics in mammalian systems. Effective Fall 2017

PHM 819  Principles of Drug-Tissue Interactions
Fall of every year. Spring of every year. Summer of every year. 1 to 2 credits. 2(2-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Open to graduate students or lifelong graduate students. R: Open to graduate students and open to lifelong graduate students. Not open to students with credit in PHM 801. General principles relevant to the interaction of chemicals with biological systems. Topics include pharmacokinetics and/or pharmacodynamics. Effective Fall 2009 Effective Fall 2017

PHM 832  Applied Integrative Pharmacology Laboratory
Summer of every year. 4(2-4)  3(3-0) P: PHM 819 and PHM 830 P: (PHM 813 or concurrently) and PHM 819 and PHM 830 RB: Undergrad degree in biology, chemistry or related field. Prior biomedical lab experience helpful. R: Not open to undergraduate students. Approval of department. Integrative and organ-level pharmacology. Regulatory issues in the use of experimental animals, animal models of diseases, animal and tissue preparation for whole animal and organ-level pharmacology experiments, experimental design, data collection, data analysis, and data interpretation. This course teaches students research methods for studying integrative physiology and pharmacology and may include training in methods to study autonomic control of cardiac function and blood pressure; measuring vascular reactivity, in vitro; assessing the effects of anesthetics on cardiovascular and autonomic function; and studying drug effects on the brain. Effective Summer 2008 Effective Summer 2017
VM 611  Veterinary Externship
Fall of every year. Spring of every year. Summer of every year. 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. A student may earn a maximum of 15 credits in all enrollments for this course. RB: Completion of semester 5 of the graduate-professional program in the College of Veterinary Medicine. R: Open to graduate-professional students in the College of Veterinary Medicine.
Clinical or research experience in an off-campus setting.
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 2012 Effective Summer 2017