PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

1. Request to change the requirements for the Master of Science degree in Entomology in the Department of Entomology. The University Committee on Graduate Studies (UCGS) will consider this request at its September 14, 2015 meeting.

   a. Under the heading Admission add the following statement as sentence three in the paragraph:

      Students without a general entomology background should complete ENT 404 Fundamentals of Entomology during their first year.

   b. Under the heading Requirements for the Master of Science Degree in Entomology replace the entire entry with the following:

      The master's degree program in entomology is available under either Plan A (with thesis) or Plan B (without thesis). A total of 30 credits is required for the degree under Plan A or Plan B. The student’s program of study must be approved by either the student’s guidance committee (Plan A) or the student’s major professor (Plan B) and are planned on an individual basis by the student, the student’s major professor, and the student’s guidance committee.

      Requirements for Both Plan A and Plan B

      The student must:

      Complete at least 6 credits in entomology courses at the 400-level or above. More than half of the 30 credits required for the degree must be at the 800-level or above.

      Additional Requirements for Plan A

      1. Complete at least 6, but not more than 10 credits of Entomology 899.
      2. Successfully write and defend the doctoral dissertation research with a departmental seminar.

      Additional Requirements for Plan B

      1. Complete 3 to 5 credits of a research project in ENT 898 and present a departmental seminar.
      2. Pass a final oral examination.

   Effective Spring 2016.

2. Request to change the requirements for the Doctor of Philosophy degree in Entomology in the Department of Entomology. The University Committee on Graduate Studies (UCGS) will consider this request at its September 14, 2015 meeting.

   a. Under the heading Admission replace the entire entry with the following:

      A bachelor's degree with a 3.00 grade–point average for the last two years of study is required for admission to the master's program. Although the applicant need not have an undergraduate major in entomology for regular admission, but should have a background in biology, chemistry, mathematics, physics, and general entomology equivalent to that required of an undergraduate entomology major at Michigan State University. Students without a general entomology background should complete ENT 404 Fundamentals of Entomology during their first year. Graduate Record Examination General Test scores are required. Applicants with a good academic record but with deficiencies may be accepted on a provisional basis until deficiencies have been remediated. Collateral course work does not count towards the requirements for the degree.
b. Under the heading Requirements for the Master of Science Degree in Entomology replace the entire entry with the following:

The student’s program of study is planned on an individual basis by the student, the student’s major professor, and the student’s guidance committee. Students must take 9 entomology course credits and complete a minimum of 24 credits of ENT 999 Doctoral Dissertation Research. Within 18 months of matriculation, students must pass a doctoral qualification examination which primarily consists of the defense of a dissertation proposal. Written and oral comprehensive examinations are required after completing course work, covering specific disciplinary areas related to thesis research and broader general knowledge of entomology and related sciences. After completing research, doctoral students are required to write and defend a dissertation with a departmental seminar.

Effective Spring 2016.

3. Request to delete the curriculum and degree requirements for the Bachelor of Science degree in Plant Pathology in the Department of Plant, Soil and Microbial Sciences. The University Committee on Undergraduate Education (UCUE) will provide consultative commentary to the Provost after considering this request. The Provost will make a determination after considering the consultative commentary from the University Committee on Undergraduate Education.

No new students are to be admitted to the program effective Summer 2010. No students are to be readmitted to the program effective Summer 2010. Effective Spring 2015, coding for the program will be discontinued and the program will no longer be available in the Department of Plant, Soil and Microbial Sciences. Students who have not met the requirements for the Bachelor of Science degree in Plant Pathology through the Department of Plant, Soil and Microbial Sciences prior to Spring 2015 will have to change their major.

4. Request to delete the curriculum and degree requirements for the Bachelor of Science degree in Environmental Soil Science in the Department of Plant, Soil and Microbial Sciences. The University Committee on Undergraduate Education (UCUE) will provide consultative commentary to the Provost after considering this request. The Provost will make a determination after considering the consultative commentary from the University Committee on Undergraduate Education.

No new students are to be admitted to the program effective Summer 2010. No students are to be readmitted to the program effective Summer 2010. Effective Spring 2015, coding for the program will be discontinued and the program will no longer be available in the Department of Plant, Soil and Microbial Sciences. Students who have not met the requirements for the Bachelor of Science degree in Environmental Soil Science through the Department of Plant, Soil and Microbial Sciences prior to Spring 2015 will have to change their major.

COLLEGE OF ENGINEERING

1. Request to change the requirements in the Bachelor of Science degree in Materials Science and Engineering in the Department of Chemical Engineering and Materials Science.

The concentrations in the Bachelor of Science degree in Materials Science and Engineering 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 Materials Science and Engineering make the following changes:

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

MSE 425 Biomaterials and Biocompatibility 3

Effective Spring 2016.
2. Request to change the requirements for the Minor in Materials Science and Engineering in the Department of Chemical Engineering and Materials Science.

   a. Under the heading Requirements for the Minor in Materials Science and Engineering make the following changes:

      (1) In item 3. delete the following courses:

      MSE 451 Spectroscopic and Diffraction Analysis of Materials 3
      MSE 454 Ceramic and Refractory Materials 3
      MSE 477 Manufacturing Processes 3

      Add the following courses:

      MSE 474 Spectroscopic and Diffraction Analysis of Materials 3
      MSE 481 Ceramic and Refractory Materials 3

   Effective Spring 2016.

LYMAN BRIGGS COLLEGE

1. Request to establish in Lyman Briggs College, in collaboration with the MSU College of Osteopathic Medicine, a 3 + 4 Option for selected Lyman Briggs College students to earn a baccalaureate degree. The University Committee on Undergraduate Education (UCUE) recommended approval of this request at its January 29, 2015 meeting. The University Committee on Graduate Studies (UCGS) recommended approval of this request at its April 6, 2015 meeting.

   a. Background Information:

      Lyman Briggs College, in collaboration with the MSU College of Osteopathic Medicine, offers an opportunity for selected Lyman Briggs College students to earn a baccalaureate degree after satisfactory completion of a minimum of 90 credits at Michigan State University and a minimum of 30 credits through subsequent enrollment at the Michigan State University College of Osteopathic Medicine. Only students who matriculate as first-year students at Lyman Briggs College may pursue this option. Students interested in this option should consult with their college academic advisor during their first year in the college.

      Admission to the MSU College of Osteopathic Medicine component of this program is limited to a small number of students who complete the specified university and college requirements and who fulfill admission requirements for the MSU College of Osteopathic Medicine Doctor of Osteopathic Medicine program.

   b. Academic Programs Catalog Text:

      Lyman Briggs College, in collaboration with the MSU College of Osteopathic Medicine, offers an opportunity for selected Lyman Briggs College students to earn a baccalaureate degree after satisfactory completion of a minimum of 90 credits at Michigan State University and a minimum of 30 credits through subsequent enrollment at the Michigan State University College of Osteopathic Medicine. Only students who matriculate as first-year students at Lyman Briggs College may pursue this option. Students interested in this option should consult with their college academic advisor during their first year in the college.

      Admission to the MSU College of Osteopathic Medicine component of this program is limited to a small number of students who complete the specified university and college requirements and who fulfill admission requirements for the MSU College of Osteopathic Medicine Doctor of Osteopathic Medicine program.

      All students in this program will complete a minimum of 90 credits at Michigan State University in the Lyman Briggs College Biology major. The requirements for the program are as follows:

      1. Completion of all the Michigan State University graduation requirements, including integrative studies and general education.
2. Completion of the Lyman Briggs College graduation requirements including mathematics, chemistry, biology, physics, and history, philosophy and sociology of science.

3. Be pursuing the curriculum for the Lyman Briggs College Biology major.

4. Completion of a minimum of 30 credits at the MSU College of Osteopathic Medicine in the preclerkship component of the Doctor of Osteopathic Medicine degree program.

Upon satisfactory completion of the specified 120 credits, students in this program will be eligible for the Bachelor of Science degree in Lyman Briggs College with a major in Biology.

Effective Spring 2016.

COLLEGE OF NATURAL SCIENCE

1. Request to change the requirements for the Master of Science degree in Biomedical Laboratory Operations in the Biomedical Laboratory Diagnostics Program. The University Committee on Graduate Studies (UCGS) will consider this request at its September 14, 2015 meeting.

   a. Under the heading Admission delete paragraph two.

   b. Under the heading Requirements for the Master of Science Degree in Biomedical Laboratory Operations make the following change:

   (1) Replace the introductory paragraph with the following:

   The student must complete 31 credits under Plan B (without thesis). The specific program of study includes competence in statistics and completion of a project in Biomedical Laboratory Operations as determined in consultation with the student's guidance committee. The final oral examination, which covers both course work and research, is administered by the student's guidance committee.

   Effective Spring 2016.

2. Request to change the requirements for the Master of Science degree in Physics in the Department of Physics and Astronomy. The University Committee on Graduate Studies (UCGS) will consider this request at its September 14, 2015 meeting.

   a. Under the heading Requirements for the Master of Science Degree in Physics add the following statement:

   Concentration in Beam Physics

   Students interested in pursuing a concentration in beam physics may do so through a partially or entirely online option. The regular requirements for the master's degree in physics apply. Credits for the concentration may be earned through courses and research including PHY 861, PHY 961, PHY 962, PHY 963, and PHY 964. The student's program of study must be approved by the student's guidance committee. Students may transfer up to 9 credits in relevant course topics approved on a case-by-case basis. Up to 10 credits of master's thesis research (PHY 899) may be earned under supervision of MSU faculty or through a suitable external mentor at a university or national laboratory near the student's location as determined on a case-by-case basis.

   Effective Fall 2016.
3. Request to change the requirements for the Doctor of Philosophy degree in Physics in the Department of Physics and Astronomy. The University Committee on Graduate Studies (UCGS) will consider this request at its September 14, 2015 meeting.

a. Under the heading Requirements for the Doctor of Philosophy Degree in Physics add the following statement:

Concentration in Beam Physics
Students interested in pursuing a concentration in beam physics may do so through a partially or entirely online option. The regular requirements for the doctoral degree in physics apply which includes successful completion of four subject examinations in core areas of physics which can be administered by a mutually approved local proctor, where such practice is permissible, and successful completion of a minimum of 24 credits of doctoral dissertation research. A minimum of 54 credits is required for completion of the program when combined with the requirements for the master’s degree with a concentration in beam physics.

Effective Fall 2016.

COLLEGE OF NURSING

1. Request to delete the curriculum and degree requirements for the Graduate Certificate in Adult Gerontology Clinical Nurse Specialist in the College of Nursing. The University Committee on Graduate Studies (UCGS) provided consultative commentary to the Provost after considering this request at its April 6, 2015 meeting. The Provost made the determination to discontinue the program after considering the consultative commentary from the University Committee on Graduate Studies.

No new students are to be admitted to the program effective Fall 2015. No students are to be readmitted to the program effective Fall 2015. Effective Spring 2016, coding for the program will be discontinued and the program will no longer be available in the College of Nursing. Students who have not met the requirements for the Graduate Certificate in Adult Gerontology Clinical Nurse Specialist through the College of Nursing prior to Spring 2016 will have to change their major.

1. Request to delete the curriculum and degree requirements for the Graduate Certificate in Nurse Practitioner in the College of Nursing. The University Committee on Graduate Studies (UCGS) provided consultative commentary to the Provost after considering this request at its April 6, 2015 meeting. The Provost made the determination to discontinue the program after considering the consultative commentary from the University Committee on Graduate Studies.

No new students are to be admitted to the program effective Fall 2015. No students are to be readmitted to the program effective Fall 2015. Effective Spring 2016, coding for the program will be discontinued and the program will no longer be available in the College of Nursing. Students who have not met the requirements for the Graduate Certificate in Adult Gerontology Clinical Nurse Specialist through the College of Nursing prior to Spring 2016 will have to change their major.
**PART II - NEW COURSES AND CHANGES**

**COLLEGE OF AGRICULTURE AND NATURAL RESOURCES**

**BE 845**  
Biosensor Principles and Applications  
Spring of every year. 3(3-0) Interdepartmental with Biomedical Engineering. **RB:** Knowledge of biology, chemistry, and electronics.  
Nanotechnology-based biosensors, their components, desirable properties, and associated electronics. Applications related to healthcare, biodefense, food and water safety, agriculture, bio-production, and environment. Multidisciplinary interactions necessary for biosensor development.  
**SA:** BE 845  
**Effective Spring 2008 Effective Fall 2015**

**BE 844**
Biosensor Principles and Applications  
Spring of every year. 3(3-0) Interdepartmental with Biomedical Engineering. **RB:** Knowledge of biology, chemistry, and electronics.  
Nanotechnology-based biosensors, their components, desirable properties, and associated electronics. Applications related to healthcare, biodefense, food and water safety, agriculture, bio-production, and environment. Multidisciplinary interactions necessary for biosensor development.  
**SA:** BE 845  
**Effective Spring 2008 Effective Fall 2015**

**COLLEGE OF ENGINEERING**

**BE 332**  
Engineering Properties of Biological Materials  
Fall of every year. 3(3-0) **P:** (BE 101 or concurrently) and (BS 161 or BS 181H or LB 145) and CE 221 **R:** Open to juniors or seniors in the Department of Biosystems and Agricultural Engineering. **C:** BE 334 concurrently.  
Physical and thermal properties of biological materials necessary for the design and analysis of processes and equipment in biosystems.  
**Effective Fall 2013 Effective Spring 2015**

**BE 350**  
Heat and Mass Transfer in Biosystems  
Spring of every year. 3(3-0) **P:** (BE 101 or concurrently) and (MTH 235 or MTH 255H or LB 220) and ((CE 321 or concurrently) or (CHE 311 or concurrently) or (ME 332 or concurrently)) and (((CEM 143 or concurrently) or (CEM 251 or concurrently)) or (CEM 351 or concurrently)) **P:** (BE 101 or concurrently) and (MTH 235 or LB 220) and ((CE 321 or concurrently) or (CHE 311 or concurrently) or (ME 332 or concurrently)) and (((CEM 143 or concurrently) or (CEM 251 or concurrently)) or (CEM 351 or concurrently)) **R:** Open to students in the College of Engineering. Not open to students with credit in ME 410.  
**Effective Fall 2013 Effective Spring 2016**

**BE 445**  
Biosensors for Medical Diagnostics  
Spring of every year. 3(3-0) Interdepartmental with Biomedical Engineering. **P:** (BS 161 or BS 181H or LB 145) and (CEM 141 or CEM 151) and (ECE 302 or ECE 345 or BE 334 or CEM 333) **RB:** Biology, chemistry, and electronics **R:** Open to juniors or seniors or graduate students in the College of Engineering. **Not open to students with credit in BE 845.**  
Biosensors, their components, properties, and associated electronics for applications in medical diagnostics.  
**SA:** BE 445  
**Effective Fall 2013 Effective Fall 2015**

**BE 444**  
Biosensors for Medical Diagnostics  
Spring of every year. 3(3-0) Interdepartmental with Biomedical Engineering. **P:** (BS 161 or BS 181H or LB 145) and (CEM 141 or CEM 151) and (ECE 302 or ECE 345 or BE 334 or CEM 333) **RB:** Biology, chemistry, and electronics **R:** Open to juniors or seniors or graduate students in the College of Engineering. **Not open to students with credit in BE 845.**  
Biosensors, their components, properties, and associated electronics for applications in medical diagnostics.  
**SA:** BE 445  
**Effective Fall 2013 Effective Fall 2015**

**CHE 483**  
Brewing and Distilled Beverage Technology  
Spring of every year. **Uncle John’s Fruithouse Winery, Brewing Company, East Lansing, Uncle John’s Fruithouse Winery, Brewing Company, East Lansing, Uncle John’s Fruithouse Winery, Brewing Company, East Lansing, Uncle John’s Fruithouse Winery, Brewing Company, East Lansing**  
3(2-3) Interdepartmental with Food Science. **P:** CHE 311 or BE 350 or BE 429 **P:** CHE 311 or (ME 410 or concurrently) or BE 350 or (BE 429 or concurrently) or (FSC 325 or concurrently) **RB:** Major in Chemical Engineering, Biosystems Engineering or Food Science. Must be at least 21 years of age. **R:** Approval of department.  
Raw materials for fermentation and basics of alcohol fermentation, beer and cider production; basics of distillation; brandy and eau de vie production; whiskey production; vodka, gin and flavored spirits production; flavor chemistry  
**Effective Fall 2014 Effective Fall 2015**
MSE 260  Electronic, Magnetic, Thermal, and Optical Properties of Materials
Spring of every year. 3(3-0) P: MSE 250 and (PHY 184 or concurrently) P: (MSE 250) and ((PHY 184 or concurrently) and (PHY 184B or concurrently) and (PHY 294H or concurrently) and (LB 274 or concurrently))
Processing, structures, and properties of ceramics, polymers, and composites. Electrical, thermal, magnetic and optical properties of materials. Materials selection and design.
SA: MSE 350
Effective Fall 2014 Effective Fall 2015

MSE 310  Phase Equilibria in Materials
Fall of every year. 3(3-0) P: (MSE 250 or concurrently) and ((MTH 234 or concurrently) or (MTH 254H or concurrently) or (LB 220 or concurrently)) R: Open to juniors or seniors in the College of Engineering. R: Open to juniors or seniors in the Materials Science and Engineering Major or in the Materials Science and Engineering Minor.
Enthalpy. Entropy. Free energy. Phase changes in metal, ceramic, and polymer materials systems. Application to alloying, phase diagram determination, and electrochemistry.
SA: MSE 351
Effective Fall 2014 Effective Fall 2015

MSE 320  Mechanical Properties of Materials
Fall of every year. 3(3-0) P: (ME 222 or concurrently) and MSE 250 R: Open to juniors or seniors in the Materials Science and Engineering major or approval of department. R: Open to juniors or seniors in the Materials Science and Engineering Major or in the Materials Science and Engineering Minor.
SA: MSE 355
Effective Fall 2014 Effective Fall 2015

MSE 331  Materials Characterization Methods I
Fall of every year. 2(1-3) P: MSE 310 or concurrently R: Open to juniors or seniors in the Materials Science and Engineering Major. C: MSE 310 concurrently.
Thermal analysis, microindentation techniques, quantitative optical microscopy, effects of alloying on creep deformation, slip systems in ionic crystals, environmental effects including galvanic corrosion, passivation.
SA: MSE 375
Effective Fall 2014 Effective Fall 2015

MSE 360  Fundamentals of Microstructural Design
Spring of every year. 3(3-0) P: ME 201 or MSE 310 or CHE 321 or PHY 215 RB: ((MTH 235 or concurrently) or (MTH 340 or concurrently) or (MTH 347H or concurrently) or (MTH 255H or concurrently)) and (MSE 260 or concurrently)) R: Open to juniors or seniors in the Department of Chemical Engineering and Materials Science or approval of department. R: Open to juniors or seniors in the Department of Chemical Engineering and Materials Science or in the Materials Science and Engineering Minor.
Fick’s laws of diffusion. Models of solid state diffusion. Arrhenius plots. Use of non-equilibrium energy storage from solidification, phase changes, and deformation to predict and control microstructural changes and stability during processing in metal, ceramic, and polymer systems.
SA: MSE 352
Effective Fall 2014 Effective Fall 2015
MSE 370 Synthesis and Processing of Materials  
Spring of every year. 3(3-0) P: (ME 201 or PHY 215 or MSE 310 or CHE 321) and MSE 250 RB: MSE 260 or concurrently R: Open to students in the Department of Chemical Engineering and Materials Science or approval of department; application required. R: Open to juniors or seniors in the Department of Chemical Engineering and Materials Science or in the Materials Science and Engineering Minor.  
Chemical and physical processing of materials. Powder synthesis and processing, consolidation, casting, microdevice fabrication and surface treatments, corrosion mitigation  
SA: MSE 365, MSE 380  
Effective Fall 2014 Effective Fall 2015

MSE 381 Materials Characterization Methods II  
Spring of every year. 2(1-3) P: MSE 331 and (MSE 260 or concurrently) and (MSE 360 or concurrently) and (MSE 370 or concurrently) R: Open to juniors or seniors in the Materials Science and Engineering Major. C: MSE 360 concurrently and MSE 370 concurrently.  
Characterization of materials by electron microscopy, X-ray diffraction and fluorescence spectroscopy. Fractography, surface analysis, dynamic mechanical analysis, electrical and thermal property measurements.  
SA: MSE 376  
Effective Fall 2014 Effective Fall 2015

MSE 410 Materials Foundations for Energy Applications  
Fall of every year. 3(3-0) RB: MSE 310 or ME 201 or CHE 321 R: Open to seniors in the Department of Chemical Engineering and Materials Science. R: Open to seniors in the Department of Chemical Engineering and Materials Science or in the Materials Science and Engineering Minor or approval of department.  
Survey of materials that enable new energy generation, storage, and distribution technologies; thermoelectric materials, electrochemistry of batteries, semiconductors for solar cells, radiation tolerant materials, processing of biobased fuels, greenhouse gas mitigation approaches  
Effective Fall 2014 Effective Fall 2015

MSE 425 Biomaterials and Biocompatibility  
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 2014 Effective Fall 2015

MSE 460 Electronic Structure and Bonding in Materials and Devices  
Spring of every year. 3(3-0) P: MSE 260 R: Open to seniors in the Department of Chemical Engineering and Materials Science or approval of department; application required. R: Open to seniors or juniors in the Department of Chemical Engineering and Materials Science or in the Materials Science and Engineering Minor.  
Effective Fall 2014 Effective Fall 2015

MSE 465 Design and Application of Engineering Materials  
Spring of every year. 3(3-0) P: MSE 250 R: Open to seniors or graduate students in the College of Engineering. R: Open to seniors or graduate students in the College of Engineering or in the Materials Science and Engineering Major or in the Materials Science and Engineering Minor.  
Fundamental principles of strengthening: toughening, specific strength, and stiffness. Material development based on environmental, temperature, wear, damping, fatigue, and economic considerations.  
SA: MSM 465  
Effective Fall 2014 Effective Fall 2015
MSE 466  Design and Failure Analysis (W)  
Spring of every year. 3(2-3) P: (MSE 320 and MSE 381) or approval of department and completion of Tier I writing requirement. R: Open to seniors in the College of Engineering. R: Open to seniors in the Materials Science and Engineering Major.  
Modes and causes of failure in mechanical components and role of design. Non-destructive evaluation. Legal and economic aspects of materials failure. Student projects. 
SA: MSM 466  
Effective Fall 2014 Effective Fall 2015

MSE 474  Ceramic and Refractory Materials  
Fall of every year. 3(3-0) P: MSE 260 or approval of department R: MSE 370 and MSE 381 R: Open to seniors in the College of Engineering. R: Open to seniors in the Materials Science and Engineering Major or in the Materials Science and Engineering Minor.  
Ceramic and glassy materials. High temperature processes. Mechanical and physical properties of technical ceramics.  
SA: MSM 454, MSE 454  
Effective Summer 2015 Effective Fall 2015

MSE 476  Physical Metallurgy of Ferrous and Aluminum Alloys  
Fall of every year. 3(3-0) P: MSE 250 RB: MSE 310 R: Open to seniors in the College of Engineering. R: Open to seniors in the Materials Science and Engineering Major or in the Materials Science and Engineering Minor.  
Heat treatment and properties of ferrous and aluminum alloys. Casting and solidification. Effects of alloying elements, high strength low alloy steels, hardenability, and case hardening. Joining of materials, such as welding.  
SA: MSM 476  
Effective Fall 2014 Effective Fall 2015

MSE 481 Spectroscopic and Diffraction Analysis of Materials  
Spring of every year. 3(2-3) P: PHY 184 or PHY 184B or PHY 234B P: PHY 184 or PHY 184B or PHY 234B or PHY 294H or LB 274 RB: MSE 260 and MSE 381 R: Open to juniors or seniors or graduate students in the College of Engineering or in the College of Natural Science. R: Open to juniors or seniors in the Materials Science and Engineering Major or in the Materials Science and Engineering Minor.  
SA: MSE 451, MSM 451  
Effective Summer 2015 Effective Fall 2015

ECE 202  Circuits and Systems II  
Fall of every year. Spring of every year. 3(3-0) P: ECE 201 and (MTH 235 or concurrently) or (MTH 255H or concurrently) or MTH 340 or MTH 347H) P: (ECE 201) and ((MTH 235 or concurrently) or MTH 340 or MTH 347H)  
SA: ECE 360  
Effective Fall 2013 Effective Fall 2015

ECE 305  Electromagnetic Fields and Waves I  
Fall of every year. Spring of every year. Summer of every year. 4(4-0) P: (MTH 235 or concurrently) or (MTH 255H or concurrently) or MTH 340 or MTH 347H) and (PHY 184 or PHY 184B or PHY 234B) and (ECE 280 and (ECE 202 or concurrently)) R: Open to students in the Department of Electrical and Computer Engineering and open to students in the Department of Computer Science and Engineering. Transient and time-harmonic transmission lines. Smith charts. Two-port networks. Maxwell's equations. Force, energy, and power. Plane electromagnetic waves. Guided waves.  
SA: EE 305  
Effective Fall 2013 Effective Fall 2015
ME 494  Biofluid Mechanics and Heat Transfer  
Fall of every year. 3(3-0) Interdepartmental with Biomedical Engineering. P: (ME 410 or concurrently) or (CHE 311 or concurrently) or (BE 350 or concurrently) R: Open to juniors or seniors or graduate students in the College of Engineering.  
Applications of fluid mechanics, heat transfer, and thermodynamics to biological processes, including blood flow in the circulatory system, heart function, effects of heating and cooling on cells, tissues, and proteins. Pharmaco-kinetics.  
Effective Fall 2014  Effective Fall 2015

COLLEGE OF HUMAN MEDICINE

EPI 813  Investigation of Disease Outbreaks  
Spring of every year. 3 credits. P: EPI 810 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.  
Principles of and practice in investigating disease outbreaks.  
SA: HM 813  
DELETE COURSE

EPI 836  Practicum in Epidemiological Methods  
Fall of every year. 3(3-0) P: EPI 812 and (EPI 826 or concurrently) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.  
NEW  Data management, analysis, interpretation and presentations using public data sets.  
Effective Fall 2015

EPI 979  Advanced Topics in Infectious Disease Epidemiology  
Spring of even years. 3(3-0) RB: EPI 817 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.  
NEW  Epidemiological and public health perspectives on the etiology, transmission and prevention of infectious diseases. Key conceptual and methodological issues associated with studying infectious diseases from molecular and population based perspectives.  
Effective Spring 2016

HM 639  Northern Wilderness, Emergency and Sports Medicine Elective  
Spring of every year. 6(65-65) R: Open to students in the College of Human Medicine. Approval of college.  
NEW  Development of knowledge, skills and attitudes to address the needs of patients outside of the hospital with wilderness or sports related injuries.  
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 2013

HM 819  American Healthcare Delivery: A Systems Approach  
Summer of odd years. 3(3-0) RB: graduate students or professionals with public health, medical, law, policy background interested in learning about the US Healthcare system and the ACA R: Open to students in the Public Health Major or approval of college.  
NEW  Evolution of United States healthcare system. The Affordable Care Act (ACA). Overview of funding and costs of healthcare delivery. Effect of ACA on future healthcare delivery and health professions.  
Effective Summer 2015
HM 821  Corporate Social Responsibility and Public Health: India
Fall of odd years. 3(3-0) RB: Academic or professional background in public health and/or public health related discipline, undergraduate level health-related discipline R: Open to juniors or seniors or graduate students. Approval of college.
NEW  Overview of the public health, healthcare systems and their connection to business in India. Discussion covers how business is impacted by public health and how public health is impacted by business. Based in Mumbai, the course is supported by faculty of the SP Jain Institute of Management. The course includes equal parts classroom learning and field experiences with key stakeholders from the political, business and health related fields.
Effective Summer 2015

HM 834  Advanced Counterfeit Pharmaceuticals Readings
Advanced Counterfeit Pharmaceuticals: Analysis and Assessment
Spring of even years. 3(3-0) P: HM 801 and HM 833 RB: Academic or professional background in public health or public health related discipline. R: Open to students in the Public Health Major or approval of college.
Advanced topics on the impact of counterfeit pharmaceuticals on public health.
Effective Fall 2009 Effective Summer 2015

HM 847  Public Health in Ghana
Public Health in Ghana: Methods for Community Practice
Summer of every year. 4(4-0) P: HM 848 RB: Academic or professional background in public health and/or public health related discipline; undergraduate level health-related discipline R: Open to students in the Public Health Major and open to juniors or seniors. Approval of college; application required.
Overview of major public health issues and the health care system, both Western and traditional, in Ghana. Health status indicators and determinants; major programs/strategies; organization of the health care system, access to and payment for care; role, image and status of health care providers; interface between Western and traditional medicine; basic qualitative and quantitative field research methods for community health.
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 2013 Effective Summer 2015

HM 848  Preparation for Healthcare in Ghana
Preparation for Public Health in Ghana: Methods for Community Practice
Spring of every year. 1(1-0)
Preparation for public health study abroad experiences in Ghana.
Effective Spring 2010 Effective Summer 2015

HM 880  Public Health Research Methods
Quantitative Public Health Research Methods
Summer of odd years. 3(3-0) P: HM 802 and HM 803 RB: Academic or professional background in public health and/or public health related discipline, experience with databases R: Open to students in the Public Health Major or approval of college. Not open to students with credit in VM 830.
Identification of research questions, study design, data collection and questionnaire design, dataset manipulation and analysis, reporting of findings. Proposal writing, ethical considerations and submission to institutional review board (IRB).
Effective Summer 2013 Effective Summer 2015

HM 883  Mobile Technology, Social Media, and Games in Public Health
Mobile Health, Social Media and Games in Public Health
Fall of even years. 3(3-0) RB: Academic or professional background in public health and/or public health related discipline, healthcare administration, allopathic and osteopathic medicine, telecommunications, healthcare information technology, healthcare informatics, or computer science. R: Open to students in the Public Health Major or approval of college.
Utilization and critical analysis of mobile technology, social media platforms and games to assess, implement and improve public health programs and community education.
Effective Fall 2012 Effective Summer 2015
OGR 609  Advanced Gynecology Clerkship
Fall of every year. Spring of every year. Summer of every year. 6(6-0) A student may earn a maximum of 12 credits in all enrollments for this course. A student may earn a maximum of 24 credits in all enrollments for this course. RB: OGR 608 R: Open to graduate-professional students in the College of Human Medicine.
- Additional exposure to gynecology in the preceptor mode. Participation in outpatient gynecology and inpatient care, including surgery.
- 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 2010 Effective Summer 2015

OGR 610  Perinatology Clerkship
Fall of every year. Spring of every year. Summer of every year. 4 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course. RB: OGR 608 R: Open only to graduate-professional students in College of Human Medicine. R: Open to graduate-professional students or human medicine students in the College of Human Medicine.
- Additional exposure to high risk obstetrics including prenatal diagnosis and counseling, antepartum evaluation, and care of the high risk patient. Management of the intrapartum high risk patient.
- 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 1995 Effective Summer 2015

OGR 611  Reproductive Endocrinology and Infertility Clerkship
Fall of every year. Spring of every year. Summer of every year. 4 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course. RB: OGR 608 R: Open only to graduate-professional students in College of Human Medicine. R: Open to graduate-professional students or human medicine students in the College of Human Medicine.
- Added exposure to clinical problems in reproductive endocrinology and female infertility primarily in ambulatory setting. Occasional participation in inpatient experiences. Assisted reproductive technologies.
- 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 1995 Effective Summer 2015

OGR 612  Gynecologic Oncology Clerkship
Fall of every year. Spring of every year. Summer of every year. 4 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course. RB: OGR 608 R: Open only to graduate-professional students in College of Human Medicine. R: Open to graduate-professional students or human medicine students in the College of Human Medicine.
- Added clinical experience in inpatient and ambulatory gynecologic oncology, breast disease, and complicated benign gynecology in the preceptor mode. Pre-treatment evaluation and cancer management, including surgery.
- 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 1995 Effective Summer 2015
OGR 614  Advanced Obstetrics Clerkship
Fall of every year. Spring of every year. Summer of every year. 6(6-0) A student may earn a maximum of 12 credits in all enrollments for this course. A student may earn a maximum of 24 credits in all enrollments for this course. RB: OGR 608 R: Open to graduate-professional students in the College of Human Medicine.
Additional exposure to obstetrics in the preceptor mode. Participation in ambulatory and inpatient obstetrical care, including surgery. May include maternal-fetal medicine. 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 2010 Effective Summer 2015

OGR 615  Obstetrics and Gynecology Sub-Internship
Fall of every year. Spring of every year. Summer of every year. 6(6-0) A student may earn a maximum of 24 credits in all enrollments for this course. RB: OGR 608 R: Open to students in the College of Human Medicine.
Assist in labor delivery and in the care of gynecology/obstetrics patients providing first line care to patients similar to an intern. 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 2013 Effective Summer 2015

COLLEGE OF NATURAL SCIENCE

BLD 835  Hemostasis, Thrombosis and Effective Resource Management
Fall of every year. 3(3-0) RB: Background in hemostasis, thrombosis and blood product management. R: Open to lifelong graduate students in the College of Natural Science or in the Biomedical Laboratory Diagnostics Program or in the Clinical Laboratory Sciences major or approval of department. R: Open to graduate students.
Theories of coagulation, thrombosis and effective blood product management. Needs and particular stresses during an active bleeding crisis. Request the use of ET-Extension to postpone grading. The work for the course must be completed and the final grade reported within 4 semesters after the end of the semester of enrollment.
Effective Fall 2008 Effective Spring 2016

BLD 836  Adverse Transfusion Outcomes: Detection, Monitoring and Prevention
Spring of every year. Summer of every year. 2(2-0) RB: Medical technology and clinical laboratory sciences laboratory professionals. R: Open to lifelong graduate students and open to graduate students in the Biomedical Laboratory Operations major or in the Clinical Laboratory Sciences major. R: Open to graduate students.
Adverse transfusion outcomes (ATO) covering cause, methods of detection, monitoring paradigms and prevention. Request the use of ET-Extension to postpone grading. The work for the course must be completed and the final grade reported within 3 semesters after the end of the semester of enrollment.
Effective Spring 2010 Effective Spring 2016

BLD 838  The Clinical Context of Blood Product Management
Summer of every year. 1(1-0) RB: Experience in transfusion Medicine NEW Effective blood product management in the context of high use, high demand clinical settings. Request the use of ET-Extension to postpone grading. The work for the course must be completed and the final grade reported within 3 semesters after the end of the semester of enrollment.
Effective Summer 2016
BLD 839 Problems in Histocompatibility and Immunogenetics

NEW Application of transplant immunology to case studies and data analysis.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 3 semesters after the end of the semester of enrollment.
Effective Summer 2016

MTH 101 Quantitative Literacy I

NEW Quantitative literacy including applications to health and risk, science, and the environment
Effective Fall 2015

MTH 102 Quantitative Literacy II

NEW Quantitative literacy including applications to finance, economics, and politics.
Effective Spring 2016

MTH 301 Foundations of Higher Mathematics

Fall of every year. Spring of every year. 3(3-0) P: MTH 133 or MTH 153H or LB 119 P: (MTH 133 or MTH 153H or LB 119) and MTH 202 R: Open to students in the Mathematics Elementary Teaching Major or in Mathematics-Elementary Disciplinary Teaching Minor or approval of department. Not open to students with credit in MTH 200.
Elementary set theory including permutations, combinations, cardinality theorems, relations, functions and quotient sets. Basic principles of logic and proof techniques.
Elementary number theory and abstract algebra.
Effective Fall 2013 Effective Fall 2015

MTH 415 Applied Linear Algebra

Fall of every year. Spring of every year. Summer of every year. 3(3-0) P: (MTH 235 or MTH 255H or MTH 340 or MTH 347H) and (MTH 309 or MTH 314 or MTH 317H) P: (MTH 235 or MTH 340 or MTH 347H) and (MTH 309 or MTH 314 or MTH 317H) Not open to students with credit in MTH 414.
Effective Fall 2013 Effective Fall 2015

MTH 441 Ordinary Differential Equations II

Fall of every year. 3(3-0) P: (MTH 235 or MTH 255H or MTH 340 or MTH 347H) and (MTH 309 or MTH 317H or MTH 314 or MTH 415) P: (MTH 235 or MTH 340 or MTH 347H) and (MTH 309 or MTH 317H or MTH 314 or MTH 415)
Existence and uniqueness theorems; Linearization; Local and global stability; Saddle-node, Hopf and heteroclinic bifurcations; Hamiltonian and gradient system; The Poincare map; The Poincare-Bendixson theorem and limit cycles; Selected applications.
Effective Fall 2013 Effective Fall 2015

MTH 442 Partial Differential Equations

Spring of every year. 3(3-0) P: MTH 235 or MTH 255H or MTH 340 or MTH 347H P: MTH 235 or MTH 340 or MTH 347H
Effective Fall 2013 Effective Fall 2015
MTH 451 Numerical Analysis I  
Fall of every year. 3(3-0) P: (CSE 131 or CSE 231) and (MTH 309 or MTH 314 or MTH 317H or MTH 415) and (MTH 235 or MTH 255H or MTH 340 or MTH 347H) P: (CSE 131 or CSE 231) and (CSE 131 or CSE 231) and (MTH 235 or MTH 340 or MTH 347H)  
SA: MTH 351  
Effective Fall 2013 Effective Fall 2015

MTH 457 Introduction to Financial Mathematics  
Spring of every year. 3(3-0) P: MTH 309 and (MTH 235 or MTH 255H or MTH 340 or MTH 347H) and (STT 441 or STT 351) P: (MTH 309) and (MTH 235 or MTH 340 or MTH 347H) and (STT 441 or STT 351)  
Effective Fall 2013 Effective Fall 2015

MTH 847 Partial Differential Equations I  
Fall of every year. 3(3-0) RB: Equivalent of MTH 414 R: Open to doctoral students in the College of Natural Science.  
NEW This course is first part of the sequence courses on partial differential equations. It covers the basic theory and techniques for general first-order equations, Laplace's equation, the heat equation and wave equations, with certain generalizations to the second-order linear equations of elliptic, parabolic and hyperbolic types.  
Effective Fall 2015

NEU 215 Neuroscience and Society  
Summer of every year. 3(3-0) P: Completion of Tier I Writing Requirement Not open to students with credit in NEU 301 or ZOL 402.  
NEW Critical examination of important societal issues related to neuroscience, including stress, addiction, and sex differences. Comparison of peer-reviewed neuroscientific research and popular press publications.  
Effective Summer 2016

NEU 416 Development of the Nervous System Through the Lifespan  
Fall of every year. 3(3-0) Interdepartmental with Zoology. P: NEU 302 or ZOL 402 or PSY 209 RB: ZOL 341 R: Open to undergraduate students in the Program in Neuroscience or in the Department of Integrative Biology or in the Department of Psychology or in the Lyman Briggs Neuroscience Major or in the Lyman Briggs Zoology Coordinate Major.  
NEW Development of neurons and their connections, with a focus on the roles of both genetics and behavioral experience in shaping the mammalian nervous system.  
Effective Fall 2015

NEU 430 Genomics of Brain Development, Learning, and Behavior  
Summer of every year. 3(3-0) P: (ZOL 341) and (NEU 302 or ZOL 402) RB: PSY 209  
NEW Role of genes in brain development and function; introduction to issues in behavioral and psychiatric genetics  
Effective Summer 2016

ZOL 405 Neural Basis of Animal Behavior  
Spring of every year. 3(3-0) P: (BS 161 or LB 145 or BS 181H) and (BS 162 or LB 144 or BS 182H)  
NEW Structure and function of neurons and neural circuits underlying naturally-occurring animal behaviors.  
Effective Spring 2016
**COLLEGE OF NURSING**

**NUR 426**  
Theoretical Basis for Critical Care  
Fall of every year. Spring of every year. Summer of every year. 2(2-0) P: NUR 360 R: Open to seniors in the College of Nursing.  
Nursing care of clients in critical care, requiring synthesis of pathophysiologic, pharmacologic, and therapeutic concepts. Family theory, stress-adaptation, psychosocial concepts and legal and ethical issues.  
DELETE COURSE  
Effective Summer 2015

**NUR 838**  
Care for Aging Individuals Across the HealthCare Continuum  
Spring of every year. Summer of every year. 1(1-0) P: NUR 802 R: Open to graduate students in the Master of Science in Nursing or in the Nurse Practitioner Graduate Certificate. R: Open to graduate students in the Nurse Practitioner Graduate Certificate or in the Master of Science in Nursing or approval of college; application required.  
Regulations, financing methods, forms of service delivery, and management methods in care of the older adult within a variety of health care environments. Aging of the American society, the impact of the baby-boomer generation, consumer choice, and the growing diversity in care options, focusing on long-term care.  
Effective Fall 2012 Effective Fall 2015

**NUR 841**  
Health Care Policy in Perspective: Economics, Politics and Ethics  
Spring of every year. 2(2-0)  
Economic, political and regulatory environment of the U.S. health care system. Quality, costs, equity in access of services. Comparison of U.S. systems with those of other advanced industrial countries.  
SA: NUR 503  
DELETE COURSE  
Effective Fall 2015

**NUR 865**  
Nursing Education Seminar  
Spring of every year. 2(2-0) RB: Open only to students in the Clinical Nurse Specialist-Nurse Education concentration. R: Open to graduate students in the Master of Science in Nursing.  
Syntheses of teaching and learning, curricular development, and learner-evaluation theories and strategies. Curricular design and unique characteristics of academic and clinical instruction and learning.  
DELETE COURSE  
Effective Fall 2015

**NUR 867**  
Clinical Internship in Nursing Education  
Spring of every year. 4(1-9) P: NUR 861 RB: Open only to students in the Clinical Nurse Specialist-Nurse Education concentration. R: Open to graduate students in the Master of Science in Nursing.  
Application and evaluation of teaching and learning principles in a diverse health care setting.  
DELETE COURSE  
Effective Fall 2015

**COLLEGE OF OSTEOPATHIC MEDICINE**

**FCM 650**  
Principles of Family Medicine - Intensive  
Fall of every year. Spring of every year. Summer of every year. 1(0-40) A student may earn a maximum of 2 credits in all enrollments for this course. P: OST 551 or OST 552 or (OST 553 or concurrently) R: Open to graduate-professional students in the College of Osteopathic Medicine.  
One week intensive preceptorship in family medicine.  
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 Fall 2013 Effective Fall 2015