

Graduate College

Dual-Listed Courses

Departments must request permission to offer courses at the graduate level in conjunction with 300-400 level undergraduate courses. The request is made to the Graduate Curriculum and Catalog Committee. If the dual-listed courses are also experimental courses (400X/500X), submit the experimental course form to the Scheduling Office, 10 Enrollment Services, AND attach an approved copy of the experimental course form(s) to the dual –listed request.

Dual-listed courses permit undergraduate and graduate students to be in the same class but to receive credit under two different course numbers. Credit in the graduate course is not available to students who have received credit in the corresponding undergraduate course. Both graduates and undergraduates receive the same amount of credit for the course, but additional work is required of all graduate students taking the course under the graduate-level course number. This extra work may take the form of additional reading, projects, examinations, or other assignments as determined by the instructor. The instructor must be a member of the Graduate Faculty or a Graduate Lecturer. Each dual-listed course is designated in the catalog with the phrase “Dual-listed with,” although the student’s official transcript of credits, both graduate and undergraduate, does not identify dual-listed courses as such. There is a limit to the number of dual-listed course credits that may be used to meet the requirement for an advanced degree. (For information about procedures for requesting permission to offer dual-listed courses, faculty should consult the *Graduate Faculty* *Handbook*.).

 In reviewing proposals for dual-listed courses, this committee needs to understand the department’s rationale for offering the course. When a department submits a request, an explanation should be given of the purpose served by the course and the criteria used by the department to determine if the course is suitable for dual-listing. Please submit the proposal in electronic form as a word attachment to grad\_college@iastate.edu.

The following information should be included in the proposal:

1. Full catalog information for each course to be dual-listed, including the course numbers (or proposed course numbers), title, credits, semester offering (if applicable), prerequisites, and description. Dual-listed courses bear common numbers, e.g., 580 (480).

**BMS 439/539: Principles of Pharmacology, 4 credits (offered Spring)**

**General principles of drug actions; drug disposition; drug acting or, cardiovascular, respiratory, renal, gastrointestinal, and endocrine systems; anti-inflammatory and antibiotic drug; anti-cancer drugs; anesthetics CNS stimulants; lifestyle drugs; drug addiction, abuse and dependence; drugs in sport; drugs for obesity; biopharmaceuticals and gene therapy; drug development.**

1. Graduate faculty status of the proposed instructor. **Richard J. Martin,**

**Graduate Faculty, BMS and Toxicology**

1. Number of the dual-listed course credits the department will permit to be used to meet the requirements for an advanced degree. This limit includes dual-listed courses taken in all departments.

**Four for 1-year MS Biomedical Sciences**

1. The differential expectations for graduate students and undergraduates. What additional work will be required for graduate students enrolled in the course? Please describe this work, not in abstract terms (such as "more in-depth participation") but in terms of concrete measurable outcomes or other tangible evidence. Welcome inclusions: specific examples of the additional assignments with details about paper length; the number of additional readings; the length and frequency of oral presentations; portfolio expectations; indications of how these graduate requirements are weighted in the course grade (ex. 40% of final grade); comparisons with undergraduate expectations.
* **Graduate students are required to write essay questions during each of their exams and during the comprehensive final to display an in-depth knowledge of the field of study (BMS 539).**
* **Graduate students are required to achieve higher number of points to achieve the A, B, C, D grades BMS 539 vs BMS 439.**

* **Grading Scale (BMS 539)**
* **A:900-1000; A-:800-899;**
* **B+:766-799; B:733-765;B-:700-732;**
* **C+:666-699; C:=633-665; C-=600-632;**
* **D+:566-599; D:=533-565; D-=500-532**
* **F : below 500**
* **GRADING SCALE (BMS 439)**
* **A:700-666; A-:665-630;**
* **B+:629-606; B:605-582;B-:581-560;**
* **C+:559-536; C:=535-512; C-=511-490;**
* **D+:489-466; D:=465-443; D-=442-420**
* **F : 419 and below**
* **Undergraduate students will not be required to write in-depth essays with their exams; their exams shall consist of multiple choice and short answer questions (BMS 439).**
* **Graduate students are also required to attend departmental seminar lectures on topics of pharmacology.**
1. Reason(s) the course is considered sufficiently rigorous and of such an advanced nature as to challenge graduate students.

 **BMS 539 is already accepted and running as a successful graduate program. The plan is now to adapt the course without changing the graduate class to make it accessible to senior undergraduates**

1. Academic advantages and disadvantages accruing to graduate students taking this course with undergraduates.

**The academic advantage of the introduction of the BMS 439 course is for undergraduates at ISU who, at the moment do not have access to a pharmacology class at Iowa State University. BMS 539 is an existing course for graduate students. There are currently 48 graduate student taking the class; the addition of 10 undergraduate students will have no noticeable effect on the class. A large class of undergraduate students and a reduce number of graduate students would have some impact on the instruction.**

1. The place of the course in a graduate student’s program of study and why it is not considered a "remedial" undertaking intended to overcome deficiencies in the student’s preparation for graduate work.

**BMS 539 is taken in the second semester of the 1-year MS Biomedical Sciences program. The plan is to introduce BMS 439 to make pharmacology accessible to undergraduate students at Iowa State.**

1. The role of the course in an undergraduate’s degree program and the academic qualifications undergraduates must have to take this course.

Pharmacology and Toxicology undergraduate minor Curriculum

## Prerequisites for Prospective undergraduate minors

Coursework required for pre-requisites for Core and Elective Courses to meet the requirements of this undergraduate minor

## Required Common-Core Lecture Courses

TOX 401: Principles of Toxicology, 3 credits (offered fall)

### Prereq: [BBMB 404](http://catalog.iastate.edu/search/?P=BBMB%20404) or equivalent

Principles of toxicology governing entry, fate, and effects of toxicants on living systems. Includes toxicokinetics and foreign compound metabolism relative to toxification or detoxification. Fundamentals of foreign compound effects on metabolism, physiology, and morphology of different cell types, tissues, and organ systems.

BMS 439: Principles of Pharmacology, 4 credits (offered spring)

General principles of drug actions; drug disposition; drug acting or, cardiovascular, respiratory, renal, gastrointestinal, and endocrine systems; anti-inflammatory and antibiotic drug; anti-cancer drugs; anesthetics CNS stimulants; lifestyle drugs; drug addiction, abuse and dependence; drugs in sport; drugs for obesity; biopharmaceuticals and gene therapy; drug development.

Physiology (select 1)

BMS 329 Anatomy and Physiology of Domestic Animals, 3 credits (offered spring)

*Prereq:* [*BIOL 212,*](http://catalog.iastate.edu/search/?P=BIOL%20212) [*BIOL 212L*](http://catalog.iastate.edu/search/?P=BIOL%20212L)

Survey of body systems of domestic animals. Provides a medical science orientation particularly useful to students in a preveterinary medicine curriculum.

BIOL 335: Principles of Human and Other Animal Physiology, 4 credits (offered fall, spring)

### Prereq: [BIOL 314](http://catalog.iastate.edu/search/?P=BIOL%20314)

Introduction to systemic functions with emphasis on mammals. Students cannot receive credit for both BIOL 334 and BIOL 335.

 BIOL 334: Metabolic Physiology of Mammals, 3 credits

*Prereq:* [*BIOL 211,*](http://catalog.iastate.edu/search/?P=BIOL%20211) [*BIOL 212*](http://catalog.iastate.edu/search/?P=BIOL%20212)

Introduction to physiology of metabolic function in mammals and other animals.

Metabolic processes and their interactions with various subsystems, approached

form an organismal perspective. Integration of cellular, gastrointestinal, cardiovascular, respiratory, and renal processes, relevant to their control and integration at the nervous and endocrine system levels. Functional aspects of organismal physiology; energy and water balances, physiology of rest exercise, and environmental stress. Students cannot receive credit for both BIOL 334 and BIOL 335.

Supportive Electives

TOX 354: General Pharmacology, 3 credits (offered spring)

General principles; drug disposition; drugs acting on the nervous, cardiovascular, renal, gastrointestinal, and endocrine systems. Prerequisites: BBMB 404, BBMB 405

TOX 419/FS HN 419: Foodborne Hazards, 3 credits (offered alternative spring)

### Prereq: [MICRO 201](http://catalog.iastate.edu/search/?P=MICRO%20201) or [MICRO 302,](http://catalog.iastate.edu/search/?P=MICRO%20302) a course in biochemistry

Pathogenesis of human microbiological foodborne infections and intoxications, principles of toxicology, major classes of toxicants in the food supply, governmental regulation of foodborne hazards. Assessed service learning component. Only one of FS HN 419 and FS HN 519 may count toward graduation.

TOX 420/FS HN 420: Food Microbiology, 3 credits

*Prereq:* [*MICRO 201*](http://catalog.iastate.edu/search/?P=MICRO%20201) *or* [*MICRO 302*](http://catalog.iastate.edu/search/?P=MICRO%20302)

Effects of microbial growth in foods. Methods to control, detect, and enumerate microorganisms in food and water. Foodborne infections and intoxications.

TOX 426: Veterinary Toxicology, 3 credits (offered spring)

### Prereq: Permission of instructor

Study of toxicological diseases of animals emphasizing clinical recognition, circumstances of poisoning, differential diagnosis with clinical and laboratory data, therapeutic procedures, preventive management and public health implications. Supplemented with case-based materials.

BMS 443: Pharmacology and Therapeutics, 3 credits (offered fall) *Prereq:* [*B M S 354*](http://catalog.iastate.edu/search/?P=B%20M%20S%20354)

Pharmacology and therapeutic uses of fluids, antimicrobial and antiparasitic drugs, clinical use of veterinary drugs, and adverse drug reactions.

BMS 490: Independent Study, credits 1-3

TOX 499: Undergraduate Research, credits 1-3

BBMB 316: Principles of Biochemistry, credits 3 (offered spring) *Prereq:* [*CHEM 231*](http://catalog.iastate.edu/search/?P=CHEM%20231) *or* [*CHEM 331;*](http://catalog.iastate.edu/search/?P=CHEM%20331) [*BIOL 212;*](http://catalog.iastate.edu/search/?P=BIOL%20212) [*BIOL 313*](http://catalog.iastate.edu/search/?P=BIOL%20313) *and* [*BIOL 314*](http://catalog.iastate.edu/search/?P=BIOL%20314) *strongly recommended.*

Understanding biological systems at the molecular level; chemistry of biological macromolecules, enzyme function and regulation, metabolic pathways; integration of metabolism in diverse living systems. For students in biology and related majors who are not required to take more rigorous treatment of biochemistry found in

[BBMB 404/](http://catalog.iastate.edu/search/?P=BBMB%20404)405. Not acceptable for credit toward a major in biochemistry, biophysics, or agricultural biochemistry.

BBMB 404: Biochemistry I, credits 3 (offered fall) *Prereq:* [*CHEM 332.*](http://catalog.iastate.edu/search/?P=CHEM%20332)

A general overview for graduate and advanced undergraduate students in agricultural, biological, chemical and nutritional sciences. Chemistry of amino acids, proteins, carbohydrates, and lipids, vitamins; protein structure; enzymology; carbohydrate metabolism.

BBMB 405: Biochemistry II, credits 3 (offered spring)

### Prereq: [BBMB 404](http://catalog.iastate.edu/search/?P=BBMB%20404)

A general overview for graduate and advanced undergraduate students in agricultural, biological, chemical, and nutritional sciences. Metabolism of carbohydrates, amino acids, nucleotides and lipids; formation, turnover, and molecular relationships among DNA, RNA, and proteins; genetic code; regulation of gene expression; selected topics in the molecular physiology of plants and animals. Credit for both BBMB 420 and the BBMB 404 - BBMB 405 sequence may not be applied toward graduation.

BIOL 381: Environmental Systems I: Introduction to Environmental Systems, 3-4 credits (fall)

### Prereq: 12 credits of natural science including biology and chemistry

Introduction to the structure and function of natural environmental systems. Emphasis on the analysis of material and energy flows in natural environmental systems and the primary environmental factors controlling these systems.

BIOL 382: Environmental Systems II: Analysis of Environmental Systems, 3 credits (spring) *Prereq:* [*ENSCI 381*](http://catalog.iastate.edu/search/?P=ENSCI%20381)

Continuation of [ENSCI 381.](http://catalog.iastate.edu/search/?P=ENSCI%20381) Systems approach to the analysis of material and energy flows in natural environmental systems and the primary environmental factors controlling these systems.

BIOL 423: Developmental Biology, 3 credits (spring)

### Prereq: [BIOL 313](http://catalog.iastate.edu/search/?P=BIOL%20313)

Principles of embryogenesis and animal development. Establishment of body axes, organ and limb development, and specification of cell fates. Emphasis on cell signaling and the control of gene expression within the context of a developing organism. Medically relevant subjects will be discussed, including stem cells, cancer biology, fertilization, and cloning.

BIOL 434: Endocrinology, 3 credits (spring)

*Prereq:* [*BIOL 211,*](http://catalog.iastate.edu/search/?P=BIOL%20211) [*BIOL 212*](http://catalog.iastate.edu/search/?P=BIOL%20212)

Chemical integration of vertebrate organisms. The structure, development, and evolution of the endocrine glands and the function and structure of their hormones.

BIOL 436: Neurobiology, 3 credits (fall)

### Prereq: [BIOL 212](http://catalog.iastate.edu/search/?P=BIOL%20212)

Basic principles of brain function and development. Signaling of nerve cells, synaptic transmission, structure/function of ion channels and receptors, memory and synaptic plasticity, movement and central control, sensation and sensory processing, construction of neural circuits, early brain development, complex brain functions in health and disease.

BIOL 439: Environmental Physiology

### Prereq: [BIOL 335;](http://catalog.iastate.edu/search/?P=BIOL%20335) physics recommended

Physiological adaptations to the environment with an emphasis on vertebrates.

A B E 424A: Air Pollution: Air quality and effects of pollutants, 1 credit

*Prereq: Either* [*PHYS 221*](http://catalog.iastate.edu/search/?P=PHYS%20221) *or* [*CHEM 178*](http://catalog.iastate.edu/search/?P=CHEM%20178) *and either* [*MATH 166*](http://catalog.iastate.edu/search/?P=MATH%20166) *or 3 credits in statistics.*

### Senior classification or above

1 cr. per module. Module A prereq for all modules; module B prereq for D and E.

A B E 451: Food and Bioprocess Engineering, 3 credits (fall)

*Prereq:* [*A B E 216*](http://catalog.iastate.edu/search/?P=A%20B%20E%20216) *and* [*M E 436*](http://catalog.iastate.edu/search/?P=M%20E%20436) *or* [*CH E 357,*](http://catalog.iastate.edu/search/?P=CH%20E%20357) *or* [*FS HN 351*](http://catalog.iastate.edu/search/?P=FS%20HN%20351) *and* [*MATH 266*](http://catalog.iastate.edu/search/?P=MATH%20266) *or* [*MATH 267*](http://catalog.iastate.edu/search/?P=MATH%20267)

Application of engineering principles and mathematical modeling to the quantitative analysis of food and bioprocessing systems. Physical/chemical characteristics of foods and biological systems, flow processes, thermal processes and separation processes. Term paper required for graduate credit.

ENT 450: Pesticides in the Environment, 2 credits (spring)

### Prereq: 9 credits of biological sciences

Fate and significance of pesticides in soil, water, plants, animals, and the atmosphere.

ENSCI 486: Aquatic Ecology, 3 credits (fall)

*Prereq:* [*BIOL 312*](http://catalog.iastate.edu/search/?P=BIOL%20312) *or* [*ENSCI 381*](http://catalog.iastate.edu/search/?P=ENSCI%20381) *or* [*ENSCI 402*](http://catalog.iastate.edu/search/?P=ENSCI%20402) *or* [*NREM 301*](http://catalog.iastate.edu/search/?P=NREM%20301)

Structure and function of aquatic ecosystems with application to fishery and pollution problems. Emphasis on lacustrine, riverine, and wetland ecology.

B M E 440: Biomedical Applications of Chemical Engineering, 3 credits

*Prereq:* [*CH E 210,*](http://catalog.iastate.edu/search/?P=CH%20E%20210) [*MATH 266,*](http://catalog.iastate.edu/search/?P=MATH%20266) [*PHYS 222*](http://catalog.iastate.edu/search/?P=PHYS%20222)

Applications of material and energy balances, transport phenomena, chemical reaction engineering, and thermodynamics to problems in biomedical engineering and applied physiology; survey of biomedical engineering; biomaterials; biomedical imaging.

GEN 409: Molecular Genetics, 3 credits (fall)

*Prereq:* [*BIOL 313.*](http://catalog.iastate.edu/search/?P=BIOL%20313)

The principles of molecular genetics: gene structure and function at the molecular level, including regulation of gene expression, genetic rearrangement, and the organization of genetic information in prokaryotes and eukaryotes.

GEN 410: Analytic Genetics, 3 credits (spring) *Prereq:* [*GEN 409.*](http://catalog.iastate.edu/search/?P=GEN%20409)

The principles and practice of genetic analysis. Mendelian genetic analysis, mutational, transgenic, and genomic analysis of gene function, linkage and gene mapping, chromosomal aberrations, aneuploidy and polyploidy, extrachromosomal inheritance, analysis of genetic pathways.

FS HN 264: Fundamentals of Nutritional Biochemistry and Metabolism, 3 credits

(Fall)

*Prereq:* [*FS HN 167;*](http://catalog.iastate.edu/search/?P=FS%20HN%20167) [*CHEM 163,*](http://catalog.iastate.edu/search/?P=CHEM%20163) [*CHEM 163L;*](http://catalog.iastate.edu/search/?P=CHEM%20163L) [*BIOL 211*](http://catalog.iastate.edu/search/?P=BIOL%20211)

Digestion, absorption, metabolism, and biochemical functions of nutrients. Biochemical aspects of nutrient deficiencies.

FS HN 442: Issues in Food and Society, 2 credits (Fall)

*Prereq:* [*FS HN 242,*](http://catalog.iastate.edu/search/?P=FS%20HN%20242) [*FS HN 342*](http://catalog.iastate.edu/search/?P=FS%20HN%20342)

In-depth discussion, synthesis, and analysis of domestic and international food issues including: food systems from farm to fork, poverty and world hunger, over nutrition, population, agriculture and the environment, ethics, biotechnology, and policy.

FS HN 461: Medical Nutrition and Disease I, 4 credits (fall)

### Prereq: [FS HN 360,](http://catalog.iastate.edu/search/?P=FS%20HN%20360) [FS HN 361,](http://catalog.iastate.edu/search/?P=FS%20HN%20361) [FS HN 367;](http://catalog.iastate.edu/search/?P=FS%20HN%20367) plus [BIOL 256](http://catalog.iastate.edu/search/?P=BIOL%20256) and 256L or BIOL 306 or [BIOL 335](http://catalog.iastate.edu/search/?P=BIOL%20335)

(Dual-listed with [NUTRS 561)](http://catalog.iastate.edu/search/?P=NUTRS%20561) Pathophysiology of selected chronic disease states and their associated medical problems. Specific attention will be directed to medical nutrition needs of patients in the treatment of each disease state.

FS HN 464: Medical Nutrition and Disease II, 3 credits (spring)

*Prereq:* [*FS HN 360,*](http://catalog.iastate.edu/search/?P=FS%20HN%20360) [*FS HN 461;*](http://catalog.iastate.edu/search/?P=FS%20HN%20461) *plus* [*BIOL 256*](http://catalog.iastate.edu/search/?P=BIOL%20256) *and* [*BIOL 256L*](http://catalog.iastate.edu/search/?P=BIOL%20256L) *or BIOL 306 or* [*BIOL 335*](http://catalog.iastate.edu/search/?P=BIOL%20335)

(Dual-listed with [NUTRS 564)](http://catalog.iastate.edu/search/?P=NUTRS%20564) Pathophysiology of selected acute and chronic disease states and their associated medical problems. Specific attention will be directed to medical nutrition needs of patients in the treatment of each disease state.

FS HN 467: Molecular Basis of Nutrition in Disease Prevention, 3 credits (spring) *Prereq:* [*FS HN 360*](http://catalog.iastate.edu/search/?P=FS%20HN%20360) *or equivalent*

Understanding the molecular basis for the role of diet in the development and prevention of common diseases such as diabetes, cancer, and vascular diseases. Translating this understanding into practical approaches for improving the health of individuals and populations.

FS HN 489: Issues in Food Safety, 1 credit (spring)

### Prereq: Credit or enrollment in [FS HN 101](http://catalog.iastate.edu/search/?P=FS%20HN%20101) or FS HN 272 or [HSP M 233;](http://catalog.iastate.edu/search/?P=HSP%20M%20233) [FS HN 419](http://catalog.iastate.edu/search/?P=FS%20HN%20419) or [FS HN 420;](http://catalog.iastate.edu/search/?P=FS%20HN%20420) [FS HN 403](http://catalog.iastate.edu/search/?P=FS%20HN%20403)

Capstone seminar for the food safety minor. Case discussions and independent projects about safety issues in the food system from a multidisciplinary perspective.

### CHEM 211: Quantitative and Environmental Analysis, 2 credits (fall, spring) Prereq: [CHEM 163](http://catalog.iastate.edu/search/?P=CHEM%20163) and [CHEM 163L,](http://catalog.iastate.edu/search/?P=CHEM%20163L) [CHEM 201](http://catalog.iastate.edu/search/?P=CHEM%20201) and [CHEM 201L;](http://catalog.iastate.edu/search/?P=CHEM%20201L) or credit or enrollment in [CHEM 178;](http://catalog.iastate.edu/search/?P=CHEM%20178) and concurrent enrollment in [CHEM 211L](http://catalog.iastate.edu/search/?P=CHEM%20211L)

Theory and practice of elementary volumetric, chromatographic, electrochemical and spectrometric methods of analysis. Chemical equilibrium, sampling, and data evaluation. Emphasis on environmental analytical chemistry; the same methods are widely used in biological and materials sciences as well.

CHEM 331: Organic Chemistry I, 3 credits, (fall, spring, summer)

*Prereq:* [*CHEM 178*](http://catalog.iastate.edu/search/?P=CHEM%20178) *or* [*CHEM 201,*](http://catalog.iastate.edu/search/?P=CHEM%20201) *enrollment in* [*CHEM 331L*](http://catalog.iastate.edu/search/?P=CHEM%20331L) *highly recommended.* The first half of a two semester sequence. Modern organic chemistry including nomenclature, synthesis, structure and bonding, reaction mechanisms. For students majoring in physical and biological sciences, premedical and pre-veterinary curricula, chemistry and biochemistry.

1. The name of the person writing the proposal.

**Richard J. Martin**