Fall 2020 Course Descriptions as of 04/05/2020 08:10 PM

Information in Browse Course Catalog is subject to change. Information is term specific. Please refer to the appropriate term when searching for course content. Key to Course Descriptions may be found at: **http://rcs.registrar.arizona.edu/course_descriptions_key**.

Cellular & Molecular Medicine (CMM)

CMM 199: Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

CMM 199H: Honors Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

CMM 299: Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

CMM 299H: Honors Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

CMM 399: Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

CMM 399H: Honors Independent Study (1 - 3 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

CMM 401: Human Gross Anatomy (4 units)
Description: This course series is an intensive, dissection-based survey of the gross structure of the human body. CBA401/501 (Summer Session I) will cover the Upper Extremity, Head, Neck, Back, Thorax, Abdomen, Pelvis and Lower Extremity. The course is open to upper-level undergrads and graduate students with instructor permission. Grades will be based on a midterm practical and a final practical and written exam. Students taking the course for graduate credit will also have an oral and written presentation requirement.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $300
Course Components: Lecture Required
Co-convened with: CMM 501
Course typically offered:
Main Campus: Summer

CMM 404: Cell Biology of Disease (3 units)
Description: This team-taught course is designed to provide a solid grounding in cell biology with an emphasis on how key pathways contribute to human disease. The course format consists of lectures on key concepts in cell biology, with each concept linked to specific diseases caused by dysregulation of the relevant pathways. Course topics will be divided into broad cell biology themes with related diseases as case studies to illustrate the connection between cell biology and health.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: CMM 504
Course typically offered:
Main Campus: Summer

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

CMM 410: Human Histology: An Introduction to Pathology (3 units)
Description: This course will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research with essential background in functional morphology of human tissues and organs. Pathology examples will be used to help illuminate normal structure and function. The mode of instruction will be interactive lecture, including facilitated group study of virtual slides.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: CMM 425A
Co-convened with: CMM 510
Course typically offered:
Main Campus: Summer

Recommendations and additional information: MCB 181 or equivalent or permission of instructor. Credit for CMM 410 or CMM 425A but not both.

CMM 425A: Functional Human Histology (4 units)
Description: This course will focus on the normal functional histology of the tissues and organs of the human body. The course includes basic cell biology of the cells, tissues, and organs, and emphasis will be given to integrating function with structure at all levels. Pathology will be used to help illuminate normal structure and function. Modes of instruction will include lecture, discussion, and computer-based laboratory.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory May Be Offered
Lecture Required
Equivalent to: CMM 410
Co-convened with: CMM 525A
Course typically offered:
Main Campus: Fall
Online Campus: Fall

Recommendations and additional information: Credit for CMM 410 or CMM 425A but not both.

CMM 437: Immunology Basics (1 unit)
Description: The immune system integrates with all organ systems of the body, providing defense against pathogenic microorganisms and cancer, while contributing to homeostasis of many pathways throughout the body. For these reasons, any career path in biomedicine requires a basic understanding of the immune system in health and disease. This course is intended as an introduction of immunology for all students, and as necessary background for students who plan to study immunology and related fields. This course will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health, etc.), as well as students planning a career in biomedical research, with a valuable grounding in the basic concepts of human immunology.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: CMM 537
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology, including basic cell biology.
Field trip: None

CMM 447: Histology Basics (1 unit)
Description: This course will present basic concepts in functional morphology of human cells and tissues. Pathology examples and clinical cases will be used as instructive comparisons to normal structure and function. The course will complement study of gross anatomy and embryology, and will help students in mastering other health science topics such as physiology and cell biology. In addition, it will provide vocabulary that is useful in approaching the medical literature. The course will be especially useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: CMM 547
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology including rudiments of cell biology recommended.
Field trip: none

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

CMM 448: Histology of Digestive and Respiratory Systems (1 unit)
Description: This course will present functional morphology of human digestive and respiratory systems, emphasizing integration among these systems and common disease entities. Pathology examples and clinical cases will be used as instructive comparisons to normal structure and function. The course will complement study of gross anatomy and embryology, and will help students in mastering other health science topics such as physiology and cell biology. In addition, it will provide vocabulary that is useful in approaching the medical literature. The course will be especially useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: CMM 548
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Basic Histology or equivalent recommended.
Field trip: none

CMM 449: Histology of Urogenital and Endocrine Systems (1 unit)
Description: This course will present functional morphology of human urinary, reproductive and endocrine systems, emphasizing integration among these systems and common disease entities. Pathology examples and clinical cases will be used as instructive comparisons to normal structure and function. The course will complement study of gross anatomy and embryology, and will help students in mastering other health science topics such as physiology and cell biology. In addition, it will provide vocabulary that is useful in approaching the medical literature. The course will be especially useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: CMM 549
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Basic Histology or equivalent recommended.
Field trip: none

CMM 465A: Fundamentals of Light Microscopy and Electronic Imaging (2 units)
Description: This is a lecture course that teaches the essential principles and applications of light microscopy and electronic imaging. By the end of the course you will know the fundamentals of use and adjustment of a research microscope for various modes of light microscopy as well as a fundamental knowledge of digital imaging.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: CMM 565A
Course typically offered:
Main Campus: Spring

CMM 479: Art of Scientific Discovery (3 units)
Description: Techniques of posing questions and solving puzzles encountered in scientific research, with emphasis on life sciences and mathematics.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Equivalent to: ECOL 479, MCB 479
Also offered as: ECOL 479, MCB 479
Co-convened with: CMM 579
Course typically offered:
Main Campus: Fall

CMM 484: Cardiovascular Muscle Biology and Disease (3 units)
Description: This course is geared towards obtaining knowledge and quantitative insights in the molecular and integrative biology of muscle with an emphasis on cardiac muscle and the heart. It will focus on the molecular mechanisms that underlie the function and plasticity of muscle, including mechanisms of disease. In addition to lectures, the course will promote critical thinking and analysis skills by reading and analyzing primary research articles.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Also offered as: BME 484, MCB 484, PSIO 484
Course typically offered:
Main Campus: Spring

Home department: Physiology, Graduate Level
Enrollment requirement: PSIO 201, PSIO 202 (C or better in these two courses required for PRP and PSIO majors and minors) and PSIO 303A or PSIO 303B. MCB 410 or MCB 305 can substitute all course requisites for non-majors/minors PSIO/PRP.
Honors Course: Honors Contract
Honors Course: Honors Contract

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-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

CMM 499: Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

CMM 499H: Honors Independent Study (3 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

CMM 500A: Applied Critical and Creative Thinking: Problem Solving Across Health Sciences (1 unit)
Description: This course will be the first course in a two course sequence offered in partnership with Minerva. Students who take this course will be exposed to unique learning opportunities that center on problem solving in a complex health care environment. The course is intended to provide broad skills to all pre-health students. This course is the first in a sequence of two courses
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Winter, Spring
Online Campus: Fall, Spring, Summer

Field trip: No field trips necessary.

CMM 501: Human Gross Anatomy (4 units)
Description: This course series is an intensive, dissection-based survey of the gross structure of the human body. CBA401/501 (Summer Session I) will cover the Upper Extremity, Head, Neck, Back, Thorax, Abdomen, Pelvis and Lower Extremity. The course is open to upper-level undergrads and graduate students with instructor permission. Grades will be based on a midterm practical and a final practical and written exam. Students taking the course for graduate credit will also have an oral and written presentation requirement.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $300
Course Components: Laboratory Required
Co-convened with: CMM 401
Course typically offered:
Main Campus: Summer

CMM 502: Principles of Neuroanatomy (4 units)
Description: Cellular elements and recognized subsystems of the mammalian nervous system, with emphasis on general principles of neuroanatomical organization and their functional significance.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: NRSC 502, PSIO 502, PSY 502, SLHS 502
Course typically offered:
Main Campus: Spring

Home department: Psychology
Interdisciplinary Interest Area: NRSC - Neuroscience Grad Prog
Interdisciplinary Interest Area: SLHS - Speech Lang & Hearing

CMM 504: Cell Biology of Disease (3 units)
Description: This team-taught course is designed to provide a solid grounding in graduate-level cell biology with an emphasis on how key pathways contribute to human disease. The course format consists of lectures on key concepts in cell biology, with each concept linked to specific diseases caused by dysregulation of the relevant pathways. Course topics will be divided into broad cell biology themes with related diseases as case studies to illustrate the connection between cell biology and health.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with: CMM 404
Course typically offered:
Main Campus: Summer

CMM 505: Making the Critical Connections between Basic Sciences & Clinical Medicine (4 units)
Description: The purpose of this course is to provide pre-medical and Pre-Medical Admissions Pathway (P-MAP) students the framework for connecting basic science knowledge with clinical medicine concepts and practice. The course is designed mainly for people entering, or who are considering entering, medical school.This course will provide a framework for the introduction of how the clinician depends on and utilizes the Basic Sciences in everyday medical practice. The course will focus on the following Organ Systems: Cardiac, Respiratory, Renal, Musculoskeletal, and Gastro-Intestinal. A brief overview will be presented initially of the Basic Science, prior to presenting clinical vignettes in which the students utilize their prior knowledge in solving clinical problems. The course will proceed in a spiraling manner bringing back prior organ systems as new ones are introduced.The goal upon completion of this course is that students realize the critical connection between the Basic Sciences and Clinical Medicine. In addition, this course will also provide students with an understanding that when testing concepts of basic science they will be framed in the context of clinical scenarios.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring

Field trip: N/A

CMM 510: Human Histology: An Introduction to Pathology (3 units)
Description: This course will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research with essential background in functional morphology of human tissues and organs. Pathology examples will be used to help illuminate normal structure and function. The mode of instruction will be interactive lecture, including facilitated group study of virtual slides. Graduate-level requirements include a presentation comparing structure and function in two relevant organ systems, to be decided in consultation with the instructors.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: CMM 525A
Co-convened with: CMM 410
Course typically offered:
Main Campus: Summer

Recommendations and additional information: Credit for CMM 510 or CMM 525A but not both.

CMM 512A: Biological Electron Microscopy (5 units)
Description: Provides theoretical background and practical experience in transmission and scanning electron microscopy that are necessary for the efficient and effective application of ultra-structural and cytochemical techniques as research tools.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory — May Be Offered
Lecture — Required
Equivalent to: ANS 512, ANS 512A, BIOC 512, BIOC 512A, CBA 512, CBA 512A, EIS 512A, ENTO 512, ENTO 512A, MBIM 512, MCB 512, PATH 512, PATH 512A, PLP 512, PLP 512A, PSIO 512, PSIO 512A, VSC 512, VSC 512A
Also offered as: ACBS 512A, EIS 512A, MCB 512A, PATH 512A, PLP 512A, PSIO 512A
Recommendations and additional information: One college-level course in each of physics, chemistry, and biology.
Home department: Molecular & Cellular Biology
Interdisciplinary Interest Area: BIOC - Biochemistry

CMM 518: Fundamental Genetic Mechanisms: from Molecules to Genomes (3 units)
Description: This is a survey course in Genetics for beginning graduate students in a variety of life-science disciplines. The material is organized into five units, with lectures by expert faculty. Unit 1 provides a rapid review of molecular biology mechanisms that are essential for normal cellular function. Unit 2 covers mutations from both evolutionary and phenotypic perspectives. Unit 3 explores the technologies being used for basic and applied genetics research. Unit 4 addresses how exemplary organisms have been used to reveal the mechanisms of complex biological processes. Unit 5 introduces some of the controversies resulting from application of genetic tools to challenges facing modern society.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture — Required
Course typically offered:
Main Campus: Fall

CMM 519: Introduction to Genetic Counseling (2 units)
Description: This course will introduce first year students to the field of genetic counseling. The focus will be on developing beginning counseling skills necessary for clinical practice, including constructing and using family and medical histories, management of clinical cases, establishing a mutually agreed upon agenda and employing active listening and interviewing skills. The process of genetic counseling will be explored through theories of counseling as they apply to the development of interviewing skills, psychosocial and family development, multicultural sensitivity and competence, disability awareness and crisis intervention. Examination of the role of the genetic counselor in health care will be used to develop clinical and professional skills.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Field trip: NA
Enrollment requirement: Students enrolled in CMM 519 must be active within the MS in Genetic Counseling Program.

CMM 520: Clinical Cancer Genetics (2 units)
Description: This course will present important ideas in cancer genetics and precision health, preparing students to identify and evaluate patients with a family history consistent with a hereditary cancer syndrome, and to understand, interpret and apply the results of germline and somatic tumor testing.The course will cover three major topics:1. Cancer biology and genetics2. Inherited cancer syndromes3. Ethical, legal and social issues in clinical cancer geneticsThe educational format will include lectures by experts in the field, reading and presentation of instructive cases. Students will use this knowledge to analyze pedigrees, perform risk assessment and explain clear and ambiguous test results.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Spring

Field trip: None

CMM 525A: Functional Human Histology (4 units)
Description: This course will focus on the normal functional histology of the tissues and organs of the human body. The course includes basic cell biology of the cells, tissues, and organs, and emphasis will be given to integrating function with structure at all levels. Pathology will be used to help illuminate normal structure and function. Modes of instruction will include lecture, discussion, and computer-based laboratory. Graduate-level requirements include: Choose two diseases that interest you and that have histopathological manifestations (many diseases do), and for each one, generate a clinical case and prepare a description of (1) the normal histology of the area(s) involved and (2) the histological changes (pathology) associated with the disease. The core of these reports will be well chosen, accurately labeled illustrations (at appropriate magnifications) comparing normal and diseased tissue. Faculty will be happy to help you in selection of materials for this exercise and directing you to useful resources, etc.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory — May Be Offered
Lecture — Required
Equivalent to: CMM 510
Co-convened with: CMM 425A
Course typically offered:
Main Campus: Fall
Online Campus: Fall

Recommendations and additional information: Credit for CMM 510 or CMM 525A but not both.

CMM 527: Pathophysiology Basics (1 unit)
Description: This course is designed for graduate students and advanced undergraduates interested in pursuing a career in translational biomedical research and in the health professions. The course will provide students with a foundational understanding of disease as a manifestation of disrupted physiology. Course content will include introductory cell physiology and disruption of homeostatic maintenance in disease processes associated with hematologic, cardiovascular and immune system. Principles will be illustrated using representative commonly occurring disorders and their treatments. This course is designed to compliment CMM 547, Histology Basics, which presents principles of cell and tissue organization of the human body.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture — Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: A background in human biology or instructor permission.
Field trip: None

CMM 528: Pathophysiology of Integumentary, Respiratory, and Digestive Systems (1 unit)
Description: This course is designed for graduate students and advanced undergraduates interested in pursuing a career in translational biomedical research and in the health professions. The course will provide students with a foundational understanding of disease as a manifestation of disrupted physiology. Course content will include an overview of normal physiology of integumentary, respiratory and digestive systems, as well as disruption of homeostatic maintenance in disease processes associated with these organ systems. Principles will be illustrated using representative commonly occurring disorders and their treatments. This course is designed to compliment CMM 548, Histology of Respiratory and Digestive Systems.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Successful completion of CMM 527: Pathophysiology Basics or obtained direct instructor consent.
Field trip: None

CMM 529: Pathophysiology of Urogenital and Endocrine Systems (1 unit)
Description: This course is designed for graduate students and advanced undergraduates interested in pursuing a career in translational biomedical research and in the health professions. The course will provide students with a foundational understanding of disease as a manifestation of disrupted physiology. Course content will include an overview of normal physiology of urogenital and endocrine systems, as well as disruption of homeostatic maintenance in disease processes associated with these organ systems. Principles will be illustrated using representative commonly occurring disorders and their treatments. This course is designed to compliment CMM 549, Histology of Urogenital and Endocrine Systems.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Successful completion of CMM 527: Pathophysiology Basics or obtained direct instructor consent.
Field trip: None

CMM 530: Advanced Genetic Mechanisms (1 unit)
Description: The function of genes lies at the heart of heritability and variation in biology. Understanding genetic mechanisms and genetic interactions is essential to understanding foundational concepts like developmental biology, cell physiology, evolution, and disease. But much of what is known about genetic mechanism is well advanced over the basics enumerated by Mendel and other early luminaries. This course covers advanced concepts in gene function, genetic interactions, and genetic analyses and manipulations that are commonly in use in research laboratories, or that go awry in human disease.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: A course in basic genetic mechanisms or permission of instructor.

CMM 531: Advanced Chromosome Genetics (1 unit)
Description: The function of genes lies at the heart of heritability and variation in biology. Understanding genetic mechanisms and genetic interactions is essential to understanding foundational concepts like developmental biology, cell physiology, evolution, and disease. Genes are carried by chromosomes, which have features and requirements that constrain their biology. Defects in chromosome behavior can lead to disease through alterations to chromosome number, gene dose, or genome instability. This course covers advanced concepts in chromosome biology, including telomeres, centromeres, origins of replication, heterochromatin, segregation, and chromosome aberrations and aneuploidies.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: CMM 530: Advanced Genetic Mechanisms or equivalent.

CMM 532: Advanced Genetic Interaction (1 unit)
Description: The function of genes lies at the heart of heritability and variation in biology. Understanding genetic mechanisms and genetic interactions is essential to understanding foundational concepts like developmental biology, cell physiology, evolution, and disease. Genes are not isolated units, and cannot be properly understood as if they are. Genes interact with each other to create complex phenotypes and emergent phenomena. This course will examine interacting genetic systems with emphasis on understanding failure of normal interactions such that human disease may result.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: CMM 530: Advanced Genetic Mechanisms or equivalent.

CMM 533: Molecular Medicine (1 unit)
Description: This course will provide pre-health science professions students (Medicine, Pharmacy, Dentistry, Veterinary Medicine, Nursing, Public Health) as well as students planning a career in biomedical research with a valuable background in the application of molecular biology to the understanding of the mechanisms of cancer, and cardiovascular, neurological and metabolic diseases. The use of molecular techniques for disease diagnosis, prognosis and treatment will be explored.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology (including introductory cell biology and genetics); general chemistry (including introductory organic chemistry).

CMM 534: Genomic Medicine (1 unit)
Description: This course will provide pre-health science professions students (Medicine, Pharmacy, Dentistry, Veterinary Medicine, Nursing, Public Health) as well as students planning a career in biomedical research with a valuable background in the application of computer analysis of genome structure and function for disease diagnosis, prognosis and therapeutic decision making in clinical medicine.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: CMM 533 Molecular Medicine; regular access to a computer for online data analysis and processing.

CMM 535: Genetic Medicine (1 unit)
Description: This course will provide pre-health science professions students (Medicine, Pharmacy, Dentistry, Veterinary Medicine, Nursing, Public Health) as well as students planning a career in biomedical research with a valuable background in the application of genetics to the diagnosis, prognosis and treatment of human diseases.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: CMM 533 Molecular Medicine.

CMM 536: Cell Biology Basics (1 unit)
Description: The course will provide an overview of the major organelles in cells and their functions, along with a discussion of key pathways and concepts in cell biology. This course is intended as an introduction to graduate-level cell biology for all students in the biomedical sciences, and as a building block for students who plan further study in cell and molecular biology. Cell biology is integral to virtually all aspects of biomedicine. This course will provide students planning careers in the pre-health science professions (Medicine, Pharmacy, Nursing, Public Health, etc.), as well as students planning a career in biomedical research, with a valuable grounding in the basic concepts of cell biology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology, including entry-level concepts in cell biology.

CMM 537: Immunology Basics (1 unit)
Description: The immune system integrates with all organ systems of the body, providing defense against pathogenic microorganisms and cancer, while contributing to homeostasis of many pathways throughout the body. For these reasons, any career path in biomedicine requires a basic understanding of the immune system in health and disease. This course is intended as an introduction of immunology for all students, and as necessary background for students who plan to study immunology and related fields. This course will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health, etc.), as well as students planning a career in biomedical research, with a valuable grounding in the basic concepts of human immunology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with:
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology, including basic cell biology.

CMM 538: Applied Biotechnology in Research and Medicine: Molecular Biology (1 unit)
Description: Biological and biomedical research, clinical diagnostic tests, and gene therapies utilize sophisticated technological procedures and techniques. Evaluating the data from these tests and keeping abreast of research advances requires understanding their theoretical underpinnings, proper application, interpretations, and limitations. This course will cover common and fundamental molecular-genetic techniques including detecting and analyzing DNA and RNA nucleic acids, proteins, sub-cellular localization, and tissue-limited gene expression.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: At least one upper division course in molecular genetics.

CMM 539: Applied Biotechnology in Research and Medicine: Sequencing and Editing (1 unit)
Description: Biological and biomedical research, clinical diagnostic tests, and gene therapies utilize sophisticated technological procedures and techniques. Evaluating the data from these tests and keeping abreast of research advances requires understanding their theoretical underpinnings, proper application, interpretations, and limitations. This course will cover sequencing technologies from the beginning until now, methods of genome editing, including CRISPR, and new and cutting-edge adaptations of the CRISPR/Cas9 technology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: At least one upper division course in molecular genetics.

CMM 540: Applied Biotechnology in Research and Medicine: In Vivo Analyses (1 unit)
Description: Biological and biomedical research, clinical diagnostic tests, and gene therapies utilize sophisticated technological procedures and techniques. Evaluating the data from these tests and keeping abreast of research advances requires understanding their theoretical underpinnings, proper application, interpretations, and limitations. This course will cover common and fundamental molecular-genetic techniques including chromatin analysis, nuclear structure, transgenesis, reporter and fusion genes, and specialized advanced assay systems.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: At least one upper division course in molecular genetics.

CMM 541: Bright-Field Microscopy (1 unit)
Description: This course will cover the fundamentals and theory of Bright-Field Microscopy. Students will learn image formation theory based on optical theory and diffraction as it relates to bright-field methods. Once the fundamentals have been covered, the class will discuss several modes of bright-field microscopy, including standard bright-field, phase contrast, polarized light, and differential interference contrast microscopy. The content will conclude with a discussion of imaging ethics as pertains to bright-field microscopy methods and as accepted by the world's scientific community. Bright-field microscopy is an indispensable and ubiquitous tool in cell biology, histology and pathology, and students pursuing many fields in medicine and biological research will benefit from an understanding of these very commonly used methods.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Some physics background will help, but is not necessary.

CMM 542: Fundamentals of Digital Imaging (1 unit)
Description: This course will cover the fundamentals and theory of Digital Imaging. Students will learn image resolution theory based on optical theory. Once the fundamentals have been covered, the class will discuss several aspects of Digital Imaging. The content will conclude with a discussion of Imaging Ethics, as relates specifically to digital imaging and as accepted by the world's scientific community. Digital imaging is a ubiquitous tool in biomedical research and in medical practice, therefore, students pursuing many fields in medicine will benefit from an understanding of this very versatile tool.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Some physics background will help, but is not necessary.

CMM 543: Embryology I (1 unit)
Description: This course will present major events in human development during the early embryonic period (weeks 0-4), as well as disorders of development established during this period. In addition, it will introduce the mechanisms involved in early embryonic morphogenetic changes. It will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research with valuable background in human embryology including a basis for understanding congenital malformations. Clinical cases will be used to help students understand typical and atypical development. The course will complement study of histology and gross anatomy. In addition, it will provide vocabulary that is useful in approaching the medical literature.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

CMM 544: Embryology II (1 unit)
Description: This course will present the major morphogenetic changes occurring in the mesodermal germ layer and relate them to the development of endodermal structures during the embryonic period of human development. It will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research with valuable background in human embryology including a basis for understanding congenital disease. Clinical cases will be used to help students understand typical and atypical development. The course will complement study of histology and gross anatomy. In addition, it will provide vocabulary that is useful in approaching the medical literature.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Enrollment requirement: CMM 543

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

CMM 545: Embryology III (1 unit)
Description: This course will present the major morphogenetic changes occurring in the development of endodermal structures and the male and female urogenital systems. It will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research with valuable background in human embryology including a basis for understanding congenital malformations. Clinical cases will be used to help students understand typical and atypical development. The course will complement study of histology and gross anatomy. In addition, it will provide vocabulary that is useful in approaching the medical literature.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Enrollment requirement: CMM 544

CMM 546: Fluorescence Microscopy (1 unit)
Description: This course will cover the fundamentals and theory of Fluorescence Microscopy. Students will learn image formation theory based on optical theory and light interactions. Once the fundamentals have been covered, the class will discuss several modes of fluorescence microscopy, including: Wide-field fluorescence, Confocal microscopy, Convolution and deconvolution, Super-Resolution imaging. The content will conclude with a discussion of Imaging Ethics, as relates to fluorescence microscopy and as accepted by the world's scientific community. Fluorescence microscopy is a frequently used tool in biomedical research, and understanding of the method and results obtained from it is essential to understanding much of our knowledge of cellular and molecular mechanisms of the human body in health and disease. Fluorescence methods are also routinely used as diagnostic tools in medicine. Therefore, students pursuing many fields in medicine and biological research will benefit from an understanding of this technology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Some physics background will help, but is not necessary.

CMM 547: Histology Basics (1 unit)
Description: This course will present basic concepts in functional morphology of human cells and tissues. Pathology examples and clinical cases will be used as instructive comparisons to normal structure and function. The course will complement study of gross anatomy and embryology, and will help students in mastering other health science topics such as physiology and cell biology. In addition, it will provide vocabulary that is useful in approaching the medical literature. The course will be especially useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with:
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology including rudiments of cell biology.

CMM 548: Histology of Digestive and Respiratory Systems (1 unit)
Description: This course will present functional morphology of human digestive and respiratory systems, emphasizing integration among these systems and common disease entities. Pathology examples and clinical cases will be used as instructive comparisons to normal structure and function. The course will complement study of gross anatomy and embryology, and will help students in mastering other health science topics such as physiology and cell biology. In addition, it will provide vocabulary that is useful in approaching the medical literature. The course will be especially useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with:
Course typically offered: Online Campus: Fall, Spring, Summer

Enrollment requirement: CMM 547: Basic Histology or equivalent or Instructor Consent.

CMM 549: Histology of Urogenital and Endocrine Systems (1 unit)
Description: This course will present functional morphology of human urinary, reproductive and endocrine systems, emphasizing integration among these systems and common disease entities. Pathology examples and clinical cases will be used as instructive comparisons to normal structure and function. The course will complement study of gross anatomy and embryology, and will help students in mastering other health science topics such as physiology and cell biology. In addition, it will provide vocabulary that is useful in approaching the medical literature. The course will be especially useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with:
Course typically offered: Online Campus: Fall, Spring, Summer

Enrollment requirement: CMM 547: Basic Histology or equivalent or Instructor Consent.

CMM 550: Inflammation and Immune Pathology (1 unit)
Description: The immune system is essential for life in a septic world, but the potent mechanisms of defense must be tightly regulated to prevent damage to the host. Virtually all diseases encountered in the clinic have some pathology contributed by immune-related pathways. Further, many of the most prescribed medications act by targeting these pathways. Therefore, students pursuing many fields in biomedicine will benefit from an understanding of the major mechanisms of inflammation, pathology caused by the immune system, pathways of resolution, and therapeutic targets. This course will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health, etc.), as well as students planning a career in biomedical research, with an essential understanding of the ways in which the immune system contributes to disease.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology; basic immunology.

CMM 551: Anatomy: A Regional Approach (1 unit)
Description: This course will take a regional approach to presenting human gross anatomy, and as such it will provide a basis for developing a differential diagnosis to illness based on location of patient symptoms. It will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research with valuable background in the structure and organization of the human body. Clinical cases resulting from injury or pathology will be used as instructive comparisons to normal structure and function. The course will complement study of embryology and histology, and will help students in mastering other health science topics such as physiology. In addition, it will provide vocabulary that is useful in approaching the medical literature.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: CMM 552, Systemic Anatomy, is suggested either before or after this course.

CMM 552: Anatomy: A Systemic Approach (1 unit)
Description: This course will approach the study of human gross anatomy from the perspective of organ systems rather than regionally and as such it will compliment a regional anatomical approach. It will provide pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health) as well as students planning a career in biomedical research with valuable background in the structure and anatomical relationships of organs and organ systems of the human body. Clinical cases resulting from injury or pathology will be used as instructive comparisons to normal structure and function. The course will complement study of embryology and histology, and will help students in mastering other health science topics such as physiology and cell biology. In addition, it will provide vocabulary that is useful in approaching the medical literature.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

CMM 553: Cancer Biology Basics (1 unit)
Description: A graduate course in the phenotypic changes of epithelia associated with normal development and the pathologies of metastasis and fibrosis.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology (including introductory cell biology and genetics); general chemistry (including introductory organic chemistry).
Field trip: None

CMM 558: Epithelial-mesenchymal Transition in Development and Disease (1 unit)
Description: A graduate course in the phenotypic changes of epithelia associated with normal development and the pathologies of metastasis and fibrosis.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Introductory biology (including introductory cell biology and genetics); general chemistry (including introductory organic chemistry).
Field trip: N/A

CMM 559: Principles of Clinical Reasoning (1 unit)
Description: This course is intended as an introduction to clinical reasoning for students planning careers in the pre-health professions (Medicine, Pharmacy, Nursing, Public Health, etc.). The course will provide an introduction to the process of clinical reasoning. With an early understanding of this process, pre-health students will be able to better integrate and employ the knowledge base they're developing into the eventual skills of diagnosis and management.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Field trip: N/A

CMM 560: Clinician Reasoning in Their Own Words (1 unit)
Description: The course will explore clinical reasoning through analysis of interviews with clinicians at the University of Arizona. This course is intended as part of an introduction to reasoning for students planning careers in the pre-health professions (Medicine, Pharmacy, Nursing, Public Health, etc.). By analyzing how clinicians actually reason, pre-health students will be able to better integrate the knowledge base they're developing into the eventual purposes of diagnosis and management.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Students must have completed CMM 559: Principles of Clinical Reasoning.
Field trip: N/A

CMM 561: Clinical Reasoning: Working Clinical Cases (1 unit)
Description: The course will teach the application of process skills for reasoning through clinical cases from presentation to differential diagnosis. This course is intended as part of an introduction to reasoning for students planning careers in the pre-health professions (Medicine, Pharmacy, Nursing, Public Health, etc.). In applying the process of clinical reasoning to example cases, pre-health students will develop foundational skills for case-based instruction and their eventual application to diagnosis and management.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Students must have completed CMM 559: Principles of Clinical Reasoning and CMM 560: Clinician Reasoning in Their Own Words.
Field trip: N/A

CMM 563: Diabetes, Obesity & Metabolism (3 units)
Description: This course will present concepts surrounding clinical and research topics in diabetes (type 1 and type 2), obesity, metabolism, and insulin resistance. The approach taken will integrate clinical knowledge with research findings and the techniques used to discover knowledge about these conditions. The course will be useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health), students planning a career in biomedical research, and students seeking additional training in clinical and translational sciences.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: It is strongly encouraged that students interested in enrolling in this course have taken and passed introductory biology, physiology and cell biology coursework. The Department may look at transcripts to determine if this requirement has been met.
Field trip: N/A

CMM 564: Vascular Biology in Health and Disease (1 unit)
Description: This course will add a valuable background in integrative vascular biology. Aim of this course is to provide understanding of vascular function on cellular and organ levels in health and disease. The course will be useful to pre-health science professions students (Medicine, Pharmacy, Nursing, Public Health), students planning a career in biomedical research, and students seeking additional training in clinical and translational sciences.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered: Online Campus: Fall, Spring, Summer

Recommendations and additional information: It is strongly recommended that students have a strong background and have complete with a passing grade introductory biology, physiology and cell biology courses.
Field trip: N/a

CMM 565A: Fundamentals of Light Microscopy and Electronic Imaging (3 units)
Description: This is a lecture/hands-on course that teaches the essential principles and applications of light microscopy and electronic imaging. By the end of the course you will be able to use and adjust a research microscope for various modes of light microscopy.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $42
Course Components: Lecture Required
Co-convened with: CMM 465A
Course typically offered:
Main Campus: Spring

CMM 577: Principles of Cell Biology (4 units)
Description: Intensive, graduate-level introduction to principles and mechanisms of cell biology, including current research strategies in the field.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ANAT 577, MCB 577
Also offered as: MCB 577
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Consent of course coordinator.

CMM 579: Art of Scientific Discovery (3 units)
Description: Techniques of posing questions and solving puzzles encountered in scientific research, with emphasis on life sciences and mathematics. Graduate-level requirements include use of all techniques in a semester-long research project and final paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Equivalent to: ECOL 579, MCB 579
Also offered as: ECOL 579, MCB 579
Co-convened with: CMM 479
Course typically offered:
Main Campus: Fall

CMM 584: Cardiovascular Muscle Biology and Disease (3 units)
Description: This course is geared towards obtaining knowledge and quantitative insights in the molecular and integrative biology of muscle with an emphasis on cardiac muscle and the heart. It will focus on the molecular mechanisms that underlie the function and plasticity of muscle, including mechanisms of disease. In addition to lectures, the course will promote critical thinking and analysis skills by reading and analyzing primary research articles. Graduate-level requirements include writing a research proposal that addresses an unresolved area in muscle biology (to be selected from a list of research articles provided at the beginning of the semester).
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ANAT 584, CBA 584, NRSC 584
Also offered as: BME 584, MCB 584, PSIO 584
Co-convened with: CMM 484
Course typically offered:
Main Campus: Spring

Home department: Physiology, Graduate Level

CMM 588: Principles of Cellular and Molecular Neurobiology (4 units)
Description: Detailed introduction to the biology of nerve cells, emphasizing cellular neurophysiology, synaptic mechanisms, and analysis of neural development.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory May Be Offered
Lecture Required
Equivalent to: ANAT 588, BIOC 588, CBA 588, EIS 588, INSC 588, MCB 588, PSIO 588
Also offered as: BIOC 588, EIS 588, MCB 588, NRSC 588, PSIO 588
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Consult program office before enrolling.
Home department: Committee on Neuroscience

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CMM 594: Clinical Practicum (2 units)
Description: Students enrolled in CMM 594 will apply theoretical concepts to assess and manage individuals and families with genetic disorders. Students will expand their clinical knowledge base necessary for an effective career in genetic counseling and successful completion of their graduate program. This course will also provide students with the clinical training experiences to prepare them for the certification exam by the American Board of Genetic Counseling. Individual clinical rotations will be arranged by the UAGCGP leadership. All clinical practicum rotations will take place in sites that meet the requirements of competencies for genetic counselors, as defined by the Accreditation Council for Genetic Counseling.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Practicum Required
Repeatable: Course can be repeated a maximum of 5 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Field trip: NA
Enrollment requirement: Students must be actively enrolled in the MS in Genetic Counseling Program.

CMM 595: Genetic Counseling Colloquium (1 unit)
Description: This 1-credit course will focus on student-lead educational opportunities to a variety of issues specific to genetic counseling. It will be taken by first and second year genetic counseling students together in the spring of both years. Students will develop their academic and clinical skills by progressing through case presentations and journal article reviews to a 50-minute PowerPoint presentation. Class participation is strongly encouraged by using collaborative learning techniques.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Spring

Field trip: None
Enrollment requirement: Students must be part of the MS in Genetic Counseling Grad Program.

CMM 595A: Journal Club (1 unit)
Description: This course will give Cell Biology & Anatomy graduate students and faculty an opportunity to effectively communicate, and critically evaluate research findings/papers from current scientific literature and journal articles.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 15 times.
Course typically offered:
Main Campus: Fall, Spring

CMM 595G: Cancer Biology: Focus on Breast Cancer (1 unit)
Description: This a graduate-level journal club which will focus on the biology of cancer with a specific focus on breast cancer-related peer-reviewed research articles.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 7 times.
Equivalent to: BIOC 595G, CBA 595G, CBIO 595G, PCOL 595G
Also offered as: CBIO 595G, MCB 595G, PCOL 595G
Home department: Molecular & Cellular Biology
Interdisciplinary Interest Area: BIOC - Biochemistry

CMM 595H: Problems in the Biology of Complex Diseases (2 units)
Description: Complex diseases (CDs: e.g., asthma, allergy, COPD, obesity, inflammatory bowel disease, hypertension, coronary artery disease, diabetes, rheumatoid arthritis, multiple sclerosis, schizophrenia) are the next major challenge in human biology because they are at the same time unique, common and difficult to decipher. The complexity of CDs lies in their pathogenesis, in which a constellation of environmental and genetic factors interact in intricate ways to alter biological thresholds and response patterns, modifying disease susceptibility. Since both genes and environmental exposures contribute to CDs, the biological pathways involved in CD pathogenesis depend on the genetic background of a given population and the specific environment to which that population is exposed. Hence, asthma, obesity and hypertension in Arizona may not be the same as asthma, obesity and hypertension in Iceland.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Equivalent to: GENE 595H, IMB 595H, MCB 595H
Also offered as: GENE 595H, IMB 595H, MCB 595H, PCOL 595H
Course typically offered:
Main Campus: Spring

CMM 596A: Seminar in Cardiovascular Biology (1 unit)
Description: Weekly seminar series where students and guest speakers will present ongoing research in the area of cardiovascular development. Typical format will be two 20-30 minute research presentations or a 1 hour seminar by a visiting guest lecturer.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated for a maximum of 6 units.
Course typically offered:
Main Campus: Fall, Spring

CMM 596B: Seminar in Protein Trafficking (1 unit)
Description: Weekly seminar series where students and speakers will present ongoing research in the area of Protein Trafficking. A typical format will be a single 45 minute presentation of ongoing research or a journal article.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated for a maximum of 6 units.
Course typically offered:
Main Campus: Fall, Spring

CMM 596F: Cognitive Psychology (3 units)
Description: Investigation of research and ideas on a specialized topic within cognitive psychology, including the psychology of language, visual perception and cognitive memory, decision, and learning. The discussion and exchange of scholarly information in a small group setting, papers and student presentations.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Also offered as: BIOC 596F, LING 596F, MGMT 596F, PSY 596F
Course typically offered:
Main Campus: Fall, Spring

Home department: Psychology

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

CMM 597: Getting the Word Out on Science: A Scientific Communication Course (3 units)
Description: This course is intended primarily for Master of Science-level students. The course format includes/relies on/is based on readings of primary scientific journals and science articles in the popular press as examples. Students will learn to critique published work and develop skills for oral and written communication of complex scientific topics to a wide range of audiences.
Grading basis: Regular Grades
Career: Graduate
Course Components: Workshop Required
Course typically offered:
Main Campus: Spring

CMM 597H: Human Neuroanatomy (1 unit)
Description: This course provides an overview of the gross and sectional anatomy of the human brain and is designed to compliment PSY 502, Principles of Neuroanatomy.
Grading basis: Regular Grades
Career: Graduate
Course Components: Workshop Required
Also offered as: PSIO 597H, PSY 597H
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Prerequisite or concurrent registration, PSY 502.
Home department: Psychology
Interdisciplinary Interest Area: NRSC - Neuroscience Grad Prog
Interdisciplinary Interest Area: SLHS - Speech Lang & Hearing

CMM 599: Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

CMM 600: Introduction to Genetic Counseling Research (1 unit)
Description: The goal of this course is to guide students through the development and implementation of a research project which can culminate in a publishable thesis. Students learn essential elements of research including critical assessment of genetic/medical literature, application of research methodology, the challenges of collaborative research, and logistics of clinical research, including human subjects protection and IRB approval. Topics such as proposal writing, data collection and analysis, design of figures and tables, and identification of suitable target publications will be covered. Oral presentation skills will also be emphasized. Ethical issues will also be addressed.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

CMM 603: The Art of Scientific Communication (2 units)
Description: This course is geared towards understanding the link between current medical practice and our understanding of the underlying basic science. There will be a substantial writing component to this course. Students will attend a minimum of 10 medical rounds and prepare half page write-ups of the basic science relevant to the medical presentation. Students will meet regularly with course instructors to present and discuss the basic science background of the case. The final exam will consist of an 8-10 page (exclusive of references) research paper that which will be a comprehensive analysis of a medical case, the basic science underlying our understanding of the disease and it treatment, and the current gaps in the basic science understanding that could inform future treatments.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 3 times.
Course typically offered:
Main Campus: Spring

CMM 604: Current Topics in Translational Medicine (2 units)
Description: This course is geared towards understanding the link between current medical practice and our understanding of the underlying basic science. There will be a substantial writing component to this course. Students will attend a minimum of 10 hours of medical rounds with a physician and prepare 5, ¿ page write-ups of the basic science relevant to the medical presentation. Students will meet regularly with course instructors to present and discuss the basic science background of the case. The final exam will consist of an 8-10 page (exclusive of references) research paper that which will be a comprehensive analysis of a medical case, the basic science underlying our understanding of the disease and it treatment, and the current gaps in the basic science understanding that could inform future treatments. Permission of the instructors is required to take this class. Before signing up for this class, it is required that the student has identified a physician who is willing to fulfill the role of mentor. This class may be taken multiple times. If the class is retaken, a different physician must be identified to fulfill the role of mentor.
Grading basis: Regular Grades
Career: Graduate
Course Components: Discussion — May Be Offered
Lecture — Required
Repeatable: Course can be repeated a maximum of 3 times.
Course typically offered:
Main Campus: Spring

CMM 605: Medical Immunology and Infectious Disease (4 units)
Description: This course will combine lectures from the UA medical curriculum with regular meetings with basic-science faculty to introduce students to the concepts of Medical Immunology and Infectious Disease. Students will gain knowledge of not only basic-science aspects of these highly interrelated topics, but also medical aspects of these topics that will be valuable in guiding translational research in this general area. This course provides a flexible learning format with less formal in-class instruction than traditional courses. Students will view course content in podcast format on their own (or with other students), and meet once per week as a class with faculty for group discussion and review of the content. See the end of this proposal for a complete list of lecture topics.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture — Required
Also offered as: IMB 605
Course typically offered:
Main Campus: Fall

Recommendations and additional information: CMM 577.

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

CMM 620: Foundations of Medical Genetics (1 unit)
Description: This one credit course will focus on the foundations of medical genetics. It will introduce various genetic epidemiology study designs and cover basic statistical genetic analysis approaches and inferences. Students will develop an understanding of the different types of inheritance, human genetic variation, the genetic basis of disease, epistasis, gene-environment interaction, and epigenetics. Practical applications of calculating genetic risks for families and clients will be accomplished using specific methods and case examples.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Spring

Field trip: None

CMM 621: Reproductive Genetic Counseling (1 unit)
Description: This one-credit hour course will present important ideas in prenatal genetics and genetic counseling. The information provided will span from preconception to delivery and include obtaining and interpreting family history, discussing and recommending testing/screening, and interpreting/delivering results. Specialty situations, such as assisted reproduction and perinatal death and loss, will also be covered.The course will cover three major topics:1. Pregnancy and family history basics2. Screenings, testing, and other technologies related to prenatal and pre-conception genetics3. Ethical, legal and social issues in prenatal geneticsThe educational format will include lectures by experts in the field, readings and review of instructive cases. Students will apply this knowledge during class discussions and when preparing for their mock genetic counseling case.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Spring

Field trip: None
Enrollment requirement: Enrollment for this class is restricted to students in the Genetic Counseling Graduate Program.

CMM 691: Practical Science Education (2 units)
Description: This course will provide graduate students with hands-on training in science education. It will combine the practical experience of a teaching assistantship with direct mentorship and training in the theory and practice of education.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Course typically offered:
Main Campus: Fall, Spring, Summer

CMM 695D: Human Genetic Disease Colloquium (3 units)
Description: The course will cover a few medical genetic disorders in depth, with different topics each year. Clinical presentation, pathophysiology, genetic mechanisms and biochemical features will be considered. Readings will come mainly from the primary biomedical literature.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 4 times.
Equivalent to: BIOC 695D, GENE 695D, MCB 695D, NRSC 695D, PSIO 695D
Also offered as: BIOC 695D, GENE 695D, MCB 695D, NRSC 695D, PSIO 695D
Course typically offered:
Main Campus: Spring

CMM 695E: Science, Society, and Ethics (1 unit)
Description: Practical colloquium focusing on ethical issues raised in the research laboratory setting.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Colloquium Required
Equivalent to: CBA 695E, GENE 695E, NRSC 695E
Also offered as: MCB 695E
Course typically offered:
Main Campus: Spring

Home department: Molecular & Cellular Biology

CMM 695L: Advanced Topics: Modulation of the Biology of Aging by Inflammation, Infection and Immunity (1 unit)
Description: An interactive graduate-level course focused on how inflammation and immune function/dysfunction contributes to key biological and medical aspects of aging. This course will evaluate the basic biology of aging with a focus on how the aging immune system impacts geriatric principles of care, common geriatric syndromes and aging-associated disease, the biologic basis of health disparities (where known), and other unique issues related to aging research. The course is open to both graduate students and medical students/residents. Graduate students funded through the Training Grant will be required to attend in their 3rd and 4th year in place of Journal Club. The course is comprised of three aspects: literature review, topic discussion, and attendance in the Advances in Aging Lecture Series (Grand Rounds). Students will be assigned relevant literature to review in advance of in-class discussion on topics in aging research. Each discussion will be led by an expert in the field. The Advances in Aging Lecture Series are 1-hour Grand Rounds that meet once per month and will add clinical perspective to the field of aging research. More information on Advances in Aging Lecture Series topics and archived lectures is available at http://aging.arizona.edu/program/advances-aging-lecture-series. Topics that will be covered in the course include: Introduction to Aging Research, Aging Theories, and Model Organisms; Replicative Senescence as a Driver of Age-Associated Inflammation; DNA Damage, Repair, and Oncogenesis; Mitochondrial Aging and Metabolism; Musculoskeletal Changes in Aging and Frailty; Infection and Immunosenescence; Aging with HIV in the age of ART; Microbiota in Aging; Neural Changes, Neurodegeneration, and Alzheimer's Disease; Cardiovascular Aging and Stroke; Stem Cell Aging and Longevity Extension/Rejuvenation Research.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 2 times.
Also offered as: BIOC 695L, CHEM 695L, CPH 695L, IMB 695L, NURS 695L, PHCL 695L, PSIO 695L
Home department: Immunobiology

CMM 696A: Departmental Seminar (1 unit)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 14 times.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Consent of instructor. Open to majors only.

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

CMM 696B: Student Seminar (1 unit)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 5 times.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Consent of instructor. Open to majors only.
Enrollment requirement: CMM, IMB, or MM PhD students only.

CMM 696C: Excellence=Mastering Medical Curriculum Content (E=MC2) Seminar (1 unit)
Description: The seminar series will develop students' interpersonal, intrapersonal, thinking and reasoning, and science competencies outlined by the American Association of Medical Colleges (AAMC). Students will engage in a series of seminars, workshops, and activities covering topics on cultural competence, service orientation, oral and written communication, ethics, resiliency, scientific inquiry, reasoning and problem solving. Students will be assessed based on their attendance, participation, and final presentation or paper.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 4 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

CMM 699: Independent Study (1 - 9 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Summer, Winter

CMM 800: Research (1 - 16 units)
Description: Research project of special interest to the student. Research activities in the department include most sub-specialties of molecular, cellular, and systems biology, including biological anthropology, cancer cell biology, neurobiology, endocrinology, reproductive biology and developmental biology.
Grading basis: Clerkship S,HP,P,F
Career: Medical School
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Consent of instructor and coordinator.

CMM 896: Gross Anatomy Lab Assistant (1 - 12 units)
Description: To provide fourth-year medical students with the opportunity to practice teaching skills and to refresh their gross anatomy knowledge-base by assisting first-year students during dissection exercises.
Grading basis: Clerkship S,HP,P,F
Career: Medical School
Course Components: Independent Study Required
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Completion of ArizonaMed Curriculum years 1 and 2 or CMM 801.

CMM 899: Independent Study (1 - 16 units)
Description: The goal of this elective is to allow the student to work with a particular faculty member in pursuit of a particular field of study in cell biology and anatomy.
Grading basis: Clerkship S,HP,P,F
Career: Medical School
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

CMM 899G: Independent Study: Selected Topics in Gross Human Anatomy (1 - 16 units)
Description: Goals:To provide an in-depth learning opportunity in the details of Gross Anatomy according to the student's chosen medical specialty. Working with the course director the student will develop specific objectives and a schedule for studyFormat:While individual plans will vary according to the needs of the student, all students will:Review and extend knowledge in selected areas of Gross Anatomy through dissections, readings and discussions.Apply the acquired knowledge to solve clinical problems.Prepare an oral presentation of the dissection to an audience of anatomists.Text Description of Evaluation Methods:The student will be evaluated on the thoroughness, logic and efficiency with which he/she uses the elective time, mastery of the regional anatomy, and compliance with the rules and regulations of the anatomy lab as reflected in the condition of student's assigned lab station (professionalism).
Grading basis: Clerkship S,HP,P,F
Career: Medical School
Course Components: Independent Study Required
Course typically offered:
Main Campus: Fall, Spring

CMM 900: Research (1 - 8 units)
Description: Individual research, not related to thesis or dissertation preparation, by graduate students.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

CMM 910: Thesis (1 - 8 units)
Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

CMM 920: Dissertation (1 - 9 units)
Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

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