

# CELL AND REGENERATIVE BIOLOGY (CRB)

## CRB/MED HIST 615 – REGENERATIVE MEDICINE ETHICS AND SOCIETY

3 credits.

Study of regenerative medicine and stem cell research within social, ethical and political contexts.

**Requisites:** Consent of instructor

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

## CRB 625 – STEM CELL SEMINAR

1 credit.

Examines various special topics in stem cell and regenerative medicine research.

**Requisites:** Junior standing

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

## CRB 630 – PROTEOMICS APPROACHES FOR BIOLOGISTS

2 credits.

Proteomics and metabolomics are playing an increasingly important role in biology and medicine. Many biology labs are now starting to use proteomics and metabolomics in their research projects. Includes the essential fundamentals and applications in mass spectrometry-based proteomics and metabolomics to address biological/medical problems. Design of proteomics/metabolomics experiments, troubleshooting, and proper interpretation of the results.

**Requisites:** BIOCHEM 501, 507, or graduate/professional standing

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

## CRB 640 – FUNDAMENTALS OF STEM CELL AND REGENERATIVE BIOLOGY

3 credits.

Provides a foundation to understand fundamental biological, mechanistic, and experimental concepts in the field of stem cell and regenerative biology.

**Requisites:** BIOCORE 383, BIOCHEM 501, BIOCHEM 507, GENETICS 466, GENETICS 467, ZOOLOGY 570, or graduate/professional standing

**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

## CRB 650 – MOLECULAR AND CELLULAR ORGANOGENESIS

3 credits.

Covers the most current knowledge of the principles of organogenesis. Focuses on the molecular and cellular pathways leading to normal tissue and organ development and regeneration, including in depth discussions of specification and differentiation processes.

**Requisites:** (ZOOLOGY/BIOLOGY/BOTANY 151 or BIOCORE 383) and junior standing, or graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

## CRB/B M E 670 – BIOLOGY OF HEART DISEASE AND REGENERATION

3 credits.

Presents diverse topics in contemporary heart biology to facilitate understanding of biological, mechanistic, and experimental concepts of cardiac physiology, disease, and regeneration. Learn cellular and molecular mechanisms underlying heart physiology, function, disease and regenerative ability in various model systems. Includes thinking critically about methodology, experimental design and interpretation, and how conclusions are reached in heart biology through cutting-edge literature.

**Requisites:** (ZOOLOGY/BIOLOGY/BOTANY 151 and BIOCHEM 501) or graduate/professional standing.

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

## CRB 675 – TOPICS IN CELL AND REGENERATIVE BIOLOGY

1-3 credits.

Examines various special topics in Cell and Regenerative Biology.

**Requisites:** (ZOOLOGY/BIOLOGY 101 and 102) or BOTANY/BIOLOGY 130 or (ZOOLOGY/BIOLOGY/BOTANY 151 and 152) or BIOCORE 383; or graduate/professional standing

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2021

## CRB 699 – INDEPENDENT STUDY

1-4 credits.

One-on-one learning experience allowing undergraduates to work with a faculty adviser to develop research projects and skills.

**Requisites:** Consent of instructor

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

**CRB/MEDICINE 701 – CELL SIGNALING AND HUMAN DISEASE**

1 credit.

Landmark discoveries, as well as current knowledge and controversies in human health, with an emphasis on cancer biology.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB/GENETICS 710 – DEVELOPMENTAL GENETICS**

3 credits.

Covers a broad range of topics in animal development, with an emphasis on molecular mechanisms. Focuses on common themes, with the goal of understanding and analyzing current research in developmental biology and genetics.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 800 – INTELLECTUAL PROPERTY, PATENTS AND LICENSING**

2 credits.

Presents important core concepts, including intellectual property, patent law, trademarks, copyrights, trade secrets, licensing and patent litigation, all specific to the field of biotechnology. Covers the types of intellectual property and how they fit together to protect a product or service. Covers the fundamentals of licensing and technology transfer and the important role of patent examines. Explores the unique aspects of early-stage intellectual property, including market dynamics, pricing and valuation.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 802 – BUSINESS OF BIOTECHNOLOGY: FUNDAMENTALS OF PRODUCT DEVELOPMENT**

2 credits.

Exposure to business principles as applied to the operation of biotechnology companies and serve as a foundation for the more advanced business curriculum. Lays the groundwork to fully appreciate the challenges inherent in translating scientific discoveries into a successful business.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 803 – MOLECULAR TECHNOLOGIES I**

2 credits.

An intensive workshop that will teach biotechniques, biotechnology product development, and biotechnology applications interfaced with analytical, communication and teaching skills. Simulates the corporate and academic biotechnology setting.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 804 – BIOTECHNOLOGY REGULATION AND ETHICS**

2 credits.

An introductory survey course of the political, legal, and ethical issues that have driven the development of the biotechnology industry. Special emphasis is given to FDA regulation of new drugs, devices, and biologics, and to federal regulation and ethics of human subjects research. Come away with an enhanced ability to understand how regulation and politics interact with business and finance to influence the formation and growth of biotechnology companies. Introduction to the ethical issues that help shape public policy regarding applications of biotechnology.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 810 – MOUSE GENETICS AND EMBRYONIC STEM CELLS: LAB IMMERSION AND UNDERSTANDING CURRENT LITERATURE**

2 credits.

Clinically relevant methods of scientific thought, inquiry and analysis via the presentation of specific research topics. Emerging concepts in developmental genetics and embryonic stem (ES) cell biology are used as a means of introducing the participants to the critical importance of identifying the "right" question, selecting the "best" tools to answer the question, using the appropriate logic to interpret experimental results and finally, constructing appropriate conclusions. Application of the literature of mouse genetics and laboratory research to biomedical health decisions. Strong emphasis on the tools used in the research literature and to 'get your hands dirty' learning the basics of the laboratory techniques involved.

**Requisites:** MED SC-M 810, 811, 812, and 813

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**CRB 820 – BIOTECHNOLOGY OPERATIONS**

5 credits.

Addresses issues related to the development and manufacture of products for human health, including medical devices and human therapeutics. Topics include regulatory affairs, quality control and validation, clinical and nonclinical studies.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB 824 – MOLECULAR TECHNOLOGIES II**

3 credits.

An intensive workshop that will teach biotechniques, biotechnology product development, and biotechnology applications interfaced with analytical, communication and teaching skills. Simulates the corporate and academic biotechnology setting.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB 830 – EARLY DRUG DISCOVERY**

4 credits.

Provides an overview of the early drug discovery process, including target identification and validation, generation of diverse chemical libraries, assay development and high throughput screening, lead optimization by compound profiling, and drug targeting and delivery.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 834 – MOLECULAR TECHNOLOGIES III**

2 credits.

Covers topics and concepts in the drug discovery process, with emphasis on laboratory assays and methods used in primary, secondary, and in vitro ADMETox (Absorption, Distribution, Metabolism, Excretion, Toxicity) drug screening. In addition, students build communication and critical thinking skills while working on team projects and analyzing scientific results.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 841 – BUSINESS OF BIOTECHNOLOGY: CONTEMPORARY CHALLENGES AND APPLICATIONS**

2 credits.

Presents contemporary issues in the business of biotechnology where students apply concepts critical to the success of modern biotechnology firms. Topics focus on modern problem-solving, including issues relating to leadership and management, product development and negotiation and licensing.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CRB 842 – BUSINESS OF BIOTECHNOLOGY: SUSTAINING GROWTH**

3 credits.

Examine how companies gain and sustain competitive advantages.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB 843 – PROJECT MANAGEMENT AND LEADERSHIP**

2 credits.

With a focus on the biotechnology and medical device industries, provides an opportunity to share experiences and information and to practice leadership and project management knowledge and skills. Focuses upon understanding and developing a Project Management Plan. Addresses the issues and various situations faced by Project Managers and their effective response.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB 844 – ADVANCED BIOTECHNOLOGY: GLOBAL PERSPECTIVES**

3 credits.

Focuses on state-of-the-art topics of global importance in biotechnology. Skills and knowledge from previous courses are integrated and applied to achieve a new level of synthesis and depth of understanding about important programs in biotechnology today. Deepen technical understanding of novel technologies and broaden awareness of ethical and regulatory issues in biotechnology globally. Increase awareness of opportunities for intellectual collaboration and entrepreneurship.

**Requisites:** Declared in the Biotechnology graduate program

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB 845 – PROFESSIONAL DEVELOPMENT AND EFFECTIVE MANAGEMENT**

1 credit.

Focus on effective management and career development. Learn and practice the applied skills needed for effective managers that lead to synergistic team success within a biotechnology company. Different communication styles will be explored that are used to engage and assess employees. Professional development will be explored to expand career pathways through networking and by generating professional resumes and interviewing skills.

**Requisites:** Declared in Biotechnology MS

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB 846 – BIOTECHNOLOGY CAPSTONE**

1 credit.

Goal is to identify a global biotechnology problem, find a technical solution, and analyze all aspects from a business, regulatory, and scientific perspective.

**Requisites:** Declared in Biotechnology MS

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CRB 850 – FUNDAMENTALS OF STEM CELL AND REGENERATIVE BIOLOGY**

1 credit.

Gain in-depth knowledge of the fundamentals of stem cell and regenerative biology. This knowledge forms the basis for novel translational research and both diagnostic and therapeutic options. Topics to be covered include the origins of embryonic stem cells (ESCs) and induced pluripotent stem cells (iPSCs) and how they are being used for both research and for clinical applications. Read, discuss, and present cutting-edge literature on how iPSCs are being used to model a variety of human diseases and how stem cell therapies are being used to treat autoimmune disorders such as Lupus Erythematosus, Multiple Sclerosis, and Crohn's disease. Participate in the Stem Cell and Regenerative Medicine Center weekly seminar, and hear from top UW researchers about how they are using stem cells to develop therapies for bone and vascular repair.

**Requisites:** MED SC-M 810, 811, 812, and 813

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**CRB 860 – THE BEAT GOES ON: GENERATION AND REGENERATION OF THE HEART**

2 credits.

The molecular and cellular development of the heart and of its regenerative potential. This knowledge forms the basis for novel translational research and both diagnostic and therapeutic options. Topics to be covered include the genetics underlying normal heart development as well as cardiac tissue specification and differentiation with a focus on molecular signals, associated signal transduction pathways, and transcriptional regulation. Read, discuss, and present cutting-edge literature on the genetic contributions to congenital heart defects and adult heart disease and on cardiac stem cells and the regenerative capacity of the heart. Participate in Adult and Pediatric Cardiology Grand Rounds, the Madison Perinatology Conference, learn about cutting-edge molecular diagnostics for fetal, pediatric and adult cardiac disease, and learn when and how to perform an adult echocardiogram.

**Requisites:** MED SC-M 810, 811, 812, and 813

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**CRB 990 – RESEARCH AND THESIS**

1-9 credits.

Research and Thesis.

**Requisites:** Consent of instructor

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023