

ONCOLOGY (ONCOLOGY)

ONCOLOGY 401 – INTRODUCTION TO EXPERIMENTAL ONCOLOGY

2 credits.

Biological processes associated with and characteristic of neoplasia.

Requisites: ZOOLOGY/BIOLOGY 101, BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 383, or graduate/professional standing

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

Level - Intermediate

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

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Demonstrate fundamental knowledge and understanding of foundational concepts in the areas of cancer etiology, cancer biology, and cancer prevention and cancer treatment.

Audience: Undergraduate

2. Read and critically evaluate scientific literature.

Audience: Undergraduate

3. Synthesize scientific ideas based upon knowledge gained in the course

Audience: Undergraduate

4. Demonstrate breadth within their learning experiences.

Audience: Undergraduate

5. Communicate complex ideas in a clear and understandable manner.

Audience: Undergraduate

ONCOLOGY/MICROBIO 545 – TOPICS IN BIOTECHNOLOGY

1 credit.

Seminars on current topics in agricultural, medical, and industrial biotechnology such as: microbiological production of food, drink, biopharmaceuticals; production methods, genetic engineering (vectors, recombination cloning), continuous fermentation; bioconversion processes and production of chemicals from biomass; plant biotechnology; transgenic animals.

Requisites: (ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 383, or BIOLOGY/BOTANY 130) and (CHEM 104 or 109) or graduate/professional standing

Course Designation: Level - Intermediate

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

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2026

Learning Outcomes: 1. Attend all lectures on a diverse range of speakers from the Biotechnology sector and related topics.

Audience: Undergraduate

2. Demonstrate an understanding of lectures through lecture evaluation sheets.

Audience: Undergraduate

3. Choose a current topic in Biotechnology and formulate an opinion paper on the challenges and potential utility.

Audience: Undergraduate

ONCOLOGY/M&ENVTOX/PHM SCI/PHMCOL-M/POP HLTH 625 – TOXICOLOGY I

3 credits.

Basic principles of toxicology and biochemical mechanisms of toxicity in mammalian species and man. Correlation between morphological and functional changes caused by toxicants in different organs of the body.

Requisites: (BIOCHEM 501 or 508) and (ANAT&PHY 335, 435, or (BIOCORE 485 and 486)) and PATH 404; 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: Fall 2025

Learning Outcomes: 1. Discuss the physiology and pathology of toxicology, understanding the basic fundamentals of toxicology and toxic agents

Audience: Both Grad & Undergrad

2. Demonstrate metabolism and breakdown of toxicants using a given dataset

Audience: Both Grad & Undergrad

3. Recognize various experimental models to obtain scientific results

Audience: Both Grad & Undergrad

4. Implement knowledge to design experiments applicable to one's own research

Audience: Both Grad & Undergrad

5. Critique an example of toxicology in media and develop a presentation of this example

Audience: Both Grad & Undergrad

6. Explore new areas to assist in career development via journal club

Audience: Graduate

ONCOLOGY/M M & I/PL PATH 640 – GENERAL VIROLOGY- MULTIPLICATION OF VIRUSES

3 credits.

The structure, multiplication, genetics, pathology and control of animal and plant viruses.

Requisites: (GENETICS 466 or 467) and (BIOCHEM 501 or 508) 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: Fall 2025

Learning Outcomes: 1. Identify the major classes of viruses infecting animals and plants, and summarize their basic replication strategies.

Audience: Both Grad & Undergrad

2. Identify the major innate and adaptive antiviral immunity mechanisms of animals and plants, and examples of viral countermeasures against these.

Audience: Both Grad & Undergrad

3. Summarize the burdens and threats of viruses to public health, agriculture, etc.

Audience: Both Grad & Undergrad

4. Identify the major approaches and challenges to virus control at the single organism and host population levels, including why viruses are generally harder to control than bacteria, and major steps in developing new antiviral agents.

Audience: Both Grad & Undergrad

5. Illustrate beneficial uses of viruses and their genes in research, biotechnology and medicine.

Audience: Both Grad & Undergrad

6. Design and evaluate basic experiments to address specific questions in virology.

Audience: Both Grad & Undergrad

7. Read and evaluate primary literature papers in virology.

Audience: Graduate

ONCOLOGY 673 – PURIFICATION AND CHARACTERIZATION OF PROTEIN AND PROTEIN COMPLEXES

2 credits.

The theory and practice of protein purification. Topics covered include conventional and recent protein fractionation techniques; enzyme assays, handling, and characterization; purification strategy; and overproduction of cloned gene products. The emphasis is on micro and laboratory scale purifications.

Requisites: BIOCHEM 508, CHEM 511 or graduate/professional standing

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

Repeatable for Credit: No

Last Taught: Spring 2022

Learning Outcomes: 1. Demonstrate fundamental knowledge and understanding foundational concepts in the areas of protein purification, purification of recombinant proteins, and protein characterization and use.
Audience: Both Grad & Undergrad

2. Read and effectively evaluate current literature.

Audience: Both Grad & Undergrad

3. Actively engage in the latest scholarly research discussions.

Audience: Graduate

ONCOLOGY 675 – ADVANCED OR SPECIAL TOPICS IN CANCER RESEARCH

1-3 credits.

Examines special topics in cancer research. Topics and content will vary each semester and by section of the course.

Requisites: Consent of instructor

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

Level - Intermediate

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: Summer 2025

Learning Outcomes: 1. Apply, analyze, or evaluate advanced theories, concepts, or methods in Cancer Biology.

Audience: Both Grad & Undergrad

2. Identify and describe key theories, concepts, and methods in Cancer Biology.

Audience: Both Grad & Undergrad

3. Explore a new phenomenon or modality in the Cancer Biology area and apply the knowledge gained to research in the field (graduate student).

Audience: Graduate

ONCOLOGY 699 – SPECIAL RESEARCH PROBLEMS

1-3 credits.

Directed study projects as arranged with instructor.

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 2026

Learning Outcomes: 1. Apply concepts learned in coursework to real life situations.

Audience: Undergraduate

2. Read and effectively search scientific literature.

Audience: Undergraduate

3. Develop critical, analytical, and independent thinking skills.

Audience: Undergraduate

ONCOLOGY 703 – CARCINOGENESIS AND TUMOR CELL BIOLOGY

3 credits.

Viral, chemical, and physical factors involved in tumor formation in humans and experimental animals; biology and biochemistry of neoplasia, both in vivo and in vitro.

Requisites: Graduate/professional standing

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

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Explore new conceptual and technological advancements in Cancer Biology and apply the knowledge gained to research in the field.

Audience: Graduate

2. Demonstrate fundamental knowledge and understanding of foundational concepts in Carcinogenesis and Tumor Cell Biology.

Audience: Graduate

3. Articulate research problems, potentials, and limits with respect to theory, knowledge, or practice within the field of Carcinogenesis and Tumor Cell Biology.

Audience: Graduate

4. Communicate complex ideas in a clear and understandable manner.

Audience: Graduate

5. Read and effectively search scientific literature.

Audience: Graduate

ONCOLOGY 715 – ETHICS IN SCIENCE

1 credit.

A review and discussion of the fundamentals of ethical issues in science.

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 2025

Learning Outcomes: 1. Articulate research problems, potentials, and limits with respect to theory, knowledge, or practice within the field of Cancer Biology.

Audience: Graduate

2. Formulate ideas, concepts, designs, and/or techniques beyond the current boundaries of knowledge within the field of Cancer Biology.

Audience: Graduate

3. Demonstrate breadth within their learning experiences.

Audience: Graduate

4. Communicate complex ideas in a clear and understandable manner.

Audience: Graduate

5. Foster ethical and professional conduct.

Audience: Graduate

ONCOLOGY 725 – READINGS IN CANCER BIOLOGY

2 credits.

A review and discussion of the current literature on topics related to cancer biology. The emphasis is on the development of skills in data analysis, critical interpretation, and clear writing.

Requisites: Consent of instructor

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

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Articulate research problems, potentials, and limits with respect to theory, knowledge, or practice within the field of Cancer Biology.

Audience: Graduate

2. Formulate ideas, concepts, designs, and/or techniques beyond the current boundaries of knowledge within the field of Cancer Biology.

Audience: Graduate

3. Demonstrate breadth within their learning experiences.

Audience: Graduate

4. Communicate complex ideas in a clear and understandable manner.

Audience: Graduate

5. Foster ethical and professional conduct.

Audience: Graduate

ONCOLOGY 735 – GRANT WRITING IN CANCER BIOLOGY

2 credits.

Scientific writing. Evaluation of exemplar fellowship applications. Creation of a research proposal with iterative, constructive feedback. Constructive, articulate feedback on classmates' writing.

Requisites: Graduate/professional standing

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

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Describe the process of grant writing and review.

Audience: Graduate

2. Evaluate and articulate strengths and weaknesses of funding applications.

Audience: Graduate

3. Create a cogent and convincing written rationale for proposed experiments that provides the basis for the preliminary exam and an extramural funding proposal.

Audience: Graduate

4. Build resilience by responding to feedback on writing assignments.

Audience: Graduate

ONCOLOGY 745 – MODELING HUMAN DISEASE IN ANIMALS

1 credit.

Provides a background in the use of animals in the study of human disease and hands-on exposure to common techniques such as tissue collection and processing, surgeries, imaging, and other manipulations. Lectures by basic scientists and clinicians will provide background about each of the organ systems or diseases and the ethics of animal research. Prior to start of course, completion of online animal safety training. Instructions will be provided after enrollment.

Requisites: Consent of instructor

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

Repeatable for Credit: No

Learning Outcomes: 1. Describe the rationale for choosing a model system for their research

Audience: Graduate

2. Perform procedures or dissections to collect tissues or organs for further investigation

Audience: Graduate

ONCOLOGY 778 – BIOINFORMATICS FOR BIOLOGISTS

3 credits.

Become familiar with bioinformatics theory and principles. Provides real-world experience that can be applied to your own work. Provides a foundation of knowledge that can be used to critically evaluate existing bioinformatics tools that can be used in your work, and in the absence of an appropriate tool, identify the analyses that demand the development of novel tools.

Requisites: Consent of instructor

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

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Identify the appropriate analysis tools for common bioinformatics problems, format data, execute the analysis, and adjust necessary parameters.

Audience: Graduate

2. Interpret results of common bioinformatic analysis including their own results as well as the published works of others.

Audience: Graduate

3. Demonstrate competence in bioinformatic analysis by conducting an original analysis of primary data from their own lab or publicly available databases.

Audience: Graduate

4. Understand the assumptions and principles of bioinformatic pipelines and their implications for validity and statistical significance.

Audience: Graduate

ONCOLOGY 901 – SEMINAR

1 credit.

Critical review of selected topics in cancer research.

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 2026

Learning Outcomes: 1. Organize and present a research presentation, which includes background information, data slides, conclusions, and future directions.

Audience: Graduate

2. Offer constructive feedback to peers on research presentation style and information delivery.

Audience: Graduate

ONCOLOGY 990 – RESEARCH

1-12 credits.

Independent research and writing for graduate students under the supervision of a faculty member.

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 2026

Learning Outcomes: 1. Conduct independent research using a variety of approaches.

Audience: Graduate

2. Think critically and independently to address research challenges.

Audience: Graduate

3. Exhibit and foster professional and ethical conduct in their research.

Audience: Graduate

4. Collaborate with other investigators within or outside the thesis lab.

Audience: Graduate