



CHESTNUT  
HILL  
COLLEGE

**BIOL 445 (3 credits)**  
*The Cure: From Bench to Bedside*  
Spring 2021

**Course information**

Due to COVID-19 restrictions on face-to-face classes, this course will be conducted in a completely online format. Voice-over recordings of all lectures will be uploaded to the course shell on Canvas. In addition to the pre-recorded lectures, we will meet as a group during **nine** synchronous, live class sessions via Zoom on:

- January 26 from 12:30-1:45 pm
- February 9 from 12:30-1:45 pm
- February 11 from 12:30-1:45 pm
- March 25 from 12:30-1:45 pm
- March 30 from 12:30-1:45 pm
- April 1 from 12:30-1:45 pm
- April 22 from 12:30-1:45 pm
- April 27 from 12:30-1:45 pm
- May 6 from 10:45 am-12:45 pm

Without exception, all students enrolled in the course are expected to attend these Zoom class sessions.

This course is **team-taught** by scientists from Fox Chase Cancer Center. Contact and background information for each instructor is linked below.

**Amanda Purdy, PhD**

Director, Academic Affairs

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*Units 1 and 8, review sessions*



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*Units 4 and 8*



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*Units 2 and 6*



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*Units 5 and 9*



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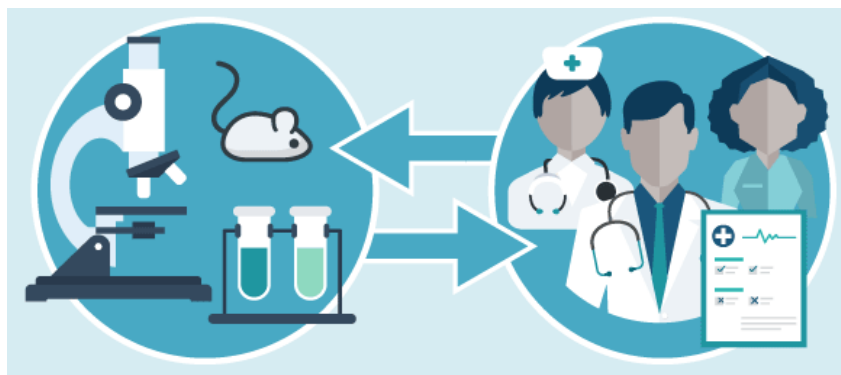
*Units 7 and 9*



**Office hours:** Via Zoom, by appointment. Email Dr. Amanda Purdy with questions anytime ([Amanda.Purdy@fcc.edu](mailto:Amanda.Purdy@fcc.edu)). You may also contact Dr. Ken Soprano, Professor of Biology at CHC, with questions (215-248-7038, [sopranok@chc.edu](mailto:sopranok@chc.edu)).

## **Course Overview**

Cancer is the leading cause of death in the developed world, and extensive research has been performed over many years to develop therapies and preventative strategies to combat cancer. This course will explore the differences between normal cells and cancer cells, and how these differences are exploited to develop therapies and prevent cancer from forming. The process of therapy design and testing in the laboratory and the clinic will be discussed for common therapies including surgery, radiation, chemotherapy, targeted therapy, immunotherapy, and more. How clinical trials are designed, and the ethics and disparities of clinical trials, will be reviewed. Finally, important skills including problem solving, critical thinking, and written and oral science communication will be introduced and practiced. The course will be primarily lecture-based with both synchronous and asynchronous lectures, and will include learning through worksheets and other assignments, reading of scientific articles and websites, and student presentations and papers. This course will translate knowledge from genetics and molecular and cellular biology to human disease, as well as familiarize students with the current state of cancer therapy and prevention.



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## **Course Learning Outcomes**

The course is designed to educate students about the history and biology of cancer, therapeutic strategies for cancer treatment, and prophylactic strategies for cancer prevention. Integrated into the course framework is a focus on science communication skills.

It is expected that students will develop problem solving and analytical skills that will help them to connect the information at hand and also help to find the best strategy to test their hypothesis or check the validity of a reported result. Specific learning goals will be included with each of the 9 units.

At the end of the course the students are expected to have a solid grasp on:

- The hallmarks of cancer;
- The different types of cancer;
- The difference between the ‘popular’ understanding of cancer and the rigorous, scientific reality of cancer prognosis, therapy benefits and limitations;
- The main types of therapy currently available in oncological clinics;
- The types of clinical trials and the steps required to start and complete a trial;
- The main components of a trial study design;
- The considerations in the ethical use of human subjects in research;
- The approaches to addressing health disparities and achieving health equity;
- Strategies to prevent cancer initiation and onset;
- How to deliver an effective oral presentation;
- How to read a primary research article; and
- How to compose a concise and clear research paper.

Chestnut Hill College is committed to various student-learning outcomes. CHC has outlined learning outcomes that all CHC students should endeavor to develop including: Information Literacy, Communication, Critical and Creative Inquiry, Leadership and Collaborations, Integrative Learning, Civic Engagement, Ethical Reasoning,

Knowledge of Self and Others, Intentional Learning, and Spiritual Growth. This course will implicitly focus on several of these student-learning outcomes including:

**Information Literacy:** *“Students will demonstrate the ability to access, organize, interpret, evaluate and utilize information from a variety of sources in an ethically appropriate manner.”* Students will be required to read primary scientific journal articles, websites, and review articles on a variety of cancer biology, genetics and molecular biology-based topics.

**Critical and Creative Inquiry:** *“Students will demonstrate an understanding of and an ability to use critical analysis to develop innovative and imaginative methods of inquiry and problem-solving.”* Students will be encouraged to use critical thinking skills as a guide to multiple modes of inquiry, challenging conventional wisdom and stereotypes. In presentations and papers, students will be required to read and interpret genetics, molecular and cell biology experimental data from peer-reviewed science journals and track how potential treatments and prevention strategies have been developed from such experimental evidence.

**Integrative Learning:** *“Students will demonstrate the ability to transform information and experience into knowledge and knowledge into judgment resulting in action.”* Students will be encouraged to make connections within and among academic disciplines, co-curricular activities and pursuits beyond the campus boundaries. Students will be required to draw on disciplines of chemistry, biochemistry, cell biology, and genetics to fully understand the aspects and applications of cancer biology.

**Communication:** *“Students will demonstrate effective communication in a variety of modes in and out of the classroom, specifically the ability to read, write, speak, listen and employ various media effectively.”* Students will be encouraged to use critical and creative forms of expression. Students will be required to actively participate in discussions (via Discussion Board on Canvas) and give formal presentations on various topics throughout the course. These exercises will provide opportunities to develop and enhance oral communication skills. In addition, three papers each in part describing a cancer, the standard of care and the development and testing of a new cancer therapeutic/prophylactic approach will serve as a means to demonstrate written communication skills.

## **Unit Outlines**

This course is divided into 9 separate units. For each unit, an outline will be distributed. The Unit Outline will highlight important content covered during the unit including keywords and concepts as well as a list of required readings and assignment dates. The Unit Outline should be used as a study guide for post-lecture worksheets and a reference for the study design.

## **Text**

Book chapters and primary journal and review articles will be provided in lieu of a textbook. All texts will be made available in the course shell on Canvas.

## **How You Will Be Graded**

Your grade will consist of three major components: A Study Design paper (30% of your total grade), Oral Presentations (30% of your total grade), Post-lecture worksheets, Discussion boards and other assignments (40% of your total grade).

### **Study Design Paper**

The Study Design Paper includes three separate writing assignments regarding a specific cancer. The first paper will contain information about the cancer including tissue(s) affected, incidence, known causes, and methods of prevention. The second paper will include a rewrite of the first paper, a description of the

current gold standard for treatment and reasons why current therapies fall short. The final paper will include revised versions of the first two papers and describe how the proposed therapy or prophylactic strategy would be tested in a fictional clinical trial. The first and second sections of the Study Design paper are due by 11:59 pm on **February 17, 2021** and **April 2, 2021**, respectively. The final paper is due by 11:59 pm on **April 27, 2021**. All papers will be handed in through Canvas. Further details on these assignments including word limit, formatting, and content will be provided to students during the semester.

### Presentations

Each student will give three oral presentations that cover information about a specific cancer (on **February 9, 2021** or **February 11, 2021**), current therapies used to treat that cancer (on **March 30, 2021** or **April 1, 2021**) and a potential new therapy or prophylactic strategy (on **April 27, 2021** or **May 6, 2021**). In addition to presenting during the class period, all presentations will be handed in through Canvas. Further details on these assignments including slide limit, formatting, and strategies for giving presentations will be provided to students during the semester.

### Weekly worksheets

Post-lecture worksheets will assess the students' understanding of the course material presented in the preceding lectures. Worksheets are due weekly (for most weeks) each Friday at 11:59 pm.

### Discussion board and other assignments

Each student will also participate in group discussions through the course shell on Canvas. The goal of these activities is to explore various topics and facilitate discussion amongst the class. Each student will be expected to follow these basic guidelines when responding to a Discussion:

- Keep in mind that this forum is for educational purposes only.
- Hold to a single topic for each thread and try to give a complete, substantial and concise answer to the question/topic. Postings should encourage a conversation and provide avenues for additional continuous dialogue.
- Remember we should base our opinions with evidence and research. You are encouraged to support your comments with scientific references to aid in understanding your point.
- Postings and replies should be relevant and contain substance. Please refrain from short 'I agree' or 'yes' replies. Responses should indicate agreement/disagreement and why.
- Be polite and courteous. Try to keep your responses positive and constructive and remember online communication lacks the verbal cues normally part of face-to-face interactions.
- Use a tone and manners similar to the ones you would use within a professional environment.
- Read previous postings *before* you post to try to avoid repetitive comments to keep the discussion timely and logical and make sure you are posting under the appropriate heading or thread.

Additional information regarding posting frequency and minimum number of posts will be provided during the semester. For select units additional assignments may be assigned. Refer to the Unit Outline for more information.

Description	% of grade
<b>Study Design Paper</b> ( <i>Paper 1: Background on Cancer, 5%; Paper 2: Current Therapies, 10%; and Paper 3: Proposed Study Design, 15%</i> )	30%
<b>Study Design Presentations</b> ( <i>Presentation 1: Background on Cancer, 5%; Presentation 2: Current Therapies, 10%; and Presentation 3: Proposed Study Design, 15%</i> )	30%
<b>Post-lecture worksheets, Discussion Boards, and other assignments</b>	40%

### Letter Grade Scale

**A** = 94-100%, **A-** = 90-93%, **B+** = 86-89 points, **B** = 82-85%, **B-** = 78-81%, **C+** = 74-77%, **C** = 70-73%, **C-** = 66-69%, **D+** = 62-65%, **D** = 60-61%, **F** = <59%

## Biol 445 Schedule and Course Topics

Dates		Lecture Topics	Assignments Due
Jan	26	Unit 1: Purdy - Overview of the course, introductions, using Canvas, syllabus review, cancer background – <b>SYNCHRONOUS LECTURE</b>	Student profile due – Jan 26
	28	Unit 1: Purdy – Hallmarks of cancer	Worksheet due – Jan 29 Introduction video due – Jan 29 Cancer topic survey due – Jan 29
Feb	2	Unit 2: Aylward – How to find and read peer-reviewed information from PubMed and the web	Nearpod assignment in lecture due – Feb 4
	4	Unit 2: Aylward – How to find and read peer-reviewed information from PubMed and the web, Effective communication in research	Paper/presentation assignment due – Feb 5 Worksheet due – Feb 5
	9	Student presentations – Cancer types – <b>SYNCHRONOUS LECTURE</b>	Turn in slides by noon on Feb 9
	11	Student presentations – Cancer types Unit 3: Zhigarev – Scientific method, process of research – <b>SYNCHRONOUS LECTURE</b>	Assignment: description of a short imaginary experiment due – Feb 19 In Class Assignment due – Feb 15
	16	Unit 3: Zhigarev – History of cancer treatment using surgery, theory of surgery	Paper due – Feb 17 <sup>th</sup>
	18	Unit 3: Zhigarev – History of cancer treatment using radiation, theory of radiotherapy	Worksheet due – Feb 19
	23	Unit 4: Tagai – History of cancer treatment using chemotherapy, theory of	
	25	Unit 4: Tagai – Chemotherapy, theory of	Worksheet due – Feb 26
Mar	2	Unit 5: Uribe – Targeted therapy using small molecules, theory of	
	4	Unit 5: Uribe – Targeted therapy using small molecules	Worksheet due – Mar 5
	9	Unit 6: Aylward – History of cancer treatment using immunotherapy, theory of	
	11	Unit 6: Aylward – Immunotherapy (Ab, cell-based, CARs)	Worksheet due – Mar 12
	16	Unit 6: Aylward – Immunotherapy (Ab, cell-based, CARs)	
	18	Unit 7: Moise – Cancer Prevention: Introduction	Worksheet due – Mar 19
	23	Unit 7: Moise – Cancer Prevention: Screening, Vaccination, and Chemoprevention	
	25	Review: Purdy – <b>SYNCHRONOUS LECTURE</b>	Worksheet due – Mar 26 Community Health Interview due – Mar 28
30	Student Presentations – Known therapeutic options for specific cancer – <b>SYNCHRONOUS LECTURE</b>	Turn in slides	
Apr	1	Student Presentations – Known therapeutic options for specific cancer – <b>SYNCHRONOUS LECTURE</b>	Paper due – April 2
	6	Unit 8: Purdy and Tagai – Research Study Design I	
	8	Unit 8: Purdy and Tagai – Research Study Design II	Worksheet due – Apr 9
	13	Unit 8: Purdy and Tagai – Research Study Design III	

	15	Unit 9: Uribe – Ethical use of human subjects	Worksheet due – Apr 16
	20	Unit 9: Moise – Health disparities and health equity	Social media post due – by Apr 22 before noon
	22	Review: Purdy – <b>SYNCHRONOUS LECTURE</b>	Worksheet due – Apr 23 Threaded Discussion due – by Apr 25 before noon
	27	Student Presentations – <b>SYNCHRONOUS LECTURE</b>	Final paper due – Apr 27
May	6	Final - Student presentations, 10:45 am-12:45 pm – <b>SYNCHRONOUS LECTURE</b>	Turn in slides by 9 am

**Late Assignment Policy:**

Late assignments will be accepted up to three days beyond the due date. However for each day that the assignment is late, 10% of the total assignment grade will be deducted. Assignments turned in beyond three days past the due date will not be accepted—no exceptions.

**Attendance Policy:**

**This course will be conducted entirely online.** Each week, students must listen to the assigned recorded lectures and complete the post-lecture study question worksheets. In addition, at various times during the semester, students will be expected to attend a “live” Zoom video conference which will serve as an opportunity to review lecture material and attend student presentations. These live sessions will meet during the time when the course has been scheduled (Tuesday/Thursday 12:30-1:45pm). A live video conference is also scheduled for the first day of class, Tuesday, January 26<sup>th</sup> at 12:30 pm to give everyone in the class an opportunity to introduce themselves and discuss the course and how it will be taught.

If an emergency arises and the student cannot complete the week’s assignments or attend the live meetings, they should notify Drs. Purdy and Soprano via e-mail at once. Students will be responsible for turning in any missed work and for rescheduling any missed presentations.

**Description of Online Behavior**

For our nine synchronous classes (Jan 26, Feb 9 and 11, Mar 25 and 30, and April 1, 22, and 27, and May 6) it is expected that you will have your camera on and your microphone muted. Exceptions will be made on an individual basis and are the sole discretion of the instructor. Please keep electronic communication devices, such as smartphones, on silent to prevent distractions and allow you to give your whole attention to the lecture. Please do not send or receive email or text messages during class (especially during your fellow classmates’ presentations). Disruptive behaviors, such as sidebar conversations and arriving after class has started, are disrespectful to others and reflect that you are not engaged in learning process.

**Course Technology Requirements**

All students are required to comply with Chestnut Hill College’s Computer and Network Security Policy. Access to and familiarity with Canvas is imperative for success in this course. All course materials, including pre-recorded lectures, are accessed via Canvas, communications will be posted there, and assignments must be submitted via Canvas. It is recommended that students check Canvas weekly to ensure that they have all materials necessary for the course. If any student anticipates having issues with accessing Canvas or any other technology issues, please inform Drs. Purdy and Soprano as soon as possible.

**Academic Support**

A student in need of academic assistance can contact the Student Learning Services Center (215-248-7061) or the Office of Academic Advising (215-248-7199) for support. The following resources are all available to all CHC students.

### **Special Accommodations / Disability Policy**

Accommodations for Disabilities: If you are a student who has any kind of disability, whether apparent or non-apparent, learning, emotional, physical, or cognitive, and you need accommodations to increase your access to the college environment, Chestnut Hill is consistent with federal, state, and local laws (Section 504 and ADA) to provide reasonable accommodations to students with disabilities. Disclosure of a disability is voluntary and confidential. In order to disclose a disability to receive accommodations under the law, students should contact the Disability Resource Center, located in St. Joseph Hall, room 240 by emailing the Interim Director of the Center, Saundra M. Freedman at [disabilities@chc.edu](mailto:disabilities@chc.edu), or [freedmans@chc.edu](mailto:freedmans@chc.edu), or by calling 215-242-7738. Students can also visit the Disability Resource Center online at [www.chc.edu/disability](http://www.chc.edu/disability). Students can apply for accommodations at any time of the semester, but please be aware that some accommodations may require more time to implement than others.

As instructors of this course, we strive to provide an inclusive learning environment. If you experience barriers to learning in this course, do not hesitate to discuss them with Drs. Purdy or Soprano.

### **Counseling Center:**

Telephone: 215-248-7104, Email: [kennedys@chc.edu](mailto:kennedys@chc.edu)

The Counseling Center offers free, short-term individual therapy to students during the fall and spring semesters. The Counseling staff can also do a one-time consultation for advice. Students may use the Counseling Center at all times (even over breaks) when they are enrolled at the College. In general, counselors see students once a week for a fifty-minute session as long as the student desires. In addition, counselors reserve time every day to see any student in crisis needing immediate attention.

The Counseling Center is completely confidential, except in cases of life-threatening emergency (the threat or attempt of suicide, and the threat of seriously injuring another person, for example) or when we are legally required to report abuse of a minor. Except in these extraordinary circumstances, neither what is discussed nor any of the required written records are shared with anyone - including roommates, parents, friends, faculty, and staff - without the student's written permission.

In the event of a mental health emergency, call 911 or go to the nearest hospital emergency room, or call the National Suicide Prevention Hotline at 1-800-273-TALK (8255).

### **The Study Skills/Peer Tutoring Center**

Telephone: 215-242-7738, Email: [tutoring@chc.edu](mailto:tutoring@chc.edu)

The Study Skills Center can help you learn effective study strategies through workshops or individual study skills counseling. Counselors can help you learn to manage your time, work through test anxiety, and improve reading and listening skills. Tutors can be arranged for specific courses that you are taking, as well. These services are free and available at any point during the semester.

The Study Skills Center is located on the second floor of St. Joseph's Hall. You can contact the Center's Director Saundra Freedman at 215-242-7738 or by email at [freedmans@chc.edu](mailto:freedmans@chc.edu) or [tutoring@chc.edu](mailto:tutoring@chc.edu).

### **The Writing Center**

Telephone: 215-248-7114, Email: [writingcenter@chc.edu](mailto:writingcenter@chc.edu)

The Center is staffed by Director John Ebersole ([ebersolej@chc.edu](mailto:ebersolej@chc.edu)) who will put you in touch with other students who have been trained to help you work through writing assignments.

Writing tutors can:

- Discuss a writing assignment with you
- Help you figure out how to generate and organize your ideas
- Help review a draft of your paper
- Help with proper documentation
- Help with editing papers

### **Academic Integrity**

Students are expected to follow CHC's guidelines for academic honesty and fulfill their academic duties. Academic integrity promotes trust, mutual respect, cooperation, and the advancement of learning. Cheating and plagiarism destroy the trust and mutual respect that are essential to a community of learning. These behaviors violate the deepest convictions of the College community and are infractions of academic integrity. Plagiarism is defined as the submission of work (written work, art work, musical composition, oral presentation, software program, experimental design, etc.) that incorporates ideas from another individual (student, teacher, author, etc.) and presents these ideas as one's own without adequate acknowledgement of the source. Please refer to the SUS handbook for CHC's student academic integrity policy. Note that any student who breaches the academic integrity policy in this class will be held accountable. Plagiarism (accidental and deliberate) will not be tolerated, and offenders will be reported to the Dean.

### **PA Department of Education Hours**

A substantial amount of extra reading will be required in this course. For the most part, these additional materials bridge the gap between the basic principles of cancer therapeutics and the application of these basic principles leading to the development of a viable, effective therapeutic treatment program. Therefore, completing these additional readings will significantly expand the students' knowledge of the topics covered in this course.

### **Strategies for Success in BIOL 445**

1. Listen to the pre-recorded lectures each week.
2. Review the unit outline, learning objectives, and vocabulary *before* each unit.
3. Define any words that are unfamiliar. Add those definitions to your unit outline.
4. Read any assignments prior to watching the lectures and attending the live class session.
3. Reread notes taken during the pre-recorded and live class sessions within 24 hours. Before the next session, reread the information presented in class.
4. During lectures and while studying, make a list of specific questions about the material that you find difficult to understand.
5. Make a set of flashcards with definitions or study questions on one side and their explanations on the reverse side.
6. Participate in a cooperative study group which meets regularly, weekly or biweekly (virtually).
7. Participate in discussion boards and other group learning opportunities.
8. Carefully review and use instructor feedback on the first and second papers to improve the subsequent papers.
9. Save all post-lecture worksheets for review.
10. Attend office hours (email Dr. Purdy to schedule online office hours).
11. Use time wisely. Often, multiple "snippets" of time (periods of 10-30 minutes daily) enhance the learning process better than longer less frequent study periods. Make a tentative daily/weekly schedule reflecting time use. For a college science class, a minimum of **2 hours of study time is recommended for each hour of class time.**