

Major Human Diseases and Biotechnology: from Bench to Bedside

人类重大疾病与生物技术：从基础到临床

Description

共10课时。主要介绍威胁人类公共卫生安全的重大疾病（癌症、神经退行性疾病、传染病等）以及现代生命科学技术如何开发创新性的治疗方案。

This course is composed of 10 lectures and will systematically describe (1) major human diseases such as cancer, age-related disease (aging), Alzheimer's Disease, viral infection and (2) cutting-edge biotechnologies that may potentially cure these diseases. Each lecture is structured by the introduction of a specific disease and then a discussion on related biotechnologies. The course will cover background knowledge including but not limited to: (1) major aspects of AP biology level knowledge, (2) part of AP chemistry and AP physics, and (3) basis of neuroscience and artificial intelligence, especially how it is used to solve human health problems. This course is best suited for students with strong interests on biology and eager to learn more on the health and biotechnology.

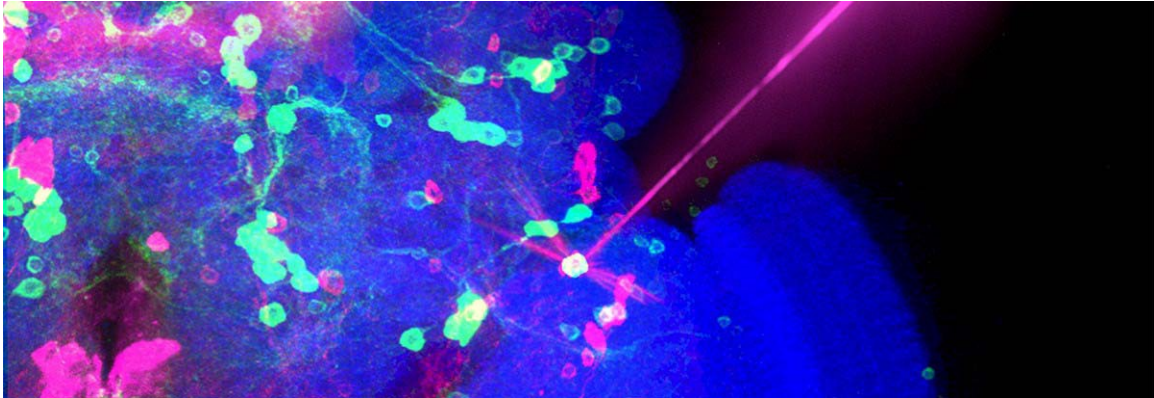


What the students will learn:

- (1) To learn fundamentals of modern biology (AP biology level and some extension): genetics, biochemistry, biophysics, molecular biology and cell biology;
- (2) To learn and exercise how to perform scientific literature search and how to read and comprehend scientific paper in the most effective way;
- (3) To practice scientific paper writing and potentially how to publish a scientific paper (or research competitions);
- (4) To comprehend the principles of biotechnology and scientific experiments, potentially laying a foundation for future lab internship or rotations.

Textbook:

This course does not rely on specific textbook, but the following books are highly recommended to students for a better understanding of the contents: *Campbell Biology AP Ninth Edition* (Biology, 9th Edition), *Principles of Neurobiology* by Dr. Liqun Luo

**Format of the course:**

The lectures will be given online via a Zoom conference of one hour each week. At the end of each lesson, there will be 15 minutes for questions!

Students will have assignments, most likely essay writing after certain literature search. Rubric are shown in the following sections.

This course is designed for a small group of learners who are self-motivated to establish a solid biology background.

The instructor believes the following groups of students will benefit from this course:

- 1) Those interested in biology, chemistry and physics;
- 2) Those interested in careers in the life sciences or in STEAM;
- 3) Those intending on studying in an American high school or university;
- 4) Those intending to improve their science writing or writing in general;
- 5) Students aged 13-18.

Instructor: BS in Life Sciences from Tsinghua University. MA in Biology from Harvard University. PhD in Biology from Harvard University. Research fellow of Harvard Medical School.

Course leader: Howard Shen, Masters of Education with a concentration in Technology from Harvard University in 1997. Mr. Shen was a former staff officer and lecturer at Harvard University. He was the IT lecturer and online course manager of Program for Global Leadership from 1997 to 2001 at Harvard Business School.



Weekly schedule (tentative and can be adjusted with students' interests):

Classes begin 10 October 2020, Saturday evenings, 20:00—21:00.

Week 1: introduction, human diseases and disease modeling

Week 2: cancer, genetic mutations and cell death

Week 3: aging and methods to promote longevity

Week 4: neurodegenerative diseases and single cell sequencing

Week 5: stem cell biology and regenerative medicine (including organoid)

Week 6: CRISPR genome editing and new cures to genetic diseases

Week 7: psychiatric disorders and optogenetics

Week 8: infectious disease and how virus is used in biomedical science

Week 9: diabetes and gut microbiota

Week 10: closing remarks and final project

The following rubric is for optional essay:

Item	1-2	3-5	6-8	9-10
Grammar	Obvious grammatical errors, punctuation mistakes, poor verb conjugation that should have been caught by spellcheck	Basic grammatical errors, punctuation mistakes, poor verb conjugation that should have been caught by proofreading	Minor grammatical errors, punctuation, etc.	Few or no grammatical mistakes; sentences read fluently, punctuation is appropriate and not overused or underused;
Spelling	Multiple obvious spelling errors that should be addressed with spellcheck; spelling errors affect comprehension of text	Basic spelling errors, the spelling does not affect comprehension but it stands in the way of easy reading	Minor spelling errors, confusion of words, minor mistakes when spelling difficult words, or mistakes in conjugation	Few or no spelling errors
Vocabulary	Careless or inaccurate word choice that obscures meaning	Language that is trite, vague, or flat	Shows some variety of word choice, there is purposeful use of words	Effective and engaging use of word choice
Conciseness	Frequent run-ons or fragments, poor punctuation, poor understanding of the material	Writer inserts unnecessary sentences or opinions that are out of place; essay is not focused on topic	Writer uses clear point of view and writes with an understanding of the audience; sentences are of appropriate length for topic	Writer has a strong sense of style and voice and communicates concepts and ideas clearly and succinctly and with style
Organization	Writing is disorganized and underdeveloped with no transitions or closure	Writing is brief and underdeveloped with weak transitions and closure	Uses correct writing format, incorporates a coherent closure to ideas and makes transitions between ideas	Writing includes a strong and clear beginning, middle, and end with appropriate transitions and good closure
Logic	Writing is extremely limited in communicating knowledge with no central theme	Writing is limited in communicating knowledge; length may not be appropriate	Writes related ideas, quality paragraphs, coherent concepts, and does not diverge from topic	Writing is purposeful and focused; ideas contain examples and details

Item	1-2	3-5	6-8	9-10
Data	Writer uses no relevant information from the resources	Writer uses limited data from resources, may not apply concepts appropriately	Writer uses data from resources, applies the data in relevant ways	Writer uses data from resources with a keen understanding of implications and addresses those implications
Beginning	Has no introduction and/or does not have a thesis statement	Has a weak introduction and a weak thesis statement that does not introduce topics discussed in the essay	Has an introduction and a thesis statement that are relevant to the essay	Has an introduction and thesis statement that are both relevant in addition to providing an outline for the contents of the essay
Conclusion	Has no conclusion or conclusion is not related to essay	Conclusion is present but it does not provide a relevant summary of the essay and does not draw conclusions	Conclusion summarizes essay and outlines ideas presented	Conclusion is concise, draws clear, logical ideas and implications from the material included

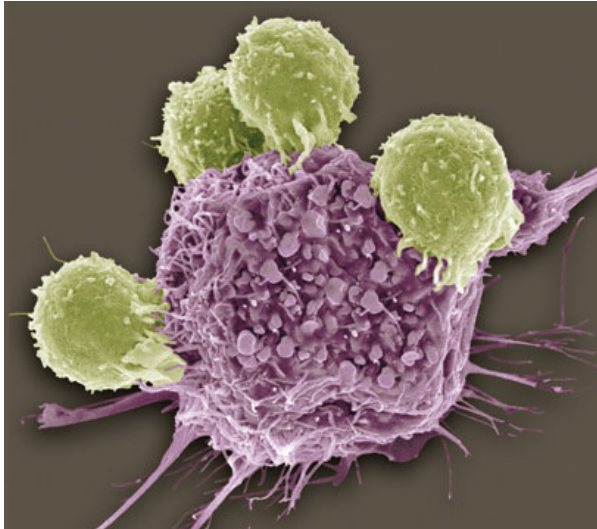
Additional remarks:

Please be sure to check the link for the NYTimes Student Essay Competition, where you will find information on the STEM essay competition. Parents are encouraged to help their student research and formulate the essay.

New York Times Student Contest:

<https://www.nytimes.com/2020/07/15/learning/our-2020-21-student-contest-calendar.html>

Please reference the link above to view the calendar of upcoming events and contests. The STEM writing contest spans from January 19—March 2, 2021. There are other contests that you may wish to investigate.

**Tuition:**

The tuition for the entire course, including all course materials: \$350

Early bird offer (sign up by Sept. 21st): \$300

Group discount: \$300 (for two students or more)

Please send payment via PayPal hshen@ginsengedu.com or Alipay caiwu@50edu.cn.

Registration

Please register with the link: <https://forms.gle/6qjuvc48wJbLaf5o6>, or QR code below. You can also register by emailing hshen@ginsengedu.com, or visiting www.ginsengedu.com.

