BISC8b, Drugs that Changed the World

Time: MWR 10-10:50 am (Block C)
Location: TBA
Instructor: Lizbeth Hedstrom, hedstrom@brandeis.edu, x62333, Kosow 112
Office hours: TBA

Summary:

BISC8b is designed to introduce students to the science of drug discovery. This course is designed to serve students seeking the HSSP major and for non-science students interested in fulfilling their science requirement.

We will explore the drug discovery process through a historical perspective, first by studying the discovery of sulfa antibiotics and the invention of "modern" drug discovery, and then by studying the development of the antileukemia drug Gleevec, the first example of personalized cancer treatment. We will examine the underlying science and how the methodologies have changed with new technologies.

Prerequisite: High School Chemistry
Note: Does not meet the requirements for the major in biology.

Brandeis seeks to welcome and include all students. If you are a student who needs accommodations as outlined in an accommodations letter, please talk with me and present your letter of accommodation as soon as you can. I want to support you.

In order to provide test accommodations, I need the letter more than 48 hours in advance. I want to provide your accommodations, but cannot do so retroactively. If you have questions about documenting a disability or requesting accommodations, please contact Student Accessibility Support (SAS) at 781.736.3470 or access@brandeis.edu.

Books

1. *The Demon Under the Microscope: From Battlefield Hospitals to Nazi Labs, One Doctor's Heroic Search for the World's First Miracle Drug*
   Author: Thomas Hager,

   Author: Jessica Wapner

Additional reading will be posted on Latte or on reserve in Library

General resources: Morris et al, *Biology: How life works* (a general biology textbook)
   Jawetz, Melnick, and Adelberg's *Medical Microbiology* online access
   Eckstein, *ISOA/ARF Drug Development Tutorial* (online and on Latte)
   C&E News Top Pharmaceuticals (online)
   WHO Essential Medicines
Grading:

- Class discussion: 5%
- Homework: 15%
- Exams: 2 x 25%
- Paper: 15%
- Group presentation: 15%

a) **Homework** in the form of short quizzes will be assigned approximately every week. These assignments are designed to ensure that students keep up with the reading.

b) **Examinations** will be the short answer type, and will cover relevant material from the lectures and reading. To answer some of the questions, you will need to apply principles learned from the lectures to new problems. Seating will be assigned. Prof. Hedstrom will grade the exams. Any requests for re-grading must be made in writing within 7 days after the exam is returned. Rescheduling and incompletes will not be granted except in the most extraordinary of cases.

c) **Paper: Outbreaks.** Each student will write a paper describing an infectious disease outbreak that occurred in the last 5 years. The paper is due **Nov. 8 at 5 pm** as a pdf file submitted on Latte. Papers should be 5 pages (no more! Less is OK as long as information is complete), single-spaced, including figures but not including references (1 inch margins, size 11 font). Five pages is not very long! Think of ways to condense information with figures and flow charts. Note that the amount of publically available information varies with each outbreak, so be sure to do a reference search before you commit. You may need journals that are not available at Brandeis. You can access such papers via Interlibrary Loan, but this can take a few days, so don’t wait until the last minute to start your research.

Turnitin will be available on Latte to check for plagiarism. Please check your paper prior to the due date so that you will have time to re-write if needed. Paper rubric can be found on Latte.

1. **Content.** Papers will describe the pathogen, host and environment, and what changed to cause the outbreak. Include a description of the disease, treatment options and the prospects for a new outbreak (or prospects for resolution if it is still ongoing).

2. **Grammar/style/spelling.** Remember the topic sentence!

3. **Figures.** Figures must have titles and legends. Clearly differentiate between the legend and the text. The best way is to enclose the figure and legend in a box. Make sure the fonts are at least 9 point in the figure. The figures should be high resolution. Be sure to reference the source in the Figure legend if the figure is not yours, and remove any parts of the figure that are not needed for your paper. Don’t break up a paragraph with a figure.

4. **References.** Use number citations in the text. **List all authors** as shown in the example below. Note: Endnote is available from ITS.


Remember:
- Page numbers
- Indent paragraphs
- **DO NOT QUOTE.** You should be able to rephrase in your own words.
- Avoid phrases such as “It has been shown...” and “Research has shown...”
d) Group presentation: Essential Medicines. Students will divide into teams of 2-3 people- rosters are due Nov. 6. Each team will prepare a presentation on the discovery and use of a WHO Essential Medicine. To avoid duplicate presentations, topics must be approved by Prof. Hedstrom by Nov. 18. References should include at least 4 popular media sources- these may be popular media websites, newspapers or articles from non-scientific publications and at least 4 scientific sources- these may be government or academic websites, primary biological texts, or scientific journal articles.

Each team will prepare a 10-20 minute presentation (time dependent on # of teams). Presentations will answer the question: Why is this drug deemed essential? Presentations should include information about the disease, drug mechanism of action/toxicity, drug discovery, and comparison with other available treatments, including cost. Sources should include at least 4 popular media sources- these may be popular media websites, newspapers or articles from non-scientific publications and at least 4 scientific websites- these may be government or academic websites, primary biological texts, or scientific journal articles.

Some tips:

1. Slides should have a consistent format (theme). Make purposeful use of color. Design with high contrast- avoid yellow on white or purple on black. Assume viewing conditions will be less than perfect.
2. All slides should have a title. The best titles are informative- they state a conclusion or fact. For example, “Drug X is converted into a toxic metabolite” is a much better title than “Metabolism”.
3. Fewer words are better, pictures are best.
4. If you use a figure from somewhere else, include attribute at bottom of slide.
5. If you show a figure, you must be prepared to answer questions about all of it.
6. Font size: no less than 18, bigger is much better.
7. Practice- delivery matters. Introduce your team at the start, introduce the next speaker. Avoid “Um” “like” etc. Note that the task is to produce the best possible presentation- it may be that the best presentation uses only one speaker.