

## Chemistry 314C Biochemistry at the Bar Spring 2019

ROOM ISC 1111; T or R 2:00-2:50 pm

Instructor:	Office	Phone	Office Hours*	email
Doug Young	ISC 2037	221-253	W (1:00–2:30); R (10:30–12:00)	dyoung01@wm.edu

\* Please note that office visitations are not necessarily restricted to these times. Additional times arranged by appointment.

**Text:** T. McKee & J.R. McKee, *Biochemistry: The Molecular Basis of Life*, Fifth Edition, Oxford University Press. Text web address: [www.oup.com/us/mckee](http://www.oup.com/us/mckee)

The above text will be supplemented with the following material:

K. Drlica, *Understanding DNA and Gene Cloning: A Guide for the Curious*, John Wiley & Sons, Inc. 1984

K. Hanna, *Biomedical Politics*, National Academy Press, 1991

B. Rollin, *The Frankenstein Syndrome: Ethical and Societal Issues in the Genetic Engineering of Animals*, Cambridge University Press 1995

M.P. Battin, L.P. Francis, J.A. Jacobson & C.B. Smith, *The Patient as Victim and Vector: Ethics and Infectious Disease*. Oxford University Press, 2009.

E.J. Emanuel & J.S. Hawkins, *Exploitation and Developing Countries: The Ethics of Clinical Research*, Princeton University Press, 2008.

B. Goldacre, *Bad Pharma: How Drug Companies Mislead Doctors and Harm Patients*, Faber and Faber, 2013.

J.D. Moreno, *Undue Risk: Secret State Experiments on Humans*, W.H. Freeman and Company, 2000.

U. Schmidt, *Justice at Nuremberg*, Macmillian Press, 2004

M.L. Rantala, *O.J. Unmasked: The Trial, the Truth, and the Media*, Catfeet Press, 1996.

D.B. Resnik, *The Ethics of Science*, Routledge Press, 1998.

**Course Goals:** With the recent sequencing of the human genome, increasing prevalence of various diseases and disorders including cancer, Alzheimer's, etc., and advancing sophistication of numerous biotechnologies, new social and ethical responsibilities fall upon the scientist. This 1-credit supplement to the Biochemistry 314 course fulfills the COLL 200 requirement, and aims to “reach-out” beyond the science and put the responsibilities of the biochemist on trial. Through the integration science with the fields of philosophy, law, and government, this course aims to produce a “global scientist.” Drawing from multiple sources including film, current events, and guest lectures students will be afforded a holistic perspective on science in society and the implications of biochemical research. This class must be taken concurrently with CHEM 314: Biochemistry; however will result in an independent grade.

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**Course Structure:** The course will be divided into 3 units, each framed by a popular film. The bioethics and science related to “cloning” will first be examined employing *Jurassic Park* for context. This unit will consist of a scientific primer, and will engage in the philosophical debate on the ethics of DNA manipulation. We aim to ask big picture questions involving genetic screening, DNA manipulation, and the cloning of organisms. The next unit will emphasize the ethics and societal impact of disease and *Contagion* will aid in providing context for the material. This unit will draw from current events and examine a variety of disease related topics including, the ethics of drug development, vaccinations, and Machiavellian principles in disease outbreak. The final unit will be much more literal and examine the role of science in the courtroom. To frame the material, *Conviction* will be explored in terms of both the science and societal impacts of forensic evidence, but also the role of science in the courtroom. To further the discussion, the role of scientific evidence will be explored in the context of the OJ Simpson and Steven Avery trials, as well as popular TV shows including *CSI*. This unit will also examine the role of “whistleblowers” in the scientific field and the ethics and consequences of this behavior. Additional readings may be assigned as required to provide fundamentals beyond the scientific knowledge expected from the student.

**Evaluation:** Due to the interdisciplinary nature of the course, a “choose your own adventure” approach will be employed towards evaluation. Final grades will be based on the standard scale (90-100: A/A-; 89-89: B-/B/B+, etc); however a curve may be applied if needed. No grades will be curved down. As this is a non-lecture based course, and driven by in-class discussion, a non-negotiable 20% of the grade will be based on participation/attendance. The additional 80% of the grade will be self-selected based on your strengths and/or areas you would like to develop. Each student will fill out a “contract” that is due **during the class meeting of the 2<sup>nd</sup> week of the course**, outlining their desired mechanism of assessment. There will be 3 primary categories of assessment, and while you are free to select all 3, you must be evaluated in AT LEAST 2 of the areas. You may opt to do multiple assignments within one area; however, a selected assignment can be weighted no less than 10% and no more than 40%. These areas are as follows:

Case Study: Within the examination category there will be 2 case studies offered. Both will consist of a separate case study, requiring the application of both biochemical knowledge and societal impacts. You may take one or both towards receiving credit.

Presentation: The presentation component will have 2 options: 1) A 5-10 minute in class presentation of a current event related to Biochemistry and its social/ethical consequences; and 2) a “mock” trial on a mutually selected topic. You will be assigned a side to provide an appropriate argument surrounding the biochemical ethics of the topic. For each side of the argument 2-3 individuals may be assigned to work collectively to afford the most persuasive argument, with the rest of the class serving as the jury.

Writing: There will be two written assignments offered. The first will be a 2-4 page essay selecting a film with biochemical relevance and clearly analyzing the science followed by the societal impacts related to the science. A list of films will be provided, however, others may be selected WITH INSTRUCTOR APPROVAL. The second writing assignment will be a 2-4 page essay critically analyzing a current event (within the past 6 months) that has both biochemical and social relevance. If selected in conjunction with the oral presentation a different event must be selected.

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### Schedule\*:

Week	Topic	
1/21	Introduction	
1/28	Primer to Molecular Biology/ CRISPR-Cas 9	Reading: Drlica pg. 28-42; 175-182  <b>Evaluation Contract Due</b>
2/4	Jurassic Park Discussion	Reading: Hanna pg. 258-268; 302-307; Rollin pg. 21-32
2/11	Ethics Primer/Guest Lecture	Reading: Resnik pg. 13-30; TBD
2/18	Contagion Discussion	Reading: Battlin pg. 16-40 <b>Case Study #1 Due</b>
2/25	Disease and Society	Reading: Hawkins pg. 55-62 <b>Paper #1 Due</b>
3/4	Spring Break	
3/11	Drug Development Ethics	Reading: Goldacre TBD; Current Events Articles
3/18	Conviction Discussion	Reading: Moreno pg. 53-85 Schmidt pg. 199-222
3/25	Science and Law/Guest Lecture	Reading: TBD
4/1	Biochemistry in the Courtroom/ Crime Scene	Reading: Rantala pg. 90-119 <b>Case Study #2 Due</b>
4/8	Presentations	<b>Paper #2 Due</b>
4/15	Presentations	
4/22	Course Assessment	

\*The schedule is dependent upon the assessment selection and may need to be adjusted accordingly. For example, presentations may be extended into the final week in order to accommodate the need. A finalized schedule will be provided on Week 3 of the course.