

# THE WAGNER FREE INSTITUTE OF SCIENCE

Winter 2018  
CHEMISTRY SERIES  
**Biochemistry of Your Medicine Cabinet – and Beyond**  
Professor Joseph B. Rucker

The course meets at the **Independence Branch of the Free Library**, located at 18 S. 7th Street (between Chestnut and Market Streets), Philadelphia.

**Dates:** 6 Wednesdays, January 24 to February 28, 2018

LECTURES ARE HELD FROM 6:15 to 7:30 PM

## Course Description

People regularly take medications for all kinds of conditions, from headaches and upset stomachs to cancer and deadly infections. This course will be a biochemist's view of how the medicines we take – or hear about in the news – work. Each week will focus on a different drug or class of drugs, how they were discovered, and how they act at the molecular and cellular level.

## Course Schedule

### **1. Wednesday, January 24, 2018 – From Lab Bench to Bedside: How Do Medicines Work?**

Course introduction; from pills to molecules; thinking about molecules; from targets to cells; how new drugs are discovered.

### **2. Wednesday, January 31, 2018 – Bad Bug, Good Bug: Bacteria and Antibiotics**

What are bacteria? The discovery of antibiotics; the rise of antibiotic resistance; understanding the microbiome.

### **3. Wednesday, February 7, 2018 – Cardio Training: Cholesterol and Heart Disease**

Cholesterol, lipids, and the cardiovascular system; the rise of statins; learning from genetics; failures and successes in the 21<sup>st</sup> century.

### **4. Wednesday, February 14, 2018 – No Pain, No Gain: Understanding Opiates**

From opium to oxycodone; from opioid receptors to endorphins; the biology of side effects; what's next?

### **5. Wednesday, February 21, 2018 – 21<sup>st</sup> Century Medicine: Cell Therapy and the Promise of Personalized Medicine**

From immunity to medicine; learning from HIV; manipulating genes; teaching our bodies to fight diseases.

### **6. Wednesday, February 28, 2018 – A Day in the Life**

How do you start thinking about treating a disease? What does a biotech company look like?

Wednesday, March 9, 2016 – make-up class (if needed)

**Disclaimer:** Understanding how medicines work at the biochemical level is not the same as understanding how they might act on a patient. Nothing in this course is medical advice or should be interpreted as medical advice.

### **Recommended Readings**

There is no textbook or required reading for this course. Any good undergraduate biochemistry textbook (even one that is old) can provide deeper insight into many of the topics discussed in this course. The following general resources can be used as optional supplements to the course for people who wish to learn more.

1. Three faculty members at Oregon State University (Kevin Ahern, Indira Rajagopal, and Taralyn Tan) have produced two free online undergraduate textbooks of biochemistry, available in a variety of formats (PDF, Kindle, and iPad). Files can be downloaded at:

<http://biochem.science.oregonstate.edu/content/biochemistry-free-and-easy>

2. *In the Pipeline* is chemist Derek Lowe's blog on drug discovery. While some of the posts are relatively technical in nature, many of them are general thoughts on the art and science of drug discovery. The blog is located on the *Science* magazine website but is editorially independent. Dr. Lowe has a dry wit and a veteran's perspective on the pharmaceutical and biotech industry.

<http://blogs.sciencemag.org/pipeline/>

**Dr. Joseph B. Rucker** is the vice-president of research and development and a co-founder of Integral Molecular, a biotech company in West Philadelphia. His scientific expertise focuses on membrane proteins, sensory receptors, viruses, and antibodies. He is an author on more than 30 publications and has published in journals including *Cell*, *Science*, and *Nature*. He received his Ph.D. in chemistry from the University of California, Berkeley and did post-doctoral work at the University of Pennsylvania. He joined the Wagner's faculty in 2015.

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