

# THE WAGNER FREE INSTITUTE OF SCIENCE

Winter 2020  
CHEMISTRY SERIES  
**Living Small: Adventures in the Bacterial World**  
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 22 to February 26, 2020

**Time:** Lectures are held from 6:15 to 7:45 PM

**No pre-registration required. Please register by filling out a registration form at the class.**

## Course Description

From the air we breathe to the depths of the ocean to our own bodies, bacteria live all around us, on us, and in us. This course will be an exploration of the world of bacteria, including how they grow and reproduce, how they interact with each other and other organisms, and how they contribute to human health.

## Course Schedule

### **1. Wednesday, January 22, 2020 – What are bacteria?**

Course introduction; the tree of life; what are bacteria?; studying bacteria.

### **2. Wednesday, January 29, 2020 – Replication**

From one to many; replicating DNA, mutation and variation, sex and the single bacterium.

### **3. Wednesday, February 5, 2020 – Antibiotics**

Bacterial diseases; the discovery of antibiotics; how antibiotics work; antibiotic resistance.

### **4. Wednesday, February 12, 2020 – The Social Life of Bacteria**

From glowing squid to cholera; how bacteria talk to each other; the advantages of working together; the bacterial origins of animals and plants.

### **5. Wednesday, February 19, 2020 – Bacteria are Us: The Microbiome**

How bacteria shape the world; good and bad roommates; bacteria and the immune system.

### **6. Wednesday, February 26, 2020 – Living on the Edge**

Some like it hot; how are bacteria so tough?; what bacteria tell us about the origin of life

Wednesday, March 4, 2020 – make-up class (if needed)

### **Recommended Readings**

There is no textbook or required reading for this course. The following general resources can be used as optional supplements to the course for people who wish to learn more.

1. Amyes, S. G. B. *Bacteria: A Very Short Introduction*. (OUP Oxford, 2013).  
This is a very accessible introduction to bacteria. Also available at the Free Library of Philadelphia.
2. Cossart, P. *The New Microbiology: From Microbiomes to CRISPR*. (ASM Press, 2018).  
This is an accessible but somewhat more technical overview of discoveries made in microbiology over the last decade or so.
3. <https://open.oregonstate.edu/microbiology/>  
This is a free online textbook at Oregon State University that covers bacteria as well as other microbes.

### **About the Professor**

**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.

**The course is presented by the Wagner Free Institute of Science.** Founded in 1855, the Wagner is dedicated to providing free science education. All classes are free and open to the public. To attend, please complete a registration form at the class. For more information about the Wagner Free Institute of Science and its programs, please visit [www.wagnerfreeinstitute.org](http://www.wagnerfreeinstitute.org) or call 215-763-6529.

---