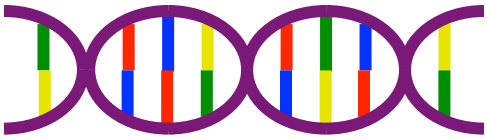
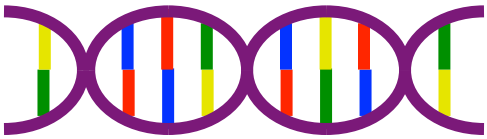
Dr. Rider's Laboratory at Voyagers

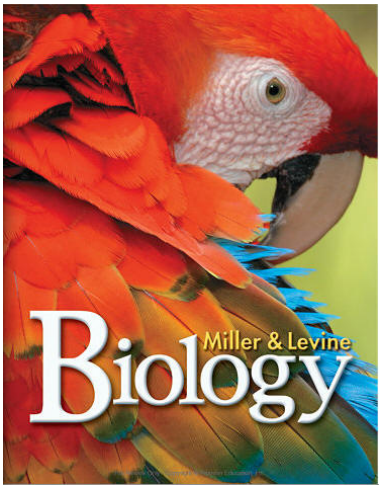
Biology

Mondays 10:30-Noon Spring 2020
$390 members/$440 nonmembers
Chelmsford, MA voyagersinc.org
Dr. Todd H. Rider, thor@riderinstitute.org





This course will cover the field of biology from its fundamental principles through cutting-edge synthetic biology and drug discovery. **No prior knowledge is required—new students are very welcome to join.** Each class will have short lectures but will mainly focus on hands-on lab activities using high-quality microscopes, DNA-copying thermocyclers, DNA analysis gels, cell culture supplies, centrifuges, and other professional laboratory equipment. It is recommended (though not required) that students buy a biology textbook for supplementary readings during each week. Students can use **either** Miller & Levine's *Biology* **or** *Campbell Biology*:



For younger/less experienced students:

Macaw edition (2010 or later)

or

Dragonfly edition (2005)

OR

For older/more experienced students:

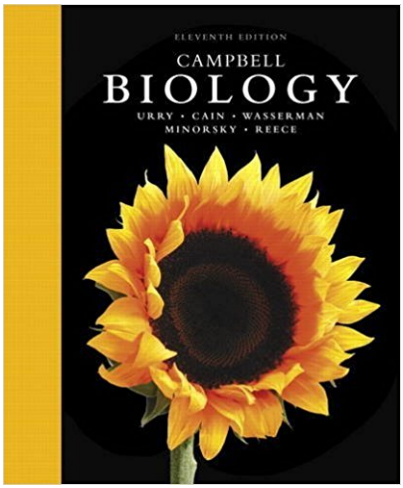
11th ed. (2016)

or

10th ed. (2013)

or

9th ed. (2010)



Date	Subject	Topic	Campbell or	Miller & Levine
1/27	Molecular biology	DNA	Ch. 16	DNA, Genetic Engineering
2/3	Molecular biology	DNA	Ch. 20	DNA, Genetic Engineering
2/10	Molecular biology	RNA	Ch. 17	RNA, Human Heredity/Genome
2/17	[No class—School vacation week]			
2/24	Molecular biology	RNA	Ch. 18	RNA, Human Heredity/Genome
3/2	Molecular biology	Proteins	Ch. 15	Protein Synthesis
3/9	Molecular biology	Proteins	Ch. 17	Protein Synthesis
3/16	Microbiology	Bacteria	Ch. 27	Prokaryotes (or Bacteria)
3/23	Microbiology	Bacteria	Ch. 27	Prokaryotes (or Bacteria)
3/30	Microbiology	Viruses	Ch. 19	Viruses
4/6	Microbiology	Viruses	Ch. 19	Viruses
4/13	Microbiology	Other microorganisms	Ch. 28	Protists, Fungi, Worms
4/20	[No class—School vacation week]			
4/27	Microbiology	Other microorganisms	Ch. 31, 33	Protists, Fungi, Worms

Note: Chapter numbers differ widely among different editions of Miller & Levine, so the right column lists them by their topics, not their numbers. Chapter numbers can also vary in some editions of Campbell, so always verify that the chapter's topic matches the intended topic.

New textbooks are insanely expensive, but more affordable used copies are available from online dealers at amazon.com, abebooks.com, etc. Students can also save money (without losing much scientific content) by buying an edition that is recent but not the very latest edition. Dr. Rider will bring copies of the textbooks to the first class if you would like to examine them before deciding which one to order. He can suggest free information sources online for those who prefer not to buy a book.

Students are encouraged to pursue their own independent studies or science fair projects outside of the course. Dr. Rider is happy to offer suggestions or advice. Some useful books on setting up a home lab are:

Raymond E. Barrett & Windell H. Oskay, *The Annotated Build-It-Yourself Science Laboratory* (2015)

Robert Bruce Thompson, *Illustrated Guide to Home Biology Experiments* (2012)

William Berman, *How to Dissect* (4th ed., 1984)

James D. Witherspoon, *From Field to Lab* (1993)

A good source of supplies for setting up a home lab is:

www.homesciencetools.com (Wide range of supplies; ignore the creationist books)

Information on upcoming science fairs and previous winning projects is available at:

www.societyforscience.org

About the instructor:

Dr. Todd H. Rider received his Ph.D. from MIT, and his research has been featured in magazines ranging from *Science* to *Time* and on TV programs from NBC's Nightly News to BBC's Horizon. In biology research, he invented and developed the CANARY sensor, which uses genetically engineered white blood cells to rapidly identify bacteria, viruses, and other pathogens. Dr. Rider also invented the DRACO broad-spectrum antiviral therapeutics and demonstrated that they are safe and effective against 18 different viruses in cells and 4 viruses in mice. In physics research, he discovered fundamental physical limitations on nuclear fusion reactors, analyzed antimatter rocket engines, and demonstrated methods to combine numerous laser beams to form more powerful laser beams. He created the K-12 Science on Saturday program at MIT and has over 25 years of experience teaching biology, chemistry, physics, earth science, engineering, and archaeology courses to students at all levels. He is currently working on his plan for world domination.