

**THE UNIVERSITY OF IOWA BIOLOGICAL SCIENCES
GENETICS SUBTRACK**

1. *Students lacking background equivalent to the following courses should enroll in these courses which they could have taken as an undergraduate.*

099:110 Biochemistry **3 s.h.**

Chemistry, metabolism, molecular biology of living systems. **Prerequisites:** two semesters of general chemistry, one semester of organic chemistry, and one of the following: a life science course, an additional organic chemistry course, or consent of instructor.

or

099:120 Biochemistry and Molecular Biology I **3 s.h.**

Structures of nucleic acids, proteins, carbohydrates, lipids, and their participation in cellular transport, catalysis, oxidative reactions; first course of two-semester course that concludes with 099:130. **Prerequisites:** two semesters of general chemistry and one of organic chemistry.

and

099:130 Biochemistry and Molecular Biology II **3 s.h.**

Molecular dynamics of biological systems, metabolism of lipids and nitrogen-containing compounds; information transfer in prokaryotes, eukaryotes; recombinant DNA techniques; chemistry and enzymology of replication, transcription, translation, cell transformation, regulation of gene expression. **Prerequisite:** 099:120.

2. *At least two of the following lecture based courses are required, one from Group A and one from Group B.*

Group A

002:171 Molecular Genetics **4 s.h.**

Mechanism, regulation of RNA, DNA, protein biosynthesis, with emphasis on methods of genetic analysis; application of modern recombinant DNA techniques to basic problems. Open only to undergraduates and first-year graduate students. **Prerequisite:** 002:128 or 099:120.

142:210 Advanced Prokaryotic Molecular Biology **3 s.h.**

Mechanism and regulation of DNA, RNA, and protein synthesis in bacteria. Consent of instructor required. **Prerequisite:** 156:201, or 002:128 and 099:130. Same as 061:210.

142:215 Molecular Biology of Gene Expression **3 s.h.**

Principles and techniques for investigating mechanisms of controlling eukaryotic gene expression; basic genome organization, chromatin structure, transcription, RNA processing, translation; cloning methods, use of electronic sequence databases, footprinting, chromatin immunoprecipitation, in vivo and in vitro transcription assays, DNA microarray analysis, information retrieval. **Prerequisite:** 156:201.

Group B

002:170 Bioinformatics **3 s.h.**

Basics of genetics and molecular biology; overview of bioinformatics and genome science, including genome projects, functional genomics, phylogenetics, proteomics, microarrays, DNA

polymorphisms, data-mining algorithms; experimental methods, analytical approaches.
Prerequisite: 002:128 or 099:120 or graduate standing or consent of instructor. Same as 055:121, 127:170.

002:168 Genes and Development

3 s.h.

Mechanisms by which genes control development; methodology of scientific research applied to developmental genetics. Open only to seniors and graduate students. Offered spring semesters.

Prerequisite: 002:128.

002:162 Population Genetics and Molecular Evolution

3 s.h.

Nucleotide sequences, genes, and mutation; rates and patterns of nucleotide substitution; selection at the molecular level and the neutral theory; population genetics theory; genome evolution. **Prerequisite:** grade of C- or higher in 002:128 or consent of instructor.

3. One 2 s.h. advanced seminar course with a writing component each year after declaring the track. At least three of which must be the following:

002: 191 Topics in Molecular Genetics

2 s.h.

Topics rotate, for example: Chromatin Structure and Function, Cell Cycle, DNA Replication, Meiosis