

Course Title: Interdisciplinary Research Fundamentals I (Biology)

Instructor: Steven Davis, PhD; email: s.davis@life.isct.ac.jp

Description: This course introduces fundamental topics in biology (evolution, cell and molecular biology, genomics, bioinformatics) to students who have had little to no exposure to the life sciences.

Course objective: To help students acquire knowledge in a broad range of biological concepts and phenomena for application to the biomedical and biotechnology fields.

Goals: At the end of the course, students are expected to have acquired broad knowledge in biological fields and in the molecular and cellular bases of life. It is also hopeful that they begin exploring the relevance of life science topics to their own fields of study.

Schedule: Monday, 13:30-15:10 (1:30 pm – 3:10 pm) (April 13– June 1, 2026);
B2-226 Suzukakedai-campus

Grading: The final grade will be calculated on a scale of 0-100, based on the following:

• Class attendance (quizzes)	42%
• Homework (search of paper/topic)	28%
• Short report	30%
Total	100%

*If the submitted report contains plagiarism from known documents (including information on the internet), the grade of this class will be marked as zero. In some cases, further disciplinary action may be subjected by the University.

References:

MIT Open course “Introductory Biology” (Video Lectures): https://ocw.mit.edu/courses/7-016-introductory-biology-fall-2018/video_galleries/lecture-videos/

COURSE SCHEDULE

Week	Topic	Essential questions	References
1	Introduction to biology and life science, cell structure and function	What is biology and why study it? What are the basic structures of cells and how do they function?	Lecture 1 Readings
2	Central dogma (DNA, RNA, proteins), gene expression (transcription, translation) and regulation	What is life and what are its basic components? How does gene expression dictate our features?	Lecture 2 Readings
3	Mitosis, meiosis, and genetics	How is DNA replicated and transmitted to offspring? How are traits inherited from parents to offspring?	Lecture 3 Readings
4	Evolution of life and biodiversity	How has life evolved on our planet? What are the different forms and lineages of life?	Lecture 4 Readings
5	Sensory mechanisms and the nervous system	How do living things process information, sense the environment and each other?	Lecture 5 Readings
6	Stem cells, recombinant DNA, and gene editing	How is a complicated organism produced from one fertilized egg? What are stem cells? How can we modify the genomes of living organisms for our benefit?	Lecture 6 Readings
7	Genomics and bioinformatics	How do we study large amounts of biological information, from the genome to proteome?	Lecture 7 Readings