Nucleic Acid Engineering

Syllabus Number 5C225
Basic Major Subjects
Elective Requisites 2 credit

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1. Course Description

The purpose of this course is to learn the following.
(1) DNA cloning: restriction enzyme, ligation of DNA, and plasmid
(2) Analysis of the cloned DNA: DNA sequencing, PCR, etc.
(3) Application of nucleic acid engineering technology

2. Course Objectives

This course aims to understand the basic tools and techniques in nucleic acid engineering, and its applications.

3. Grading Policy

Final grade will be calculated according to the midterm examination (40%) and the final examination (60%). To pass, students must earn at least 60 points out of 100.

4. Textbook and Reference

Reference
T. Tamura "Kiso kara manabu" genetic engineering (in Japanese) Yodosha, ISBN 978-4-7581-2083-8

5. Requirements(Assignments)

Students have to prepare each lecture by reading the handout posted on LMS and summarizing the content of next lecture in a notebook. This preparation will take one hour.
There will be homework each week. Students should review the questions they did not understand in their homework. This review will take two hours.

6. Note

Students should take "Molecular genetics". Please review the contents of "Molecular genetics". Handout will be posted on LMS.

7. Schedule

[1] What is genetic engineering?
Replication of DNA
Gene expression
[2] Basic methods of handling nucleic acids
[3] DNA amplification by PCR and gel electrophoresis
[4] Cloning and vector
[5] Plasmid, restriction enzyme and DNA ligase
[6] Introduction of recombinant gene
[7] Recombinant protein expression and analysis
[8] Midterm examination and commentary
[9] Generating DNA library and screening
[10] Detection and sequencing of DNA
[11] Gene expression analysis
[12] Analysis of protein-DNA interaction
[13] Analysis of protein-protein interaction
[14] Application of genetic engineering technology and its safety
[15] Final examination and commentary