

**Course Syllabus**  
**SCBM 374 Gene Technology**  
**Academic Year 2024**

**Course Title:** Gene Technology  
**Course Code:** SCBM 374  
**Total Credit:** 1 (0-2-1)  
**Prerequisite:** None  
**Duration:** Second Semester

**Course Description:**

Gene manipulation and recombinant DNA techniques; principles of gene technology; mini-project involving handling of nucleic acid and proteins; evaluation of the quality of experimental data, laboratory rules and regulations.

**Course Objectives:**

At the end of this course, students will be able to

1. Explain basic principles of gene technology
2. Understand basic principles of nucleic-acid experiments
3. Understand basic principles of protein experiments
4. Interpret and evaluate the quality of experimental data

**Teaching Methods:**

Practical laboratory and computational sessions

**Teaching Media:**

PowerPoint; Classroom handouts; Google Classroom

**Evaluation of Student Achievement:**

• Quiz	20%
• Attendance	10%
• Lab report (2 report per group)	40%
• Written exam	30%
• <b>Total</b>	<b>100%</b>

Grading scheme (0-50 F; 51-55 D; 56-60 D+; 61-65 C; 66-70 C+; 71-75 B; 76-80 B+; 81-100 A)

**Recommended Textbook**

- Molecular Cloning, A Laboratory Manual, 4th Edition, [www.molecularcloning.org](http://www.molecularcloning.org)
- Cold Spring Harbor Protocols, [www.cshprotocols.org](http://www.cshprotocols.org)
- Addgene's Plasmids 101 (3<sup>rd</sup> Ed.), [www.addgene.org/educational-resources/ebooks/](http://www.addgene.org/educational-resources/ebooks/)

**Instructors**

Lecturers, research scientists and a team of teaching assistants from Department of Biochemistry, Faculty of Science, Mahidol University

- Sakonwan Kuhaudomlarp (SK) Ph.D.
- Sittinan Chanarat (SC), Ph.D.
- Kitima Srisanga (KS), Research scientist

**Course Coordinator**

Dr. Sakonwan Kuhaudomlarp  
Department of Biochemistry,  
Faculty of Science, Mahidol University  
Tel: 02-201-5455, Email: [sakonwan.kuh@mahidol.edu](mailto:sakonwan.kuh@mahidol.edu)

## Course introduction

Gene technology is a broad term describing recombinant DNA manipulation techniques. The technology is particularly useful for several purposes such as cloning of gene of interest, gene editing, gene transfer, protein engineering and recombinant protein production.

The SCBM 374 Gene Technology course is designed to provide an intensive hands-on laboratory practice in a variety of basic techniques of gene technology, including 'cutting and pasting' genes, multiplying DNA molecules using bacterial cells and enzymatic reactions, and protein synthesis using bacteria and developing skills in experimental designs to tackle real-world problems. During the course, students will also experience basic *in silico*—via computer simulation—recombinant DNA design and protein sequence and structural analyses.

This course comprises of 3 main parts;

1. **Session 1-4: DNA fingerprinting.** This part will involve the use of bioinformatics and a variety of molecular techniques and tools to identify the origin of an unknown sample
2. **Session 6-7: Recombinant protein production and analysis.** This part will involve bioinformatic analysis of protein sequence, structural analysis and prediction, codon optimization and SDS-PAGE.
3. **Session 5, 8, 9: Result discussion and data interpretation**

**SCBM 374 Schedule for the 2<sup>nd</sup> Semester, Year 2024,  
Student group SCBM Faculty of Science,  
Mahidol University (Phayathai Campus)**

Session	Date	Time	Contents	Class format	Room	Instructor
1	W 12 Mar 24	13-16h	Bioinformatics I DNA sequence analysis and primer design	Powerpoint presentation video clips, onsite activity	TBC	SK, KS, TA1, TA2, Aj
2	F 14 Mar 24	13-16h	Buffer preparation	Powerpoint presentation video clips, onsite activity	TBC	SK, KS, TA1, TA2, Aj
3	W 19 Mar 24	13-16h	Plasmid isolation, PCR	Powerpoint presentation video clips, onsite activity	TBC	SK, KS, TA1, TA2, Aj
4	F 21 Mar 2024	13-16h	Restriction digest/agarose electrophoresis	Powerpoint presentation, video clips, onsite activity Quiz	TBC	SK, KS, TA1, TA2, Aj
5	W 26 Mar 2024	13-16h	Result discussion/quiz	Powerpoint presentation video clips, onsite activity	TBC	SK, KS, TA1, TA2, Aj
6	F 28 Mar 2024	13-16h	Bioinformatics II protein sequence and structural analyses	Powerpoint presentation, video clips, onsite activity	TBC	SK, KS, TA1, TA2, Aj
7	W 2 April 2024	13-16h	Cell lysis, SDS-PAGE, Coomassie stain	Powerpoint presentation	TBC	SK, KS, TA1, TA2, Aj
8	F 4 April 2024	13-16h	Result discussion II/quiz	Powerpoint presentation, Computational activity Quiz	TBC	SK, KS, TA1, TA2, Aj
9	W 9 April 2024	13-16h	Interactive Q&A and lab report discussion	Powerpoint presentation, Computational activity	TBC	SK, KS, TA1, TA2, Aj
10	F 11 Arpil 2024	13-16h	Exam	Onsite	TBC	SK, KS, TA1, TA2, Aj