



School of Bioinnovation and Bio-based Product Intelligence (SCIN)
Program in Bioinnovation (International Program, Multidisciplinary Program)
Course: SCIN 392 Synthetic Biology

Degree ☒ Bachelor ☐ Master ☐ Doctoral
Faculty of Science

Course Code and Course Title	English SCIN 392 Synthetic Biology Thai วนน 392 ชีววิทยาเชิงสังเคราะห์
Number of Credits	3 (3-0-6)
Curriculum and Course Type	Program of Study: Bachelor's Degree Program in Bioinnovation (International Program) Course Type: Major Elective Course
Course Coordinator	Dr Sitthivut Charoensutthivarakul (SC) Address: K618 Chalermphrakiat Building Department of Pharmacology, Faculty of Science, Mahidol University Tel: 0-2201-5956 email: sitthivut.cha@mahidol.ac.th
Semester/Year of Study	Academic Year 2026 First Semester (1/2026) / Third Year
Prerequisite	None
Co-requisite	None
Day/Time/Study Site Location	Monday / 9.00 AM-12.00 PM / SC1-154 Faculty of Science, Mahidol University, Salaya Campus
Date of Latest Revision	18 July 2026

Course Learning Outcomes (CLOs)

After successful completion of this course, students can

1. Utilize knowledge in fundamental processes in life science to artificial systems and synthetic biology
2. Apply appropriate materials for biological tools toward problems in life science, agricultural technology, environmental management and medicine
3. Develop innovative approaches for synthetic biology to translate into innovation

Course Description

Fundamental concepts of biopolymers; bioengineering of proteins and nucleic acids; metabolic pathways and engineering; biosensors and reporters; cellular reprogramming; synthetic tissues and tissue engineering; nanobiotechnology, integrations of omics to control diverse bioprocesses; and modern techniques in synthetic biology.



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Credit Hours / Semester

Theory (Hours)	Addition Class (Hours)	Laboratory/Field trip/ Internship (Hours)	Self-study (Hours)
45 Hours/Semester (3 Hours x 15 Weeks)	-	-	90 Hours/Semester (6 Hours x 15 Weeks)

Number of Hours per Week for Individual Advice

1 hour per week by appointment at **K618** Faculty of Science, Mahidol University, Phayathai Campus or online via <https://mahidol.webex.com/meet/sitthivut.cha>. Students can contact the instructors by email or via Google Classroom which will be responded to during office hours.

Evaluation of the CLOs

Course Learning Outcomes		Measurement Method			Weight (%)
		Class Attendance, Participation and Behavior in Class	Written Exam	Class Project	
CLO1	Utilize knowledge in fundamental processes in life science to artificial systems and synthetic biology.	5%	10%	5%	20%
CLO2	Apply appropriate materials for biological tools toward problems in life science, agricultural technology, environmental management and medicine.	5%	25%	10%	40%
CLO3	Develop innovative approaches for synthetic biology to translate into innovation.	5%	25%	10%	40%
	Total	15%	60%	25%	100%



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Measurement and evaluation

After completion of the evaluation process each student is assigned a criterion-referenced grade (as shown in the table below). Evaluation and achievement will be justified according to Faculty and University code, conducted by grading systems of A, B+, B, C+, C, D and F. To pass this course, students must earn a grade of at least a D.

Total Percentage of Evaluation	Below 49.5	49.5-54.5	54.5-59.5	59.5-64.5	64.5-69.5	69.5-74.5	74.5-79.5	79.5-100
Grade	F	D	D+	C	C+	B	B+	A

Teaching staff:

Code	Name	Email
SC	Sitthivut Charoensutthivarakul Office: K618 (Phayathai Campus)	sitthivut.cha@mahidol.ac.th
CS	Chotiwat Seephetdee Office: Pr614 (Phayathai Campus)	chotiwat.see@mahidol.ac.th
PC	Papasara Chantawichitwong Office: B400 (Phayathai Campus)	papasara.cha@mahidol.ac.th
TJ	Thapakorn Jaroentomeechai Office: BT207 (Phayathai Campus)	thapakorn.jar@mahidol.ac.th
PW	Patompon Wongtrakoongate Office: K623 (Phayathai Campus)	patompon.won@mahidol.ac.th



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Teaching Schedule 1st Semester of Academic Year 2026

Monday 9.00 AM - 12.00 PM, SC1-154 Faculty of Science, Mahidol University

Week	Date	Topic	Hour		Instructor
			Lecture	Lab	
1	3 Aug	Course Orientation The Central Dogma Review Protein Structure and Functions	3	0	SC
2	10 Aug	Gene organization and expression	3	0	CS
3	17 Aug	Tools in Synthetic Biology and Bioinformatics	3	0	CS
4	24 Aug	Designing mRNA for Therapeutics	3	0	CS
5	31 Aug	Delivery Systems & Lipid Nanoparticle (LNP) Synthesis	3	0	PC
6	7 Sep	Synthetic Biology for Longevity and Anti-Aging I	3	0	PW
7	14 Sep	Synthetic Biology for Longevity and Anti-Aging II	3	0	PW
8	21 Sep	Trends in Cell-Free Synthetic Biology	3	0	TJ
Midterm examination period					
10	5 Oct	No class	-	-	-
11	12 Oct	L2 – L7 assessment	3	0	CS/PC/PW
12	19 Oct	Introduction to Post-Translational Modifications (PTMs) and Cell Signaling	3	0	SC
13	26 Oct	Synthetic Glycobiology	3	0	TJ
14	2 Nov	Chimeric Antigen Receptor (CAR) Cell Engineering	3	0	PC
15	9 Nov	Bioorthogonal Tools for Chemical Biology	3	0	SC
16	16 Nov	Antibody-Drug Conjugates (ADCs)	3	0	SC
17	23 Nov	Writing a proposal for therapeutics startup	3	0	CS/PC/TJ/SC/PW
Final examination period (L8-16 assessment) PC/TJ/SC					