

School of Bioinnovation and Bio-based Product Intelligence, MUSC
the First Semester, Academic Year 2026

SCIN 494 Senior Project in Bioinnovation II: 3 (0-9-3)

About This Course

Planning and proceeding for a case study of research in bioinnovation; the research instrumental analysis and key technology; data collections and analysis; results evaluations and discussions; re-search writing; research presentations

Outcome-based education

CLO1	Design and implement a bioinnovation research or innovation project by applying scientific principles, research methodologies, and technical skills
CLO2	Utilize digital technologies and appropriate AI-assisted tools responsibly to collect, manage, analyze, and interpret scientific data while maintaining scientific integrity and ethical standards
CLO3	Critically evaluate research findings, identify limitations, and propose evidence-based conclusions or innovative solutions
CLO4	Communicate research outcomes effectively through scientific writing and professional oral presentations using appropriate digital communication tools
CLO5	Demonstrate professionalism, ethical conduct, lifelong learning, and awareness of sustainability, intellectual property, and regulations in conducting bioinnovation research

Study: Lecture via online (Google Meet), Work in Laboratory, Seminar at B400 (PhayaThai)

Assignment: Google classroom (gh3ve3wl) - <https://classroom.google.com/c/ODcxNDY1MTO1MDI2?cjc=gh3ve3wl>

Duration: Aug 3, 2026 - Dec 4, 2026

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SCIN494 Schedule in the First Semester, Academic Year 2026

Period	Date	Topics	Place	Instructor
1	Aug 13 9:00am- 11:00am	Introduction to SCIN 494 Course description Course evaluation Important dates	Online via Google Meet	AR/SC/PC
2	Aug 27 9:00am- 11:00am	Prep workshop 1: Experimental design, methodology, risk assessment, digital research tools	Online via Google Meet	AR/SC/PC
3-6	Aug-Sep	Research implementation I	Work under a supervision of research advisor	Advisors
7	Sep 17	Mid-semester research progression	Record of progress meeting with supervisor around week 7 - Progress form (with canva/ppt and lab pic)	Advisors/ AR/SC/PC
8-10	Sep-Oct	Research implementation II	Work under a supervision of research advisor	Advisors
11	Oct 22 9:00am- 11:00am	Prep workshop 2: Preparation for research report and final presentation	Online via Google Meet	AR/SC/PC
12	Oct 29	Mid-semester research progression	Record of progress meeting with supervisor around week 12 - Progress form (with canva/ppt and lab pic)	Advisors/ AR/SC/PC
13-14	Oct-Nov	Research implementation III	Work under a supervision of research advisor	Advisors
15	Nov 23 - Dec 3	Submission Senior project report Abstract Safety evaluation	via Google Classroom/Form	Advisors/ AR/SC/PC
16	Dec 9 (or TBA)	Final Project Presentation Evaluation	Seminar at B400 (PhayaThai)	AR/SC/PC/ Advisors

List of Advisors:

Advisors	Office	Phone	E-mail

Assessment:

Class attention **not less than 80%** of total classes to have a chance for the final project presentation.

All absence form with documents must be submitted within 3 days after absent date.

(Advisor)

Research Performance 30 %

(Advisor and Course-coordinators)

Progress Evaluation 20 %

Final Research Report 20 %

(Advisor, Course-coordinators, and peers)

Final Project Presentation 30 %

Grading:

A	80 – 100 %	B +	75 – 79 %
B	70 – 74 %	C +	65 – 69 %
C	60 – 64 %	D +	55 – 59 %
D	50 – 54 %	F	< 50 %

There is no re-examination for this course. Extension of the research period may be granted through an Incomplete (I) grade according to Mahidol University regulations and requires approval from both the course coordinators and the advisor. In such cases, the final grade may be reduced, with the maximum attainable grade limited to B, based on the consideration of the student's progress, project completion, and academic performance.

Appealing Procedure:

In the event a student believes an assigned grade or an imposed academic action is incorrect or not appropriate, the student may follow the processes outlined below to seek prompt and equitable resolution of the matter.

If a student believes a grade has been incorrectly assigned, the student should:

- 1) Present the case to the course director, providing all supporting data concerning the nature of the discrepancy.
- 2) If, after a decision is rendered, the student believes that his or her concerns have not been adequately resolved, the student may pursue a formal appeal with the academic program. To appeal to the academic program, a student must present a written statement detailing the grounds for the appeal with appropriate documentation to the program director. This appeal must be within seven (7) days of the course director's decision. The program director will provide a written decision, including the basis for it, within seven (7) days, or as soon thereafter as practical
- 3) If the student is not satisfied with the program director's resolution, the student may pursue the appeal at the faculty level. To appeal at the faculty level, the student must present copies of all documents originally sent to the course director and the program director, along with a formal letter of appeal, to the dean of the Faculty of Science. This appeal must be submitted within seven (7) days of the program director's decision. The dean of the Faculty of Science will review the appeal and will render a written decision, including the basis for it, within seven (7) days, or as soon thereafter as practical.

If, after carrying out the steps of either process described above, the student believes that the matter has not been adequately resolved, or if no decision has been rendered by the appropriate date, the student may appeal at the university level at the Division of Education Administration. To appeal at the university level, the student must present copies of all documents and a formal letter of appeal to the Division of Education Administration. The responsible party will respond in writing with a final resolution, including the basis for it, as soon thereafter as practical.

Student can contact the administrative office to make the appeal on grading. There will be a meeting to decide on the appeal. Please submit a request form to

Educational Affair Division, Faculty of Science, Mahidol University

272 Rama VI Road, Ratchathewi District, Bangkok 10400, THAILAND Tel: +66-2201-5000

References:

Teaching and learning resources include advisor consultation, research articles and scientific data-bases, laboratory facilities and research equipment, bioinformatics and data analysis tools, digital learning platforms, AI-assisted tools for literature review and data interpretation, research methodology guidelines, biosafety and ethical guidelines, intellectual property and innovation resources, and scientific writing and presentation

materials. Students are encouraged to utilize appropriate resources responsibly to support independent learning, research development, and effective communication of bioinnovation outcomes.

Suggested Materials:

- Scientific databases and reference management tools (e.g., PubMed, Scopus, Web of Science, Google Scholar, and reference management software).
- Research articles, review papers, books, and electronic resources related to bioinnovation, biotechnology, and relevant scientific fields.
- Laboratory manuals, standard operating procedures (SOPs), biosafety guidelines, and research ethics guidelines.
- Digital tools for data management, statistical analysis, visualization, bioinformatics, and responsible AI-assisted research applications.
- Scientific writing and presentation guidelines for research reports, posters, and oral presentations.
- Resources on intellectual property, innovation management, sustainability, and relevant regulations in biotechnology.

Rubrics for [progression on week 7 and 12](#)

Instructions: Please evaluate the student based on their actual performance throughout the project. Assign scores from **1 = Needs Major Improvement** to **5 = Excellent**, selecting the level that best reflects the student's behaviors and quality of work.

Criteria	5 Excellent	4 Very good	3 Satisfactory	2 Needs improvement	1 Unsatisfactory
Experiments & methodology <i>(CLO1 — 10%)</i>	Progress exceeds or meets planned milestones. Demonstrates high technical proficiency and independent problem-solving.	Progress meets planned milestones with minor delays. Executes methods accurately with minimal guidance.	Progress is acceptable but behind schedule. Requires regular guidance to complete basic procedures.	Significant delays in implementation. Demonstrates technical struggles and relies heavily on supervision.	Minimal to no progress made. Unable to execute experimental procedures correctly.
Digital and data management <i>(CLO2 — 5%)</i>	Systematic, real-time data collection using digital tools; fully documented, ethical, and responsible use of AI tools.	Well-organized data collection and digital records; proper AI usage with minor gaps in documentation.	Basic data tracking; uses AI tools adequately but documentation of integrity is inconsistent.	Poor data tracking; questionable or undocumented reliance on AI tools.	Fails to maintain data records; unverified/unethical use of AI tools.
Professionalism, ethics & lab conduct <i>(CLO5 — 5%)</i>	Consistently punctual, maintains safety standards, highly proactive, complete research logbook.	Punctual, adheres to safety and ethical guidelines, maintains regular progress logs.	Generally punctual, follows basic safety guidelines, progress logs are filled with minor delays.	Frequent tardiness, occasional safety or logbook lapses, requires monitoring.	Unprofessional, violates biosafety/ethics guidelines, fails to maintain a research logbook.

Rubric for Assessing Undergraduate SCIN Students' Senior Project Report

Instructions: Please evaluate the student based on their actual performance throughout the project. Assign scores from **1 = Needs Major Improvement** to **4 = Excellent**, selecting the level that best reflects the student's behaviors and quality of work.

Criteria	Weight (%)	4 (Excellent)	3 (Good)	2 (Satisfactory)	1 (Needs Improvement)
1. Title, Abstract & Keywords	10	Title is concise and informative; abstract clearly summarizes objectives, methods, major findings, and significance; appropriate keywords.	Minor omissions or unclear wording.	Important information missing or unclear.	Incomplete or poorly written.
2. Introduction & Literature Review	15	Clearly defines background, research gap, objectives, and significance with comprehensive, up-to-date literature.	Good background with minor gaps or limited literature synthesis.	Limited background or weak justification.	Poor literature review and unclear objectives.
3. Materials and Methods	15	Experimental design is appropriate, reproducible, ethical, and clearly described; statistical methods are appropriate.	Mostly complete with minor missing details.	Important methodological details missing.	Methods unclear or inappropriate.
4. Results	15	Results are accurate, well-organized, supported by high-quality tables/figures, and presented objectively.	Results generally clear with minor presentation issues.	Results incomplete or difficult to interpret.	Results poorly presented or inaccurate.
5. Discussion & Critical Analysis	20	Excellent interpretation, critical analysis, comparison with literature, discussion of limitations, and future directions.	Good interpretation with limited critical analysis.	Mostly descriptive with limited discussion.	Minimal or incorrect interpretation.
6. Scientific Writing & Organization	10	Logical organization, excellent academic writing, grammar, and formatting; follows journal/report guidelines.	Minor language or formatting issues.	Frequent language or organization problems.	Poor writing quality and organization.
7. References & Citation	5	Uses appropriate, recent, high-quality references; citations are complete and consistent.	Minor citation errors.	Several citation or formatting errors.	Inadequate or inappropriate references.
8. Research Integrity & Responsible AI Use	10	Demonstrates ethical conduct, proper attribution, transparent reporting, responsible use of AI/digital tools, and no evidence of plagiarism.	Minor issues in reporting or documentation.	Limited transparency or incomplete attribution.	Serious ethical concerns, plagiarism, or inappropriate AI use.

Rubric for Assessing Undergraduate SCIN Students' Senior Project Performance

Instructions: Please evaluate the student based on their actual performance throughout the project. Assign scores from **1 = Needs Major Improvement** to **5 = Excellent**, selecting the level that best reflects the student's behaviors and quality of work.

Assessment Rubric Table 1 (Score of 10)

Assessment Criteria	9 - 10 Excellent	7 - 8 Very Good	5 - 6 Satisfactory	3 - 4 Needs Improvement	1 - 2 Needs Major Improvement
1. Discipline in Work Practices	Consistently follows all procedures, highly responsible, works independently without supervision	Follows most procedures, shows good responsibility, occasionally needs reminders	Follows basic procedures but inconsistently; requires regular supervision	Frequently fails to follow procedures; lacks responsibility; needs close monitoring	Shows very poor discipline; does not follow instructions or procedures
3. Experimental Design Skills	Designs clear, rigorous experiments with appropriate controls and replicates	Designs experiments well with most essential components	Designs basic experiments but lacks some key elements	Experimental design is unclear or conceptually flawed	Design does not align with objectives; major methodological errors
4. Attention to Detail in Research Work	Works meticulously with thorough verification; minimal errors	Generally careful; minor errors present	Moderate level of detail; noticeable avoidable errors	Often careless; frequent errors	Very careless; does not verify work; numerous errors
5. Punctuality	Consistently meets deadlines and attends work sessions on time	Usually punctual with occasional justified delays	Sometimes punctual; increasing delays	Frequently late; rarely informs in advance	Very often late; lacks time responsibility
6. Creativity	Generates original, valuable ideas that significantly improve the project or solve problems effectively	Shows good creativity; offers useful ideas	Some creative ideas but not consistent	Lacks initiative; follows instructions without proposing new ideas	No creativity; avoids contributing ideas
6. Work Attitude	Very positive attitude; open to feedback; collaborates exceptionally well	Generally positive attitude	Neutral attitude; inconsistent receptiveness to feedback	Occasionally negative attitude; affects workflow	Negative attitude; disrupts teamwork

Rubric for Assessing Undergraduate SCIN Students' Senior Project Performance

Instructions: Please evaluate the student based on their actual performance throughout the project. Assign scores from **1 = Needs Major Improvement** to **5 = Excellent**, selecting the level that best reflects the student's behaviors and quality of work.

Assessment Rubric Table 2 (Score of 20)

Assessment Criteria	16 - 20 Excellent	13 - 15 Very Good	9 - 12 Satisfactory	5 - 8 Needs Improvement	1 - 4 Needs Major Improvement
2. Ability in Scientific Thinking, Analysis, and Reasoning	Demonstrates deep analytical thinking; applies scientific reasoning correctly; forms and tests hypotheses systematically	Good analytical skills; applies scientific process with minor gaps	Basic analytical ability; applies scientific reasoning partially	Analysis is unclear or incorrect; uses scientific concepts inconsistently	Lacks analytical skills; scientific reasoning is largely incorrect
8. Overall Quality of the Final Report	Thorough, well-structured, clear, logically presented, with correct citations	Strong report with minor points for improvement	Basic structure complete; clarity inconsistent	Poorly organized; missing key sections	Incomplete, unclear, or fundamentally incorrect