

# SISR 617 (4866) Principles in Systems Pharmacology

(Code: 4866, 1<sup>st</sup>~2<sup>nd</sup> year, 4 units)

(Course ID: GS—c4866—S)

## 1. Instructors

| Name  | Position | Department                    | Contact Information         |
|---|----------|-------------------------------|-----------------------------|
| Chief Instructor:<br>Somponnat Sampattavanich | Lecturer | Department of<br>Pharmacology | Somponnat.sam@mahidol.ac.th |

## 2. Classroom/Lab Lecture

Lecture

Lecture Room 1119, Department of Pharmacology

## 3. Course Purpose and Outline

Systems-level reasoning of complex biological processes; advanced omics techniques for systems pharmacology research; Basics in handling big data from omics measurement; Computational concepts in biomolecular dynamics, signaling cascades, feedback regulations and biological noises.

## 4. Course objectives

By the end of the course, participants will be able to understand principles of systems pharmacology and research, ranging from data gathering to computational biology.

## 5. Format

Lectures, group discussion, report presentation

All programs will be conducted in English.

All class activities will be provided in an online format via Moodle platform

## 6. Course Details

| No.  | Date | Time        | Topic  | Lecturer                        |
|--|------|-------------|--|---------------------------------|
| <b>Module I: Quantitative foundations for systems pharmacology</b> |      |             |  |                                 |
| 1  | TBD  | 09.00-12.00 | What is systems approach + MATLAB tutorial           | Somponnat                       |
| 2  | TBD  | 09.00-12.00 | Mathematical representation of biological systems    | Somponnat                       |
| 3  | TBD  | 09.00-12.00 | Rate law and basic biomolecular dynamics             | Somponnat                       |
| <b>Module II: Mechanistic approach</b>                             |      |             |  |                                 |
| 4  | TBD  | 09.00-12.00 | Michaelis Menten kinetics, avidity and cooperativity | Somponnat                       |
| 5  | TBD  | 09.00-12.00 | Solving dynamic models: ode solvers                  | Somponnat                       |
| 6  | TBD  | 09.00-12.00 | Stability and noise in biology                       | Somponnat<br>Pakpoom(Nare suan) |
| 7  | TBD  | 09.00-12.00 | Important network motifs and synthetic biology       |                                 |
|  |      |             |  |                                 |
|  |      | 09.00-12.00 | Exam SIPM508 (I): 1 - 7                              | Faculty                         |
|  |      |             |  |                                 |
| <b>Module III: Data-driven approach</b>                            |      |             |  |                                 |
|  |      |             |  |                                 |
| 8  | TBD  | 09.00-12.00 | Graph Theory basics                                  | Metha                           |
|  |      |             |  |                                 |
| 9  | TBD  | 09.00-12.00 | Surveying complex biological systems                 | Siwanon                         |
|  |      |             |  |                                 |
| 10   | TBD  | 09.00-12.00 | Important databases and basics of data mining        | Sira(CU)                        |
|  |      |             |  |                                 |
|  |      |             |  |                                 |
| 11   | TBD  | 09.00-12.00 | Building regression models                           | Metha                           |

| Module IV: Applications in Pharmacology |     |             |                           |         |
|---|-----|-------------|---------------------------|---------|
| 12                                      | TBD | 09.00-12.00 | PK/PD modeling            | Dr.Paul |
| 13                                      | TBD | 09.00-12.00 | Cancer drug discovery     | Siwanon |
| 14                                      | TBD | 09.00-12.00 | Precision Medicine        | Manop   |
| 15                                      | TBD | 09.00-12.00 | Student Projects          | Faculty |
|   |     | 09.00-12.00 | Exam SIPM508 (II): 8 - 14 | Faculty |

## 7. Assessment

Scoring

Exam 50%

Student Project 40%

Attendance 10%

Grade

A more than 80

B+ between 75-79

B between 70-74

Criterion-reference grading

A = 80 points or more

B+ = 70 - 79.99 points

B = 60 - 69.99 points

C = 50 - 59.99 points

D = 40 - 49.99 points

F = 0 - 39.99 points

## 8. Prerequisite Reading

When reading materials are given or specified in advance, participants are expected to study those materials before attending the class.

## 9. Reference Materials

To be announced before individual classes

**10. Language used**

All classes are conducted in English.

**11. Office Hours**

Mon – Fri: 9:00 AM – 17:00 PM

Contact: Lecturer Somponnat Sampattavanich, Department of Pharmacology

Email : Somponnat@gmail.com

Please contact the instructor regarding questions or consultations.

**12. Note(s) to Students**

None.