| Course Code and Course Title | English | SCIN 171 Modelling and Simulation |
| --- | --- | --- |
| | Thai | วทนว 171 การสร้างแบบจำลองและการจำลองสถานการณ์ |
| **Number of Credits** | 2 (2-0-4) | |
| **Curriculum and Course Type** | Program of Study | Bachelor's Degree Program in Science and Technology (International Program, Multidisciplinary Program) |
| | Course Type | Specific Courses |
| **Course Coordinator** | Asst.Prof. Somkid Amornsamankul, Ph.D | |
| | Address: | Department of Mathematics, Faculty of Science, Mahidol University |
| | | Tel: (66) 02-201-5339  email: somkid.amo@mahidol.ac.th |
| **Semester/Year of Study** | Academic Year 2020 First Semester (1/2020) / First Year | |
| **Prerequisite** | None | |
| **Co-requisite** | None | |
| **Day/Time/Study Site Location** | Wendesday / 10:00AM-12:00PM / Online | |
| | Faculty of Science, Mahidol University, Salaya Campus | |
| **Date of Latest Revision** | 13 July 2021 | |

**Course Learning Outcomes (CLOs)**

After successful completion of this course, students are able to

1) CLO1  model deterministic systems and differentiate between nonlinear and linear models.
2) CLO2  numerically simulate linear and non-linear ordinary differential equations and deterministic systems.
3) CLO3  estimate and validate a model based upon input and output data.
4) CLO4  create a model prediction based upon new input and validate the output data.
5) CLO5  comprehend and apply theory-based understanding of fundamentals of knowledge in the selected discipline area to predict the effect of activities.
6) CLO6  apply natural, physical and biological sciences, mathematics, statistics, computer and information sciences to applications

1.

**Course Description**

Modelling and simulation concepts. Real world and model world. Continuous, and discrete models. Computational simulation. Monte Carlo method. Numerical methods, Visualization and analysis of simulation results.

**Credit Hours / Trimester**

| Theory (Hours) | Addition Class (Hours) | Laboratory/Field trip/ Internship (Hours) | Self-study (Hours) |
| --- | --- | --- | --- |
| 30 Hours/Semester (2 Hours x 15 Weeks) | - | - | 60 Hours/Semester (4 Hours x 15 Weeks) |

**Number of Hours per Week for Individual Advice**

2 hours per week or student requirement during prescribed date and time

**Evaluation of the CLOs**

| Course Learning Outcomes | | Evaluation Strategies | | | Weight (%) |
|---|---|---|---|---|---|
| | | Class Attendance, Participation and Behavior in Class | Written Exam | Class Project Executed without Plagiarism | |
| CLO1 | model deterministic systems and differentiate between nonlinear and linear models. | 2% | - | 10% | 12% |
| CLO2 | numerically simulate linear and non-linear ordinary differential equations and deterministic systems. | 2% | 20% | 10% | 32% |
| CLO3 | estimate and validate a model based upon input and output data. | 2% | 10% | - | 12% |
| CLO4 | create a model prediction based upon new input and validate the output data. | 2% | - | 10% | 12% |
| CLO5 | comprehend and apply theory-based understanding of fundamentals of knowledge in the selected discipline area to predict the effect of activities. | 2% | 10% | 10% | 22% |
| CLO6 | apply natural, physical and biological sciences, mathematics, statistics, computer and information sciences to applications | - | - | 10% | 10% |
| | Total | 10% | 40% | 50% | 100% |

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 justifying according to Faculty and University code, conducted by grading system of A, B+, B, C+, C, D and F.  To pass this course, student must earn a grade of a least D.

| Total Percentage of Evaluation | Below 20 | 20-29.99 | 30-39.99 | 40-49.99 | 50-59.99 | 60-69.99 | 70-79.99 | 80-100 |
|---|---|---|---|---|---|---|---|---|
| Grade | F | D | D+ | C | C+ | B | B+ | A |

**Teaching staff:**

| Code | Name | Email |
|---|---|---|
| SA | Somkid Amornsamankul M 210, M. Bld. (MUSC-Phayathai) | somkid.amo@mahidol.ac.th |

School of Bioinnovation and Bio-based Product Intelligence (SCIN)  Degree ☑ Bachelor ☐ Master ☐ Doctoral

Program in Bioinnovation (International Program, Multidisciplinary Program)  Faculty of Science

Course: SCIN 171 Modelling and Simulation

**Teaching Schedule 1st Semester of Academic Year 2020**

Wednesday 10:00AM-12:00PM, Online, and Faculty of Science, Mahidol University, Salaya Campus

| Week | Date | Topic | Number of Hours | | Instructor |
|---|---|---|---|---|---|
| | | | Lecture | Laboratory | |
| 1 | 11 Aug 2021 | Introduction of course discipline and class orientation, What is Modelling? What is simulation? | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 2 | 18 Aug 2021 | What is Modelling? What is simulation? | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 3 | 25 Aug 2021 | Real world vs. model world | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 4 | 1 Sep 2021 | Real world vs. model world | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 5 | 8 Sep 2021 | Continuous, and discrete models | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 6 | 15 Sep 2021 | Continuous, and discrete models | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 7 | 22 Sep 2021 | Computational simulation | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 8 | 29 Sep 2021 | Computational simulation | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| Midterm Examination (4 to 8 Oct 2021) | | | | | |
| | | | | | |
| 9 | 13 Oct 2021 | Computational simulation | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 10 | 20 Oct 2021 | Monte Carlo method | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 11 | 27 Oct 2021 | Monte Carlo method | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 12 | 3 Nov 2021 | Numerical methods | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 13 | 10 Nov 2021 | Numerical methods & visualization | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 14 | 17 Nov 2021 | Analyses of simulation results | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| 15 | 24 Nov 2021 | Analyses of simulation results | 2 | 0 | Asst. Prof. Somkid Amornsamankul |
| **Final Examination (29 Nov to 10 Dec 2021)** | | | | | |