

Science International degree @ Mahidol (SIM)

Course Name : Renewable energy (SCBE 319) 3(3-0-6)

Lecture : Tuesday (13:30 - 16:30)

Semester : Semester I/2026

Course Syllabus

Course Coordinator: Toemthip Poolpak, Ph.D.

Course Instructure: Prof. Prayad Pokethitiyook, Ph.D. (PP)

Toemthip Poolpak (TP)

Course Description

The energy systems and renewable energy resources, scientific examination of the energy field; an emphasis on alternative energy sources, technology and application; societal present needs and future energy demands, conventional energy sources and systems examination; fossil fuels, nuclear energy, alter-native or renewable energy sources, solar, biomass (conversions), wind power, geothermal, and hydro, energy conservation methods.

Evaluation

1. Mid-term examination	30%
2. Final examination	30%
3. Presentation & Reports	20%
4. Class assignments	10%
5. Attendants	10%

Note: Grading system is A, B⁺, B, C⁺, C, D⁺, D and F.

Tentative Schedule

Month	Date	Topic	Activity
Aug	4	Introduction to energy: Brief history of our relationship with energy, unit of energy and their interconversion, heat capacity and form of energy	TP
	11	Laws of thermodynamics, Energy conversion (entropy and heat transfer)	TP

	18	Energy production today: Fossil fuels and combustion and pollution	TP
	25	Energy consumption today: Energy in transportation, agriculture and industry	TP
Sep	1	Energy transition: Economic of energy transition	TP
	8	Energy analysis and energy balance	PP
	15	Introduction to computer modelling: simulations	PP
	22	Monte Carlo Model	PP
		Mid-term Exam	PP/TP
Oct	20	Energy production tomorrow: Biomass	PP
	27	Energy production tomorrow: Wind energy	PP
Nov	3	Energy production tomorrow: Solar energy	PP
	10	Energy production tomorrow: Hydrogen as a fuel	PP
	17	Energy production tomorrow: Geothermal	TP
	24	Energy conservation in architectural design and urban planning	TP
Dec		Final Exam	PP/TP

Course Coordinator: Dr. Toemthip Poolpak (TP)

Lecturer: Prof. Dr. Prayad Pokethitiyook (PP)

References:

Buxton G. 2015. Alternative energy technologies. CRC Press, NY.

Shah YT. 2020. Modular system for energy and fuel recovery and conversion. CRC Press, NY.

Miljanic OS and Pratt JA. 2022. Introduction to energy and sustainability. Wiley-VCH, TX.

Assad MEH and Rosen MA. 2021. Design and performance optimization of renewable energy systems. AP, UK.