

Master of Science Program in Industrial Chemistry

- 1. Course Title:** Master of Science Program in Industrial Chemistry
- 2. Master Degree:** Master of Science (Industrial Chemistry)
- 3. Academic Institution:** Faculty of Science / Naresuan University
- 4. Duration:** 2 years from June 2026 – May 2028
- 5. Background and Rational:**

The program is established to support the Thai National Economic and Social Development Plan for the development of the economics through industries of Thailand. The development of research personnel is the most important key strategy to meet the successfulness of the program. The program also supports the liberalization of the ASEAN Community to have international links in terms of academic and investment. The needs of future personnel in both industry and academia are to be highly competent. The main mechanism for the country's development is in terms of economy, society, politics, culture and environment.

From the current economic development which aims to be an innovative industry that comes from research in science and technology, the program has focused on the enhancement of students to have potential in research that can be used in industry, in order to develop their abilities to work and to live in everyday life. The program is also helping drive the nation to be an innovative society that can be self-reliant, and strengthen communities at the basic economic level, upgrading the knowledge of the community and increase the ability to compete with other countries. In addition, the curriculum focuses on students to be able to have entrepreneurial mindset to create innovations to support the BCG model strategy.

The program is able to service both national and international students. We encourage all lecturers and students to use textbooks for teaching and learning and to present their research works at international conferences. In addition, the program has built partnerships with foreign universities in the United Kingdom (UK), France and Taiwan through research support and scientific workforce development from national and international organizations. All lecturers (including international lecturers from UK and Czech Republic) in our program have substantial experience in terms of academic research, international collaboration, communication in English, etc, which offers great support for all students.

6. Objectives:

To produce a Master's degree with the following characteristics:

1. Having knowledge and understanding in creative thinking and creating innovations in industrial chemistry.
2. Having skills and ability to research and acquire new knowledge in the form of all-inclusive chemistry industry to bring benefits at the local, national and international levels, and can create a network of industrial chemistry cooperation and integrate them with economic, educational and other benefits to improve quality of life.
3. Having good morals and ethics to carry over their career in industrial chemical industry

7. Course Synopsis and Methodology:

7.1 Study plan

Year 1

First Semester

277511	Advanced Industrial Chemistry	4(3-2-7)
277513	Material Characterization	3(3-0-6)
277518	Material Characterization Laboratory	2(0-4-2)
277543	Waste and Safety Management of Chemicals in Industry	3(2-2-5)
277591	Research Methodology in Science and Technology (Non-credit)	3(3-0-6)
	Sum	12 credit

Second Semester

277512	Investment and Management in Industrial Chemistry	3(2-2-5)
277xxx	Elective Course	3(x-x-x)
277xxx	Elective Course	3(x-x-x)
277xxx	Elective Course	3(x-x-x)
277597	Thesis 1, Type A2	3 credit
	Sum	15 credit

First Semester

277514	Seminar (Non-credit)	1(0-2-1)
277598	Thesis 2, Type A2	3 credit
	Sum	3 Credit

Second Semester

277599	Thesis 3, Type A2	6 credit
	Sum	6 credit

Remark: Thesis Planning for student

1. Year 1, Semester 1: Student find and select supervisor who she/he will work with to set the research area and title

2. Year 1, Semester 2: Student submit documents to announce the name of supervisor and research title and start to do research under supervision of supervisor

3. Year 2, Semester 1: Student should have “Research Proposal Defending” and continue do research.

4. Year 2, Semester 2: Student should have “Research Defending” to finish the program with the requirement of one research publication (conference proceeding is also accepted).

Remark: Delay of study might happen. Average time to finish of former students are from 2 ½ years to 3 years.

7.2 Course Content

Course Description

277511 Advanced Industrial Chemistry

4(3-2-7)

Application of industrial chemistry knowledge in various industries, such as petroleum and petrochemical industries, sugar industry, drying industry, distillation and fermentation of alcohol industry, principle of calculation in industrial chemistry, theoretical and method of industrial chemical instruments focusing on relevant process such as distillation unit with bubble cap and packed column, packed column gas and liquid absorbers, tray and spray drier, crystallizer and heat exchanger

277512 Investment and Management in Industrial Chemistry 3(2-2-5)

Project management in industrial chemistry, data collection, production design and planning, financial strategy, marketing survey, capital evaluation, investment and retrieval, location selection and business plans, project management and quality control systems such as ISO 9000, HACCP, GMP

277513 Material Characterization 3(3-0-6)

Identification techniques for polymers, ceramics, metals and alloys such as chemical analysis, thermal analysis, molecular weight and molecular weight distribution analysis, X-ray diffraction and electron microscopy, surface analysis including mechanical properties of materials

277514 Seminar 1(0-2-1)

Review of research related to industrial chemistry, discussion and presentation in research process and methodology

277517 Current Topics in Industrial Chemistry 3(3-0-6)

Interesting topics in industrial chemistry emphasizing on process, research methodology, recent and modern processes, modification for improvement in fields of industrial chemistry

277518 Material Characterization Laboratory 2(0-4-2)

Laboratory for material characterization, such as sample preparation, thermal analysis, molecular weight and molecular weight distribution analysis, spectroscopy, X-ray diffraction, electron microscopy, surface analysis including mechanical properties of materials

277521 Solid State of Ceramics 3(2-2-5)

Crystal chemistry, microstructures and physical structures of ceramics, thermodynamics of ceramics, roles of structure and composition in influencing and controlling physical properties, such as thermal, electrical, magnetic, optical-, and mechanical properties, recent synthetic methods for special ceramics, nanoceramics, application of ceramic materials, such as optical fibers, data storage and solar cells

277522 Ceramic Processing

3(2-2-5)

Raw materials for industrial ceramic processing, chemical and physical properties of raw materials and their altered properties, unit operations in processing technical ceramics and effect of operations on properties of ceramic products; pottery, sanitary ware, refractory, ceramic composite and nanoceramics, quality control of ceramic products

277531 Metallic Materials

3(2-2-5)

Metal castings, cast microstructure, properties of cast metals, metal forming techniques, automotive materials, aerospace materials, architectural and packaging materials

277532 Structure and Thermodynamics of Metallic Materials

3(3-0-6)

Structure of crystalline solids, imperfections in solids, mechanical properties of metals, strengthening mechanism in metals and alloys, failure, phase diagrams, phase transformations in metals, thermal processing of metal alloys, metal alloys, corrosion and protection

277543 Waste and Safety Management of Chemicals in Industry

3(2-2-5)

Types and resources of waste in the industry, chemical analysis for grouping treatment and disposal, types of wastewater in industry, appropriate technologies for wastewater treatment and disposal, recycling of waste and materials for value added products, environmental and safety guideline, safety management in industry

277551 Organic Chemistry of Polymer

3(2-2-5)

Introduction to polymer chemistry and polymer synthesis, reaction and kinetics of step-growth polymerization, free radical polymerization of homopolymer and copolymer, anionic and cationic polymerization, Ziegler–Natta coordination reaction, synthesis of functionalized polymer for preparing block and graft copolymer

277552 Polymer Physics

3(2-2-5)

Structure and shape of polymer molecule, crystallization and crystal structure, molecular movement and physical behavior of polymer, effect of temperature, time and molecular structure on state of transition, thermodynamics and interaction of polymer solution, phase diagram of polymer blends, mechanism and thermodynamics of transport properties of polymers, surface chemistry of polymers

277553 Polymer Processing Technology

3(2-2-5)

Fundamentals of rheology, Newtonian and non-Newtonian fluid behavior, viscoelastic properties, measurement of rheological properties, factors affecting rheological properties, principle of polymer processing, single and twin-screw extrusion, injection moulding, blow moulding, calendering, coating, foaming, fiber spinning and transfer moulding, polymer structure and properties relation

277554 Rubber Technology

3(2-2-5)

Structure and properties of natural rubber and synthetic rubbers, rubber additive, rubber formulation, compounding of rubbers, rubber processing, basic rheology for compound rubber, rubber vulcanization and rubber testing, progression in rubber, research in rubber and rubber technology, application in rubber industry and recycle of rubber

277555 Polymer Blends and Composites

3(2-2-5)

Definitions and types of polymer blends, blends methods, blends characterization techniques, structures and properties of blends, thermodynamics and miscibility, use of compatibilizers in polymer blends and their applications, definitions and types of composites, fillers/reinforcement and matrices, composite fabrication techniques, interfacial adhesion between fillers/reinforcement and matrices, orientation, mechanical properties of composites, composite characterization and applications.

277556 Advanced Polymer Synthesis

3(2-2-5)

Synthesis of linear polymers, chemical reactions of saturated and unsaturated polymers, degradation and stability of polymers, advanced polymer synthesis techniques such as group transfer polymerization, ring-opening metathesis polymerization, controlled radical polymerization; RAFT, ATRP, synthesis of high molecular weight polymers and block co-polymers including polymerization techniques used in industry today

277561 Petroleum and Petrochemical Industry

3(2-2-5)

Generation, exploration and production of petroleum, source and separation of petroleum products, petrochemicals production from olefins and aromatic compounds, petroleum applications such as liquefied petroleum gas (LPG), natural gas for vehicles (NGV) and fuel oil

277562 Catalyst and Catalytic Processes

3(3-0-6)

Fundamental aspects of homogenous and heterogeneous catalyst, biocatalyst, catalyst preparation and characterization, deactivation of catalytic process, and its application in industry

277571 Biomaterials

3(2-2-5)

Fundamental materials used as biomaterials and their properties, use of polymers in biomedical applications, understanding of polymer usage in medical field, overview of the current status of polymers in biomedical applications, special topics - tissue engineering and biodegradable polymers, overview of existing and potential applications, including: drug delivery, surgical fixation and wound scaffolding applications

277572 Nanotechnology

3(2-2-5)

Fundamental nanomaterials and nanotechnology, synthesis and characterization of nano-biomaterials including metal nanoparticles, porous inorganic/organic materials, identifying applications of nanomaterials in science and engineering, and explanation of techniques or synthesis and characterization of nanomaterials

277591 Research Methodology in Science and Technology

3(3-0-6)

Meaning, characteristic and research goal, type and research process, variables and hypothesis, collecting data, proposal and research writing evaluation and its application, ethics of researcher, proper techniques of research methodology in science and technology

277597 Thesis 1, Type A2

3 credit

Studying the elements of a thesis or thesis examples in the related field of study; determining the thesis title; developing a concept paper; and preparing the summary of the literature and related research synthesis

277598 Thesis 2, Type A2

3 credit

Developing research instruments and research methodology; and preparing a thesis proposal in order to present it to the committee

277599 Thesis 3, Type A2

6 credit

Collecting data; analyzing data; preparing a progress report in order to present it to the thesis advisor; and preparing the full-text thesis and a research article in order to get published according to the graduation criteria

8. Graduation Conditions:

Following the graduate school and university regulations, the requirements (in brief) are followed:

1. Duration of study is within the graduate school regulation (within 5 years)
2. Completion in registration following the program
3. Pass of English test (following university regulation)
4. Completion in subjects of study
5. Grad average must not less than 3.00 (from 4.00)
6. Pass of thesis defending
7. At least one publication has to be submitted to the graduate school. Note: publication is including full paper and conference proceeding.

9. Applicant Qualifications

The applicants must finish their Bachelor's degree in chemistry, industrial chemistry or any related subjects that can be considered by the program committee.

Remark: In case of transfer of the program: the applicants can transfer their studied credits (not more than 40% in total of our program) from other program to our program. Details are following the graduate school regulation.

10. Document Required

ระบุเอกสารที่ใช้ประกอบการสมัคร กรณีเพิ่มเติมจากเอกสารของกรมความร่วมมือระหว่างประเทศ โดยเอกสารที่กรมความร่วมมือระหว่างประเทศจะจัดส่งให้แก่มหาวิทยาลัย ได้แก่

- ใบสมัครทุนรับทุนและ Medical Report สามารถดูรายละเอียดได้จากเว็บไซต์: <https://tica-thaigov.mfa.go.th/en/page/75500-tipp-application-form?menu=605b13dbb6f1b76ed31778b3>

- Transcript
- Recommendation Letter
- English Test

11. Contact:

11.1 Associate Professor Dr. Sukunya Ross (Head of Program)

11.2 Assistant Professor Dr. Supatra Pratumchat (Co-Ordinator of the Program)

ติดต่อรายละเอียดเพิ่มเติม

กองความร่วมมือด้านทุน

กรมความร่วมมือระหว่างประเทศ

ศูนย์ราชการเฉลิมพระเกียรติ 80 พรรษา อาคาร B (ทิศใต้) ชั้น 8

ถนนแจ้งวัฒนะ หลักสี่ กทม. 10210

Tel. 0 2203 5000 ต่อ 43107, 43108 Fax: 0 2143 8451

E-mail: tipp@mfa.go.th
