2011 Graduate Catalog
and
2010 Annual R & D Report

Sirindhorn International Institute of Technology
Thammasat University

A Leading Teaching /Learning and Research Institute
2011 Graduate Catalog
and
2010 Annual R & D Report

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Preface

On January 29, 1992, with initial funding provided by Keidanren and the Federation of Thai Industries (FTI), the Thammasat University Council approved the establishment of bachelor's degree programs in civil, electrical, and industrial engineering, which became the autonomous International Institute of Technology (IIT), Thammasat University, on September 16, 1994, by Thammasat University Council's special regulation. His Majesty the King graciously granted the name "Sirindhorn International Institute of Technology (SIIT)" to the Institute on June 28, 1996.

Located at the Rangsit Campus of Thammasat University and the Bangkadi Industrial Park, SIIT is privately funded with initial funding provided by FTI and Keidanren. It is envisioned to become a leading international institute of technology for both teaching/learning and research.

1. Academic Programs

Sirindhorn International Institute of Technology (SIIT) offers undergraduate and graduate programs (master and doctoral levels) leading to the Bachelor of Engineering (BEng), Bachelor of Science (BSc), Master of Engineering (MEng), Master of Science (MSc), and Doctor of Philosophy (PhD) in the following areas: Chemical Engineering (ChE), Civil Engineering (CE), Electronics and Communication Engineering (EC), Industrial Engineering (IE), Mechanical Engineering (ME), Computer Science (CS), Information Technology (IT), Engineering Management (EM), and Management Technology (MT).

In the academic year 2010, the total number of SIIT undergraduate students was 2,025. First year students are admitted through the national university entrance selection process, the entrance examination conducted by SIIT, or through evaluations of standardized test scores, such as SAT and GCSE. The Institute also admits transfer students from other universities.

SIIT started graduate programs in engineering and technology leading to master's and doctoral degrees in 1995 and 1997, respectively. In 2007, SIIT started three new international master's degree curriculums: Master of Engineering in Engineering Technology; Master of Engineering in Information and Communication Technology for Embedded Systems; and Master of Engineering in Logistics and Supply Chain Systems Engineering. In the academic year 2010, there were 103 master's degree students and 73 doctoral degree students. Interested individuals should consult the Graduate Catalog and contact the faculty members whose research interests match theirs.

2. Faculty Members

All SIIT full-time faculty members hold doctoral degrees from leading universities around the world. It is a policy of the Institute that faculty members be active in research. Results of their research and development are published in national and international journals, as well as regional and international conference proceedings, and are briefly presented in this report. They are therefore well qualified to provide up-to-date academic instruction to the students.

3. Academic Facilities

To achieve high quality academic services and research, the Institute maintains a conscientious effort to develop facilities of the Library and Information Services Center in addition to advanced laboratories. The SIIT library at Rangsit has a total floor area of 2,518 m² with a 490-seat capacity. More than 28,600 volumes of publications are available. An SIIT branch library at Bangkadi has a total floor area of 1,319 m² with a 250-seat capacity. The branch library has more than 9,600 volumes of publications. The library adopted the VTLS integrated library system in July 1995 to facilitate the usage of the Library collection. Computer facilities are also provided for accessing world-wide information resources, electronic journals and online databases.

SIIT at Rangsit has two five-storey buildings, the SIIT main building and the advanced laboratory building, the Edutivity Building which accommodates classrooms and a student activities center, and a small building housing the Environmental Technology Laboratory. Construction of a new five-story building of 7,004 m² was commenced in October 2009 and will be completed in October 2011. There are two new buildings at Bangkadi, in addition to an existing building which is named after Thanpuying Niramol Suriyasat. One is a five-storey building housing the administration offices, and classrooms. The other, the “Sirindhralai” Building, is a six-storey building. It accommodates the School of Information, Computer, and Communication Technology, School of Management Technology, the Library, the computer center, engineering laboratories, and classrooms.

Since 1996, the Institute has graduated 16 batches of students and the total number of SIIT graduates (as of June 2011) is 4,737; 4,553 Bachelor's Degree, 125 Master's Degree and 59 Doctoral Degree graduates. Most of the graduates are working in industry, while many have chosen to further their studies in leading universities in Australia, Europe, Japan, and the USA.
# 2011 Graduate Catalog

Sirindhorn International Institute of Technology

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Sirindhorn International Institute of Technology
Thammasat University

Vision

To be a leading international institute of technology for both teaching/learning and research.

Missions

1. Primarily to produce high-quality bachelor-degree engineers and related technologists who are able to handle advanced industrial technologies and use English as a working language.

2. To conduct research and development in engineering and related technologies relevant to teaching and modern industries.

During the 9th Japan-Thailand Joint Trade and Economic Committee Meeting held in Kobe, Japan in 1989, the delegates from the Japan Federation of Economic Organizations (Keidanren – now Nippon Keidanren) and the Federation of Thai Industries (FTI) realized that in order to enhance industrial development of Thailand, engineering programs, where all lecture and laboratory courses would be taught in English by highly qualified faculty members with doctoral degrees, needed to be established.

A cooperation agreement among Keidanren, FTI, and Thammasat University was reached in 1992 to establish bachelor degree programs in engineering at Thammasat University with initial funds provided by Keidanren and FTI. After two years of successful operation, the "International Institute of Technology (IIT)" was founded on September 16, 1994. Her Royal Highness Princess Maha Chakri Sirindhorn graciously presided over the Cornerstone Laying Ceremony of a new building at the Rangsit Campus of Thammasat University, using part of the initial fund for the construction. His Majesty King Bhumibol Adulyadej of Thailand graciously granted the Institute a new name, "Sirindhorn International Institute of Technology (SIIT)", on June 28, 1996.

On October 2, 1997, Her Royal Highness Princess Maha Chakri Sirindhorn graciously presided over the Sirindhorn International Institute of Technology's Inauguration Ceremony of its name and building. In 1999, FTI provided a parcel of land with an existing building at Bangkadi Industrial Park (BKD) for SIIT’s use for 30 years. In June 2001, the former Prime Minister Anand Panyarachun inaugurated a new building at Bangkadi for Information Technology and Computer Science programs.

Her Royal Highness Princess Maha Chakri Sirindhorn graciously presided over the inauguration of the Sirindhralai Building at Bangkadi on June 28, 2006. This new six-storey building houses the Electronics and Communication Engineering, Engineering Management, and Management Technology programs, a library, a computer center, laboratories and classrooms.

Thammasat University

Founded in 1934, Thammasat University was originally dedicated to the teaching of humanities and social sciences. The University has produced a large number of graduates who have greatly contributed to the development and progress of the country.

Realizing the significant impact of science and technology on the country's economic growth, in the 1980's and 1990's Thammasat University initiated degree programs in engineering, technologies, physical sciences, and medical sciences at its Rangsit Campus, Pathum Thani.

The Japanese Business Federation (Nippon Keidanren)

Through the merger of several economic and industrial organizations, the Japan Federation of Economic Organizations (Keidanren) was established in August 1946. Keidanren was a private, non-profit economic organization representing virtually all branches of economic activities in Japan. Keidanren maintained close contact with both public and private sectors at home and abroad, and endeavored not only to find practical solutions to economic problems but also to contribute to the sound development of the economics of Japan and countries around the world.

In May 2002, Keidanren merged with Nikkeiren (Japan Federation of Employer’s Associations) to become Nippon Keidanren (The Japanese Business Federation).
Headed by internationally distinguished leaders of the Japanese business community, Nippon Keidanren plays an active and influential role towards the achievement of harmonious economic prosperity for all mankind.

**The Federation of Thai Industries**

Formerly known as the Association of Thai Industries (ATI), the Federation of Thai Industries (FTI) came into existence on December 29, 1987. It was a transformed body of ATI, which was created in 1967. FTI is an industrial private sector that brings together industrial leaders to promote Thailand’s socio-economic development. The main objectives of FTI are to represent Thai manufacturers at both national and international levels, to help promote and develop industrial enterprises, to work with the government in setting up national policies, and to offer consulting services to members.

FTI is a full-service organization that cooperates with the government to help mobilize Thai industries to reach international markets. It acts as a "match-maker" between foreign industrialists and Thai resources which combine the financial strength, planning ability, and persuasive power of Thailand’s industrialists.

**Sirindhorn International Institute of Technology**

Sirindhorn International Institute of Technology (SIIT) offers undergraduate and graduate programs (master and doctoral levels) leading to the Bachelor of Engineering (BEng), Bachelor of Science (BSc), Master of Engineering (MEng), Master of Science (MSc), and Doctor of Philosophy (PhD) in the following areas: Chemical Engineering (ChE), Civil Engineering (CE), Electronics and Communication Engineering (EC), Industrial Engineering (IE), Mechanical Engineering (ME), Computer Science (CS), Information Technology (IT), Engineering Management (EM), and Management Technology (MT).

At the present time, the Institute has established both faculty member and student exchange programs with a number of universities in Asia, Australia, Europe, and North America. These programs allow not only faculty members to collaborate with their counterparts in research projects but also students to have an opportunity to take engineering courses at those universities. Additionally, invitations to visit and teach SIIT courses are regularly extended to qualified foreign professors under such programs.

Although it is a unit of Thammasat University, SIIT is financially and administratively separate from the central university system. SIIT’s policies and operations are guided and supervised by the Board of Trustees which consists of representatives from Thammasat University, FTI, and Nippon Keidanren, and scholars appointed by the university. In addition, there are two academic committees — the Academic Rank Assessment Committee (ARAC) and the Academic Review Committee (ARC) — comprising reputable scholars in various fields. ARAC provides recommendations on rank promotions of faculty members. ARC provides guidance and recommendations on other academic and research matters. The Institute, headed by the Director, consists of administrative divisions, a library and information services center, five academic schools, and Department of Common and Graduate Studies (CGS).

**Campuses of SIIT**

Operations of SIIT are carried out at two locations: Rangsit Campus of Thammasat University and at Bangkadi, Pathum Thani.

**Rangsit Campus**

**Campus and Transportation**

The Rangsit Campus of Thammasat University (TU), is located at km # 41 on Paholyothin Road (northbound). The campus can be conveniently reached by car via a multi-lane divided superhighway (Paholyothin), the Chaengwattana-Bangsai Expressway, and both outer East-Ring and West-Ring Highways. It can also be reached by buses No. 29, 39, and 510 (both air-conditioned and non air-conditioned). The nearest train station, the Thammasat Station, is near the northwest corner of the Rangsit Campus.

**Facilities**

**Air-Conditioned SIIT Buildings**

SIIT has two five-story buildings and a four-story building located at the Rangsit Campus. The first building is the main building with an area of almost 13,673 m², housing offices and classrooms. The first floor and a section of the second floor are occupied by the Library and Information Services Center, with an excellent collection of up-to-date
textbooks, magazines, and journals. SIIT’s academic programs and faculty members’ offices, as well as the Computer Center, are located on the second and third floors. Classrooms of various sizes are on the third, fourth, and fifth floors of the building.

The second SIIT building, adjacent to the first one, is a five-story advanced laboratory building with a total area of about 3,000 m². It was dedicated by Keidanren and FTI to SIIT on October 6, 1998. The Advanced Laboratory Building houses laboratories for conducting senior projects of fourth-year students, research work of graduate students, and research projects of faculty members.

The third building, SIIT Edutivity Building, adjacent to the second one, is a four-story building with a total area of about 1,500 m². This building houses a student activities center, the Ground & Properties Division, classrooms of various sizes, and the Construction and Maintenance Technology Research Center.

Computer Center

SIIT Computer Center is located on the third floor of SIIT building. The center is equipped with microcomputers in four separate rooms, two of which are used mainly for instruction purpose on programming, mathematical problem solving, engineering graphic design and professional report preparation, while the other rooms are used by students for general computing purposes. Up-to-date software packages are installed via servers on the local area network allowing students to become proficient with their applications. The local area network system supports both academic and administrative chores which include the library’s computer-based services, e-learning/instruction, finance, and the internal mailing system for faculty members and staff. There are a number of servers for academic purposes in various programs. The local area network is connected to the Internet via the Thammasat-Rangsit fiber optic backbone. Students, faculty members and staff are provided with an individual e-mail address and service. Wireless Internet (WiFi) can be accessible from any area of SIIT buildings. The VPN service by which students can access SIIT’s online system from their homes is also available. Information on the Institute can be viewed from the official web page at www.siit.tu.ac.th.

Library and Information Services Center

The Library and Information Services Center is located on the first and second floors of the main building. The Library has an excellent collection of textbooks (in science and engineering), conference proceedings, reports, technical magazines, and journals. Electronic access to several international databases is provided. The Library also has a computerized search system to assist students in locating their information sources.

Students who would like to study by themselves or in groups will find it convenient to study in the Library. Individual study areas and group study areas are located both on the first and second floors. For group discussion, students can meet and discuss in the group study rooms on the second floor which provide maximum privacy and minimum interference.

Furthermore, students can use the main TU library, which is also located at the Rangsit Campus, for their study and literature searches on social sciences and humanities.

First-Aid Room

The SIIT first-aid room is situated on the ground floor of the main building. It is staffed during office hours by a fully qualified nurse. The nurse can assist with minor medical problems and, for more serious cases, can arrange timely transfer to Thammasat University Hospital.

Hospitals

Thammasat University Hospital, located at the Rangsit Campus, provides outpatient, inpatient, and emergency medical services, as well as other health care services such as X-ray, physical examination, and dental care. Physicians, nurses, and medical interns are available 24 hours a day. Students are eligible to receive discounts for room charges and services.

There are also several private hospitals near the Navanakorn Industrial Estate which is only a 5-minute drive from the Rangsit Campus.

Student Activities Center

A spacious student activities center is located on the first floor of the SIIT Edutivity building. There is a range of facilities available for student use including air-conditioned meeting rooms, and a food and drink area.

Student activities are coordinated by the student committee under the supervision of the Assistant Director for Student Affairs. All student activities must conform to the SIIT and TU regulations.
University Bookstore

The TU Bookstore at the Rangsit Campus is well stocked with publications and magazines in both Thai and English languages. Textbooks used in individual courses can be purchased at the University Bookstore at competitive prices. Stationery and office supplies are also available.

Post Office

The Thammasat-Rangsit Post Office is located on the first floor of the Administration (Dome) Building. The post office offers complete postal services such as regular mail service, express mail service (EMS), registered mail service, package service, and money orders during business hours.

Convenience Stores

Students living in the dormitories will find that shopping is quite convenient. The 7-Eleven stores and other convenience stores are located on campus. The 7-Eleven store is open 24 hours a day.

Cafeterias and Canteens

Several cafeterias and canteens can be found throughout the Rangsit Campus. A variety of food is offered by vendors at reasonable prices, both on weekdays and weekends. Adjacent to the SIIT building is a cafeteria which serves both SIIT students and students of the Faculty of Engineering.

Additionally, there are two canteens inside the SIIT main building (on the first floor) and student activities center selling snacks and beverages.

Banking Services

For banking services such as cash withdrawal and balance inquiries, students can conveniently use the automated teller machines (ATM) which are located at various locations on campus and at the SIIT main building. For full services, students can go to the on-campus branch offices of Bangkok Bank, Krung Thai Bank, and Thai Military Bank. Other banks with branches near the campus are Kasikorn Bank, Siam City Bank, and Siam Commercial Bank.

Dormitories

The Rangsit Campus has on-campus dormitories for male and female students. Over 6,200 living units are available to accommodate students, faculty members, and university staff. Within walking and short-driving distances, many private dormitories can be found. These are co-ed dormitories, as well as dormitories with separate buildings for male and female students. Air-conditioned units with bathrooms are also available.

Sports Facilities

The Rangsit Campus has a wide range of sporting facilities for students including swimming pools and practice fields for soccer, basketball, volleyball and tennis, all of which are in the vicinity of the student dormitories. Areas for indoor sports such as badminton and table tennis are provided in the indoor gymnasiums.

Other than sports activities, students may choose to exercise by biking, jogging, etc., especially in the morning since the air is very refreshing.

Bangkadi Campus

In 1999, FTI, with co-operation from Toshiba Thailand Co., Ltd., and Mitsui & Co. (Thailand), Ltd., provided 5.6 rai (0.9 hectare) of land with an existing office building in the Bangkadi Industrial Park for SIIT’s use for a period of 30 years. Later, SIIT purchased two more parcels of land in the industrial park with areas of 4 rai (0.64 hectare) and 5 rai (0.8 hectare). The existing building was renovated and a new building was constructed. The two buildings have a combined area of approximately 3,300 m². The Computer Science and Information Technology programs moved to these new facilities in June 2002.

Another 6-story building with an area of 6,452 m² was completed in October 2004. Her Royal Highness Princess Maha Chakri Sirindhorn graciously granted the use of the name “Sirindralai” for this new building and graciously presided over the inauguration of this new building on June 28, 2006. It houses the Electronics and Communication Engineering program, the Engineering Management program, and the Management Technology program, the library, the computer center, classrooms, laboratories, and the Transportation Research Center (TREC).
Bangkadi Campus is equipped with a complete computer/networking infrastructure. There are network access points in almost every room in the campus’ buildings which connect to the Rangsit Campus by a high-speed connection (Wimax system) and connect directly to the Internet with speeds up to 9 Mbps bandwidth. Students can easily access the Internet either from their laptops, using wireless hotspots in every building, or from the computers in both the library and the computer laboratory. There are two computer laboratories for instruction and students’ use.

The Library at Bangkadi is located on the 3rd floor of the Sirindralai Building. The Library has an excellent collection of textbooks, technical books, conference proceedings, reports, technical magazines and journals in the fields of electronics and communication, instrumentation and control systems, computer science, information technology, engineering management, and management technology. Computer facilities are provided for accessing the library database, online databases and full-text journals, and for self-study. The library also provides wireless facilities for students to access the Internet and online information sources with their personal notebooks.

Students may obtain services related to course registration, academic records, and financial matters at the Bangkadi Campus. Shuttle buses between the Rangsit and Bangkadi campuses are provided on a regular basis.

In addition, the SIIT Hall of Residence at Bangkadi has two five-story buildings, one for male residents and one for female residents. There are 72 rooms on the 2nd - 5th floors, which can accommodate up to 144 residents. Common rooms, internet rooms, a fitness center, a canteen, and a launderette are located on the first floor, with a convenient store nearby.

**SIIT Graduate Programs**

**General Information**

Sirindhorn International Institute of Technology offers international graduate programs as follows:

- Master of Engineering Program in Engineering Technology
- Master of Engineering Program in Information and Communication Technology for Embedded Systems (ICTES)
- Master of Engineering Program in Logistics and Supply Chain Systems Engineering (LSCSE)
- Master of Science Program in Engineering and Technology
- Doctor of Philosophy Program in Engineering and Technology

**Application Form**

Application form and letter of recommendation form may be downloaded from the website http://www.siit.tu.ac.th. They are also available from:

Admissions Division  
Sirindhorn International Institute of Technology  
Thammasat University - Rangsit Campus  
P.O.Box 22, Thammasat-Rangsit Post Office  
Pathum Thani 12121, Thailand.

Tel. +66 (0) 2 986 9009, (0) 2 564 3226 (Ext. 1520)  
Fax. +66 (0) 2 986 9106, 2 986 9112-3  
E-mail: admissions@siit.tu.ac.th  
http://www.siit.tu.ac.th

**Application fee:** 500 Baht (or 15 US dollars)

Candidates must complete an application form and submit their application documents to the Admissions Division at the above address.

**Application Deadline:**  
The last week of April for June Semester  
The last week of September for November Semester

**Interview**

All candidates who have received notification of interview after having submitted their application forms shall be interviewed by at least three faculty members. The interview is conducted in English.
Fees
The institute reserves the right to revise its charges for tuition and education support fees and to establish other fees as may be required by increased educational costs.

Tuition Fee
The tuition fee which includes charges for instruction and academic advice is

3,000 Baht per credit.

Education Support Fees
The fees include services other than instruction, such as library, publications, thesis support, computing facility, counseling and placement, but do not cover the cost of damage to or loss of university property. The fees are charged at the following rates:

Regular semester: 44,800 Baht per semester (or 32,300 Baht if register ≤ 6 credits)
Summer session: 22,000 Baht for summer session (or 15,750 Baht if register ≤ 3 credits).
Status maintaining: 4,800 Baht per semester.

The total tuition and education support fee per semester is approximately 72,000 Baht for 9 credit hours.
Other fees such as late payment fee, late registration fee, and fine for overdue books may be charged.

Financial Aid
Internal and external scholarships are available each year to a number of students. For additional information, please contact the school heads or faculty members in the area of your interest, or visit www.siit.tu.ac.th.

Academic Policies and Procedures

Semester Period
First Semester: June - October
Second Semester: November - March

Academic Regulations

Registration
A full-time student may register from 6 to 15 credits per regular semester and no more than 6 credits in summer.
A student who does not register to take any course in a semester must pay the "Student Status" maintaining fee.

Evaluation of Academic Performance
The academic performance of students on a taught course is measured by the grade point average (GPA) system or equivalent. The following grades are used:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Point</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0</td>
<td>Excellent</td>
</tr>
<tr>
<td>B+</td>
<td>3.5</td>
<td>Very Good</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
<td>Good</td>
</tr>
<tr>
<td>C+</td>
<td>2.5</td>
<td>Fair</td>
</tr>
<tr>
<td>C</td>
<td>2.0</td>
<td>Poor</td>
</tr>
<tr>
<td>D</td>
<td>1.0</td>
<td>Very Poor</td>
</tr>
<tr>
<td>F</td>
<td>0.0</td>
<td>Inadequate</td>
</tr>
<tr>
<td>S</td>
<td>-</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>U</td>
<td>-</td>
<td>Unsatisfactory</td>
</tr>
</tbody>
</table>
Master of Engineering Program in Engineering Technology (International Program)

Curriculum Title

Master of Engineering in Engineering Technology (International Program)

Degree Title

Master of Engineering (Engineering Technology)

Applicants’ Qualifications

1. The applicant must hold a bachelor’s degree in engineering, science or a related field that is accepted by the SIIT Academic Committee.
2. The applicant must have a cumulative GPA of at least 2.75 or sufficient relevant research or work experience as specified by the SIIT Academic Committee.
3. The applicant must submit an official score of one of the following English language tests:
   - TU-GET,
   - TOEFL (official or institutional),
   - IELTS,
   - an English test conducted by SIIT.

The score must not be older than two years from the date on which it was issued to the date of the application for admission to the program.

Admission Requirements

1. The applicant must pass a selection interview conducted by an SIIT Committee consisting of at least 3 faculty members.
2. Admission to the program requires approval by the SIIT Academic Committee.

Remark: Students who have inadequate knowledge in some areas, may be required to take additional courses in those areas.

Academic System

1. All courses are conducted in English. An academic year is divided into 2 semesters. Each semester consists of 16 weeks. Courses may be offered for a summer semester of at least 8 weeks duration. The total number of lecture hours required for the summer semester is the same as that for the regular semester. Enrollment for summer courses is optional.
2. Curriculum
   2.1 Study Plan
   The syllabus consists of prescribed coursework (24 credits) and thesis (15 credits). A total of 39 credits is required for completion of the program.
   2.2 Thesis
   2.2.1 A student can register for a thesis after he or she has studied for at least 2 regular semesters or has gained 12 credits with a minimum cumulative GPA of 3.00.
   2.2.2 Thesis Committee
   The Thesis Committee consists of a) a faculty member of SIIT who is the student’s advisor, b) two or more members, at least one of whom is a faculty member of SIIT, and c) a co-advisor if necessary. There must be at least one member who is not affiliated with Thammasat University. The advisor and co-advisor (if there is) must not be the chairperson of Thesis Committee. The number of the committee members who are not the thesis advisor or co-advisor must not be less
2.2.3 Thesis Final Defense Committee
The Thesis Final Defense Committee consists of the same members as the Thesis Committee. However, the defense must be chaired by a thesis committee member who is not the advisor or co-advisor.

2.2.4 External Examiner
The external examiner must be appointed by the SIIT Academic Committee.

Period of Study
The maximum period of study to complete the program is 4 academic years.

Registration
The student must enroll in courses and/or register for a thesis totalling at least 6 credits but not more than 15 credits per semester for a regular semester and not more than 6 credits for a summer semester.

Academic Performance Evaluation and Graduation
1. Evaluation of Academic Performance
1.1 A credit will be earned only if the grade is “S” or not lower than grade “C”. Grade “D” or “F” will be included in the calculation of the grade point average of each semester and for the cumulative grade point average.
1.2 Any student, who gets grade “U”, “D” or “F” in a compulsory taught course, can re-enroll in that course only one more time. His or her student status will be terminated if he or she still fails to obtain grade “S” or at least “C” for the course in the second enrollment.
1.3 Thesis assessment is graded into 2 grades:
   • S (Satisfactory)
   • U (Unsatisfactory).
Students must get grade “S” for their theses.

2. Graduation Requirements
To graduate, students must meet the following minimum requirements:
2.1 Twenty-four credits of taught courses required by the curriculum with an accumulative GPA of at least 3.00. In addition, the grade of each of these courses must be at least “C”.
2.2 Fifteen credits of thesis work and passing a thesis defense.
2.3 Approval of the thesis by the external examiner and the thesis committee.
2.4 At least one paper on thesis findings has been accepted for publication in a national journal approved by the Academic Review Committee of SIIT, or at least one paper has been accepted for publication in international conference proceedings.
2.5 Having satisfied one of the following English proficiency requirements:
   • A TOEFL (official or institutional) score of at least 550 (paper-based), or 213 (computer-based), or 79 (internet-based), or
   • An IELTS score of at least 6.0, or
   • A TU-GET score of at least 550.

Transferred Credits
Nine credits (maximum) of courses with all grades B or better, can be transferred.
Curriculum

1. Total credits requirement
   A total of 39 credits is required for completion of the program.

2. Structure and Components

   2.1 Core Courses
       2.1.1 Compulsory Courses
           9 Credits
       2.1.2 Specialized Courses
           12 Credits
           from one of the following six majors of study, i.e.,
           1. Chemical Engineering
           2. Civil Engineering
           3. Electrical Engineering
           4. Industrial Engineering and Manufacturing Systems
           5. Mechanical Engineering
           6. Sustainable Energy and Environment

   2.1.3 Elective Courses
       3 Credits

   2.2 Master’s Thesis
       15 Credits

   Total
       39 Credits

3. Course Coding System

   Sirindhorn International Institute of Technology sets up the course as follows:

   3.1 Subject code consists of letters and numbers.

   3.2 ES   indicates basic subjects.
       ET    indicates subjects in Engineering Technology Program.
       ICT  indicates subjects in Information and Communication Technology for Embedded Systems.
       SE   indicates subjects in Supply Chain System Engineering and Logistics Program.

   3.3 Numbers are composed of 3 digits.
       • The first unit-place-digit indicates the subject order.
       • The tenth-place-digit indicates the subject group.
           0    General
           1    Chemical Engineering
           2    Civil Engineering
           3    Electrical Engineering
           4    Industrial Engineering and Manufacturing Systems
           5    Mechanical Engineering
           6-7 Sustainable Energy and Environment
       • The hundredth-place-digit indicates the graduate program.

4. List of courses in the curriculum

4.1 Core Courses, 24 credits

   4.1.1 Compulsory Courses, 9 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES805</td>
<td>Research Methodology</td>
<td>2(2-0-6)</td>
</tr>
<tr>
<td>ES806</td>
<td>Research Seminar</td>
<td>1(0-3-1)</td>
</tr>
<tr>
<td>ET601</td>
<td>Computer-Aided Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ES801</td>
<td>Advanced Engineering Mathematics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ES811 Theory of Computation</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ES812 Advanced Business Statistics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ET600 Numerical Methods for Engineers</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ICT600 Computational Mathematics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>SE600 Decision Making and Optimization</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>
4.1.2 Specialized Courses, 12 credits from one of the following majors

4.1.2.1 Major: Chemical Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET610</td>
<td>Special Topic in Chemical Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET611</td>
<td>Current Topics in Chemical Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET61x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET61x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.1.2.2 Major: Civil Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET620</td>
<td>Special Topic in Civil Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET621</td>
<td>Current Topics in Civil Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET62x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET62x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.1.2.3 Major: Electrical Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET630</td>
<td>Special Topic in Electrical Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET631</td>
<td>Current Topics in Electrical Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET63x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET63x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
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</tbody>
</table>

4.1.2.4 Major: Industrial Engineering and Manufacturing Systems

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET640</td>
<td>Special Topic in Industrial Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET641</td>
<td>Current Topics in Industrial Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET64x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET64x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>or SE611-7</td>
<td></td>
</tr>
</tbody>
</table>

4.1.2.5 Major: Mechanical Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET650</td>
<td>Special Topic in Mechanical Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET651</td>
<td>Current Topics in Mechanical Engineering</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET65x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET65x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.1.2.6 Major: Sustainable Energy and Environment

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET660</td>
<td>Special Topic in Sustainable Energy</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET661</td>
<td>Current Topics in Sustainable Energy</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET66x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ET66x</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>or ET67x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or ET67x</td>
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</tr>
</tbody>
</table>

4.1.3 Elective Course, 3 Credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET6xx</td>
<td>Technical Elective</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>or SE611-7</td>
<td></td>
</tr>
</tbody>
</table>

4.2 Master’s Thesis

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES800</td>
<td>Master’s Thesis</td>
<td>15</td>
</tr>
</tbody>
</table>
Course Descriptions

Compulsory Courses

**ES801 Advanced Engineering Mathematics** 3(3-0-9)
Mathematics for solving engineering problems; ordinary differential equations of higher order; partial differential equations; integral equations; numerical analysis; optimization techniques.

**ES805 Research Methodology** 2(2-0-6)
Concept of scientific and technological research; Statistics for research planning and research study; Data collection and data analysis; Interpretations, conclusions and recommendations of research results.

**ES806 Research Seminar** 1(0-3-1)
Student-faculty interaction on advanced research topics.

**ES811 Theory of Computation** 3(3-0-9)
Set theory; relations; formal proof methods; finite automata; regular expressions; context-free grammar; pushdown automata; Turing machines; uncomputability; computational complexity; first-order logic.

**ES812 Advanced Business Statistics** 3(3-0-9)
This course exposes students to the application of statistical techniques used to address business and economic problems. Topics include linear regression and correlation, multiple regression, model building, analysis of variance, multivariate statistics, time series analysis, and chi-square test of significance.

**ET600 Numerical Methods for Engineers** 3(3-0-9)
Programming concepts and techniques; Modern programming languages and computational tools for engineering problems; Numerical methods as applied to practical engineering problems; Introduction to finite element methods.

**ET601 Computer-Aided Engineering** 3(3-0-9)
Computational methods for engineering modeling and simulation; Geometric modeling; Grid generation; Finite element methods; Finite volume methods; Applications of numerical methods to advanced engineering problems.

**ICT600 Computational Mathematics** 3(3-0-9)
Set theory; Relations; Formal proof methods; Finite automata; Regular expressions; Context-free grammar; Pushdown automata; First order logic; Theories related to counting, graphs and networks; Interplay between continuous models and their solution via discrete processes; Vector spaces, basis, dimension, eigenvalue problems, diagonalization, inner products, unitary matrices; Introduction to applied statistics and its application to intelligent systems; Introduction to supervised statistical learning including discrimination methods.

**SE600 Decision Making and Optimization** 3(3-0-9)
Fundamental optimization tools for quantitative analysis to develop modeling and decision-making skill in management sciences; Linear programming; Integer programming; Nonlinear programming; Goal programming; Game theory; Markov chains; Queuing theory and decision analysis techniques; Advanced topics in optimization.

Specialized Courses/Elective Courses

**ET610 Special Topic in Chemical Engineering** 3(3-0-9)
An in-depth study on a topic of interest in the field of Chemical Engineering such as advanced reactor design, advanced process analysis, biochemical process design, principles of coal-fired power plant, advanced transport phenomena, advanced thermodynamics, and automatic control process.

**ET611 Current Topics in Chemical Engineering** 3(3-0-9)
A study on current interests in the field of Chemical Engineering such as nanotechnology, genetic engineering, biochemical engineering, polymer science and engineering, fuel cell and solar cell design, and alternative chemical energy resources.

**ET612 Advanced Thermodynamics for Chemical Engineering** 3(3-0-9)
Review of basic concepts and definitions, the first-law and energy, the second law and entropy; Availability equation for control mass/energy applications; Energy analysis of engineering cycles and Thermoeconomics; Thermodynamics of multi component and multiphase chemical system, chemical reaction equilibrium, non-ideal solution system.

**ET613 Advanced Transport Phenomena** 3(3-0-9)
Review on the constitutive equations of momentum, energy and mass transfer; Development of microscopic and macroscopic of momentum, energy and mass transfer equations for chemical engineering applications including non-Newtonian fluid flow and unsteady state system for momentum, energy and mass transfer.
ET614 Advanced Chemical Kinetics and Reactor Design 3(3-0-9)
Modeling and design of batch and continuous reactors via the concept of chemical kinetics and mass and energy balances including multiphase reactor design; Concept of catalysis including homogeneous and heterogeneous catalysis, support material synthesis and enzyme catalysis.

ET615 Genetic Engineering 3(3-0-9)
Basic mechanisms of genetic information and regulation of DNA replication, transcription, and translation; Methods and applications of genetic engineering, including gene manipulation and transfer techniques in prokaryotes; Emphasis on applications of recombinant DNA technology in the elucidation of gene functions and enhancing the activity of enzymes.

ET616 Advances in Polymer Science and Technology 3(3-0-9)
Thermodynamics of polymer solution and blends; Specific interactions in polymer multi-component, especially hydrogen bonding and its characterization employing Fourier Transform Infrared (FTIR) spectroscopy; Biocompatible polymers; Degradable polymers.

ET617 Petrochemical Technology 3(3-0-9)
Primary raw materials for petrochemistry; Fundamental chemistry, reactions and separations involved in the value-added processing of refinery products such as ethylene, butylenes, sulfur, medium heating value gas, etc; Use of petrochemical properties in the engineering design and operation of petroleum value-added processes; Chemistry and concerns of petrochemical pollutants.

ET618 Biochemical Engineering Fundamentals 3(3-0-9)
Overview of biological basics; Major metabolic pathways; Metabolic stoichiometry and energetics; Kinetics of substrate utilization, product formation, and biomass production in cell cultures; Transport phenomena in bioprocess systems; Selection, scale-up, operation, and control of bioreactors; Recovery and purification of products.

ET620 Special Topic in Civil Engineering 3(3-0-9)
An in-depth study on a topic of interest in the field of Civil Engineering such as computational methods in civil engineering, advanced structural analysis and design, advanced foundation engineering, maintenance of structures, and construction materials.

ET621 Current Topics in Civil Engineering 3(3-0-9)
A study on current interests in the field of Civil Engineering.

ET622 Finite Element Methods 3(3-0-9)
Review of variational principles; The Ritz method; Weighted residual methods; Interpolation and shape functions; Natural coordinate systems; Generic finite element formulation for linear elasticity; Numerical integrations; Standard element shape functions; Applications of finite element methods; Programming of finite element methods.

ET623 Advanced Structural Analysis 3(3-0-9)
Structural modeling concepts; Static and kinematic requirements for structural systems; Discrete modeling of structural systems; Matrix force and matrix displacement methods; Direct stiffness method; Numerical methods and solution techniques appropriate to discrete structural systems; Numerical techniques for large-scale structural systems.

ET624 Advanced Structural Design 3(3-0-9)
Structural design concepts; Advanced topics on ultimate limit state design and serviceability design of structures; Fatigue design of structures; Design of high-rise buildings; Design of long-span bridges.

ET625 Foundation Design and Analysis 3(3-0-9)
Site Investigation; Immediate settlements; Bearing capacity of footings; Eccentric foundations; Settlement analysis; Piled foundations; Foundations on difficult soils; Earth pressure problems including retaining walls and sheet pile structures.

ET626 Inspection, Maintenance and Retrofit of Concrete Structures 3(3-0-9)
Damage of concrete structures; Types of damage—mechanisms of deterioration; Inspection—inspection methods, visual inspection; Tests—nondestructive tests, partially destructive tests, chemical tests, corrosion tests, cores, load tests; Protection and repair—materials and methods for protection and repair, special techniques; Strengthening.

ET627 Engineering Cost and Financial Management 3(3-0-9)
Economic decisions; Capital Rationing for investment in projects; Cost estimation—design cost estimation, construction cost estimation, total cost of engineering projects; Cash flow forecasting and budgetary control; Business financing and financial performance; Advanced financial management; Project Financing.
ET628 Construction Management Information Systems 3(3-0-9)
Information systems; Information technology; Information generation and utilization for the management of construction projects; Integration of construction management software; Conceptual modeling and knowledge-based models.

ET630 Special Topic in Electrical Engineering 3(3-0-9)
An in-depth study on a topic of interest in the field of Electrical Engineering such as digital communication systems, telecommunication networks, network planning and design.

ET631 Current Topics in Electrical Engineering 3(3-0-9)
A study on current interests in the field of Electrical Engineering.

ET632 Data Communication Networks 3(3-0-9)
Fundamentals of data communications and networking; Layered network architectures and protocols; Data transmission and coding; Error detection and correction; Local and wide area networks; Internetworking, routing, and switching; Queuing theory; Cryptography and network security.

ET633 Network Planning and Management 3(3-0-9)
Fundamentals of computer and communication network planning, design, and management; Graph theory and queuing theory for network design; Network design problems and optimization; Network planning and design tools; Network management standards and protocols.

ET634 Optical Communication Systems 3(3-0-9)
Fundamentals of optical signals and modern optical devices; Wavelength division multiplexing; Optical communication systems and networks; Optical network architectures; Analysis and design of optical communication systems.

ET635 Digital Signal Processing in Communication Systems 3(3-0-9)
Multirate signal processing; QMF filter bank design; LPC speech coding; Subband image coding; Channel estimation/equalization; Power spectral estimation; Fundamental of adaptive filtering; Basic DSP hardware implementation.

ET636 Digital Communication System Design 3(3-0-9)
Digital transmission principles; Digital modulation techniques—ASK, FSK, PSK; Channel coding design—convolutional code, turbo code; Channel modeling; Synchronization; Transceiver design; Fundamentals of multiple access systems—CDMA, OFDM.

ET640 Special Topic in Industrial Engineering and Manufacturing Systems 3(3-0-9)
An in-depth study on a topic of interest in the field of Industrial Engineering and Manufacturing Systems such as fundamental planning and control concepts for production management and supply chains, organization of the planning, scheduling and control functions, inventory management & control systems and methodologies (MRP, MRPII, ERP, OPT, JIT).

ET641 Current Topics in Industrial Engineering and Manufacturing Systems 3(3-0-9)
A study on current interests in the field of Industrial Engineering and Manufacturing Systems such as design, automation, and integration of supporting systems in the manufacturing environment including flexible manufacturing systems, robotics, automated material handling systems and automated inspection systems.

ET642 Quality Management 3(3-0-9)
Concept of advanced quality management theory; Tools and techniques for quality improvement including SPC, six sigma, measurement system analysis, FMEA, QFD, design of experiment; Quality management system (ISO 9000)—auditing and certification; Quality economic and performance measures.

ET643 Manufacturing Strategy 3(3-0-9)
Role and context of manufacturing strategy; Interaction of manufacturing strategy and other company strategies; Strategic decisions within operations; System approach to strategy formulation and manufacturing system design; Cellular manufacturing concept; Make/buy analysis, sourcing and subcontracting; Manufacturing control and information systems; Company performance evaluation.

ET644 Simulation Modeling and Analysis 3(3-0-9)
Understanding the role of modeling and simulation in the development and improvement of business processes; Methodology and modeling; Conduct of a simulation study; Hands-on exercise of a particular software package and its application in a practical context.

ET645 Advanced Manufacturing Processes 3(3-0-9)
Fundamental knowledge, principles, applications, and economics of advanced manufacturing processes including electrical-discharge machining, electrochemical machining, high speed machining, laser beam machining, and water-jet machining; Adhesive and elastic bonding technologies; Principles and applications of rapid prototyping.
ET646  Design of Operations Facilities and Systems  3(3-0-9)  
Strategic issues in the location of business in a global environment; Modern methods applied to facility layout and location design; Material handling and integrated production systems; Warehousing and logistics; Quantitative approaches to location and layout modeling; Computer-aided layout design; Personnel issues in layout design; Design for next generation manufacturing and services.

ET647  Advanced Materials and Processes  3(3-0-9)  
Metallic materials with enhanced performance characteristics; Metal alloys; Near net shape forming processes for metals; Advanced ceramic materials—their applications and processing; New engineering polymers; Polymer composite matrix and fiber reinforcement; Polymer composite fabrication techniques; Design techniques for anisotropic composites.

ET650  Special Topic in Mechanical Engineering  3(3-0-9)  
An in-depth study on a topic of interest in the filed of Mechanical Engineering such as advanced refrigeration and cryogenics, solar design methods and applications, energy resources and technologies, principles of gas-fired power plant, air-conditioning system design, steam boiler and furnace technology, fuzzy and neural control, mechatronics, and automatic control.

ET651  Current Topics in Mechanical Engineering  3(3-0-9)  
A study on current interests in the field of Mechanical Engineering such as advanced technologies for energy management in buildings, energy-economic modeling and policy analysis, bio-energy conversion, and applied soft computing in mechanics.

ET652  Power Plant Engineering and Emissions  3(3-0-9)  
Fossil fuels—properties, classification, world reserves; Fossil fuel-fired power plants; Fuels and combustion; Combustion methods and boiler classifications; Boiler and power plant efficiencies and fuel consumption; Formation of major pollutants (CO₂, NOₓ, SOₓ and PM) in boiler furnaces—effects of fuel properties, boiler design and operating conditions; Trace elements and PAHs from firing fossil fuels; Emission control in power plants; Assessment of major emissions from boilers and power plants.

ET653  Optimization Methods in Mechanical Engineering  3(3-0-9)  
Principles and algorithms in development of optimization problems in mechanical engineering; Methods of solving optimization problems—conventional multi-variable techniques, genetic algorithm, simulated annealing method, linear programming, etc.; Computer-aided optimization and applications.

ET654  Advanced Heat Transfer  3(3-0-9)  
Laminar forced convection in circular, non-circular, annular cross-sectioned conduits; Turbulent forced convection over ducts and flat plates; Boiling and condensation; Analytical techniques and numerical methods for solving heat conduction problems; Conduction problems including heat sources and geometric factors; Radiation heat transfer—radiation from clouds and gases.

ET655  Biomass for Heat and Power  3(3-0-9)  
Biomass characteristics and availability; Potential for biomass utilization in heat and power generation; Biomass combustion analysis; Boilers and gasifiers; Power generating equipment and processes; Cogeneration; Performance analysis; Financial evaluation of biomass projects; Emissions calculation and control methods.

ET656  Computational Fluid Dynamics  3(3-0-9)  
The basic concept of fluid flow; Introduction to numerical analysis—finite difference methods, finite volume methods, techniques for solving linear equation systems, etc.; Application of CFD methods to solving the wave equation, the heat equation, Laplace’s equation, Burgers’ equation and simple forms of the Navier-Stokes equations; Commercial CFD software.

ET657  Energy Modeling  3(3-0-9)  
Energy consumption and supply balance; Energy matrix; Thailand sectorial energy consumption; Energy supply and intermediate energy forms; Principles of model building; Model types; Construction of projection functions; Data requirements; Sensitivity and model verification; Policy analysis and choice of models; Linkage with other national models—macro-economic, population planning and agricultural models.

ET660  Special Topic in Sustainable Energy and Environment  3(3-0-9)  
An in-depth study on a topic of interest in the field of Energy and Environment such as biomass energy, fossil fuels, geothermal energy, nuclear power, wind power, solar energy, hydrogen fuel, fusion energy, biodegradation and bioremediation, waste treatment technologies, and waste disposal technologies.

ET661  Current Topics in Sustainable Energy and Environment  3(3-0-9)  
A study on current interests in the field of Energy and Environment such as bio-energy conversions, clean energy resources, low carbon economy and technology, energy-environmental-sustainable-economic development, greenhouse gas mitigation technologies.
ET662 Energy and Environmental Impact Assessment  3(3-0-9)
EIA objectives and principles; EIA process; Types of EIA; Impact assessment methods; Impacts on various sectors of environment; Energy system and its environmental impacts; Baseline data collection; Modeling of facility combined with existing baseline conditions; Analysis of potential effects and mitigation measures; Issues in social and health impact assessment.

ET663 Climate Change  3(3-0-9)
Sources of greenhouse gases (GHG); Global carbon cycle; Greenhouse gases effects on climate; Energy system related to GHG emissions; Sectoral energy demand and GHG emissions; Primary energy consumption and GHG emissions; Energy technologies for climate change mitigation; GHG mitigation assessment in energy system; Impact of climate change on natural resources and ecosystem; Production system and public health; Mitigation measures including sequestration; Clean development mechanisms (CDM).

ET664 Sustainable Energy  3(3-0-9)
Current and potential future energy systems, covers resources, extraction, conversion, and end-use, and emphasizes meeting regional and global energy needs in the 21st century in a sustainable manner; Different renewable and conventional energy technologies will be presented including biomass energy, fossil fuels, geothermal energy, nuclear power, wind power, solar energy, hydrogen fuel, and fusion energy and their attributes described within a framework that aids in evaluation and analysis of energy technology systems in the context of political, social, economic, and environmental goals.

ET665 Energy Planning and Policy  3(3-0-9)
Energy flows in the economy; Energy accounting framework; Basic econometric Methods; Methodology for energy demand analysis; End-use method of energy; Demand analysis; Energy demand forecasting methodologies; Planning in electricity; Demand side management; Energy policy and institutions; Environmental regulations of energy.

ET666 Nuclear Power Generation and Management  3(3-0-9)
Principle of nuclear reaction and power generation; Types of current nuclear reactors and future development; Nuclear fuel cycle and waste disposal management; Nuclear safety; Nuclear power plant siting and public participation; Nuclear reactor decommissioning procedures; Economics of nuclear power plants; Legal and regulatory issues associated with nuclear power generation and proliferation risks.

ET667 Cleaner Production  3(3-0-9)
Sustainable waste treatment; Industrial ecology; Green chemistry; Life cycle assessment; Waste and cleaner production audits; Cleaner production technologies, applications, implementation, and success case studies; Roles of international standards; ISO14000.

ET668 Pollution Control and Management  3(3-0-9)
Physical, chemical and biological processes influencing the extent of air, water and soil pollution; Methods of treatment and control of air and water pollution; Treatment, reuse, recycle, and management of solid and hazardous wastes; Monitoring; Standards.

ET669 Nuclear Reactions and Radiation  3(3-0-9)
Kinetics of nuclear reactions and radioactive decay, fission reactions, fusion reactions, and reactions of energetic neutrons, properties of the fission products and the actinides; nuclear models and transition probabilities; interaction of radiation with matter.

ET672 Resource Economics  3(3-0-9)
Economic analysis of the natural and energy resources, relationship between environment and economy, the causes and impacts of environmental deterioration, the economics of environmental quality, the application of economic theories to various kinds of resources, economic theories and instruments in resource management, energy and environmental policy, social and legal issues.

SE611 Procurement Logistics  3(3-0-9)
Overview of the procurement and purchasing activities in a supply chain; Supplier evaluation and selection; Pricing, negotiation, contracts; Outsourcing; Multiple sourcing; Just-in-time procurement; Inventory management; Buying decisions and plans; Cost analysis; Purchase agreements; E-procurement; Real-time internet-based e-supply chains; Reverse logistics and customer services; Supply chains for financing; Purchasing analysis of capital equipment; Institutional and government purchases.

SE612 Laws and Regulations in Logistics  3(3-0-9)
Logistics systems and legal framework for the domestic and international movement of goods; Operational characteristics of providers for exporting and importing services; Effects of government trade policies on global logistics.
SE613 Transportation Systems Design and Analysis 3(3-0-9)
Characteristics of various modes of domestic and international transportations; Vehicle types; Urban, air, ocean, highway, pick-up and delivery systems; Scheduling; Factors that influence transport demand; Costs; Market structures; Carrier pricing; Carrier operating and service characteristics and their influence on other supply chain costs and supply chain performance such as routes; labor; competition.

SE614 Warehouse Design and Operations 3(3-0-9)
Fundamental operations in warehousing including roles of warehousing, layout and facility design, warehouse technology such as bar codes, radio frequency identification (RFID) for inventory control systems, modern warehouse operations, classifying products, materials handling, racking and shelving, automated storage and retrieval systems (AS/RS), aisle width decision; Information technology for warehouse operations; Health and safety issues.

SE615 Operations Scheduling 3(3-0-9)
Sequencing and scheduling activities including: static and dynamic problems; deterministic and stochastic models, single machine processing; Parallel machine processing; Flow-shop and job-shop scheduling; Project scheduling; Workforce scheduling; Exact and heuristic solution methods and applications in logistics and supply chain systems.

SE616 Design of Experiments in Supply Chain Systems 3(3-0-9)
Fundamental of Design of Experiment; Simple experiment design, factorial, fractional factorial experiments; ANOVA analysis, model adequacy analysis, mixed level designs, response surface methodology and Taguchi design; Review of successful experimentation in Supply Chain Management practices.

SE617 Accounting and Financial Management for Logistics and Supply Chain Systems 3(3-0-9)
Profitability, liquidity; Analysis and interpretation of published financial statements; Cost behavior analysis; Profit, volume analyses; Budget preparation and control; Standard costing; Divisional, segmental performance measurement; Capital investment; Risk and uncertainty analysis; Effects of inflation and taxation; Introduction to computer based financial modeling; Good corporate governance.

Master's Thesis

ES800 Master's Thesis 15 credits
Master of Engineering Program in Information and Communication Technology for Embedded Systems (International Program)

Curriculum Title
Master of Engineering in Information and Communication Technology for Embedded Systems (International Program)

Degree Title
Master of Engineering (Information and Communication Technology for Embedded Systems)

Applicants’ Qualifications
1. The applicant must hold a bachelor’s degree in engineering, science or a related field that is accepted by the SIIT Academic Committee.
2. The applicant must have a cumulative GPA of at least 2.75 or sufficient relevant research or work experience as specified by the SIIT Academic Committee.
3. The applicant must submit an official score of one of the following English language tests:
   - TU-GET,
   - TOEFL (official or institutional),
   - IELTS, or
   - an English test conducted by SIIT.

The score must not be older than two years from the date on which it was issued to the date of the application for admission to the program.

Admission Requirements
1. The applicant must pass a selection interview conducted by an SIIT Committee consisting of at least 3 faculty members.
2. Admission to the program requires approval by the SIIT Academic Committee.

Remark: Students who have inadequate knowledge in some areas, may be required to take additional courses in those areas.

Academic System
1. All courses are conducted in English. An academic year is divided into 2 semesters. Each semester consists of 16 weeks. Courses may be offered for a summer semester of at least 8 weeks duration. The total number of lecture hours required for the summer semester is the same as that for the regular semester. Enrollment for summer courses is optional.
2. Curriculum
   2.1 Study Plan
   
   The syllabus consists of prescribed coursework (24 credits) and thesis (15 credits). A total of 39 credits is required for completion of the program.

   2.2 Thesis
   2.2.1 A student can register for a thesis after he or she has studied for at least 2 regular semesters or has gained 12 credits with a minimum cumulative GPA of 3.00.

   2.2.2 Thesis Committee
   
   The Thesis Committee consists of a) a faculty member of SIIT who is the student’s advisor, b) two or more members, at least one of whom is a faculty member of SIIT, and c) a co-advisor if
necessary. There must be at least one member who is not affiliated with Thammasat University. The advisor and co-advisor (if there is) must not be the chairperson of Thesis Committee. The number of the committee members who are not the thesis advisor or co-advisor must not be less than the number of the thesis advisor and co-advisor. The number of Thesis Committee members who are faculty members of SIIT should not be smaller than that of the Thesis Committee members from outside.

2.2.3 Thesis Final Defense Committee

The Thesis Final Defense Committee consists of the same members as the Thesis Committee. However, the defense must be chaired by a thesis committee member who is not the advisor or co-advisor.

2.2.4 External Examiner

The external examiner must be appointed by the SIIT Academic Committee.

Period of Study

The maximum period of study to complete the program is 4 academic years.

Registration

The student must enroll in courses and/or register for a thesis totalling at least 6 credits but not more than 15 credits per semester for a regular semester and not more than 6 credits for a summer semester.

Academic Performance Evaluation and Graduation

1. Evaluation of Academic Performance

1.1 A credit will be earned only if the grade is “S” or not lower than grade “C”. Grade “D” or “F” will be included in the calculation of the grade point average of each semester and for the cumulative grade point average.

1.2 Any student, who gets grade “U”, “D” or “F” in a compulsory taught course, can re-enroll in that course only one more time. His or her student status will be terminated if he or she still fails to obtain grade “S” or at least “C” for the course in the second enrollment.

1.3 Thesis assessment is graded into 2 grades:

- S (Satisfactory)
- U (Unsatisfactory).

Students must get grade “S” for their theses.

2. Graduation Requirements

To graduate, students must meet the following minimum requirements:

2.1 Twenty-four credits of taught courses required by the curriculum with an accumulative GPA of at least 3.00. In addition, the grade of each of these courses must be at least “C”.

2.2 Fifteen credits of thesis work and passing a thesis defense.

2.3 Approval of the thesis by the external examiner and the thesis committee.

2.4 At least one paper on thesis findings has been accepted for publication in a national journal approved by the Academic Review Committee of SIIT, or at least one paper has been accepted for publication in international conference proceedings.

2.5 Have satisfied one of the following English proficiency requirements:

- A TOEFL (official or institutional) score of at least 550 (paper-based), or 213 (computer-based), or 79 (internet-based), or
- An IELTS score of at least 6.0, or
- A TU-GET score of at least 550.

Transferred Credits

Nine credits (maximum) of courses with all grades B or better, can be transferred.
Curriculum

1. Total credits requirement
   A total of 39 credits is required for completion of the program.

2. Structure and Components

   2.1 Core Courses 24 Credits
      2.1.1 Compulsory Courses 15 Credits
      2.1.2 Compulsory Elective Course 3 Credits
      2.1.3 Technical Elective Courses 6 Credits

   2.2 Master’s Thesis 15 Credits

   Total 39 Credits

3. Course Coding System

   Sirindhorn International Institute of Technology sets up the course as follows:

   3.1 Subject code consists of letters and numbers.

   3.2 ES  indicates basic subjects.
   ET  indicates subjects in Engineering Technology Program.
   ICT  indicates subjects in Information and Communication Technology for Embedded Systems.
   SE  indicates subjects in Supply Chain System Engineering and Logistics Program.

   3.3 Numbers are composed of 3 digits.
   • The first unit-place-digit indicates the order of subject.
   • The tenth-place-digit indicates the subject group.
   • The hundredth-place-digit indicates the graduate program.

4. List of courses in the curriculum

   4.1 Core Courses, 24 credits

      4.1.1 Compulsory Courses, 15 credits

      | Code | Course Title                        | Credits |
      |------|-------------------------------------|---------|
      | ES805| Research Methodology                | 2(2-0-6)|
      | ES806| Research Seminar                   | 1(0-3-1)|
      | ICT700| Software for Embedded Systems      | 3(3-0-9)|
      | ICT710| Software Design Exercise for Embedded Systems | 3(2-3-7)|
      | ICT720| Hardware for Embedded Systems      | 3(3-0-9)|
      | ICT730| Hardware Design Exercise for Embedded Systems | 3(2-3-7)|

      4.1.2 Compulsory Elective Course, 3 credits

      | Code | Course Title                        | Credits |
      |------|-------------------------------------|---------|
      | ES801| Advanced Engineering Mathematics    | 3(3-0-9)|
   or ES811 Theory of Computation | 3(3-0-9)|
   or ES812 Advanced Business Statistics | 3(3-0-9)|
   or ET600 Numerical Methods for Engineers | 3(3-0-9)|
   or ICT600 Computational Mathematics | 3(3-0-9)|
   or SE600 Decision Making and Optimization | 3(3-0-9)|

      4.1.3 Technical Elective Courses, 6 credits

      | Code | Course Title                        | Credits |
      |------|-------------------------------------|---------|
      | ICT740| Communication                       | 3(3-0-9)|
      | ICT750| Signal Processing                   | 3(3-0-9)|
      | ICT760| Intelligence Processing             | 3(3-0-9)|
      | ICT770| Environment and Control Systems     | 3(3-0-9)|
      | ICT780| Current Topics in Embedded Systems  | 3(3-0-9)|
      | ICT781| Advanced Topics in Embedded Systems | 3(3-0-9)|
      | ICT782| Selected Topics in Embedded Systems | 3(3-0-9)|
      | ICT790| Current Topics in Information and Communication Technology | 3(3-0-9)|
      | ICT791| Advanced Topics in Information and Communication Technology | 3(3-0-9)|
      | ICT792| Selected Topics in Information and Communication Technology | 3(3-0-9)|
4.2 Master’s Thesis

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<td>ICT800</td>
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</table>

**Course Descriptions**

**Compulsory Courses**

**ES801 Advanced Engineering Mathematics**
Mathematics for solving engineering problems; ordinary differential equations of higher order; partial differential equations; integral equations; numerical analysis; optimization techniques.

**ES805 Research Methodology**
Concepts of scientific and technological research; Statistics for research planning and research study; Data collection and data analysis; Interpretations, conclusions and recommendations of research results.

**ES806 Research Seminar**
Student-faculty interaction on advanced research topics.

**ES811 Theory of Computation**
Set theory; relations; formal proof methods; finite automata; regular expressions; context-free grammar; pushdown automata; Turing machines; uncomputability; computational complexity; first-order logic.

**ES812 Advanced Business Statistics**
This course exposes students to the application of statistical techniques used to address business and economic problems. Topics include linear regression and correlation, multiple regression, model building, analysis of variance, multivariate statistics, time series analysis, and chi-square test of significance.

**ICT700 Software for Embedded Systems**
Software programming; embedded operating systems and middle-wares such as ITRON or embedded linux; verification and testing for embedded Systems; software issues in the design of embedded systems; microcontroller architectures and peripherals; compilers and debuggers; timer and interrupt systems; interfacing of devices; software issues in communications and networking.

**ICT710 Software Design Exercise for Embedded Systems**
Overview of hardware tools (training board, JTAG interface) and software development tools (compiler, linker, debugger); software project management techniques and tools: UML, test plan, test automation, CASE; embedded operating systems: services and APIs; software development project: requirement analysis, software detailed and test case design, software coding and testing, software documentation; FPGA prototype board using sample application; FPGA logics; VHDL/verilog programming; project planning, system specification design, software coding; software implementation and verification on FPGA prototype board.

**ICT720 Hardware for Embedded Systems**
Basic digital system design; processor architecture design; VLSI design methodologies; hardware concepts on microcontroller architectures and peripherals; device interface; hardware for communications and networking.

**ICT730 Hardware Design Exercise for Embedded Systems**
Overview of hardware development tools (logic synthesis, simulation, verification); VHDL/Verilog programming language; FPGA design flow: I/O pin assignment, synchronous/asynchronous logic design, logic simulation and optimization, verification of design constraints; custom hardware development project: implementation and verification of IP cores on FPGA; software/hardware implementation and verification on FPGA prototype board; practical issues on microcontroller and FPGA.

**Compulsory Elective Courses**

**ET 600 Numerical Methods for Engineers**
Programming concepts and techniques; Modern programming languages and computational tools for engineering problems; Numerical methods as applied to practical engineering problems; Introduction to finite element methods.

**ICT600 Computational Mathematics**
Set theory; Relations; Formal proof methods; Finite automata; Regular expressions; Context-free grammar; Pushdown automata; First order logic; Theories related to counting, graphs and networks; Interplay between continuous models and their solution via discrete processes; Vector spaces, basis, dimension, eigenvalue
problems, diagonalization, inner products, unitary matrices; Introduction to applied statistics and its application to intelligent systems; introduction to supervised statistical learning including discrimination methods.

SE600 Decision Making and Optimization 3(3-0-9)
Fundamental optimization tools for quantitative analysis to develop modeling and decision-making skill in management sciences; Linear programming; Integer programming; Nonlinear programming; Goal programming; Game theory; Markov chains; Queuing theory and decision analysis techniques; Advanced topics in optimization.

Technical Elective Courses

ICT740 Communication 3(3-0-9)
Information theory; signal processing; communication systems; data and digital communication concepts; theory and techniques in data communications: transmission, encoding, decoding, error detection, error correction, link control, networking, and standards; communication hardware and software; synchronization subsystems; time-division multiple-access systems; code-division multiple-access systems.

ICT750 Signal Processing 3(3-0-9)
Digital signal processing theory; audio processing; video processing; discrete-time signals and systems; linear time-invariant systems and their properties; sampling of continuous-time signals and convolution; IIR and FIR filter designs; discrete Fourier transforms; fast Fourier transform algorithms; relations between Fourier transform (FT), discrete-frequency FT (DFFT) or Fourier series discrete-time FT (DTFT), and discrete FT (DFT: discrete both time & frequency); Speech coding and decoding; image coding and decoding; transmultiplexers; filter banks; channel estimation; channel equalization; synchronization; array processing; power spectral estimation; adaptive filtering; ADC and DAC algorithms.

ICT760 Intelligence Processing 3(3-0-9)
Human interface; computer graphics; artificial intelligence (AI); concept and design of human-machine interface; trends of human interface design; graphic user interface, interactive software design; hardware technology for human interface; basic descriptive geometry: points, lines, planes and their relationships; Methods of creating, storing, manipulating, presenting and animating two and three dimensional objects; overview of current research and application of artificial intelligence; introduction to AI languages such as Prolog or LISP; search techniques; knowledge representation, reasoning and inference; machine learning; expert systems.

ICT770 Environment and Control Systems 3(3-0-9)
Control systems theory; environment control systems; power management systems; Laplace transforms; control system description and block diagrams; dynamics of typical controlled systems; development and simplification of transfer functions; analytic tools for predicting system response and performance; root locus design techniques.

ICT780 Current Topics in Embedded Systems 3(3-0-9)
Topics of current interest in the field of embedded systems.

ICT 781 Advanced Topics in Embedded Systems 3(3-0-9)
Advanced topics which may be continuation of embedded system-related topics offered in other lower-level courses.

ICT782 Selected Topics in Embedded Systems 3(3-0-9)
Topics selected by the instructor to prepare students to continue their research in embedded systems.

ICT790 Current Topics in Information and Communication Technology 3(3-0-9)
Topics of current interest in the field of information and communication technology

ICT791 Advanced Topics in Information and Communication Technology 3(3-0-9)
Advanced topics which may be continuation of a topic offered in other lower-level courses of information and communication technology.

ICT792 Selected Topics in Information and Communication Technology 3(3-0-9)
Topics selected by the instructor to prepare students to continue their research in information and communication technology.

Master's Thesis

ICT800 Master's Thesis 15 credits
Student-faculty interaction on research and development in embedded system-related fields or information and communication technology-related fields.
Master of Engineering Program in Logistics and Supply Chain Systems Engineering (LSCSE) (International Program)

Curriculum Title
Master of Engineering in Logistics and Supply Chain Systems Engineering (LSCSE) (International Program)

Degree Title
Master of Engineering (Logistics and Supply Chain Systems Engineering)

Applicants’ Qualifications
1. The applicant must hold a bachelor’s degree in engineering, science or a related field that is accepted by the SIIT Academic Committee.
2. The applicant must have a top 20% class rank for his/her Bachelor’s Degree, or a cumulative GPA of at least 2.75, or sufficient relevant research or work experience as specified by the SIIT Academic Committee.
3. The applicant must submit an official score of one of the following English language tests:
   - TU-GET,
   - TOEFL (official or institutional),
   - IELTS, or
   - an English test conducted by SIIT.

   The score must not be older than two years from the date on which it was issued to the date of the application for admission to the program.

Admission Requirements
1. The applicant must pass a selection interview conducted by an SIIT Committee consisting of at least 3 faculty members.
2. Admission to the program requires approval by the SIIT Academic Committee.

   Remark: Students who have inadequate knowledge in some areas, may be required to take additional courses in those areas.

Academic System
1. All courses are conducted in English. An academic year is divided into 2 semesters. Each semester consists of 16 weeks. Courses may be offered for a summer semester of at least 8 weeks duration. The total number of lecture hours required for the summer semester is the same as that for the regular semester. Enrollment for summer courses is optional.
2. Curriculum
   2.1 Study Plan A

   The syllabus consists of prescribed coursework (24 credits) and thesis (15 credits). A total of 39 credits is required for completion of the program.

   2.2 Study Plan B

   This syllabus is focused on coursework (not less than 33 credits). Independent study (not less than 6 credits) and comprehensive examination are required for completion of the program.
3. Thesis (Study Plan A)

3.1 A student can register for a thesis after he or she has studied for at least 2 regular semesters or has gained 12 credits with a minimum cumulative GPA of 3.00.

3.2 Thesis’s Examination

3.2.1 SIIT shall appoint a thesis advisor and, if required, a thesis co-advisor to advise the student on thesis work.

3.2.1.1 The thesis advisor must be a faculty member of SIIT with a doctoral degree or equivalent, or have an academic rank of at least associate professor in the program or a related program.

3.2.1.2 The thesis co-advisor must be a faculty member of SIIT or a faculty member of a recognized institution with a doctoral degree or equivalent, or have an academic rank of at least associate professor in the program or a related program.

3.2.1.3 The thesis advisor and co-advisor must not be the chairperson of the student’s thesis committee, and must attend all thesis examinations.

3.2.2 SIIT shall appoint a thesis committee of at least 3 persons consisting of the thesis advisor, a faculty member of SIIT, and an external member. The number of the committee members who are not the thesis advisor or co-advisor must not be less than the number of the thesis advisor and co-advisor. In addition, the number of the committee members from SIIT must not be less than the number of the external committee members. The faculty member of SIIT, as well as the external member must have a doctoral degree or equivalent, or an academic rank of at least associate professor in the program or a related program.

3.2.3 SIIT shall appoint an external examiner who must be approved by SIIT’s Academic Committee.

3.2.4 When the thesis proposal is completed, it has to be evaluated and approved by the thesis committee.

3.2.5 Progress on thesis work must be evaluated by the thesis committee at the end of each semester.

3.2.6 The thesis committee shall conduct an oral examination for the final thesis defense.

3.2.7 If required, additional members of the thesis committee may be appointed.

4. Independent Study (Study Plan B)

4.1 A student can register for independent study after he or she has gained at least 18 credits with a minimum cumulative GPA of 3.00.

4.2 A student can take the final examination of an independent study only after he or she obtained P (pass) for his or her comprehensive examination and satisfied English proficiency requirements.

4.3 Independent Study Examination

4.3.1 SIIT shall appoint a project advisor and, if required, a project co-advisor to advise the student on the independent study.

4.3.1.1 The project advisor must be a faculty member of SIIT with a doctoral degree or equivalent, or have an academic rank of at least associate professor in the program or a related program.

4.3.1.2 SIIT shall appoint a project committee of at least 3 persons consisting of the project advisor, project co-advisor (if needed), faculty member(s) of SIIT, and an external member if necessary.

4.4 Comprehensive Examination

4.4.1 A comprehensive examination can be done if the student has gained 24 credits with a minimum cumulative GPA of 3.00.

4.4.2 A student can take the comprehensive examination 3 times, but must pass by the last time. If the student cannot pass the comprehensive examination, the status of the student will be terminated. Results of all comprehensive examinations will be recorded in the student’s academic record.

Period of Study

The maximum period of study to complete the program is 4 academic years.

Registration

The student must enroll in courses and/or register for a thesis totalling at least 6 credits but not more than 15 credits per semester for a regular semester and not more than 6 credits for a summer semester.
Academic Performance Evaluation and Graduation

1. Evaluation of Academic Performance
   1.1 A credit will be earned only if the grade is “S” or not lower than grade “C”. Grade “D” or “F” will be included in the calculation of the grade point average of each semester and for the cumulative grade point average.

   1.2 Any student, who gets grade “U”, “D” or “F” in a compulsory taught course, can re-enroll in that course only one more time. His or her student status will be terminated if he or she still fails to obtain grade “S” or at least “C” for the course in the second enrollment.

   1.3 Thesis assessment and independent study assessment are graded as follows:
      • S (Satisfactory)
      • U (Unsatisfactory).

      Students must get grade “S” for their theses/independent studies.

2. Graduation Requirements
   2.1 Graduation requirements (Study Plan A)
      To graduate, students must meet the following minimum requirements:
      2.1.1 Twenty-four credits of courses required by the curriculum with an accumulative GPA of at least 3.00. In addition, the grade of each of these courses must be at least “C”.
      2.1.2 Fifteen credits of thesis work with grade “S” and passing a thesis defense.
      2.1.3 Approval of the thesis by the external examiner.
      2.1.4 At least one paper on thesis findings has been accepted for publication in a national journal approved by the Academic Review Committee of SIIT, or at least two papers have been accepted for publication in international conference proceedings.
      2.1.5 Having satisfied one of the following English proficiency requirements:
         • A TOEFL score of not less than 550 (paper-based) or 213 (computer-based), or 79 (internet-based), or
         • An IELTS score of not less than 6.0, or
         • A TU-GET score of not less than 550.

   2.2 Graduation requirements (Study Plan B)
      To graduate, students must meet the following minimum requirements:
      2.2.1 Thirty three credits of courses required by the curriculum with an accumulative GPA of at least 3.00. In addition, the grade of each of these courses must be at least “C”.
      2.2.2 Having obtained “S” in his or her independent study for 6 credits and passing the comprehensive examination.
      2.2.3 Having satisfied one of the following English proficiency requirements:
         • A TOEFL score of not less than 550 (paper-based) or 213 (computer-based), or 79 (internet-based), or
         • An IELTS score of not less than 6.0, or
         • A TU-GET score of not less than 550.

      Students must satisfied one of the above English proficiency requirements before the final independent study examination.

Transferred Credits

Nine credits (maximum) of courses with all grades B or better, can be transferred.

Curriculum

1. Total credits requirement
   A total of 39 credits is required for completion of the program.

2. Structure and Components
2.1 Study Plan A

2.1.1 Courses 24 Credits
2.1.1.1 Compulsory Courses 12 Credits
2.1.1.2 Technical Elective Courses 12 Credits
2.1.2 Master’s Thesis 15 Credits

Total 39 Credits

2.2 Study Plan B

2.2.1 Courses 33 Credits
2.2.1.1 Compulsory Courses 12 Credits
2.2.1.2 Technical Elective Courses 21 Credits
2.2.2 Independent Study 6 Credits

Total 39 Credits

3. Course Coding System

Sirindhorn International Institute of Technology sets up the course as follows:

3.1 Subject code consists of letters and numbers.
3.2 ES indicates basic subjects.
    ET indicates subjects in Engineering Technology Program.
    ICT indicates subjects in Information and Communication Technology for Embedded Systems.
    SE indicates subjects in Supply Chain System Engineering and Logistics Program.

3.3 Numbers are composed of 3 digits.
    • The first unit-place-digit indicates the order of subject.
    • The tenth-place-digit indicates the subject group.
    • The hundredth-place-digit indicates the graduate program.

4. List of courses in the curriculum

4.1 Core Courses, 24 credits

4.1.1 Compulsory Courses, 12 credits

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<td>ES801</td>
<td>Advanced Engineering Mathematics</td>
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<td>or</td>
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<td>SE600 Decision Making and Optimization</td>
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SE601 Logistics and Supply Chain Systems 3(3-0-9)
SE602 Production Logistics 3(3-0-9)
ES805 Research Methodology 2(2-0-6)
ES806 Research Seminar 1(0-3-1)

4.1.2 Technical Elective Courses

4.1.2.1 Study Plan A

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4.1.2.2 Study Plan B

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4. List of courses in the curriculum

4.1 Core Courses, 24 credits

4.1.1 Compulsory Courses, 12 credits

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ES805 Research Methodology 2(2-0-6)
ES806 Research Seminar 1(0-3-1)

4.1.2 Technical Elective Courses

4.1.2.1 Study Plan A

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<tr>
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<td>Technical Elective*</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE61x</td>
<td>Technical Elective*</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE61x</td>
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</tr>
<tr>
<td>SE61x</td>
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<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.1.2.2 Study Plan B

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE61x</td>
<td>Technical Elective**</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE61x</td>
<td>Technical Elective**</td>
<td>3(3-0-9)</td>
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<tr>
<td>SE61x</td>
<td>Technical Elective**</td>
<td>3(3-0-9)</td>
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<td>SE61x</td>
<td>Technical Elective**</td>
<td>3(3-0-9)</td>
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<td>SE61x</td>
<td>Technical Elective**</td>
<td>3(3-0-9)</td>
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<td>Technical Elective**</td>
<td>3(3-0-9)</td>
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<td>SE61x</td>
<td>Technical Elective**</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE61x</td>
<td>Technical Elective**</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>
List of Technical Electives

* For Study Plan A, select 4 courses (12 credits) from the following courses.
** For Study Plan B, select 7 courses (21 credits) from the following courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE610</td>
<td>Simulation Modeling and Analysis in Supply Chain</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE611</td>
<td>Procurement Logistics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE612</td>
<td>Laws and Regulations in Logistics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE613</td>
<td>Transportation Systems Design and Analysis</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE614</td>
<td>Warehouse Design and Operations</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE615</td>
<td>Operations Scheduling</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE616</td>
<td>Design of Experiments in Supply Chain Systems</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE617</td>
<td>Accounting and Financial Management for Logistics and Supply Chain</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE618</td>
<td>Special Topic in Logistics and Supply Chain Systems</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>SE619</td>
<td>Current Topics in Logistics and Supply Chain Systems</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.2 Master’s Thesis/Independent Study

<table>
<thead>
<tr>
<th>Study Plan A</th>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SE800</td>
<td>Master’s Thesis</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study Plan B</th>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SE801</td>
<td>Independent Study</td>
<td>6</td>
</tr>
</tbody>
</table>

Course Descriptions

Compulsory Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES801</td>
<td>Advanced Engineering Mathematics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>Mathematics for solving engineering problems; ordinary differential equations of higher order; partial differential equations; integral equations; numerical analysis; optimization techniques.</td>
<td></td>
</tr>
<tr>
<td>ES805</td>
<td>Research Methodology</td>
<td>2(3-0-6)</td>
</tr>
<tr>
<td></td>
<td>Concepts of scientific and technological research; Statistics for research planning and research study; Data collection and data analysis; Interpretations, conclusions and recommendations of research results.</td>
<td></td>
</tr>
<tr>
<td>ES806</td>
<td>Research Seminar</td>
<td>1(0-3-1)</td>
</tr>
<tr>
<td></td>
<td>Student-faculty interaction on advanced research topics.</td>
<td></td>
</tr>
<tr>
<td>ES811</td>
<td>Theory of Computation</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>Set theory; relations; formal proof methods; finite automata; regular expressions; context-free grammar; pushdown automata; Turing machines; uncomputability; computational complexity; first-order logic.</td>
<td></td>
</tr>
<tr>
<td>ES812</td>
<td>Advanced Business Statistics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>This course exposes students to the application of statistical techniques used to address business and economic problems. Topics include linear regression and correlation, multiple regression, model building, analysis of variance, multivariate statistics, time series analysis, and chi-square test of significance.</td>
<td></td>
</tr>
<tr>
<td>ET600</td>
<td>Numerical Methods for Engineers</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>Programming concepts and techniques; Modern programming languages and computational tools for engineering problems; Numerical methods as applied to practical engineering problems; Introduction to finite element methods.</td>
<td></td>
</tr>
<tr>
<td>ICT600</td>
<td>Computational Mathematics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>Set theory; Relations; Formal proof methods; Finite automata; Regular expressions; Context-free grammar; Pushdown automata; First order logic; Theories related to counting, graphs and networks; Interplay between continuous models and their solution via discrete processes; Vector spaces, basis, dimension, eigenvalue problems, diagonalization, inner products, unitary matrices; Introduction to applied statistics and its application to intelligent systems; Introduction to supervised statistical learning including discrimination methods.</td>
<td></td>
</tr>
<tr>
<td>SE600</td>
<td>Decision Making and Optimization</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>Fundamental optimization tools for quantitative analysis to develop modeling and decision-making skill in management sciences; Linear programming; Integer programming; Nonlinear programming; Goal programming; Game theory; Markov chains; Queuing theory and decision analysis techniques; Advanced topics in optimization.</td>
<td></td>
</tr>
</tbody>
</table>
SE601 Logistics and Supply Chain Systems 3(3-0-9)
Principle of domestic and international logistics and supply chain systems, logistics, transportation, production planning, inventory control, purchasing and procurement, packaging, supply chain integration; Information technologies and management information system/development and analysis, model-based, data-based, and knowledge-based systems and knowledge engineering; Newly emerging technologies in supply chain systems such as radio frequency identification (RFID); Global supply chain models, government intervention and regulations, international transportation and risk analysis.

SE602 Production Logistics 3(3-0-9)
Design, analysis and implementation of enterprise-wide resource and production planning and control systems; Demand forecasting, aggregate planning; Decision support models for production planning; Master scheduling; Shop floor control; Inventory control and policy; Maintenance and reliability in engineering systems; Application of information technologies such as ERP and MRPII to production and operations planning and control.

Technical Elective Courses

SE610 Simulation Modeling and Analysis in Supply Chain 3(3-0-9)
Understanding the role of modeling and simulation in the development and improvement of logistics and supply chain operations; Methodology and modeling; Conducting a simulation study; Hands-on exercise of a particular software package and its application in a practical context.

SE611 Procurement Logistics 3(3-0-9)
Overview of the procurement and purchasing activities in a supply chain; Supplier evaluation and selection; Pricing, negotiation, contracts; Outsourcing; Multiple sourcing; Just-in-time procurement; Inventory management; Buying decisions and plans; Cost analysis; Purchase agreements; E-procurement; Real-time internet-based e-supply chains; Reverse logistics and customer services; Supply chains for financing; Purchasing analysis of capital equipment; Institutional and government purchases.

SE612 Laws and Regulations in Logistics 3(3-0-9)
Logistics systems and legal framework for the domestic and international movement of goods; Operational characteristics of providers for exporting and importing services; Effects of government trade policies on global logistics.

SE613 Transportation Systems Design and Analysis 3(3-0-9)
Characteristics of various modes of domestic and international transportations; Vehicle types; Urban, air, ocean, highway, pick-up and delivery systems; Scheduling; Factors that influence transport demand; Costs; Market structures; Carrier pricing; Carrier operating and service characteristics and their influence on other supply chain costs and supply chain performance such as routes; labor; competition.

SE614 Warehouse Design and Operations 3(3-0-9)
Fundamental operations in warehousing including roles of warehousing, layout and facility design, warehouse technology such as bar codes, radio frequency identification (RFID) for inventory control systems, modern warehouse operations, classifying products, materials handling, racking and shelving, automated storage and retrieval systems (AS/RS), aisle width decision; Information technology for warehouse operations; Health and safety issues.

SE615 Operations Scheduling 3(3-0-9)
Sequencing and scheduling activities including: static and dynamic problems; deterministic and stochastic models, single machine processing; Parallel machine processing; Flow-shop and job-shop scheduling; Project scheduling; Workforce scheduling; Exact and heuristic solution methods and applications in logistics and supply chain systems.

SE616 Design of Experiments in Supply Chain Systems 3(3-0-9)
Fundamental of Design of Experiment; Simple experiment design, factorial, fractional factorial experiments; ANOVA analysis, model adequacy analysis, mixed level designs, response surface methodology and Taguchi design; Review of successful experimentation in Supply Chain Management practices.

SE617 Accounting and Financial Management for Logistics and Supply Chain Systems 3(3-0-9)
Profitability, liquidity; Analysis and interpretation of published financial statements; Cost behavior analysis; Profit, volume analyses; Budget preparation and control; Standard costing; Divisional, segmental performance measurement; Capital investment; Risk and uncertainty analysis; Effects of inflation and taxation; Introduction to computer based financial modeling; Good corporate governance.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE618</td>
<td>Special Topic in Logistics and Supply Chain Systems</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>Advanced topics in integrated logistics and supply chain operations; Procurement strategies and strategic sourcing; Dynamic pricing and revenue management tactics; Mitigation of supply chain risk through supply contracts; Risk analysis in global environment; Strategic outsourcing of supply chain functions and operations; Management and operation of third party logistics providers; Management of supply chain security.</td>
<td></td>
</tr>
<tr>
<td>SE619</td>
<td>Current Topics in Logistics and Supply Chain Systems</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>A study on current interests in the field of logistics and supply chain systems and operations.</td>
<td></td>
</tr>
</tbody>
</table>

**Master's Thesis**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE800</td>
<td>Master's Thesis</td>
<td>15 credits</td>
</tr>
<tr>
<td></td>
<td>Students will conduct research studies in the area of logistics and supply chain systems engineering under the supervision of their thesis advisor. Research areas include production logistics analysis (production planning, inventory control, maintenance, reliability, scheduling specifically for and limited to logistics and supply chain systems), procurement logistics analysis (e-procurement, outsourcing, multiple sourcing), distribution center and warehouse system analysis, transportation systems design and analysis specifically for logistics and supply chain systems. Research output must lead to publication in international conference proceedings, or national/international refereed journal.</td>
<td></td>
</tr>
</tbody>
</table>

**Independent Study**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE801</td>
<td>Independent Study</td>
<td>6 credits</td>
</tr>
<tr>
<td></td>
<td>Students will conduct research studies in the area of logistics and supply chain systems engineering under the supervision of their project advisors. Progress of the research studies must be reported at the end of semester. Research output must lead to publication in international conference proceedings, or national/international refereed journal.</td>
<td></td>
</tr>
</tbody>
</table>
Master of Science Program in Engineering and Technology (International Program)

Curriculum Title
Master of Science in Engineering and Technology (International Program)

Degree Title
Master of Science (Engineering and Technology)

Applicants’ Qualifications

1. The applicant must hold a bachelor’s degree in engineering, science or a related field that is accepted by SIIT Academic Committee and must have a top 20% class rank for a Bachelor’s Degree, or a cumulative GPA of at least 2.75 or 2.50 with sufficient relevant research or work experience as specified by SIIT Academic Committee.

2. Two letters of recommendation.

3. The applicant must submit an English score of one of the following English language tests:
   - TOEFL score of not less than 400 (paper-based) or 97 (computer-based), or 32 (internet-based).
   - IELTS score of not less than 4.5
   - TU-GET score of not less than 400
   The score must not be older than two years, from the date on which it was issued, to the date of the application for admission to the program.

4. Approval of the admission by the SIIT Academic Committee.

After admission, the student must achieve one of the following English scores by the end of their first year. If the student cannot pass this English score, the status of the student will be terminated.

   - TOEFL score of not less than 500 (paper-based) or 173 (computer-based), or 61 (internet-based).
   - IELTS score of not less than 5.5
   - TU-GET score of not less than 500

Admission Requirements

1. The applicant must pass a selection interview conducted by an SIIT Committee consisting of at least 3 faculty members.

2. Admission to the program requires approval by the SIIT Academic Committee.

Remark: Students who have inadequate knowledge in some areas, may be required to take additional courses in those areas.

Academic System

1. All courses are conducted in English. An academic year is divided into 2 semesters. Each semester consists of 15 weeks. Courses may be offered for a summer semester of at least 8 weeks duration. The total number of lecture hours required for the summer semester is the same as that for the regular semester. Enrollment for summer courses is optional.

2. Curriculum
   2.1 Study Plan
   The syllabus consists of prescribed coursework (12 credits) and thesis (27 credits). A total of 39 credits are required for completion of the program.

   2.2 Thesis
   2.2.1 A student can register for a thesis after he or she has studied for at least 1 regular semester or has gained 12 credits with a minimum cumulative GPA of 3.00.
2.2.2 Thesis Committee

The Thesis Committee consists of a) a faculty member of SIIT who is the student’s advisor, b) two or more members, at least one of whom is a faculty member of SIIT, and c) a co-advisor (if needed) with a doctoral degree or equivalent, or an academic rank of at least associate professor. There must be at least one member who is not affiliated with Thammasat University. The advisor and co-advisor must not be the chairperson of the Thesis Committee. The number of the committee members who are not the thesis advisor or co-advisor must not be less than the number of the thesis advisor and co-advisor. The number of Thesis Committee members who are faculty members of SIIT should not be smaller than that of the Thesis Committee members from outside.

2.2.3 Thesis Final Defense Committee

The Thesis Final Defense Committee consists of the same members as the Thesis Committee. However, the defense must be chaired by a thesis committee member who is not the advisor or co-advisor.

2.2.4 External Examiner

The external examiner must be appointed by the SIIT Academic Committee.

Period of Study

The maximum period of study to complete the program is 4 academic years.

Registration

The student must enroll in courses and/or register for a thesis totalling at least 6 credits but not more than 15 credits per semester for a regular semester and not more than 6 credits for a summer semester.

Academic Performance Evaluation and Graduation

1. Evaluation of Academic Performance

1.1 A credit will be earned only if the grade is “S” or not lower than grade “C”. Grade “D” or “F” will be included in the calculation of the grade point average of each semester and for the cumulative grade point average.

1.2 Any student, who gets grade “U”, “D” or “F” in a compulsory course, can re-enroll in that course only one more time. His or her student status will be terminated if he or she still fails to obtain grade “S” or at least “C” for the course in the second enrollment.

1.3 Thesis assessment is graded as follows:
   - S (Satisfactory)
   - U (Unsatisfactory).

   Students must get grade “S” for their theses.

1.4 Additional course assessment and English proficiency requirements are graded as follows:
   - P (Pass)
   - N (Not Pass).

2. Graduation Requirements

To graduate, students must meet the following minimum requirements:

2.1 Twelve credits of courses (see the course descriptions) with a GPA of at least 3.00 or equivalent.

2.2 Twenty seven credits of thesis with grade “S”.

2.3 At least one paper on thesis results must have been accepted for publication in a reputable international journal approved by the Academic Review Committee. The following alternate requirements may be used: one national journal paper (accepted) and one national conference paper in proceedings (accepted), or one international conference proceedings paper (accepted and registered for presentation) and one international conference proceedings paper (submitted).

2.4 Approval of the thesis by Thesis Committee, and passing a thesis defense.

2.5 Satisfying one of the following English proficiency requirements: TOEFL (official or institutional) not less than 550 (or 213 for computer-based test or 79 for Internet-based test), or IELTS not less than 6.0, or TU-GET with a score of at least 550.
Transferred Credits

Nine credits (maximum) of courses with all grades B or better, can be transferred.

Curriculum

1. Total credits requirement

A total of 39 credits is required for completion of the program.

2. Structure and Components

2.1 Compulsory Courses 6 Credits
2.2 Compulsory Elective Course 3 Credits
2.3 Elective Course 3 Credits
2.4 Master’s Thesis 27 Credits

Total 39 Credits

3. Course Coding System

Sirindhorn International Institute of Technology sets up the courses as follows:

3.1 Subject code consists of letters and numbers.

3.2 ES indicates basic subjects.
    ET indicates subjects in Engineering Technology Program.
    ICT indicates subjects in Information and Communication Technology for Embedded Systems.
    SE indicates subjects in Supply Chain System Engineering and Logistics Program.

3.3 Numbers are composed of 3 digits.
    • The first unit-place-digit indicates the subject order.
    • The tenth-place-digit indicates the subject group.
    • The hundredth-place-digit indicates the graduate program.

4. List of courses in the curriculum

4.1 Compulsory Courses, 6 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES803</td>
<td>Special Study</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ES805</td>
<td>Research Methodology</td>
<td>2(2-0-6)</td>
</tr>
<tr>
<td>ES806</td>
<td>Research Seminar</td>
<td>1(0-3-1)</td>
</tr>
</tbody>
</table>

4.2 Compulsory Elective Course, 3 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES801</td>
<td>Advanced Engineering Mathematics or ES811</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td></td>
<td>Theory of Computation</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>ES812 Advanced Business Statistics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ET600 Numerical Methods for Engineers</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ICT600 Computational Mathematics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>SE600 Decision Making and Optimization</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.3 Elective Course, 3 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES804</td>
<td>Selected Topic</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.4 Master’s Thesis, 27 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES800</td>
<td>Master’s Thesis</td>
<td>27</td>
</tr>
</tbody>
</table>
**Course Descriptions**

**Compulsory Courses**

**ES803  Special Study**  3(3-0-9)
Each student is required to undertake an in-depth study of an approved topic which will lead to formulation of thesis proposal. The study will be supervised by a faculty member. A written report and oral presentation have to be given at the end of the semester to the student’s thesis committee.

**ES805  Research Methodology**  2(2-0-6)
Concept of scientific and technological research; statistics for research planning and research study; data collection and data analysis; interpretations, conclusions and recommendations of research results.

**ES806  Research Seminar**  1(0-3-1)
Student-faculty interaction on advanced research topics.

**Compulsory Elective Courses**

**ES801  Advanced Engineering Mathematics**  3(3-0-9)
Mathematics for solving engineering problems; ordinary differential equations of higher order; partial differential equations; integral equations; numerical analysis; optimization techniques.

**ES811  Theory of Computation**  3(3-0-9)
Set theory; relations; formal proof methods; finite automata; regular expressions; context-free grammar; pushdown automata; Turing machines; uncomputability; computational complexity; first-order logic.

**ES812  Advanced Business Statistics**  3(3-0-9)
This course exposes students to the application of statistical techniques used to address business and economic problems. Topics include linear regression and correlation, multiple regression, model building, analysis of variance, multivariate statistics, time series analysis, and chi-square test of significance.

**ET600  Numerical Methods for Engineers**  3(3-0-9)
Programming concepts and techniques; Modern programming languages and computational tools for engineering problems; Numerical methods as applied to practical engineering problems; Introduction to finite element methods.

**ICT600  Computational Mathematics**  3(3-0-9)
Set theory; relations; Formal proof methods; Finite automata; Regular expressions; Context-free grammar; Pushdown automata; First order logic; Theories related to counting, graphs and networks; Interplay between continuous models and their solution via discrete processes; Vector spaces, basis, dimension, eigenvalue problems, diagonalization, inner products, unitary matrices; Introduction to applied statistics and its application to intelligent systems; introduction to supervised statistical learning including discrimination methods.

**SE600  Decision Making and Optimization**  3(3-0-9)
Fundamental optimization tools for quantitative analysis to develop modeling and decision-making skill in management sciences: Linear programming; Integer programming; Nonlinear programming; Goal programming; Game theory; Markov chains; Queuing theory and decision analysis techniques; Advanced topics in optimization.

**Elective Course**

**ES804  Selected Topic**  3(3-0-9)
The student may select, by consultation with the student’s thesis advisor, to undertake a course or an in-depth study of an approval topic which is relevant to the student’s thesis. For the latter case, a written report and oral presentation have to be given at the end of the semester to the student’s thesis committee. The course/the topic of the in-depth study has to be approved by the student’s thesis committee.

**Master’s Thesis**

**ES800  Master’s Thesis**  27 Credits
This course guides students how to develop and carry out master research in the field of engineering and technology: Thesis writing, thesis presentation, publication, and research ethics.
Doctor of Philosophy Program in Engineering and Technology (International Program)

Curriculum Title

Doctor of Philosophy in Engineering and Technology (International Program)

Degree Title

Doctor of Philosophy (Engineering and Technology)

Applicants’ Qualifications

1. A graduate of Master Degree in Engineering or Science or related fields with very good academic record (normally with cumulative GPA of not less than 3.50) and/or thesis experience; or a master's degree student of SIIT with at least one international journal publication.

2. Two letters of recommendation.

3. The applicant must submit an English score of one of the following English language tests:
   - TOEFL score of not less than 400 (paper-based) or 97 (computer-based), or 32 (internet-based).
   - IELTS score of not less than 4.5
   - TU-GET score of not less than 400
   The score must not be older than two years, from the date on which it was issued, to the date of the application for admission to the program.

4. Approval of the admission by the SIIT Academic Committee.

After admission, the student must achieve one of the following English scores by the end of their first year. If the student cannot pass this English score, the status of the student will be terminated.

- TOEFL score of not less than 500 (paper-based) or 173 (computer-based), or 61 (internet-based).
- IELTS score of not less than 5.5
- TU-GET score of not less than 500

Admission Requirements

1. The applicant must pass a selection interview conducted by an SIIT Committee consisting of at least 3 faculty members.

2. Admission to the program requires approval by the SIIT Academic Committee.

Remark: Students who have inadequate knowledge in some areas, may be required to take additional courses in those areas.

Academic System

1. All courses are conducted in English. An academic year is divided into 2 semesters. Each semester consists of 15 weeks. Courses may be offered for a summer semester of at least 8 weeks duration. The total number of lecture hours required for the summer semester is the same as that for the regular semester. Enrollment for summer courses is optional.

2. Curriculum

   2.1 Study Plan

      2.1.1 Plan 1.1
      60 credits of thesis, the Thesis-only PhD Program Plan 1 (60 credits)

      2.1.2 Plan 2.1
      - 12 credits of courses.
      - 48 credits of thesis.

   2.2 Thesis
2.2.1 Plan 1.1
A student can register for a thesis in the first semester.

2.2.2 Plan 2.1
A student can register for a thesis after he or she has studied for at least 1 regular semester or has gained 12 credits with a minimum cumulative GPA of 3.00 and has grade “P” (Pass) in a qualification examination.

2.3 Thesis Committee
The Thesis Committee consists of:

- Two advisors comprising one principal advisor, who is an SIIT faculty member, and one co-advisor, with a doctoral degree or equivalent or an academic rank of at least associate professor in the program or a related program.

- Three or more committee members with at least one being a faculty member of SIIT and at least one member who is not affiliated with Thammasat University, with a doctoral degree or equivalent or an academic rank of at least associate professor in the program or a related program. The principal advisor and co-advisor must not be the chairperson of Thesis Committee. The number of the committee members who are not the thesis advisor or co-advisor must not be less than the number of the thesis advisor and co-advisor. The number of Thesis Committee members who are faculty members of SIIT should not be smaller than that of the Thesis Committee members from outside.

2.4 Thesis Final Defense Committee
The Thesis Final Defense Committee consists of the same members as the Thesis Committee. However, the defense must be chaired by a thesis committee member who is not the advisor or co-advisor.

2.5 External Examiner
The external examiner must be appointed by the SIIT Academic Review Committee (ARC).

Period of Study
The maximum period of study to complete the program is 5 academic years.

Registration
The student must enroll in courses and/or register for a thesis totaling at least 6 credits but not more than 15 credits per semester for a regular semester and not more than 6 credits for a summer semester.

Academic Performance Evaluation and Graduation
1. Evaluation of Academic Performance
   1.1 A credit will be earned only if the grade is “S” or not lower than grade “B”.
   1.2 Any student, who gets grade lower than grade “B” or gets “U” in a compulsory course, can re-enroll in that course only once. His or her student status will be terminated if he or she still fails to obtain grade “S” or at least “B” for the course in the second enrollment.
   1.3 Thesis assessment is graded as follows:
      - S (Satisfactory)
      - U (Unsatisfactory).

      Students must get grade “S” for their theses.

1.4 Additional course assessment and English proficiency requirements are graded as follows:
   - P (Pass)
   - N (Not Pass).

2. Graduation Requirements
   To graduate, students must meet the following minimum requirements:

2.1 Plan 1.1
   2.1.1 Students must successfully complete 60 credits of thesis.
   2.1.2 Approval of the thesis by Thesis Committee and passing a thesis defense.
2.1.3 Two international journal papers (accepted), and one international conference proceedings paper (accepted) or one national journal paper (accepted).

2.1.4 Satisfying one of the following English proficiency requirements: TOEFL (official or institutional) not less than 550 (or 213 for computer-based test or 79 for Internet-based test), or IELTS not less than 6.0, or TU-GET with a score of at least 550.

2.2 Plan 2.1

2.2.1 Students must successfully complete 60 credits comprising at least 12 credits of coursework and at least 48 credits of thesis.

2.2.2 GPA of at least 3.00 or equivalent.

2.2.3 Each required course must have a "Satisfactory" grade, or at least a B grade.

2.2.4 Two international journal papers (accepted), and one international conference proceedings paper (accepted) or one national journal paper (accepted).

2.2.5 Approval of thesis by the thesis committee and the external examiner, and passing a thesis defense.

2.2.6 Satisfying one of the following English proficiency requirements: TOEFL (official or institutional) not less than 550 (or 213 for computer-based test or 79 for Internet-based test), or IELTS not less than 6.0, or TU-GET with a score of at least 550.

Transferred Credits

Twelve credits (maximum) of courses with all grades B or better, can be transferred.

Curriculum

1. Total credits requirement

1.1 Plan 1.1, 60 credits of thesis
1.2 Plan 2.1, 48 credits of thesis and 12 credits of courses with a GPA of at least 3.00 or equivalent

2. Structure and Components

2.1 Plan 1.1

Doctoral Thesis 60 Credits

2.2 Plan 2.1

2.2.1 Compulsory Courses 6 Credits
2.2.2 Compulsory Elective Course 3 Credits
2.2.3 Elective Course 3 Credits
2.2.4 Doctoral Thesis 48 Credits

Total 60 Credits

3. Course Coding System

Sirindhorn International Institute of Technology sets up the courses as follows:

3.1 Subject code consists of letters and numbers.

3.2 ES indicates basic subjects.
    ET indicates subjects in Engineering Technology Program.
    ICT indicates subjects in Information and Communication Technology for Embedded Systems.
    SE indicates subjects in Supply Chain System Engineering and Logistics Program.

3.3 Numbers are composed of 3 digits.
    • The first unit-place-digit indicates the subject order.
    • The tenth-place-digit indicates the subject group.
    • The hundredth-place-digit indicates the graduate program.

4. List of courses in the curriculum

4.1 Plan 1.1

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES900</td>
<td>Doctoral Dissertation</td>
<td>60</td>
</tr>
</tbody>
</table>
4.2 Plan 2.1

4.2.1 Compulsory Courses, 6 Credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES803</td>
<td>Special Study</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>ES805</td>
<td>Research Methodology</td>
<td>2(2-0-6)</td>
</tr>
<tr>
<td>ES806</td>
<td>Research Seminar</td>
<td>1(0-3-1)</td>
</tr>
</tbody>
</table>

4.2.2 Compulsory Elective Course, 3 Credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES801</td>
<td>Advanced Engineering Mathematics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ES811 Theory of Computation</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ES812 Advanced Business Statistics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ET600 Numerical Methods for Engineers</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>ICT600 Computational Mathematics</td>
<td>3(3-0-9)</td>
</tr>
<tr>
<td>or</td>
<td>SE600 Decision Making and Optimization</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.2.3 Elective Course, 3 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits (lecture-practice-self study hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES804</td>
<td>Selected Topic</td>
<td>3(3-0-9)</td>
</tr>
</tbody>
</table>

4.2.4 Doctoral Thesis, 48 credits

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES900</td>
<td>Doctoral Dissertation</td>
<td>48</td>
</tr>
</tbody>
</table>

Course Descriptions

Compulsory Courses

ES803 Special Study
3(3-0-9)
Each student is required to undertake an in-depth study of an approved topic which will lead to formulation of thesis proposal. The study will be supervised by a faculty member. A written report and oral presentation have to be given at the end of the semester to the student’s thesis committee.

ES805 Research Methodology
2(2-0-6)
Concept of scientific and technological research; statistics for research planning and research study; data collection and data analysis; interpretations, conclusions and recommendations of research results.

ES806 Research Seminar
1(0-3-1)
Student-faculty interaction on advanced research topics.

Compulsory Elective Courses

ES801 Advanced Engineering Mathematics
3(3-0-9)
Mathematics for solving engineering problems; ordinary differential equations of higher order; partial differential equations; integral equations; numerical analysis; optimization techniques.

ES811 Theory of Computation
3(3-0-9)
Set theory; relations; formal proof methods; finite automata; regular expressions; context-free grammar; pushdown automata; Turing machines; uncomputability; computational complexity; first-order logic.

ES812 Advanced Business Statistics
3(3-0-9)
This course exposes students to the application of statistical techniques used to address business and economic problems. Topics include linear regression and correlation, multiple regression, model building, analysis of variance, multivariate statistics, time series analysis, and chi-square test of significance.
ET600  Numerical Methods for Engineers  3(3-0-9)
Programming concepts and techniques; Modern programming languages and computational tools for engineering problems; Numerical methods as applied to practical engineering problems; Introduction to finite element methods.

ICT600  Computational Mathematics  3(3-0-9)
Set theory; relations; Formal proof methods; Finite automata; Regular expressions; Context-free grammar; Pushdown automata; First order logic; Theories related to counting, graphs and networks; Interplay between continuous models and their solution via discrete processes; Vector spaces, basis, dimension, eigenvalue problems, diagonalization, inner products, unitary matrices; Introduction to applied statistics and its application to intelligent systems; Introduction to supervised statistical learning including discrimination methods.

SE600  Decision Making and Optimization  3(3-0-9)
Fundamental optimization tools for quantitative analysis to develop modeling and decision-making skill in management sciences; Linear programming; Integer programming; Nonlinear programming; Goal programming; Game theory; Markov chains; Queueing theory and decision analysis techniques; Advanced topics in optimization.

Elective Course

ES804  Selected Topic  3(3-0-9)
The student may select, by consultation with the student’s thesis advisor, to undertake a course or an in-depth study of an approval topic which is relevant to the student’s thesis. For the latter case, a written report and oral presentation have to be given at the end of the semester to the student’s thesis committee. The course/the topic of the in-depth study has to be approved by the student’s thesis committee.

Doctoral Thesis

ES900  Doctoral Dissertation  48 or 60 Credits
This course guides students how to develop and carry out doctoral research in the field of engineering and technology: thesis writing, thesis presentation, publication, and research ethics.
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School of Bio-Chemical Engineering and Technology

Faculty Members and Research Interests, 2011

Dr. Alice Sharp

Associate Professor
B.Sc. in Biology, Chiang Mai University, Thailand
M.Sc. in Environmental Risk Assessment, Chiang Mai University, Thailand
M.Sc. in Natural Resource Management, Hiroshima University, Japan
Ph.D. in Natural Resource Management, Hiroshima University, Japan

Specialization and Research Areas: Community based natural resource management, Environmental Impact Assessment, Pollution monitoring.

Research Interests:

**Community Based Environmental Protection (CBEP)**

CBEP is a new approach to environmental protection. Traditionally, environmental protection programs have focused on the command and control approach, which have been very effective at reducing point source pollution and improving environmental quality. However, some environmental problems, such as non-point source pollution are less amenable to these programs. CBEP will supplement and complement the traditional environmental protection approach by focusing on the health of an ecosystem and the behavior of humans that live in the ecosystem’s boundaries. This study is aiming to 1) comprehensively identify local environmental concerns, 2) set priorities and goals that reflect overall community concerns, and 3) develop comprehensive, long-term solution to environmental problems.

**Products Life-Cycle Assessment (LCA)**

Life-cycle assessment (LCA) is used to quantify the environmental inputs and outputs of a product or process, from the mining of raw materials, through production, distribution, use and reuse or recycling, to final disposal. There are two main stages of LCA: inventory analysis and impact assessment. Inventory analysis involves the quantification of environmental inputs and outputs throughout a product or process’s lifetime. The inventory analysis is aiming to identify a list of pollutants that may have an impact on the environment. The purpose of the impact assessment is to aggregate and evaluate the potential environmental impacts identified in the inventory. This study will be focusing on particular kinds of waste which have high potential to be a major environmental problem in the future, mobile phone and its batteries, as an example in order to develop waste management plan and minimize the amount of waste before hand.

Dr. Apichit Svang-Ariyaskul

Lecturer
B.Eng. (Honors) in Chemical Engineering, Kasetsart University, Thailand
M.A.Sc. in Chemical Engineering, University of Waterloo, Canada
Ph.D. in Chemical Engineering, Georgia Institute of Technology, USA

Specialization and Research Areas: Process design and green energy.

Research Interests:

**Process Design**

Process design to improve production through mathematical simulations is being focused because it can save resources such as money, time, and energy before establishing a new process. Process design assesses the process feasibility and the production profit. The major goal is to maximize the profits of the production. This goal can be achieved by increasing product yield and quality but also decreasing waste production and energy consumption compared to existing processes. Current processes of interest include global concern issues such as green energy and pharmaceutical production.

**Biofuel**

Biofuel receives great attention from both academia and industry as an alternative green energy. The use of biofuel expands across the globe as it is the best...
way to reduce the emission of greenhouse gases. Bioethanol is an alcohol produced by the fermentation of sugar molecules in plant materials. Biodiesel is produced through transesterification of vegetable oils or animal fats. Thailand produces enormous amounts of agricultural products and wastes annually. Therefore, Thailand’s agricultural waste is an attractive feedstock for biofuel production. Currently, biofuel has been blended in a small portion with petroleum fuel as the price of biofuel is still high in comparison. Therefore, it is important to select an appropriate feedstock, design a process, investigate the process feasibility, and assess the process profitability through process simulations before establishing a sustainable process to produce biofuel in Thailand. Current processes of interest include reactive distillation and reactive adsorption.

Dr. Chongrak Polprasert

Professor
B.Eng. in Civil Engineering, Chulalongkorn University, Bangkok, Thailand
Grad. Diploma in Sanitary Engineering, Chulalongkorn University, Bangkok, Thailand
M.Eng. in Environmental Engineering, Asian Institute of Technology (AIT), Bangkok, Thailand
Ph.D. in Civil/Environmental Engineering, University of Washington Seattle, Washington, USA

Specialization and Research Areas: Water pollution control, Waste recycling and recovery, Hazardous wastes engineering and management.

Research Interest:

Water Pollution Control, Waste Recycling and Recovery, Hazardous Wastes Engineering and Management

Rapid population growth and industrialization have resulted in resources depletion and environmental pollution. Research on appropriate technologies of wastewater management for municipal, agricultural and industrial reuses is essential. The application of biotechnology and nanotechnology for degradation of toxic/hazardous chemicals and their impact on climate change including sustainable development are being evaluated.

Dr. Luckhana Lawtrakul

Associate Professor
B.Sc. in Chemistry, Kasetsart University, Thailand
M.Sc. in Physical Chemistry, Kasetsart University, Thailand
Dr.rer.nat. in Theoretical Biochemistry, University of Vienna, Austria

Specialization and Research Areas: Computer-aided molecular modeling and molecular design, Computational Science and Engineering.

Research Interest:

Molecular modeling is a collective term that refers to theoretical methods and computational techniques to model or mimic the behavior of molecules. The techniques are used in the fields of computational chemistry and computational biology for studying molecular systems ranging from small chemical systems to large biological molecules. Currently applications in the following areas are of special concern: Molecular dynamics (MD) simulations and quantum chemical calculations on the stability of guest-cyclodextrins inclusion complexes, and Quantitative structure-property relationship (QSPR) studies of inclusion complexes of various guests with cyclodextrins.

Dr. Paiboon Sreearunothai

Lecturer
B.A., M.Sc. & Ph.D in Physics, University of Cambridge, UK


Research Interest:

Energy and Charge Transfer in Organic/Hybrid Materials:

Energy and charge transfer are two fundamental processes occurring in all kinds of electronic and photonic materials. The research focuses on excited state pathways in organic/hybrid materials using various electrical and optical methods. Understanding these two fundamental processes has both technological and fundamental importance since almost all processes occurring at a molecular level involve transfer of energy or charges. Applications include, but not limited to, design of efficient solar cells, photosynthesis, photocatalysis, fuel cells and molecular sensing devices.
Dr. Pakorn Opaprakasit

Associate Professor
B.Sc. (1st Class Honors) in Chemistry, Chiang Mai University, Thailand
M.S. in Materials Science and Engineering (Polymer Option), the Pennsylvania State University, Pennsylvania, USA
Ph.D. in Materials Science and Engineering, the Pennsylvania State University, Pennsylvania, USA
Specialization and Research Areas: Infrared spectroscopy, Electrospinning, Lactide-based polyesters, Biocompatible/degradable polymers, Natural rubber, Coal/fossil fuels, Biodiesel.

Research Interests:

**Lactide-based (biocompatible/degradable) Polyesters**

Polylactide (PLA) is an aliphatic polyester that is of interest in various applications, due to its biodegradability, biocompatibility, and renewable monomer resources. In addition, properties of this polymer can be modified for use in specific applications by copolymerization or blending with other polymers. In our lab, various lactide-based copolymers have been synthesized, e.g., poly(D-lactide), poly(L-lactide), poly(DL-lactide), poly(lactide-co-ethylene glycol), poly(lactide-co-glycidol), poly(lactide-co-ethylene terephthalate). The copolymers are then used in various applications, for example, as fertilizer controlled-release materials, packaging materials, and in medical, environmental and energy applications. Micro- and nanoencapsulation techniques and electrospinning methods are employed in the preparation of the materials.

**Conventional and Two-Dimensional FTIR Spectroscopy**

Infrared spectroscopy is a fundamental analytical technique that is widely used in material characterization. Recently, an advanced methodology, two-dimensional infrared spectroscopy (2D-FTIR) has been developed, which provides notable advantages over conventional FTIR. For example, an improvement in band resolution, simplicity in band assignment, and determination of relative order of responses of specific functional groups to external perturbation, have been achieved. The FTIR and 2D-FTIR techniques have been applied in characterizations of various materials, e.g., polymers, fuels, and minerals.

Dr. Pisanu Toochinda

Assistant Professor
B.Sc. in Chemistry, Mahidol University, Bangkok, Thailand
M.Sc. in Chemical Engineering, The University of Akron, Akron, Ohio, USA
Ph.D. in Chemical Engineering, The University of Akron, Akron, Ohio, USA
Specialization and Research Areas: Photo-catalytic synthesis of hydrocarbons from CO2/H2O, Photochemical solar cells, Gas-solid reactor design, Heterogeneous catalysis, Nano-material / zeolite syntheses, Biomolecular imprinted materials.

Research Interests:

**The Development of a Novel Catalyst for Hydrogen Production from Methanol Steam Reforming**

The shortage of energy is becoming an important problem for mankind and the research of renewable energy has emerged rapidly to solve this problem. One interesting renewable energy is the energy from hydrogen fuel cells. Therefore, one of the most important issues to be considered for the hydrogen fuel cell is effective hydrogen production. Hydrogen could be produced from reforming reactions of hydrocarbons such as methane, methanol, ethanol, dimethyl ether, etc. This research focuses on methanol reforming to produce hydrogen for fuel cells from the steam reforming reaction. Unfortunately, the process still requires a huge amount of energy in order to produce a high yield of hydrogen. This is a major drawback of hydrogen production from the reforming reaction. The objective of this research is to study the performance of various catalysts from different preparation methods to identify the proper catalyst for methanol reforming. The optimization of the catalytic reactor design and reaction conditions are also investigated to enhance the reaction system for effective hydrogen production from methanol reforming.

**Carbon Dioxide Capture by Immobilized Amine over Solid Sorbents**

The high performance of amine solid sorbents could provide the alternative for CO2 capture from power plant flue gases. The concept is to capture carbon dioxide (CO2) from a simulated flue gas system by a tubular reactor using immobilized amine species on different solid sorbent support (activated carbon, zeolites, agriculture product waste) at ambient conditions. The concepts of the material preparation are high performance of CO2 capture, cost effectiveness, and easy handling for various applications. The preliminary design of a scaled up plant for the CO2 capture from solid sorbents is also considered in the study.
Photocatalysis

CO₂ emission has become a worldwide problem due to its potential impact on global warming. Photocatalytic reactions, which involve the combined use of photo energy and catalysts to convert reactants to products, provide a promising alternative to reduce CO₂ and convert it into useful hydrocarbon products (e.g., methane and methanol).

Dr. Rachnarin Nitisoravut

Associate Professor
Diploma (Honors) in Analytical Chemistry, Institute of Analytical Chemistry Training, Ministry of Science, Technology, and Environment, Bangkok, Thailand
B.S. in Chemical Engineering, Chulalongkorn University, Thailand
M.S. in Biosystem Engineering, University of Hawaii at Manoa, Hawaii, USA
Ph.D. in Civil/Environmental Engineering, North Carolina State University, North Carolina, USA
Specialization and Research Areas: Environmental Biotechnology/Microbiology, Biological treatment of water and wastewater, Biosystem engineering, Water and wastewater treatment/management, Low-carbon technologies.

Research Interests:

Biohydrogen Production

Hydrogen is a promising alternative to fossil fuels. It is a clean, renewable, carbon-free energy carrier of the future. It has a heating value of approximately 2.5 times greater than that of methane and can be used in fuel cells with high efficiency. When combusted, it produces water rather than greenhouse gases. Hydrogen can be derived from various means, chemically or biologically, each with its own set of advantages and disadvantages. Biohydrogen production is an environmentally friendly method employing either natural or genetically-modified microbial communities to produce hydrogen. Prior to the establishment of full-scale biohydrogen production, substantial, fundamental research is needed to address the key capabilities of the system so that high hydrogen production rates and efficiency can be achieved.

Anaerobic Ammonium Oxidation (ANAMMOX)

The Anaerobic AMMonium OXidation (ANAMMOX) process involves the use of nitrite as an electron acceptor in the bacterially mediated oxidation of ammonia to yield di-nitrogen gas. The process allows nitrogen transformation similar to the classical processes of nitrification followed by denitrification. However, it reduces oxygen demand and requires no additional organic carbon source as compared to typical nitrification and denitification, respectively. It is a promising microbial process to remove ammonia from wastewater characterized by a low content of organic materials.

Assimilable Organic Carbon (AOC) and Regrowth Potential in Drinking Water

During the past decade, research interest in drinking water treatment has focused on the biodegradable fraction of organic carbon in natural and treated water. This interest stems from the recognition that biodegradable organic matter in water can provide growth support to microorganisms which can be intensified during storage, and travel within the distribution systems. Such phenomenon is known as biological regrowth, and the fraction of biodegradable organic carbon is commonly termed biodegradable dissolved organic carbon (BDOC) or assimilable organic carbon (AOC). Biological regrowth in distribution systems has been known for years, as a potential cause of corrosion in distribution lines and deterioration of finished water quality, as well as an indirect link to waterborne diseases. It has, however, just come under attention, particularly for developed countries, due to the unclear impact on human health.

Dr. Sandhya Babel

Associate Professor
B.Sc. in Biology/Chemistry, University of Indore, India
M.Sc. in Biochemistry, University of Indore, India
M.Sc. in Environmental Technology and Management, Asian Institute of Technology, Thailand
D.Tech.Sc. in Environmental Technology and Management, Asian Institute of Technology, Thailand
Specialization and Research Areas: Physico-chemical treatment of water and wastewater, Membrane technology, Solid and hazardous waste treatment and management, Biohydrogen production.

Research Interests:

Removal of Heavy Metals from Aqueous Solution/Sludges Using Agriculture Waste Materials

Agricultural wastes are unused resources, which in many cases present a serious problem of disposal. However, these waste materials can be used to remove toxic heavy metal from wastewater as they are capable of binding heavy metals by adsorption, chelation and ion exchange. The exchange properties of these wastes can be attributed to the presence of carboxylic, phenolic, hydroxyl groups. In order to
enhance cation exchange capacities, these groups may be modified by oxidation, carboxymethylation, acetylation, phosphation. The utilization of agricultural by-products in treating the wastewater/sludges contaminated by heavy metals is an attractive area of research.

**Environment and Development Perspectives: Life Cycle Assessment a Tool**

Developing countries in Asia have considered economic growth as the sole indicator of development. Monetary gain has dominated over environmental quality and the sustainability of natural resources. If a polluting factory yields a profit now, the effect on generations is forgotten. All this is carried out in the name of development and for the betterment of the quality of life without foreseeing the effect on the environment, which is the key component for sustainable development. Thus, it is necessary to analyze the existing situation and suggest measures to minimize the impacts on the environment and to conserve the finite natural resources. Life cycle assessment can be used as one of the tools to identify and assess the environmental burdens of different products or system over the entire period of its life.

**Phytoremediation for Treatment of Contaminated Soil**

Phytoremediation uses plants to clean contaminated sites. It is the use of plants to partially or substantially remediate selected contaminants in contaminated soil, sludge, sediment, ground water, surface water and wastewater. It utilizes a variety of plant biological processes and the physical characteristics of plants to aid in site remediation. Phytoremediation is widely viewed as the ecologically responsible alternative to the environmentally destructive physical remediation methods currently practiced. Plants have several endogenous genetic, biochemical and physiological properties that make them ideal agents for soil and water remediation. Phytoremediation uses hyperaccumulator and accumulator plants that can remove excess heavy metals from contaminated soils and other contaminants.

**Dr. Siwarutt Boonyarattanakalin**

**Lecturer**
- B.S. in Chemistry (Distinction), Colorado State University, USA
- Ph.D. in Organic Chemistry, The Pennsylvania State University, USA
- Specialization and Research Areas: Chemical Biology, Organic Chemistry, Glycochemistry, and Glycobiology.

**Research Interests:**

**Chemical Biology**

Chemical Biology has recently emerged as an exciting new field that focuses on problems and processes at the interface of chemistry and biology. Chemistry uniquely provides essential tools and techniques to study biological systems at the molecular level. Appropriate small synthetic molecules are very useful in studying and manipulating biological processes. Dr. Siwarutt's research areas include design, synthesis and evaluation of biologically active molecules; and design and validation of assays to evaluate biologically active molecules and to study cellular processes.

**Synthesis**

Our research has focused on developments of alternative chemical methods for rapid and efficient syntheses of compounds for therapeutic and material purposes. The robust synthetic protocols allow access to a large scale quantity of novel compounds. The synthetic compounds provide tools for physical and biological studies.

**Developments of Chemical and Biological Methods for Carbon Recycles**

Industrial wastes increasingly have become a financial burden for many production processes. We are investigating ways to recycle these wastes and make them become resources. Both biological and chemical methods offer potential protocols to recycle wastes.

**Dr. Wanwipa Siriwatwechakul**

**Lecturer**
- B.S. in Chemical Engineering, Massachusetts Institute of Technology, USA
- M.S. in Chemical Engineering, Princeton University, USA
- Ph.D. in Chemical Engineering, Princeton University, USA
- Specialization and Research Areas: Biomaterials and drug delivery.
Research Interest:

**Polymer and Surfactant Self-assembly Drug Delivery**

Traditionally, disease treatment is delivered mainly through oral or intravenous means. In the case of cancer treatment, however, drugs are so toxic that delivering them through traditional methods would mean killing healthy living cells. Thus, delivery vehicles are used to encapsulate the drugs and deliver them the cancer site while protecting normal cells.

We are interested in developing drug delivery vehicles from polymers and surfactants self-assembly. They are ideal candidates for this application because they are compatible with hydrophobic and hydrophilic drugs. The problem of delivering hydrophobic drugs is one of the foremost issues in pharmaceutical industry. In addition, polymers and surfactants allow flexibility in attaching targeting molecules to improve the treatment efficacy. We are also interested in drug delivery application in tissue engineering since it can provide vehicles to deliver proteins to promote the wound-healing process.

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School of Civil Engineering and Technology

Faculty Members and Research Interests, 2011

Dr. Amorn Pimanmas

**Associate Professor**
B.Eng. (1st Class Honors) in Civil Engineering, Chulalongkorn University, Thailand
M.Eng. & Ph.D. in Civil Engineering, University of Tokyo, Japan

**Specialization and Research Areas:** Behavior, analysis and evaluation of damaged reinforced concrete members and structures, Nonlinear finite element analysis of reinforced concrete, Strengthening of reinforced concrete members.

**Research Interests:**

**Earthquake Resistant Structural Design**

The goal of the research is to study the seismic performance of sub-standard non-ductile reinforced concrete members and develop a suitable structural design approach for buildings and bridges. The research begins with the evaluation of seismic performance of existing sub-standard reinforced concrete members in buildings and bridges. Several critical components such as sub-assemblages, beam-column joint, column, etc., will be tested. The failure mechanism of these critical components will be investigated. Then, appropriate design methods and reinforcement detailing shall be proposed. The research will emphasize reinforcement detailing in plastic hinge zones, shear failure in joints and columns, confinement, bond distress and lap splice failure and column hinging mechanisms.

**Seismic Retrofit of Reinforced Concrete Buildings**

The objective of the research is to retrofit existing buildings and bridges against seismic effect. The cost-effective strengthening methods will be proposed for critical sub-assemblages or components of the structure. An example of a successful retrofit method is Joint Planar Expansion which strengthens the beam-column joint. The strengthening scheme will enhance not only the capacity and displacement but also will change the failure mode from brittle to ductile failure. The research will propose both component strengthening and structural system strengthening, such as steel bracing and shear wall addition. Advanced composite materials such as fiber reinforced polymers will also be used for retrofit.

**Nonlinear Behavior and Modeling of Reinforced Concrete**

The research includes the advanced study of the nonlinear behavior and modeling of reinforced concrete. A behavioral model of beam column joints will be developed that includes bond deterioration, joint shear failure, and splitting cracks in beams and columns. A strut and tie model is also applied to explain the flow of forces within the beam-column joint. Moreover, various numerical and finite element analysis tools are utilized to analyze the behavior of components and structures. The finite element models will be both member based and element based with the advanced state-of-the-art constitutive models of reinforced concrete.
Dr. Mongkut Piantanakulchai  

**Assistant Professor**  
B.Eng. in Civil Engineering, Chulalongkorn University, Thailand  
M.Eng. in Transportation, Asian Institute of Technology (AIT), Thailand  
Ph.D. in Transportation, Tohoku University, Japan  

Specialization and Research Areas: *Multi criteria decision making in transportation planning, Activity based travel demand modeling, Computable general equilibrium modelling for energy policy studies.*

**Research Interests:**

**Multicriteria Decision Making in Civil Engineering**

The current research interest focuses on applications of multi criteria decision making techniques to solve civil engineering problems. Possible topics include engineering design, prioritization and evaluation of public measures, classification problems, etc. Some research topics require knowledge and cooperation from multi-disciplinary fields. Examples of research being conducted include highway corridor planning, prioritization of highway accident reduction measures, landslide/seismic hazard zoning, seismic resistance and maintenance prioritization of existing buildings. Techniques such as the Analytic Network Process (ANP) and Fuzzy Decision Making Methods are used to solve the multicriteria decision making problems.

**Highway Design Optimization**

Highway design is a complex process that involves many constraints and objectives to be achieved. The conventional design method is manual. Therefore the number of alternatives is limited by the choices of the designer. It is also time and cost consuming to generate many alternatives by manual design. The research aims to apply some heuristic techniques such as Genetic Algorithm (GA) and Ant Colony Optimization (ACO) to solve the highway design optimization problem within the Geographic Information System (GIS) environment.

Dr. Pruettha Nanakorn  

**Associate Professor**  
B.Eng. (1st Class Honors) in Civil Engineering, Chulalongkorn University, Thailand  
M.Eng. in Structural Engineering, Asian Institute of Technology (AIT), Thailand  
D.Eng. in Civil Engineering, The University of Tokyo, Japan  

Specialization and Research Areas: *Computational mechanics, Finite element technology, Structural optimization, Design automation.*

**Research Interests:**

**Automation in Structural Design**

Structural design can be classified into several design tasks. These tasks need different degrees of human intuition. Those design tasks that require little human intuition and can be systematically written as algorithms may be easily delegated to computers. In contrast, other design tasks that require a lot of human intuition and do not have clear algorithms cannot be done without designers’ experiences. Although it may seem that some of the heuristic design tasks are not difficult and can be handled quite easily by engineers, in practice, these easy tasks unfortunately prevent the whole design process from being completely automated. In this research area, artificial intelligence (AI) and other advanced computing technologies will be used to remove these design task hindrances in order that complete structural design automation can be developed.

**Advanced Finite Element Analysis**

It can be safely said that the finite element method (FEM) is currently the best method for solving mechanical problems. The method has been continuously developed and its progress is quite noticeable. Nevertheless, the development of FEM has been mainly concentrated on the theoretical part of the method. It is now time to integrate new computing technologies with FEM in order that advanced finite element analysis can be performed with ease. In this research area, advanced computing technologies, such as new programming technologies, artificial intelligence, information technologies, and database technologies, will be used to improve the performance and usability of FEM.
Dr. Somnuk Tangtermsirikul

**Professor**

B.Eng. (Honors) in Civil Engineering, Chulalongkorn University, Thailand  
M.Eng. & D.Eng. in Civil Engineering, University of Tokyo, Japan  

Specialization and Research Areas: Modeling of concrete behavior, Durability evaluation and service life design of concrete structures, High performance cementitious based materials, Special concrete such as SCC and RCC, Use of wastes and recycled materials in cement and concrete, Health monitoring, repair and maintenance of concrete structures.

Research Interests:

**Performance Based Analysis and Design of Concrete Mix Proportions**

Simulation models for predicting materials, mix proportion, time and environment dependent properties of concrete are studied. At present, the studied properties are workability, bleeding, strength, thermal cracking, autogenous and drying shrinkage, cracking resistance, carbonation, chloride induced corrosion, and sulfate resistance. Computer software is being developed for analysis and design purposes to obtain mix proportions of concrete with the required initial and long-term performances. Results of the research works are utilized in the establishment of “Design Considering Durability and Service Life” for concrete structures in Thailand.

**Proper Use of Cementitious and Non-cementitious Powders in Concrete**

Studies on the properties of concrete with various kinds of powder materials are conducted. The materials are: fly ash, bottom ash, CaCO₃ powder, lime ash, etc. Optimizing the use of these materials and development of new cement are the aims of this project.

**Special Concrete**

Various types of special concrete are studied with the aim to make proper use of local materials. Mix design processes in the forms of software and design charts are being developed. In addition to the mix design, some standard guidelines are being established. The studied types of special concrete are: self-compacting concrete, zero-slump concrete, low-heat concrete, sulfate-resisting concrete and expansive concrete, etc.

**Maintenance of Concrete Structures**

Research works and their applications on inspection and life cycle evaluation of concrete structures are carried out. The works are parts of the program to develop appropriate maintenance codes and standards for concrete structures in Thailand.

Dr. Taweep Chaisomphob

**Associate Professor**

B.Eng. (1st Class Honors) in Civil Engineering, Chulalongkorn University, Thailand  
M.Eng. & D.Eng. in Civil Engineering, University of Tokyo, Japan  

Specialization and Research Areas: Advanced design methods of steel and composite structures, Shear lag behavior of thin-walled structures, Development of run-off-river hydropower projects, Public participation in infrastructure project development, Development of efficient composting system for solid waste treatment, Application of Three-Dimensional Finite Element Methods to the Design of Steel Structures.

Research Interests:

**Application of Three-Dimensional Finite Element Methods to the Design of Bridge Structures**

In order to propose the improvement in the design methods of bridge structures, a three-dimensional finite element method using solid and shell elements is employed. For the local stress analysis of a complicated bridge structure, such as a composite steel-concrete bridge, a model accounting for interaction between steel and concrete is developed. By carefully investigating the behavior of steel box-girders, the assessment of shear lag effects on stress and deflection is proposed.

**Development of Run-off-River Small Hydropower Projects**

Run-off-river small hydropower is considered as one of the promising renewable energy sources in Thailand, since it gives less environmental and social impacts. Feasibility studies of the hydropower projects of this type are performed by considering engineering, economic and environmental criteria. A geographical information system (GIS) is adopted as a tool for the present study.

**Development of Efficient Organic Waste Composting System for Small and Medium Communities**

Composting as the treatment of the municipal solid waste has been getting more promising as it has lesser effect to the environment. However, in the developing countries, it has usually been over looked due to its complex processes, and lack of technology. To eliminate such problems, this research project aims to develop a better composting system. A pilot plant was set up, and a series of experiments was
conducted to study the optimal composting conditions, which would maximize its efficiency in actuality. This will be followed by a feasibility study and Life Cycle Assessment (LCA) of the proposal as a sustainable development for solid waste treatment methods in the future.

Dr. Winyu Rattanapitikon  

_Associate Professor_

B.Eng. in Agricultural Engineering, Khon Kaen University, Khon Kaen, Thailand  
M.Eng. in Water Resources Development, Asian Institute of Technology (AIT), Thailand  
D.Eng. in Civil Engineering, Yokohama National University, Yokohama, Japan  

Specialization and Research Areas: _Mathematical modeling, Coastal engineering, Hydraulics of open channel, Hydrology._

Research Interest:

**Mathematical Modeling for Cross Shore Sediment Transport and Beach Deformation under Regular and Irregular Waves**

Many numerical models had been developed to compute sediment transport rate. However, most of the models were developed under limited experimental conditions. Therefore their validity is limited according to the range of experimental conditions which were employed in the calibration. The evidence is that many models exist. The main objective of this research is to develop a reliable sediment transport model based on a wide range of experimental conditions.

School of Information, Computer, and Communication Technology

Faculty Members and Research Interests, 2011

Dr. Banlue Srisuchinwong  

_Associate Professor_

B.Eng. (Honors) in Electrical Engineering, King Mongkut's Institute of Technology Ladkrabang, Thailand  
Diploma of the Philips International Inst. of Technological Studies (Electronics), Eindhoven, The Netherlands  
M.Sc. in Electrical Engineering, University of Manchester Institute of Science and Technology, UK  
Ph.D. in Electrical Engineering, University of Manchester Institute of Science and Technology, UK  

Specialization and Research Areas: _Chaotic Oscillators, Quadrature Oscillators, Chaos and Nonlinear Dynamics, Microelectronics._

Research Interests:

**Chaotic Oscillators**

Implementation of Chua's chaotic oscillators based on simple CMOS nonlinear resistors. High-frequency Sprott's sinusoidal and chaotic oscillators using current feedback operational amplifiers (CFOAs). Interger-order and fractional-order. Chaotic attractors.  


**Sinusoidal Oscillators and Analogue Filters**

High-frequency low-power sinusoidal quadrature oscillators. High-Q wide-dynamic-range bandpass filters.

Dr. Boontawee Suntisrivaraporn  

_Lecturer_

B.Eng. (1st Class Honors) in Computer Engineering, King Mongkut's Institute of Technology Ladkrabang, Thailand  
M.Sc. in Computer Science, Technical University Dresden, Germany  
D.Eng. in Computer Science (Summa Cum Laude), Technical University Dresden, Germany  

Specialization and Research Areas: _Logic-based knowledge representation and reasoning, Description logics, Knowledge engineering, Ontology modeling, Semantic web._
Research Interests:

**Description Logic**

Knowledge Representation and Reasoning (KRR) is a prominent research field of Artificial Intelligence (AI). In essence, the goal of knowledge representation is to describe and store knowledge in a systematic and machine understandable way. Having knowledge stored properly in this way, automated reasoning can be employed in order to, for instance, detect inconsistencies and infer implicit knowledge. Several approaches to KRR have been proposed and considered in the AI literature, but some of the most important approaches are based on logic, in particular Description Logics. Description Logics form a successful family of knowledge representation formalisms with two key assets: formally well-defined semantics which allows representing knowledge in an unambiguous way and automated reasoning which allows inferring implicit knowledge from knowledge given explicitly.

**Semantic Web Ontologies**

The eXtensible Markup Language (XML) has been introduced to address the limitations of the Hyper-Text Markup Language (HTML), namely the lack of document structures. Despite a big success in several applications, XML still fails to fulfill the Semantic Web vision, which aims at describing the meaning (semantics) of Web data in a way suitable for automated reasoning. To solve this issue, the Resource Description Framework (RDF) and RDF Schema (RDFS) are used to construct a data model and define a domain-specific terminology, respectively. With a logical underpinning based on Description Logics, RDF and RDFS have been considerably extended to the Web Ontology Language (OWL), a W3C recommendation of ontology language for the Semantic Web. A collection of OWL ontologies will form an indispensable ingredient toward realization of the Semantic Web vision. Although several tools and reasoning techniques are readily available for modeling OWL ontologies, further challenges still remain.

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**Dr. Bunyarit Uyyanonvara**

**Associate Professor**

B.Sc. (1st Class Honors) in Science (Physics), Prince of Songkhla University, Thailand

Ph.D. in Image Processing, King’s College, University of London, UK

Specialization and Research Areas: Medical image processing, Texture segmentation, Relaxation labeling, Pattern recognition.

**Research Interests:**

**Image Segmentation Using Texture and Relaxation Labeling Algorithms**

When normal density or intensity segmentation is not effective enough, a new representation of texture which is derived from the spatial energy of the texture is introduced in order to segment the given image. From the energy values, a 2D histogram of texture is generated. The texture histogram is used to discriminate textures and to retrieve image segmentation. In an attempt to assess the similarities in the regional areas, the property of adjacency could be useful. This characteristic of pixels is defined as a co-occurrence matrix, which is an important tool in Image Segmentation using Texture and Relaxation Labeling Algorithms.

**Medical Image Processing**

Taking advantage of the high capability of computers, offering advantages over film based systems, several image processing techniques are of interest, especially for medical purposes in order to get most of the information out of the given medical images.

Essentially, medical imaging can make use of texture information, texture feature classification or texture segmentation because of the nature of the medical image itself. Medical assessment can then be made fully automated later on and this will lead to a reduction of human errors, increasing of consistency and repeatability. This can be distributed to the remote areas or hospitals that lack sophisticated treatment facilities or trained experts.

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**Dr. Chalie Charoenlarpnopparut**

**Associate Professor**

B. Eng. (1st Class Honors with Gold Medal) in Electrical Engineering, Chulalongkorn University, Thailand

M.S. in Electrical Engineering, The Pennsylvania State University, University Park, PA, USA

Ph.D. in Electrical Engineering, The Pennsylvania State University, University Park, PA, USA

Specialization and Research Areas: Multidimensional systems and signal processing, Robust control, Image processing, Wavelet and filter bank, Signal processing for communication, Convolutional code design, Minimax controller design.
Research Interests:

**Digital Signal Processing**

Multidimensional signal processing has become more popular lately due to its efficiency and greater degree of freedom in the design. However, the design and analysis of multidimensional systems are generally more complicated and requires thorough understanding of abstract algebra. Applications of multidimensional DSP include image compression, video coding, multi-sensor system design, filter bank design and wavelet.

**Multidimensional System/Robust Control**

Over several decades, great effort has been invested in the finding of a multivariate (n-D) polynomial matrix factorization algorithm. The problem has been completely solved only for the bivariate case. Recently with the usage of Groebner basis and conventional algebra, some n-D matrix factorization algorithms have been developed for some special cases. The general problem however, remains open. The solution to this problem will simultaneously solve many other important problems and can be directly applied to the multidimensional system realization and synthesis.

**Signal Processing for Communication and Coding Theory**

Many signal processing techniques such as adaptive filtering and spectral analysis are used to improve the fidelity of the transmission and reception of digital signals. Unlike source coding, channel coding is used for the purpose of protecting the transmitted bit stream from erroneous receiving. Correction and detection of error bits by means of algebraic coding techniques such as 1-D and 2-D convolutional code are usually employed. Topics of interest include: adaptive filtering, power spectrum estimation, array processing, 2-D convolutional code design, and application-specific coding design.

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**Dr. Cholwich Nattee**

**Assistant Professor**

B.Eng. in Computer Engineering, Chulalongkorn University, Thailand  
M.Eng. in Computer Science, Tokyo Institute of Technology, Japan  
D.Eng. in Computer Science, Tokyo Institute of Technology, Japan

Specialization and Research Areas: **Artificial intelligence, Machine learning, Knowledge discovery and Data mining, Artificial intelligence applications in distance learning, and Pattern recognition.**

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**Research Interest:**

**Inductive Logic Programming for Structure-Activity Relationship Studies**

Nowadays, a vast amount of chemical compound structure information can be produced due to advances in High Throughput Screening technology that automates compound screening using the combination of robotics, image processing and pattern recognition. From these data, knowledge describing compound activities and characteristics from their structures is essential, since it can be used for predicting characteristics of unknown compounds for developing new drugs. Machine learning and data mining techniques have been applied in order to automatically obtain models describing the relations between structure and activity. However, traditional data mining algorithms have limitations on knowledge representations. Thus, complicated structures of chemical compounds cannot be handled efficiently.

Extended from traditional machine learning techniques, Inductive Logic Programming (ILP) applies first-order logic for representing data. This allows complicated structures or relations among training examples to be denoted without losing any information. Moreover, learning results in the form of first-order rules, are comprehensible. The knowledge obtained can be easily explained to domain experts.

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**Dr. Ekawit Nantajeewarawat**

**Associate Professor**

B.Eng. in Computer Engineering, Chulalongkorn University, Thailand  
M.Eng. in Computer Science, Asian Institute of Technology (AIT), Thailand  
D.Eng. in Computer Science, Asian Institute of Technology (AIT), Thailand

Specialization and Research Areas: **Knowledge representation, Automated reasoning, Semantic web, Information extraction, Computational logics, Computation theory, Object-oriented system analysis and design.**

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**Research Interests:**

**Semantic Web**

The basic idea of the Semantic Web is to describe the meaning of Web data in a way suitable for automatic reasoning. Expectedly, the Semantic Web technology will bring about large-scale heterogeneous Web knowledge bases with a qualitatively new level of service. The concept of ontology (domain theory) will play a key role as a formal, explicit specification of shared conceptualizations that describe the
semantics of data on the Web. Formal ontology languages as well as meta-level representation of Web resources are investigated. The possibility of developing automated reasoning systems for Semantic Web is explored from both theoretical and practical viewpoints, e.g., a hybrid approach with a strict separation between ontology predicates and rule predicates and a homogeneous approach embedding rules and ontologies in a logical language. Realization of the Semantic Web vision demands further research works on several other knowledge representation and information extraction issues.

Reasoning with UML Diagrams

The Unified Modeling Language (UML) is a graphical language, adopted as a standard by the Object Management Group (OMG) for visualizing, specifying, constructing, and documenting the artifacts of a software-intensive system. As reported by recent works on the formal semantics of UML, there exist inherent interrelationships between components of a UML model. Such interrelationships constitute part of general knowledge about the domain of UML, which may be used for, e.g., deriving implicit properties and verifying the consistency of the model. A framework for knowledge representation and reasoning in the domain of UML is proposed, in which a UML model is represented as textual, XML data, and the general knowledge about the UML domain as an XML declarative description. Development of an inference engine for automatic refinement of the encoded UML diagrams and derivation of implicit model properties is underway.

Equivalent-Transformation Computation Model

In declarative paradigms, a declarative description plays the role of a precise specification, and, at the same time, operates as a program. A number of works on amalgamation and generalization of declarative languages have been proposed. Most of them have been driven mainly by computation-oriented requirements, e.g., enhancement of operational semantics and integration of computation models; other important related concepts such as program synthesis and program transformation are investigated only afterwards and not inherent in their designs. By contrast, the equivalent transformation (ET) paradigm takes a program-synthesis-oriented approach, i.e., effective generation of efficient and correct programs from specifications is its underlying design motivation. Theoretical investigation of the ET computation model is in progress.

A Theoretical Framework for Comparing Computation Models

Systematic generation of programs relies on some specific practically-determined correctness relation, which associates with each specification a number of cost-effectively-derivable correct programs with respect to it. Between two such correctness relations, if one is more expressive than the other, the former is preferable, i.e., it determines a larger space of derivable correct programs. Program generation in different computation paradigms, e.g., logic programming (LP), constraint logic programming (CLP), functional programming (FP), functional logic programming (FLP), and equivalent transformation (ET), employs different correctness relations, and the expressiveness thereof cannot be compared directly due to the discrepancy in the forms of specifications, programs and computations. A need arises for a framework for comparing the expressiveness of correctness relations across computation models.

Dr. Gun Srijuntongsiri

**Lecturer**

B.S., M.S. & Ph.D. in Computer Science, Cornell University, USA

Specialization and Research Areas: **Scientific computing and numerical analysis, with focus on intersection problems and optimization.**

Research Interests:

**Intersections of Geometric Entities**

The problems of finding all intersections between two or more geometric entities, such as lines, curves, and surfaces, have many applications in computer-aided geometric design. Ideal algorithms for these problems should have the following properties: robustness, efficiency, and accuracy. There have been no algorithms, however, that have all of the three properties; most of them are excellent in one or two aspects but are poor in the others. We are interested in designing algorithms that satisfy all of the three properties at the same time as much as possible. Another property of interest is whether the running time of the algorithm depends solely on the condition number of the problem instances. This property is beneficial to have as preconditioning is an important aspect of any numerical computations and it is not appealing if the algorithms become much slower after the problems have been preconditioned. In addition, this would give us an estimate of the running time of the algorithm for a particular problem instance.

**Exploiting Sparsity in Semidefinite Programming**

Semidefinite programming (SDP) is an optimization problem over symmetric positive semidefinite matrix variables with nonlinear but convex constraints. It is more general than linear and quadratic programming. SDP has many applications in engineering and control theory. It is also used to find approximate solutions to combinatorial optimization problems.

The semidefinite programs found in practice are usually very large but very sparse. That is, the
entries of the data matrices are mostly zeroes. To solve such programs effectively, sparsity must be exploited. The most efficient class of algorithms for SDP, primal-dual interior point methods, does not preserve sparsity and cannot exploit sparsity in the input data. We are interested in designing an algorithm that is either in this class or is as efficient that can also exploit sparsity in every step of its computation.

Dr. Itthisek Nilkhamhang

Lecturer
B.Eng. (1st Class Honors) in Electrical Engineering, Sirindhorn International Institute of Technology, Thammasat University, Thailand
M.S. in Integrated Design Engineering, Keio University, Tokyo, Japan
Ph.D. in Integrated Design Engineering, Keio University, Tokyo, Japan
Specialization and Research Areas: Robust and adaptive control, System identification, Nonlinear systems, Mechatronics, Electrical power systems, Fuzzy and neural network control theories, Hepatic interfaces.

Research Interests:

Robust and Adaptive Control Theories and Applications
Control engineering is a rapidly evolving discipline with a wide range of applications, including but not limited to chemical, electrical, mechanical, and civil systems. However, the mathematical models upon which control theories are based can never precisely describe all the characteristics of any given system. This uncertainty is a direct result of various factors, such as incomplete system knowledge, variable dynamics and parameters, complex physical mechanisms, and external disturbances. The discrepancy between a physical system and its mathematical description is therefore an issue of grave concern for control engineers. Robust and adaptive control theories have emerged as highly efficient tools for dealing with uncertainties, capable of guaranteeing robust and stable system performance under varying operational conditions. This research aims at developing robust and adaptive control strategies, with particular emphasis on mechanical and electrical systems. Possible applications include vibration suppression of automotive systems, automation of industrial processes, force feedback and haptic interfacing.

System Identification
The accuracy and performance of any control system is greatly dependent upon the mathematical model on which it is based. Thus, there is a strong correlation between the practice of control engineering and system identification. System identification refers to the use of measured data in combination with stochastic or deterministic methods to discern the structure and relevant parameters of a given system. As such, it is an invaluable tool when dealing with systems with uncertain or unknown mathematical models and parameters. This research is concerned primarily with applying system identification theories to complex systems involving nonlinearities and hybrid models.

Dr. Komwut Wipusitwarakun

Associate Professor
B.Eng. (Honors) in Electrical Engineering, Chulalongkorn University, Thailand
M.Eng. in Communication Engineering, Osaka University, Osaka, Japan
Ph.D. in Communication Engineering, Osaka University, Osaka, Japan

Research Interests:

Overlay Networks
Overlay networks are user-definable networks created over the underlying Internet (IP) networks which typically serve end-users with the best-effort service model. In overlay networks, overlay nodes which serve as the service access point and data forwarding facility utilize redundant paths and bandwidths of the Internet to transfer their service data. Since the overlay nodes are owned by the application-service providers (ASP) instead of the Internet Service Provider (ISP), all aspects of the overlay network including topology and application-specific QoS (Quality of Service) can be customized. Several research topics are still open in designing such an overlay network. These include overlay network creation strategy, overlay network topology adaptation, multipath flow routing protocol, application-oriented overlay routing protocol, overlay network service provisioning protocol, etc.

Dynamic Topology Wireless Network
Recently, wireless network services are widely available due to the availability of smaller, smarter and cheaper portable devices, inexpensive wireless technology, and mobile user’s demand for “anyone anywhere anytime” information access. There has
been much interest in dynamic wireless networks which can evolve/adapt themselves according to the changes of the volume and geographical distribution of services’ demands generated by the end users. One possible solution is to let network equipment such as the wireless service access points or mobile routers change their positions appropriately to such demand changes in order to maintain the service quality and best utilize networking resources. The research topics include user tracking algorithms, users’ demand anticipation algorithms, topology adaptation algorithms, very fast dynamic routing algorithms, etc.

**Active Network**

Currently, networks become more and more dynamic in terms of both their size and their provided services.

**Dr. Nirattaya Khamsenan**

**Assistant Professor**

B.A. in Mathematics (Cum Laude), Cornell University, USA  
M.A. Mathematics, University of California, Los Angeles (UCLA), USA  
Ph.D. in Mathematics, University of California, Los Angeles (UCLA), USA  
Specialization and Research Areas: Algebraic topology, Discrete geometry, and Cryptography.

**Research Interest:**

Algebraic Topology is a branch of mathematics which uses tools from abstract algebra to study topological spaces. The basic goal is to find algebraic invariants that classify topological spaces up to homeomorphism. The word “Topology” comes from the Greek words “topos”, which means place, and "logos", which means study. Topology is the study of the properties of spaces that are invariant (preserved) under deformations, twisting, and stretching. It is often said that a topologist is a person who cannot tell the difference between their doughnut and their coffee mug, since each can be continuously deformed to the other (each is a solid sphere with one handle).

Discrete Geometry may be loosely defined as study of geometrical objects and properties that are discrete or combinatorial, either by their nature or by their representation; the study does not essentially rely on the notion of continuity. Discrete geometry as part of discrete mathematics has become popular in recent decades because of its applications to computer science. Concepts and notations from discrete mathematics are useful to study or describe objects or problems in computer algorithms and programming languages.

Cryptography can be summarized at a high level as the theory and practice of controlling information. Simple examples of its applications can be found in many places in modern society- perhaps the most prominent is that of securing electronic commerce. Branches of cryptography touch many areas of mathematics and computer science, including algebra, number theory, combinatorics and complexity theory, to name a few.

**Dr. Pakinee Aimmanee**

**Assistant Professor**

B.S. in Mathematics (Cum Laude with Distinction), minor in Computer Science, University of Delaware, USA  
M.S. in Applied Mathematics, University of Colorado at Boulder, USA  
Ph.D. in Applied Mathematics, University of Colorado at Boulder, USA  
Specialization and Research Areas: Information retrieval, Data mining, Applied linear algebra.

**Research Interest:**

**Information Retrieval**

The number of text documents nowadays has grown very rapidly through widely varied media such as books, journals, and Webs. Getting information from the large collection of data or documents is not an easy task. Data indexing and retrieval are in the field of Information Retrieval (IR) that have been of interest to computer information scientists in the past few years. There are many search algorithms that are used to solve the retrieval problems, but each still has some disadvantages, especially in terms of storage usage, speed, and accuracy. This causes the search algorithms become not as efficient as they should be. My research focuses on how to improve search algorithms to gain more accuracy and to require less time and storage.
Dr. Prapun Suksompong

Lecturer

B.S. in Electrical and Computer Engineering (Summa Cum Laude), Cornell University, Ithaca, New York, USA
M.S. & Ph.D. in Electrical and Computer Engineering, Cornell University, Ithaca, New York, USA


Research Interests:

Computational Neuroscience

Understanding how biological neurons work has been a major goal in neuroscience. We approach this issue from a communication engineering perspective. The goal is to construct models which are simple yet biologically realistic and provide insights into the neuron codes. Our study involves ideas from probability theory, communication theory, information theory, and the analysis of signal and noise.

Wireless Network

Wireless communication is the fastest growing segment of the communications industry. We are particularly interested in the OFDMA (Orthogonal Frequency Division Multiple Access) technology which has been widely accepted as a technology of choice for broadband wireless access.

Dr. Somsak Kittipiyakul

Lecturer

S.B. and M.Eng. in Electrical Engineering and Computer Science, Massachusetts Institute of Technology, USA
Ph.D. in Electrical and Computer Engineering, University of California at San Diego, USA

Specialization and Research Areas: Wireless communications and networking, Resource allocation and scheduling, Performance analysis of queuing systems, and Stochastic control.

Research Interests:

Subcarrier Allocation in OFDM Systems with Bursty Traffic

A subcarrier allocation problem in Orthogonal Frequency Division Multiplexing (OFDM) wireless systems when the traffic is bursty is studied. The allocation objective is to minimize the average packet delay over the long run. The problem as a multi-queue multi-server allocation problem with time-varying connectivities and arrivals is modeled. For on-off connectivities and homogeneous users, it can be shown that a simultaneous maximum-throughput and load-balancing policy is delay-optimal. For more general connectivities, heuristic policies that use different degrees of queue and channel state information and whose performances depend on the traffic load are proposed.

Asymptotic Performance Analysis in Queuing Systems

Asymptotic approximation based on a large-deviations technique to analyze the delay violation probability in queuing systems is being performed. For single-user systems, the performance where the services come in constant batches is analyzed. For multi-user systems, the performance improvement due to the dynamic scheduler that assigns the service to user with longest queue length is investigated.

Dr. Stanislav S. Makhanov

Associate Professor

M. Appl. Math., Moscow State University, Faculty of Computational Mathematics and Cybernetics, Moscow
Diploma in English Language, Moscow Institute of Foreign Languages, Moscow
Ph.D. in Applied Mathematics, Computer Center of the Russian Academy of Science, Moscow

Specialization and Research Areas: Robotics, Image processing, Pattern recognition, Grid generation, Computational fluid dynamics.

Research Interests:

Software for Optimization of the Tool-Path of Industrial Milling Robots

Innovations in the field of mechanical engineering have enhanced the involvement of milling robots in various manufacturing processes. Nowadays, computer guided milling machines are employed to produce free-shape surfaces in mass manufacturing industries such as automobile, airplane, ship-building, etc. However, several physical phenomena, such as machine kinematics, thermal effects, static and dynamic loading, and common-cause failures often affect the quality of the desired surface. Although recent research papers have displayed a number of
advanced methods to improve the characteristics of
machining, a robust algorithm to generate the optimal
tool-path for geometrically complex workpieces is still
an open problem.

**Image/Signal Reconstruction**

Image processing and restoration has revolutionized
the fields of medicine, space exploration, geology,
and oceanography. A fundamental issue of image
restoration is identification of the distortion in the
presence of observation noise. However, it is well
known that small variations of the initial data could
lead to solutions far from a correct one. Moreover, the
performance of the identification procedures critically
depends on the assumptions regarding the size and
the shape of the distortion. Therefore, an efficient
procedure should be smart enough to perform an
appropriate regularization and to recognize the size
and the pattern of the distortion. These features are
particularly important in the case of multi band
wavelet based schemes since the procedure can not
be decomposed with regard to filtered components of
the image. The up-to-date Literature on Image
Processing clearly indicates the need for further
research.

**Grid Generation Technologies**

Grid generation techniques emerged as a sub-
discipline of Computational Fluid Dynamics in the
eyear seventies. Nowadays grid generators are
among the major components employed by versatile
codes in Geometrical Modeling, Computer Graphics,
CAD/CAM, Structural Analysis, Aerodynamics and
Computational Fluid Dynamics. However, in spite of
considerable efforts and a long time spent on
curvilinear and moving grid generation, the theoretical
principles have not been yet established. Grid
generation today is still much more of an art than a
science. Since many different approaches exist and
are being used, creative craftsmen are needed to
operate the various packages. Therefore, from an
industrial point of view, issues surrounding efficient
implementation, interactive, graphical user interface,
visualization and software engineering in grid
generation are of paramount importance.

**Dr. Steven Gordon**

**Assistant Professor**

B.Eng. in Computer Systems Engineering, University of South Australia, Australia
Ph.D. in Telecommunications, University of South Australia, Australia

Specialization and Research Areas: Telecommunications, Internet and Computer Networking including:
Wireless Networks, Satellite Internet, Wireless security, Distributed computing and middleware, Formal
methods and Petri Nets, System protocol design and analysis.

**Research Interests:**

**Mobile Peer-to-Peer Networking**

Low-cost wireless networking devices, such as Wi-Fi enabled laptops and mobile phones, has allowed
mobile Internet access to flourish. Future advances in wireless networking, such as Mobile Ad Hoc
Networks, Mesh Networks and Sensor Networks, will enable mobile Internet applications to be used in a
more distributed manner, in particular Mobile Peer-to-
Peer applications. To make Mobile P2P feasible,
many networking challenges must be overcome,
including: maintaining network performance in
presence of voice and video applications; providing
fair and/or prioritised allocation of resources to users
(e.g. Quality of Service control); detecting, and
preferably avoiding Denial-of-Service security attacks;
and allowing users to seamlessly move between
networks, while maintaining their application
sessions.

**Formal Design of Protocols**

Communication protocols (such as TCP/IP, IEEE
802.11, GSM, P2P protocols) are a core part of
technologies we use everyday: the Internet, mobile
and landline phones, transport systems, home
entertainment and so on. Hence, it is vital that these
protocols operate in a correct, efficient and secure
manner. The design and analysis of communication
protocols has been a subject of research and
engineering practice for years. However, with the
ever-increasing release of new protocols, especially
for the Internet and wireless networks, tools and
techniques are needed to verify the design of
common protocol mechanisms, rather than analysing
every protocol individually. Two promising areas of
research are: creating and verifying formal Petri net
models of mechanisms that are applicable to a range
of protocols; and integrating techniques for formal,
performance and security analysis (e.g. combining
Petri nets with simulation tools like NS2 and OPNET;
using formal models for security proofs).
Dr. Surapa Thiemjarus

Lecturer
B.Sc. (1st Class Honors) in Information Technology, Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand
M.Sc. in Advanced Computing, Imperial College London, UK
M.Phil. in Speech, Text Processing and Internet Technology, University of Cambridge, UK
Ph.D. in Computing, Visual Image Processing Research Group, Imperial College London, UK

Specialization and Research Areas: Body Sensor Networks (BSNs) and applications, Context-aware and pervasive sensing, Machine learning, Pattern recognition, Sensor fusion, New interfaces for musical expression, Artificial intelligence, Probabilistic graphical models, Neural networks, Feature selection.

Research Interests:

**Context Aware Sensing with Body Sensor Networks**

In mobile computing research, embedding of context knowledge into devices as a means for adding practical value to mobile devices is becoming popular. In fact, reliable detection of patient activity under which the physiological signals are sampled is important to the capture of clinically relevant episodes, since similarly detected sensory signals can be interpreted differently depending on the task the patients are engaged in.

A wireless Body Sensor Network (BSN) represents the latest evolution of diagnostic tools from the traditional episodic management to continuous monitoring of patients’ physical and biochemical parameters under their natural physiological conditions. This allows the detection of transient but life threatening abnormalities and the early prediction of adverse events. Besides its applications in healthcare, a BSN can also be used as a human-computer interface for games, and provide a monitoring platform for detailed analysis of athletes under a natural training environment.

Dr. Thanaruk Theeramunkong

Associate Professor
B.Eng. in Electrical and Electronics Engineering, Tokyo Institute of Technology, Japan.
M.Eng. in Computer Science, Tokyo Institute of Technology, Japan.
D.Eng. in Computer Science, Tokyo Institute of Technology, Japan.

Specialization and Research Areas: Artificial Intelligence (AI), Natural Language Processing (NLP), Information Retrieval (IR), Knowledge Data Discovery, Data Mining, Machine Learning (ML), and Intelligent Information Systems.

Research Interests:

**Natural Language Processing**

(1) Robust NLP and Linguistic Knowledge Acquisition

While NLP systems are gradually becoming accepted by a wider range of people both in academic and business area, many difficult problems are still unsolved. One of the important problems is how to improve robustness and adaptiveness in NLP system, especially how to analyze and interpret various phrases and sentences which are ungrammatical (also called ill-formed inputs). A user-friendly system should be robust and flexible in that it can analyze any well-formed and ill-formed input efficiently. The system should also be adaptive to deal with phrases/sentences including unseen construction and vocabulary, for instance learning some new grammar rules. Currently, we are focusing on both rule-based and corpus-based approaches to cope with ill-formed inputs and, when needed, to acquire novel linguistic knowledge. On the increase of very large electronic corpora, statistics obtained from such corpora are a useful clue for this problem.

(2) Text Interpretation: Information Retrieval, Categorization and Information Extraction

In the past, most online information stored in databases or spreadsheets. At the present time, the
majority of online information is text-based, e.g., e-mail, news, journal articles, reports, books, encyclopedias. These information sources are worth but there is too much information available, and not enough time to sort through it. Text interpretation techniques are helpful for categorizing, filtering and extracting information from text. Three types of text interpretation are information retrieval, categorization, and information extraction. We are interested in developing efficient methods to various tasks of text interpretation.

**Knowledge Science and Engineering**

(1) Knowledge Data Discovery in Database

Knowledge Data Discovery (KDD) is a rapidly growing interdisciplinary field that merges together databases, statistics, machine learning and other AI technologies in order to extract useful knowledge from a large-scaled collection of data. The problems in this field are of two general categories: (1) prediction and (2) knowledge discovery. Knowledge discovery is a stage prior to prediction, where information is insufficient for prediction, such as clustering, association rules, text mining and so on. Our study aims at finding and implementing efficient, robust and scalable methods in real-world situation where databases are complex, voluminous, noisy and non-stationary. Some interesting applications include computer-aided education (CAI), decision support systems, and management information systems.

(2) Intelligent Decision Support Systems

In business, government, and other organizations, decision making plays an important part in determining the landscape of tomorrow’s world. Computer systems that assist decision-making process are called decision support systems (DSSs). Intelligent decision support systems (IDSSs) are DSSs that make use of techniques emerging from the field of artificial intelligence (AI). Our research focuses on studying new techniques in both (1) model-driven support systems, which are based on strong theory or model, and (2) data-driven support systems, which are based on database technologies and statistical methods.

**Dr. Toshiaki Kondo**

**Assistant Professor**

B.Eng. in Mechanical Engineering, Tokyo Institute of Technology, Japan
M.Eng. in Information Processing, Tokyo Institute of Technology, Japan
M.Eng. in Image Processing, The University of Sydney, Australia
Ph.D. in Image Processing, National University of Singapore, Singapore
Specialization and Research Areas: Digital image processing (esp. feature detection and segmentation in 2-D and 3-D), Computer vision (esp. depth estimation and motion estimation), Pattern recognition (esp. human face recognition).

**Research Interests:**

**Digital Image Processing (especially Medical Image Processing)**

Feature detection and image segmentation are the primary areas of my research interests. "Analysis of 3-D maxillofacial image data" is the title of my doctoral dissertation, which focused on the analysis of the human dentition and jawbone for orthodontic treatment and surgery. The extraction of anatomical features in retinal images is one of my recent research topics.

**Computer Vision and Remote Sensing**

Depth estimation and motion analysis are the areas of my long-term research interests. Depth estimation is the central issue in dealing with stereo (or more) images, while motion analysis is concerned about the process of time-sequential images. I am particularly interested in the “correspondence problem” that has to be solved for estimating both depth and motion.

**Object Classification and Recognition**

Image understanding is another area of my interests. This category has various applications for bioinformatics and industry, such as security control, parts inspection, grading and sorting, etc. A popular research topic in bioinformatics is human face recognition which I have worked on.

**Dr. Waree Kongprawechnon**

**Associate Professor**

B.Eng. (1st Class Honors) in Electrical Engineering, Chulalongkorn University, Thailand
M.Eng. in Control Engineering, Osaka University, Japan
Ph.D. in Mathematical Engineering and Information Physics, University of Tokyo, Japan
Specialization and Research Areas: The theory in H∞ control, Control theory, Robust control, System identification, Modeling, Adaptive control, Learning control, Neural network, and Fuzzy control.
Research Interests:

**H^{*} Control**

The advent of H^{*} control was a truly remarkable innovation in multivariable theory. It eliminated the classical/modern dichotomy by formulating the design issues of classical control property and has solved it based on the state-space tool of modern theory. The theory-practice gap was no longer a significant issue at the beginning of the 1990s due to a number of successful applications of H^{*} control to real design problems, especially applications of H^{*} control based robust control theory.

**Robust Control**

No mathematical system can exactly model a physical system. Nowadays it is gradually being recognized that the real issue of control engineering we were faced with was the difficulty of modeling the plant to be controlled. For this reason we must be aware of how modeling errors might adversely affect the performance of a control system. Robust control theory became the most popular area that was expected to deal with model uncertainty.

School of Management Technology

Faculty Members and Research Interests, 2011

**Dr. Aussadavut Dumrongsiri**

*Lecturer*

B.E. in Electrical Engineering, Chulalongkorn University, Thailand
M.Sc. in Electrical Engineering, Michigan State University, East Lansing, MI, USA
M.Sc. in Industrial and Operations Engineering, University of Michigan, Ann Arbor, MI, USA
MBA (Finance), Thammasat University, Bangkok, Thailand
Ph.D. in Business Administration (Operations Management), University of Washington, Seattle, WA, USA.

**Specialization and Research Areas:** Operations management, Supply chain management, E-Business, E-Word of Mouth, Project management, Inventory management, Game theory, Business competition.

**Research Interests:**

**Dual-Channel Supply Chain**

With the introduction of the Internet, firms can introduce a web-based channel to sell products directly to the consumers and this channel competes directly with the traditional channel: retailer stores. The research aims to study the outcomes of the competition under demand uncertainty and how to maximize the total supply chain profit. The coordination mechanism between the channels is analyzed and proposed.

**Rental Service Operations**

By using the on-line historical customer information, the rental service can learn the behavior of each customer. The behavior of customers, such as rental duration, is used by the firm to better manage the rental service operation. The research aims to find dynamic optimal allocation policy to allocate limited rental items, such as DVDs, among customers classified by rental duration under the fixed-price scheme.

**Dr. Chawalit Jeenanunta**

*Assistant Professor*

B.S. in Computer Science, University of Maryland, USA
B.S. in Mathematics, University of Maryland, USA
M.S. in Management Science, University of Maryland, USA
Ph.D. in Industrial and Systems Engineering, Virginia Polytechnic Institute and State University, USA

**Specialization and Research Areas:** Linear programming, Integer programming, Network optimization, Simulation, Supply chain management.

**Research Interests:**

**Large-Scale Simulation and Optimization**

Many problems in the real world are large and complex. Researchers in this field are trying to improve the algorithm and utilize available computational technology such as parallelism or grid computing to solve such problems where their resulting models are also very large. This technology
also enables researchers to have a detail model which is close to the real world problem. Some examples of these problems are transportation problem in the urban area (where there consists of millions of people driving on thousands of streets), financial simulation, bioinformatics, and large-scale planning.

Supply Chain Management (SCM)

The researches in SCM involve the study of the process of planning, implementing, and controlling the operations of the supply chain with the purpose of reducing cost and increasing efficiency. SCM includes all movement and storage of raw materials, work-in-process inventory, and finished goods from origin to consumption. There are many problems that can be modeled by simulation and optimization models.

Dr. Morrakot Raweewan

Lecturer

B.Sc. (2nd Class Honors) in Applied Mathematics, King Mongkut’s Institute of Technology Ladkrabang, Thailand
M.S. in Mathematics, Virginia Polytechnic Institute and State University (Virginia Tech), USA
Ph.D. in Industrial Engineering, Clemson University, USA

Specialization and Research Areas: Analysis of supply chain models, Simulation modeling, Applied optimization.

Research Interests:

Information Sharing Between Partners in a Supply Chain

Knowledge and information are widely recognized as a potential competitive advantage in supply chain management. Several studies have shown that cooperation and information sharing can increase benefits, reduce cost, or both. On the other hand, firms may experience a negative reverse-impact, when a receiving partner uses the transferred information to manage its supply chain, resulting in an outcome that hurts the sharing partner. In general, every firm attempts to maintain the competitiveness of a monopoly, while at the same time tries to gain the additional benefit of interorganization cooperation. To balance these risks and benefits, firms need qualitative tools to assist in making decisions regarding information sharing. Such tools would be most valuable if they determine how much and what information should be shared as well as when, with whom, and under what conditions. This research explores these issues through a methodology based on game theory.

Agri-Food Supply Chain Management

Agri-food supply chains widely range from food safety and quality assurance to logistics and business modeling. In modern food retail and food service industries, safe and nutritional food in excellent quality with just-in-time delivery, is expected by customers, especially in developed countries. Developing countries such as Thailand, as food suppliers, have sought opportunities in cross border trade, to developed countries. To expand markets, there are needs in product and process improvement, in both food quality assurance and value creation. However, other important considerations including agriculture sustainability, energy efficiency, and welfare of workforce, should be considered together with cost reduction and profit maximization. This research studies assessment and effectiveness of current configurations and investigates balance and sustainable improvement of food supply chains in developing countries. This research is conducted and validated based on supply chain analysis, optimization, and simulation models.

Dr. Nattharika Rittippant

Lecturer

B.S. in Biology, University of Dallas, USA
B.A. in Economics, University of Dallas, USA
M.B.A. in International Business Management, University of Dallas, USA
M.M. in E-Commerce, University of Dallas, USA
Ph.D. in Strategic and International Management, University of Texas at Arlington, USA

Specialization and Research Areas: Entrepreneurial intentions, CRM, Real options, MNE and international strategies, Strategic management, Privatization, International management, and Entrepreneurship.

Research Interests:

Strategic Management

Strategic management focuses on the management process involving strategic formulation, strategic implementation, and control. The goal is to continuously assess the organization’s external factors (e.g., economy, politics, competitors) and internal factors (e.g., human resources, financial resources, core competencies) in order to create and sustain competitive advantages. This field of study explains how and why some firms outperform others.
MNE Strategies

Multinational Enterprises (MNEs) deal with a relatively higher level of uncertainty and changes than pure domestic firms due to the additional global macroenvironmental factors that can have significant impacts on these firms' strategies and performance. As such, MNEs' strategic formulation, implementation, and control processes are much more complex. Global trends and events must also be taken into consideration by the MNE top-level management when developing strategies to compete globally.

Entrepreneurial Intentions

Entrepreneurial intentions refer to the entrepreneurs’ determination to start new business ventures. The study of entrepreneurial intentions enables entrepreneurship researchers to better understand and predict entrepreneurial activities. As a result, policy makers can improve policies to promote and support entrepreneurship for economic growth and development. The entrepreneurs can also benefit from a better understanding of their own motivations.

Dr. Pisit Chanvarasuth

Lecturer
Doctor of Veterinary Medicine, Chulalongkorn University, Bangkok, Thailand
M.B.A. in Finance, Loyola University Chicago, Chicago, USA
M.S. in Management Information Systems, Rensselaer Polytechnic Institute, New York, USA
Ph.D. in Management Information Systems, Rensselaer Polytechnic Institute, New York, USA

Specialization and Research Areas: Information technology management, Electronic business, Supply chain management, Outsourcing, and Management of organizational business process.

Research Interests:

Electronic Business

Globalization and information technologies (IT) are drastically changing the face of business and organizations. We are all experiencing one of the most noticeable changes to our daily lives - the move to an Internet-based society. At present, there is a growing interest in the use of Electronic business as a means to perform business transactions. IT are being adopted and incorporated into nearly all organizations, which have invested heavily in IT infrastructure for the overall success of their businesses. Through using Electronic business, companies are able to connect with their trading partners, which improves their competitiveness globally. Not only does Electronic business create the Web-based businesses, it is the building of a new industrial order. Such a revolution brings a myriad of opportunities as well as risks. Electronic business is an exciting area for research because of its relative novelty and exploding growth.

Business Process Outsourcing

Despite the widespread trends in business process outsourcing, there has been too little focus on what happens to the shareholder wealth and firm value when an organization outsources. Typically, organizations simply lack the means and experiential research to assign value to business processes they are transferring and receiving. That is, they have no real understanding of how new value can be created in business process outsourcing situations, let alone exploited. This is a continuation of my dissertation research which focused on the shareholder wealth effect of business process outsourcing to the firm.

Dr. Pornpimol Chongphaisal

Assistant Professor
B.B.A. in Marketing, Assumption University, Thailand
M.A. in Comparative Management, Ritsumeikan University, Japan
Ph.D. in Management, Ritsumeikan University, Japan

Specialization and Research Areas: Competency in human resources management, Human behaviors in the organization, Motivations in performance management, Compensation and performance management, Career path, Career planning, and Career management, Intercorporate relations, Competencies and their applications in Human Resources Management, Organizational Behavior and Development.

Research Interest:

The “Intermediate Form” of Intercorporate Relations

The traditional ‘make’ refers to a company making its own products whereas ‘buy’ refers to the transaction in the market, has become a problem of the past. Both ‘market’ and ‘organization’ as we know has its own sets of attributes. In making a transaction, a company has to select which is better between the two, taking into consideration the attributes and costs underlying each of them. A large diversified organization has the internal market for the goods, internal capital market, and internal labor market. Transactions in the middle range has been labeled differently as ‘hybrid transactions’, and ‘mixed coordination systems’. Dr. Pornpimol’s focus is on the study of these ‘intermediate forms’ which is not quite a complete integration into a single firm, but not quite...
an exchange between two separate firms in markets either. Firms may form links or bonds of a long term, ‘relational’ nature, through which they become interdependent for business. The study covers not only the intercorporate shareholding and interlocking directorates but includes cases where the buyer may own tools used by the supplier or cases where there may be intensive technology transfer or sharing of technical and managerial knowledge between firms. The transaction efficiency, stemming from such a relationship, enables the parties involved to realize the reduction of production cost and transaction costs or its combination. Dr. Pornpimol observed the relationship between the cohesiveness of intercorporate relations and the reduction of transaction costs of a business group in Thailand and compared it with those of Japan. Social network analysis is employed to quantitatively measure and compare intercorporate shareholdings of the objects of study to understand the changes of these relationships over time. The results implied by quantitative measurement are examined and logically explained in terms of the effects to the reduction of transaction costs.

Dr. Suebsak Nanthavanij

Associate Professor
B.S. in Chemical Engineering, Chulalongkorn University, Thailand
M.S. & Ph.D. in Industrial Engineering, University of Texas at Arlington, USA
Specialization and Research Areas: Industrial ergonomics, Workforce scheduling, Industrial noise, Product and workstation design.

Research Interests:
Performance Analysis of Ergonomics-based Manual Assembly Line with Parallel Workstations and Floaters

It has been long known that manual assembly tasks are repetitive and require the use of specific muscles in the upper extremities, creating excessive postural and physical loads on the excessively used body members. As a result, manual assembly line workers are at high risk of cumulative trauma disorders in the upper extremities. When ergonomics concerns are introduced to the manual assembly line balancing problems to assign assembly tasks to workers to achieve the maximum postural-physical loads smoothness, the resulting task-workstation assignment solution must be determined using an ergonomics-based approach. Unfortunately, the line throughput is likely to decrease since the balance delay of the line might be compromised. This research project is intended to investigate the effect of adding parallel workstations to some potential bottleneck workstations and providing floaters (or extra helpers) to those parallel workstations so as to increase the assembly line productivity. Additionally, several strategies for opening parallel workstations and rotating floaters among them will be investigated with respect to various desired throughput rates. The Rapid Upper Limb Assessment (RULA) technique will be used to assess the postural and physical loads imposed on the musculoskeletal system of the body when performing each manual assembly task. A heuristic procedure will be employed to assign assembly tasks to workstations using a mixed productivity and ergonomics consideration. Based on predefined dispatching strategies to assign floaters and rotate them among parallel workstations, simulation models will be developed. The performance of the given manual assembly line under different throughput rate requirements and operational conditions will be analyzed. The variables of interest include: throughput rate, number of full-time workstations, number of parallel workstations, number of floaters, dispatching strategy, and switchover strategy. The performance indices are:

achieved throughput rate, balance delay, utilization rates of full-time and parallel workstations, switchover rates, and average queue lengths at full-time workstations.

Ergonomics-based Workforce Scheduling for the Vehicle Routing Problem

The vehicle routing problem is intended to determine the optimal number of vehicles to delivery goods between finite sets of origins and destinations, and their delivery routes. There are numerous variants of the vehicle scheduling problem that have been studied by operations research and industrial engineering researchers. However, very few (if any) have paid attention to the vehicle drivers. In real-world situations, vehicle drivers might not only drive delivery vehicles but also perform loading and unloading of goods at both the origins and destinations. With limited time windows, loading/unloading operations may require more than one person to perform. Moreover, long-distance driving is stressful and increases the risk of highway accidents. Alternate drivers may be required for certain delivery routes. This research project is intended to take the loading/unloading workload and long-distance driving into consideration when finding the optimal workforce schedule for the vehicle routing problem. Based on the given delivery loads (in terms of required energy costs) and the driving distances for individual delivery trucks, a heuristic approach will be developed to determine the minimum numbers of vehicles and operators (drivers and movers) and their delivery routes so as to minimize the total traveling distance without exceeding the recommended daily energy expenditure and driving distance.

Workforce Scheduler: An Ergonomic Manpower Management Tool

This research project is intended to develop a computerized tool called Workforce Scheduler for ergonomically managing manpower for a hazardous work system. A group of industrial workers will
receive daily work assignments to operate/attend a set of machines/workstations in the workplace where ergonomics, safety, and health hazards are present. Job rotation will be implemented to alleviate the workers’ hazard exposures. The types of hazard considered in Workforce Scheduler include industrial noise, heat, over-exhaustion, over-exertion, and toxic gases. Workers may be considered as identical or non-identical receivers, depending on the type of hazard and body tolerance. Workforce Scheduler allows the user to choose between the single-hazard exposure option and the two-hazard exposure option. The permissible daily exposure level must be specified prior to the workforce scheduling. Workforce Scheduler will determine the daily work assignment for each worker such that his/her hazard exposure does not exceed the permissible level. Additionally, the weekly work schedule for the worker can be set so that his/her daily hazard exposures for different workdays will not be the same.

Dr. Suthathip Suanmali

**Assistant Professor**
B.S. in Mathematics and Financial Economics (Summa Cum Laude), Methodist University, USA
M.S. in Applied Mathematics, North Carolina State University, USA
Ph.D. in Mathematics, North Carolina State University, USA

Specialization and Research Areas: *Applied linear algebra, Matrix theory, Energy input-output analysis, Data mining.*

Research Interest:

**Applied Linear Algebra and Matrix Theory**

Matrix theory, applied linear algebra and their applications in manufacturing are the research interests. The primary focus is to employ computational techniques of linear algebra as tools in developing and analyzing mathematical models that describe the behavior of the investigated data. Applied linear algebra and other related fields such as Markov chains, multiplicative processes, and Perron-Frobenius theorem together can deliver advanced models and algorithms and provide a clear perception of the situation in many challenging industrial problems. In particular, the applications of nonnegative matrices such as link analysis, information retrieval, and data mining are being studied. The goal is to develop a proper model for an application and create an algorithm that is capable of approximating for a solution.

Dr. Thanwadee Chinda

**Lecturer**
B.Eng. in Mechanical Engineering, King Mongkut's University of Technology Thonburi (KMUTT), Thailand
M.Eng. in Engineering Management, Griffith University, Australia
Ph.D. in Engineering Management, Griffith University, Australia

Specialization and Research Areas: *Construction safety management, System dynamics modeling.*

Research Interests:

**Construction Safety Culture**

Throughout the world, the construction industry has had a poor safety record, and is disproportionately more dangerous when compared to other industries. The major cause of construction accidents is attributed to unsafe behaviors and work practices, which are viewed as the direct result of having a poor safety culture. The development of a mature safety culture has been recognized as a vital element in the achievement of high standards of safety, alongside an effective safety management system. A better understanding of how to improve safety culture greatly assists an organization to allocate appropriate safety resources, and thus improve its overall occupational health and safety performance.

**System Dynamics Modeling**

The system dynamics (SD) modeling was first introduced by Forrester (1961) as a method for modeling and analyzing the behavior of complex social systems, particularly in an industrial context. It has been used to examine various social, economic, and environmental systems, where a holistic view is important, and feedback loops are critical to the understanding of interrelationships. A SD simulation approach relies on an understanding of complex interrelationships existing among different elements within a system. This understanding is achieved by developing a model that can simulate and quantify the behavior of the system over time. Such simulations are considered essential in understanding the dynamics of the system.
Dr. Veeris Ammarapala

Assistant Professor
B.Eng. in Industrial Engineering, Sirindhorn International Institute of Technology, Thammasat University, Thailand
M.Sc. in Operations Research, Columbia University, USA
Ph.D. in Industrial and Systems Engineering, Rutgers University, The State University of New Jersey, USA
Specialization and Research Areas: Decision support systems; Risk management, Economic analysis, Transportation maintenance management system.

Research Interests:

Decision Support Systems

Decision Support Systems (DSS) are a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

Risk Management

Risk is the net negative impact of the exercise of vulnerability, considering both the probability and the impact of occurrence. Risk management is the process of identifying risk, assessing risk, and taking steps to reduce risk to an acceptable level.

It is critical for any organization to establish a foundation for the development of an effective risk management program, containing both the definitions and the practical guidance necessary for assessing and mitigating risks identified within the organization. The ultimate goal is to help organizations to better manage mission-related risks.

Economic Analysis

Economics is a social science that typically studies the production, distribution, and consumption of goods and services. Economic logic is increasingly applied to any problem determining economic value (such as politics, religion, psychology, history and engineering).

Economic analysis is a systematic approach to a given program, designed to assist the management in solving a problem of choice. The full problem is investigated. Objectives and alternatives are searched out and compared in light of their benefits and costs through the use of an appropriate analytical framework.

School of Manufacturing Systems and Mechanical Engineering

Faculty Members and Research Interests, 2011

Dr. Boontariga Kasemsontitum

Lecturer
B.S. in Mechanical Engineering (Cum Laude), Cornell University, USA
M.S. in Mechanical Engineering, University of California at Berkeley, USA
M.S. in Industrial and Systems Engineering, University of Southern California, USA
Ph.D. in Industrial and Systems Engineering, University of Southern California, USA
Specialization and Research Areas: Vehicle routing and time windows problem, Simulation modeling, Large-scale optimization, Applied operations research, Energy management, Biomechanics.

Research Interests:

Vehicle Routing and Time Windows Problem

The Vehicle routing problem (VRP) is one of the most challenging combinatorial optimization and nonlinear programming problems. The problem is to design a set of routes for a fleet of vehicles serving a number of customers or cities. The objective of the problem is to serve every customer with known demands at minimum vehicle routing cost. VRP arises in the fields of transportation, distribution and logistics planning; often in the context of delivering or picking up goods. The vehicle routing problem with time windows (VRPTW) is more specific than VRP such that the customers have time windows constraints within which the deliveries (or pickups) must be satisfied. Both VRP and VRPTW are integer programming problems categorized as NP-hard problems, in which the computational effort required to solve a problem...
increases exponentially with the problem size. With large size problems, the approximate solutions are obtained by numerical methods. Various heuristic methods have been proposed. These methods rely on the intrinsic nature of the problems. With advanced technologies, heuristic methods can be efficiently used to generate a promising solution.

**Large-scale Optimization**

Optimization is a challenging problem that involves determination of the action parameters that best achieve a desired or overall goal or objective. The overall objective may consist of several objectives that have conflicts. In order to achieve the overall objective, some objectives may not be at the maximum or minimum. Optimization arises in decision problems in business or production activity planning. In a production problem, the objective may be to find the combination of input variables (resources) that minimizes the production costs or maximizes the profits. In a capital budgeting problem, the objective may be to select those projects that maximize the net present value of the investments. Usually, a large number of input parameters is involved in the problem and the exact solution may not be possible to obtain. Several heuristic methods such as Simulated Annealing, Genetic algorithm, etc. have been investigated and provide promising solutions. Each method may be suitable to certain types of problems.

**Dr. Bundit Limmeechokchai**

**Associate Professor**

B.Eng. (1st Class Honors) in Mechanical Engineering, King Mongkut's Institute of Technology North Bangkok
M.Eng. in Energy Technology, Asian Institute of Technology (AIT), Thailand
D.Eng. in Energy Economics and Planning, Asian Institute of Technology (AIT), Thailand


**Research Interests:**

**Energy Conservation and Energy Efficiency**

Energy management is the effective use of energy to maximise profits (minimise costs). A comprehensive energy management program is not purely technical. It takes into account planning and communication as well as marketing. Energy management includes energy productivity and energy awareness. Energy conservation and energy efficiency in residential and commercial buildings, transportation and industries are necessary to the country, as an energy importing country. To achieve energy saving targets, information on end-use devices in residential and commercial buildings, industries, and transport demand is necessary.

**Integrated Resource Planning and CO₂ Mitigation**

Traditionally, the method used in the power expansion process is to identify the sequence of generation additions, which results in supplying the forecast load at the minimum total costs. This has concentrated almost exclusively on conventional supply-side fossil-based options. However, the saving of electricity through a demand side management (DSM) program is equivalent to building a new power generating unit. This concept is known as integrated resource planning (IRP). Therefore, the DSM options in the energy sector are evaluated in the IRP process. In addition to energy efficiency improvement, CO₂ emissions and other environmental emissions are mitigated in the IRP process when both DSM options and renewable energy technologies & low-carbon technologies are included.

**Energy-Environment Modeling and CO₂ Mitigation**

The energy-environment modeling accounts for how energy is consumed, converted and produced in a given energy system under a range of alternative assumptions on population and GDP, economic development, technology, price, market penetration rates for new technologies such as efficient end-use devices and renewable energy technologies, fuel availability and trade, and CO₂ emissions.

Methodologies include both top-down projections of energy demand based on macroeconomic indicators (price, GDP), and detailed bottom-up forecasts based on end-use analysis. In addition, both final and useful energy demand analyses, transport demand modeling for transportation, and technology and environmental databases, such as GHG emissions database, are included.

The alternative energy demand and supply strategies under different user defined and physical constraints can be formulated and evaluated under simulation methods in scenario-based modeling or optimisation methods using Linear Programming (LP) and Non-Linear Programming (NLP).
Dr. Jirachai Buddhakulsomsiri

**Associate Professor**
B.Eng. in Chemical Engineering, Chulalongkorn University, Thailand  
M.S. in Industrial Engineering, Oregon State University, USA  
M.S. in Statistics, Oregon State University, USA  
Ph.D. in Industrial Engineering, Oregon State University, USA  

Specialization and Research Areas: **Applied operations research, Data mining, Production planning and control, Systems simulation, and Engineering economics analysis.**

**Research Interests:**

**Applied Operations Research**

The main focus is to effectively and efficiently solve application problems using existing, modified or newly developed optimization tools. Various applications of interest include, but are not limited to, 1) resource-constrained project scheduling problems in project management; 2) parallel replacement problems in engineering economic decision analysis; 3) vehicle routing, facility location, and supply chain optimization in logistic and supply chains, and 4) production planning and controls in manufacturing and agro-industrial plants.

**Data Analysis for Process/Product Optimization and Improvement**

Process and product can be optimized or improved by using the information contained in the process data. Data analysis tools of interest include statistical data analysis, design and analysis of experiments, statistical process control, statistical sampling, and data mining.

**Systems Simulation Modeling and Analysis**

The research involves modeling of actual and large complex systems using computer simulations and conducting analyses on the simulation models. The objectives are to study and predict the behavior of actual systems, to improve/optimize the performance of existing systems, or to design new systems.

Dr. Navee Chiadamrong

**Associate Professor**
B.Eng. in Industrial Engineering, Chulalongkorn University, Thailand  
M.Sc. in Engineering Business Management, University of Warwick, UK  
Ph.D. in Manufacturing Engineering and Operations Management, University of Nottingham, UK

Specialization and Research Areas: **Cellular manufacturing systems (CMS), Advanced manufacturing systems, Systems simulation, Production planning and control, Supply chain management.**

**Research Interests:**

**Simulation Modelling and Analysis**

Simulation is one of the most powerful analysis tools responsible for the design and operation of complex systems. Simulation involves the modelling of a process or system in such a way that the model mimics the response of the actual system to events that take place over time. The model can be used to predict future behaviour and the effects produced by changes in the systems or in its method of operation.

**Cellular Manufacturing Systems (CMS)**

CMS is another form of manufacturing system which applies the concept of group technology to provide some of the operational advantages of a flow shop while maintaining some of the strategic advantages of the job shop. Many research areas are involved in the concept including different types of cell formation and production planning for controlling the operation within and among the cells (inter-cell workload transfer).

**Production Planning and Control (PPC)**

Production planning uses the information from product and sales planning to plan the aggregate rates of production and the inventory levels. The objective of production planning is to provide sufficient finished goods in a period to meet the sales plan objectives while staying within financial and production capacity constraints. It is one of the richest areas that still require further research.

**Economic and Strategic Justification Methods**

The main objective of justification processes is to justify an investment to see whether or not it is worth investing. However, in justifying new manufacturing technologies, traditional justification methods, with their overemphasis on short-term savings, cause these projects to be rejected while others fail to come up to expectation. Many forms of the integration of economic analysis which provides results in monetary terms with strategic analysis showing results from evaluator rating of his or her subjective feeling are an interesting area for further research.
Dr. Pisal Yenradee

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B.Eng. (1st Class Honors) in Production Engineering, King Mongkut's Institute of Technology North Bangkok
M.Eng. in Industrial Engineering and Management, Asian Institute of Technology (AIT), Thailand
D.Eng. in Industrial Engineering and Management, Asian Institute of Technology (AIT), Thailand

Specialization and Research Areas: Production and Inventory Control (P&IC) systems, JIT, MRP, and TOC;
P&IC systems for Thai industries; P&IC in supply chain; Applied operations research; Systems simulation;
Supply Chain Management.

Research Interests:
Small- to medium-sized industries (SMIs) in Thailand face considerable production and inventory control (P&IC) problems. These problems greatly deteriorate the manufacturing competitiveness of SMIs. In order to alleviate the problems, their characteristics and causes should be analyzed. Some causes of the problems are manageable while others are non manageable. The non-manageable problems must be considered as constraints for developing the P&IC systems. The P&IC systems suitable for the SMIs in Thailand should be developed based on these constraints. Particular research topics in this research area are listed as follows:

Analyses of Production and Inventory Control Problems in Thai Industries

There are various possible problems related to the production and inventory control (P&IC) systems in Thai industries. The nature, characteristics, and causes of such problems should be known in order to design an appropriate P&IC system or to improve the performance of the system. This research aims to identify the characteristics and also real causes of the encountered P&IC problems in Thai industries using an interview survey and case studies.

Guideline or Methodology for Developing the Appropriate P&IC System for Thai Industries

It is reasonable to assume that the situation of industries in developed and developing countries are different. Therefore, the P&IC systems widely used in developed countries, for example, Just-in-Time, MRP, and TOC (Theory of Constraints) may not be suitable for Thai industries. An entirely new system or a modification of certain existing systems may be required by Thai industries. This research aims to recommend P&IC techniques or systems suitable for Thai industries by focusing on aggregate planning, master production scheduling, detailed production and purchasing scheduling, and shop floor control.

Dr. Satha Aphornratana

Associate Professor
B.Sc. in Mechanical Engineering, Prince of Songkhla University, Songkhla, Thailand
M.Eng. in Mechanical Engineering, University of Technology, Sydney, Australia
Ph.D. in Mechanical Engineering, University of Sheffield, England

Specialization and Research Area: Refrigeration system.

Research Interest:
Heat Powered Refrigeration Cycles

A refrigeration system is a thermodynamics cycle that removes heat from an enclosed space, or from a substance, and rejects it out to the surrounding at a higher temperature. In most refrigeration systems, the liquid refrigerant is evaporated at a low pressure and is condensed back to liquid at a higher temperature. The refrigerant can absorb heat at a low temperature during the evaporation process and condense back to liquid by rejecting heat out to the surrounding during the condensation process. Many types of refrigeration systems have been invented. The most common system used is known as “a vapor-compression refrigeration system”. In this system, the elevation of the refrigerant pressure is achieved by means of a mechanical compressor. This system is operated using electrical energy input to the mechanical compressor. Therefore it is known as a worked-operated refrigeration system.

Since energy consumption and environmental problems have become serious issues for the world, there have been many attempts to reduce the use of electricity in the refrigeration process. Heat powered refrigeration systems seem to be one of the most appropriate systems for the current energy and environment situations. Unlike the work-operated refrigeration systems, industrial waste heat can be recovered and converted to produce the useful refrigeration. As a result, the electricity purchased from utility companies for producing refrigeration from a conventional vapor compression refrigerator can be reduced. Therefore, the use of a heat powered refrigeration system helps reduce problems related to the global environment, such as emissions from burning fossil fuels in utility power plants. There are two well-known types of heat operated refrigeration systems: a jet refrigeration system and an absorption refrigeration system.
Dr. Suchada Rianmora

Lecturer

B.Eng. in Industrial Engineering, Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand
M.Eng. in Industrial Production Technology, Kasetsart University, Thailand
D.Eng. in Design and Manufacturing Engineering, Asian Institute of Technology (AIT), Thailand

Specialization and Research Areas: Structured light system based selective data acquisition, Reverse engineering, Application of image processing in manufacturing process, Adaptive layered manufacturing, CAD/CAM.

Research Interests:

Selective Data Acquisition for Supporting Direct Integration between Reverse Engineering (RE) and Rapid Prototyping (RP)

Reverse engineering (RE) has been used closely with rapid prototyping (RP) for fabricating one object from another. Existing RE-RP integrations all begin with the data acquisition of the entire surface of an object. This large point cloud data contains redundancy that must be reduced to avoid unnecessary difficulty in a subsequent surface reconstruction step. Rather than performing data reduction after capturing the data of an entire object, data are acquired selectively and locally layer by layer based on the part complexity to minimize the number of scans. The results of each scan are contour data points, which can be directly used to generate commands for fabricating a prototype.

Application of Image Processing in Rapid Prototyping Process

Build time and accuracy are two contradicting issues that have been a major concern in rapid prototyping, and have led to the development of many slicing approaches, including those applying adaptive slicing, direct slicing, and adaptive direct slicing concepts. Applying image processing has become an interesting technique to determine appropriate thickness for each sliced layer in an adaptive direct slicing process and to recommend slicing positions on a 3D CAD model.

Structured Light System (SLS)

Structured light system is a non-contact measurement technique that has been developed based on active triangulation method where a known pattern of light is projected onto an object. Using SLS technique on an object surface to appear explicitly through phase distortion of the projected patterns. The deformed patterns are captured by a camera or some other image detection device with cheap and fast operation.

Dr. Supachart Chungpaibulpatana

Associate Professor

B.Sc. (Honors) in Mechanical Engineering, Prince of Songkhla University, Songkhla, Thailand
M.Eng. & D.Eng. in Energy Technology, Asian Institute of Technology (AIT), Thailand

Specialization and Research Areas: Thermal engineering, Solar energy, Energy conservation and management, Energy policy and planning.

Research Interests:

With a background in mechanical engineering and energy technology, research activities and interests include both energy equipment design, development and applications, as well as energy system planning and management.

Energy conservation and management in industries and in large commercial buildings in Thailand is an area which still needs a lot of research. The main topics include energy analysis of potential savings, thermal energy storage (cool/ice storage) for air-conditioning system, cogeneration system for industries which require both heat and electricity simultaneously, industrial waste heat recovery and evaporative cooling.

The transportation sector accounts for about 45% of total energy demand in Thailand and, in addition, fuels used are mainly from imported petroleum. This not only affects the country economy but burning fossil fuels also produces air pollution as well as CO₂ which is a main greenhouse gas emission. Research topics under investigation include the development of Bangkok driving modes for various types of vehicles, assessment of the use of catalytic converters in gasoline cars, and the effects of using vegetable oils in diesel engines.

Another field of research to be mentioned is concerned with solar energy, both thermal and electrical applications. Interesting topics under consideration are the design and development of low cost solar water heaters using local materials, solar-photovoltaic refrigerators for use in remote areas where electricity from the utility grid is not available, modeling of solar PV/thermal systems under various types of applications, development of standard methods for testing solar energy equipment, software packages for optimum sizing of solar energy systems.
Dr. Thananchai Leephakpreeda

Associate Professor
B.Eng. in Mechanical Engineering, Chulalongkorn University, Thailand
M.S. in Mechanical Engineering, The University of Akron, Ohio, USA
Ph.D. in Mechanical Engineering, The University of Akron, Ohio, USA


Research Interest:

Mechatronics in Application-oriented Control

The primary research interests cover mechatronics in application-oriented control for practical implementation in process modelling and control, as well as design and optimization. The current topics include intelligent control of pneumatic artificial muscles, remote measurement systems, and novel techniques for computational intelligence in system and control engineering, etc.

Dr. Thawatchai Onjun

Assistant Professor
B.S. in Physics, University of Rochester, Rochester, New York, USA
M.S. in Physics, Lehigh University, Bethlehem, Pennsylvania, USA
Ph.D. in Physics, Lehigh University, Bethlehem, Pennsylvania, USA

Specialization and Research Areas: Plasma physics, Nuclear fission, Nuclear fusion, Thermal and particle transport, Magneto hydrodynamic instability, Plasma-surface interactions, Plasma fuelling system, Neutron and radiation sources.

Research Interest:

Plasma Physics and Nuclear Fusion

This work aims to study plasma behaviors and nuclear fusion reactions that occur inside a device called a “Tokamak”. The research focuses on various topics including thermal and particle transports, plasma instability, plasma-wall interactions, and plasma heating. The results can contribute in simulating the time evolution of temperature and density profiles in tokamaks. This research contributes in an essential way to the interpretation and planning of experiments, validation of theory against experimental results, development of plasma control techniques, and the design of next step devices such as ITER.

Dr. Vladimir I. Kuprianov

Associate Professor
Honors Diploma of Engineer (Equiv. to B.Eng. & M.Eng.) in Mechanical Engineering, Moscow Power Engineering Institute (MPEI), Russia
D.Eng. in Steam Boilers & Steam Generators, MPEI, Russia

Specialization and Research Areas: Thermal power plants, Boiler and furnace technology, Combustion and emission control in boilers fired with fossil fuels, Fluidized bed combustion (FBC) of biomass residues and wastes, Assessment of environmental impacts by thermal power plants and FBC systems.

Research Interests:

Analysis and Improvement of Thermal Efficiency and Environmental Performance of Boiler Units

In many countries with developing economies, fossil fuels of relatively low quality (e.g. lignite) and/or high-calorific fuels with elevated contents of fuel-S and fuel-N are used for power generation. Such a situation results in significant environmental impacts by pollutants discharged from boilers of thermal power plants. Implementation of least-cost methods for the improvement of thermal efficiency and environmental performance of operating utilities seems to be the most attractive way for energy conservation as well as mitigating environmental impacts by the power producers. Research works relevant to this objective include various aspects, such as: (1) exploring technological options for the improvement of the thermal efficiency and environmental performance of existing boiler units; (2) optimization of key operating variables affecting the combustion process in a boiler furnace when firing distinct fuels and/or fuel blends; (3) optimal load dispatching over the boiler units of a power plant. Additionally, through modeling the emission rates of different pollutants (NOx, CO2, CO, SOx, PM, trace elements) discharged from distinct boiler units, reliable data for the assessment of environmental impacts by a power plant can be obtained for various fuel options taking into account actual unit operating conditions and power outputs.
Development and Study of Fluidized Bed Combustion Systems for Firing Biomass Fuels

Biomass is one of the major primary energy sources in Thailand. Residues and wastes collected on a large scale from agricultural and forest-related activities such as rice, sugar, wood and palm oil industries can be used (alternatively to fossil fuels) as energy sources for heat and power production in this country. Thus, the development of highly efficient, reliable and environmentally friendly technologies for biomass utilization with the aim of energy production, is a problem of paramount importance for the Thai energy sector. Due to some advantages, fluidized bed combustion technology seems to be the most suitable for energy conversion of biomass. Conical fluidized-bed combustors of various modifications have been proposed and are being studied. The research objectives include: (1) investigation of fluidization characteristics of the bed material in conical prototypes; (2) study of the effects of fuel and bed material types as well as operating conditions (including air staging) on the combustion efficiency and emission characteristics of the combustor; (3) study of the physical and chemical factors affecting formation and reduction of major pollutants in the combustor; (4) optimization of the combustor design and its operating conditions; (5) assessment of environmental impacts for various biomass fuels; (6) study on co-firing of different biomass fuels and/or co-firing of biomass with coal in a conical fluidized bed.
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<tr>
<td>Assoc. Prof. Dr. Komwut Wipusitwarakun</td>
<td>System Manager of Computer Center</td>
</tr>
<tr>
<td>Ms. Saowaphan Srisophon</td>
<td>Secretary</td>
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## Corporate Relations Division

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Ms. Peetchatika Khattiya</td>
<td>Chief of Corporate Relations Division</td>
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## Finance Division

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Ms. Yaowapa Na Lamphun</td>
<td>Chief of Finance Division</td>
</tr>
<tr>
<td>Ms. Yaowaluk Laothoh</td>
<td>Chief of Finance and Budget Section (Rangsit)</td>
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## Ground and Properties Division

<table>
<thead>
<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>Mr. Kitipol Sutayasaranakom</td>
<td>Chief of Ground and Properties Division (Rangsit)</td>
</tr>
<tr>
<td>Mr. Teerasak Ngogsakda</td>
<td>Chief of Ground and Properties Section (Rangsit)</td>
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## Library and Information Services Center

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Ms. On-Anong Suranirarat</td>
<td>Head of Library and Information Services Center</td>
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<tr>
<td>Ms. Chotika Praphrutthikul</td>
<td>Chief Librarian (Rangsit)</td>
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## Registration Division

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<tr>
<td>Asst. Prof. Dr. Thawatchai Onjun</td>
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## Student Affairs Division

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<tbody>
<tr>
<td>Ms. Waraporn Thongthua</td>
<td>Chief of Student Affairs and Alumni Relation Division</td>
</tr>
<tr>
<td>Ms. Pavinee Jongjaitate</td>
<td>Chief of Student Affairs Section</td>
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## SIIT at Bangkadi

SIIT-Tel: +66 (0) 2501 3505-20; SIIT-Fax: +66 (0) 2501 3524

## Director Office

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Ms. Prapasiri Kajorncheppunngam</td>
<td>Executive Secretary</td>
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<tr>
<td>Mr. Patsakorn Puangpaiboon</td>
<td>Secretary</td>
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## Academic Services Division

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<tr>
<td>Ms. Naree Chankeaw</td>
<td>Chief of Academic Services Division</td>
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<tr>
<td>Mr. Samrit Sirboonthieng</td>
<td>Chief of Academic Services Section (Bangkadi)</td>
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## Computer Center

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<td>Assoc. Prof. Dr. Komwut Wipusitwarakun</td>
<td>System Manager of Computer Center</td>
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## Finance Division

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<tbody>
<tr>
<td>Ms. Yaowapa Na Lamphun</td>
<td>Chief of Finance Division</td>
</tr>
<tr>
<td>Ms. Netnapa Anutarakul</td>
<td>Chief of Finance and Budget Section (Bangkadi)</td>
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## Central Coordinating Division

<table>
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<tr>
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<tbody>
<tr>
<td>Ms. Boontiwa Thongkham</td>
<td>Chief of Central Coordinating Division</td>
</tr>
<tr>
<td>Ms. Sukannika Maitreepan</td>
<td>Chief of Administrative Section (Bangkadi)</td>
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## Ground and Properties Division

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<tbody>
<tr>
<td>Mr. Seangjan Kwang-Khwang</td>
<td>Chief of Ground and Properties Division (Bangkadi) and Acting Manager of SIIT Residential Hall at Bangkadi</td>
</tr>
<tr>
<td>Mr. Jedsada Sangnak</td>
<td>Chief of Ground and Properties Section (Bangkadi)</td>
</tr>
<tr>
<td>Mr. Kanokchat Choungcham</td>
<td>Chief of Transportsions and Gardening Section</td>
</tr>
</tbody>
</table>
Library and Information Services Center
Ms. On-Anong Suraniranat  ext. 1503  Head of Library and Information Services Center
Mr. Siwaraj Rajchabhat  ext. 1501  Chief Librarian (Bangkadi)

Student Affairs Division
Ms. Waraporn Thongthua  ext. 1402  Chief of Student Affairs Division

School Secretaries

SIIT at Rangsit
SIIT-Tel: +66 (0) 2986 9009, 2564 3221-9; SIIT-Fax: +66 (0) 2986 9112-3

School of Bio-Chemical Engineering and Technology (BCET)
Ms. Suwanna Punyadee  ext. 2303  Secretary
Mr. Witchapon Jomprapan  ext. 2308  Secretary

School of Civil Engineering and Technology (CET)
Ms. Pattanun Manachitrungrueng  ext. 1902  Secretary

School of Manufacturing Systems and Mechanical Engineering (MSME)
Ms. Mayuree Phan-on  ext. 2203  Secretary
Ms. Pareena Thaibumrungwiwat  ext. 2102  Secretary
Ms. Wanna Teerapokin  ext. 2202  Secretary

Department of Common and Graduate Studies (CGS)
Ms. Chanpen Huabnarin  ext. 1802  Secretary
Ms. Monthicha Nimsook  ext. 1800  Secretary
Ms. Jiraporn Kudeerak  ext. 1561  Secretary

SIIT at Bangkadi
SIIT-Tel: +66 (0) 2501 3505-20; SIIT-Fax: +66 (0) 2501 3524

School of Information, Computer, and Communication Technology (ICT)
Ms. Chiranat Puukanokhiran  ext. 1802  Secretary
Ms. Cholthicha Praditkwan  ext. 1817  Secretary
Ms. Nachcha Rodphotong  ext. 2012  Secretary
Ms. Sirinart Sirijorn  ext. 2002  Secretary

School of Management Technology (MT)
Ms. Chitra Pimnan  ext. 2104  Secretary
Ms. Prapaiporn Tunyuvardhana  ext. 2102  Secretary
Ms. Usanee Koedlapmeesuk  ext. 2110  Secretary
School of Bio-Chemical Engineering and Technology

2010 Publications

International Journals


15. Supat Ponza; Preeda Parkpian; Chongrak Polprasert; Rajendra P. Shrestha; and Aroon Jugsujinda (2010). Removal of trichloroethylene (TCE) contaminated soil using a two-stage anaerobic-aerobic composting


**National Journal**


**International Conferences**


6. Prasong Permsuwan; Pakawat Sancharoen; Somnuk Tangtermsirikul; Paiboon Sreearunothai; Ekkarut Viyanit; and Wanida Pongsakawad (2010). The corrosion behavior of different types of steel in atmospheric and tidal marine environment. In *Proceedings of the Second Regional Electrochemistry Meeting of South-East Asia (REMSEA 2010)*, 16-19 November 2010, Bangkok, Thailand. pp. 10-14.


National Conferences


2. Dujthep Yodmalai; Raktipong Sahamitmongkol; Somnuk Tangtermsirikul; and Luckhana Lawtrakul (2010). Water sorptivity, water permeability, autogenous shrinkage, and compressive strength of concrete with crystalline materials. In the Sixth Thailand Materials Science and Technology Conference (MSAT-6), 26-27 August 2010, Bangkok, Thailand, pp. 80-82.


School of Bio-Chemical Engineering and Technology
Faculty Members, 2010

1. Dr. Alice Sharp Associate Professor
2. Dr. Apichit Svang-Ariyaskul Lecturer (Joined SIIT in May 2010)
3. Dr. Chongrak Polprasert Professor
4. Dr. Luckhana Lawtrakul Associate Professor
5. Dr. Paiboon Sreearunothai Lecturer
6. Dr. Pakorn Opaprakasit Associate Professor
7. Dr. Pisanu Toochinda Assistant Professor
8. Dr. Sandhya Babel Associate Professor
9. Dr. Siwarut Boonyarattanakalin Lecturer
10. Dr. Rachnarin Nitisoravut Associate Professor
11. Dr. Wanwipa Siriwatwechakul Lecturer
School of Civil Engineering and Technology
2010 Publications

International Journals


National Journals


2. Kitipoom Chansuriyasak; Chalermchai Wanichlamlart; Pakawat Sancharoen; Waree Kongprawechnon; and Somnuk Tangtermsirikul (2010). Evaluation on use of half-cell potential for measuring corrosion potential of steel bars in reinforced concrete subjected to carbonation, Research and Development Journal of The Engineering Institute of Thailand, Vol. 21, No. 3, pp. 92-98.*


**International Conferences**


3. Kitipoom Chansuriyasak; Pakawat Sancharoen; Chalermchai Wanichlamlert; Somnuk Tangtermsirikul; and Waree Kongprawechnon (2010). Comparison between half-cell potential and macrocell corrosion current measurement of reinforcing steel corrosion due to chloride. In Proceedings of the 4th Asian Concrete Federation International Conference (ACF 2010) [CD-ROM], 28 November – 1 December 2010, Taipei, Taiwan. 4 p.*

4. Prasong Permsuwan; Pakawat Sancharoen; Somnuk Tangtermsirikul; Paiboon Sreearunothai; Ekkarut Viyanit; and Wanida Pongsakawad (2010). The corrosion behavior of different types of steel in atmospheric and tidal marine environment. In Proceedings of the Second Regional Electrochemistry Meeting of South-East Asia (REMSEA 2010), 16-19 November 2010, Bangkok, Thailand. pp. 10-14.*


National Conferences


Remark: * Joint-publication with the Construction and Maintenance Technology Research Center (CONTEC)

---

**School of Civil Engineering and Technology**

**Faculty Members, 2010**

1. Dr. Amorn Pimanmas  
2. Dr. Mongkut Piantanakulchai  
3. Dr. Pruettha Nanakorn  
4. Dr. Somnuk Tangtermsirikul  
5. Dr. Tawee Chaisomphob  
6. Dr. Winyu Rattanapitikon  

**Associate Professor**

**Assistant Professor**

**Professor**

**Associate Professor**

---

**Construction and Maintenance Technology Research Center (CONTEC)**

**Additional Publications**

**International Journal**


**International Conference**

National Conferences


Construction and Maintenance Technology Research Center Researchers, 2010

1. Dr. Chalermchai Wattanalamlerd Researcher
2. Dr. Pakawat Sancharoen Researcher
3. Dr. Pongsak Choktaweekarn Researcher
4. Dr. Raktipong Sahamitmongkol Researcher
5. Dr. Warangkana Saengsoy Researcher
School of Information, Computer, and Communication Technology

2010 Publications

International Journals


National Journals


International Conferences


**National Conferences**


**Books**


School of Information, Computer, and Communication Technology
Faculty Members, 2010

1. Dr. Banlue Srisuchinwong    Associate Professor
2. Dr. Boontawee Suntisrivaraporn  Lecturer
3. Dr. Bunyarit Uyyanonvara    Associate Professor
4. Dr. Chalie Charoenlapnopparut  Associate Professor
5. Dr. Cholwich Nattee            Assistant Professor
6. Dr. Ekawit Nantajeewarawat   Associate Professor
7. Dr. Gun Srijuntongsiri        Lecturer
8. Dr. Itthisek Nilkhamhang      Lecturer
9. Dr. Komwut Wipasitwarakun    Associate Professor
10. Dr. Nirattaya Khamsemanan    Assistant Professor
11. Dr. Pakinee Suwannajarn    Lecturer
12. Dr. Philippe Meunier            Lecturer (Until July 2010)
13. Dr. Prapun Suksompong         Lecturer
14. Dr. Somsak Kittipiyakul       Lecturer
15. Dr. Stanislav S. Makhanov    Associate Professor
16. Dr. Steven Gordon             Assistant Professor
17. Dr. Surapa Thiemjarus         Lecturer
18. Dr. Thanaruk Theeramunkong    Associate Professor
19. Dr. Toshiaki Kondo            Assistant Professor
20. Dr. Waree Kongprawechnon      Associate Professor
School of Management Technology

2010 Publications

International Journals


National Journals


International Conferences


**School of Management Technology**  
**Faculty Members, 2010**

1. Dr. Aussadavut DumrongSiri Lecturer  
2. Dr. Chawalit Jeenanunta Assistant Professor  
3. Dr. Morrakot Raweeewan Lecturer  
4. Dr. Nattharika Rittippant Lecturer  
5. Dr. Piset Chanwarasuth Lecturer  
6. Dr. Pornpimol Chongphaisai Assistant Professor  
7. Dr. Somrote Komolavanij Associate Professor (Until April 2011)  
8. Dr. Suebsak Nanthavanij Associate Professor  
9. Dr. Suthathip Suanmali Assistant Professor  
10. Dr. Thanwadee Chinda Lecturer  
11. Dr. Veeris Ammarapala Assistant Professor
School of Manufacturing Systems and Mechanical Engineering

2010 Publications

International Journals


National Journals


School of Manufacturing Systems and Mechanical Engineering
Faculty Members, 2010

1. Dr. Boontariga Kasemsontitum Lecturer
2. Dr. Bundit Limmeechokchai Associate Professor
3. Dr. Jirachai Buddhakulsomsiri Associate Professor
4. Dr. Navee Chiadamrong Associate Professor
5. Dr. Pisal Yenradee Associate Professor
6. Dr. Pisut Pongchairerks Lecturer (Until April 2010)
7. Dr. Satha Aphornratana Associate Professor
8. Dr. Suchada Rianmora Lecturer (Joined SIIT in June 2010)
9. Dr. Sujin Suwanna Lecturer (Until October 2010)
10. Dr. Supachart Chungapaiupatana Associate Professor
11. Dr. Thananchai Leephaekpreeda Associate Professor
12. Dr. Thawatchai Onjun Assistant Professor
13. Dr. Vladimir I. Kuprianov Associate Professor
<table>
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<tr>
<th>Principal Investigator</th>
<th>Title</th>
<th>Sponsoring Organization</th>
<th>Total Project Budget (Baht)</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Dr. Amorn P.</td>
<td>Analysis and Design of Vibratory Machine Foundation</td>
<td>TRC Construction Co., Ltd.</td>
<td>1,020,000</td>
<td>Apr. 2010-Present</td>
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<td></td>
<td>Retrofitting Substandard Reinforced Concrete Column Against Seismic Loading</td>
<td>The Thailand Research Fund (TRF)</td>
<td>400,950</td>
<td>Aug. 2008-Jul. 2010</td>
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<td>Dr. S. Babel</td>
<td>Hydrogen Production from Agro-industrial Wastewater Using Microorganisms</td>
<td>Joint Graduate School of Energy &amp; Environment (JGSEE)</td>
<td>538,400</td>
<td>Nov. 2007-Oct. 2011</td>
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<td></td>
<td>Phytoextraction of Cadmium from Contaminated Paddy Soils</td>
<td>The Thailand Research Fund (TRF)</td>
<td>538,400</td>
<td>Nov. 2008-May 2011</td>
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<td>Dr. Bundit L.</td>
<td>High Quality-Factor Optimal IIR Multiple Notch Filter Design</td>
<td>Thammasat University Research Fund</td>
<td>100,000</td>
<td>Jun. 2009-Jun. 2010</td>
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<tr>
<td>Dr. Chawalit J.</td>
<td>Developing Optimization Model for Daily and Weekly Planning of Power Generation</td>
<td>Electricity Generating Authority of Thailand (EGAT)</td>
<td>2,654,100</td>
<td>Sep. 2008-Aug. 2010</td>
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<tr>
<td>Dr. Duangrat E.</td>
<td>Designing a Low-power High-frequency RF Switching Circuits for a Transceiver of MIMO System</td>
<td>Thammasat University Research Fund</td>
<td>80,000</td>
<td>Jun. 2008-Jun. 2010</td>
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<td>Dr. Itthisek N.</td>
<td>Sensorless Force Feedback and Haptic Interfacing for Control of Robotic Manipulators</td>
<td>The Thailand Research Fund (TRF)</td>
<td>360,000</td>
<td>Mar. 2009-Mar. 2011</td>
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<td>Dr. V. I. Kuprianov</td>
<td>Development and Study on Co-firing of Biomass Fuels in a Conical Fluidized-bed Combustor</td>
<td>The Thailand Research Fund (TRF)</td>
<td>2,000,000</td>
<td>May 2007-Present</td>
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<tr>
<td>Dr. V. I. Kuprianov</td>
<td>Development and Study of a Fluidized-bed Combustor for Firing Some Unconventional Biomass Fuels</td>
<td>The Thailand Research Fund (TRF)</td>
<td>1,000,000</td>
<td>May 2010-April 2012</td>
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<tr>
<td>Dr. Luckhana L.</td>
<td>Molecular Dynamics Simulations and Quantum Chemical Calculation on Stability and Solubilization of Drug-Cyclodextrin Inclusion Complexes in Water/Cosolvent Mixtures</td>
<td>The Thailand Research Fund (TRF)</td>
<td>1,200,000</td>
<td>Jul. 2007-Jul. 2010</td>
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<tr>
<td>Dr. Mongkut P.</td>
<td>Guidelines for Traffic Management at Highway Construction Area and Highway Intersection</td>
<td>Office of Transport and Traffic Policy and Planning, Ministry of Transport</td>
<td>300,000</td>
<td>Sep. 2009-Present</td>
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<tr>
<td>Dr. Morakot R.</td>
<td>Planning for Data Center for Geographic Information System (GIS) and IT Personal Development for Pattaya City</td>
<td>Pattaya City</td>
<td>1,780,000</td>
<td>Sep. 2009-Present</td>
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<td>Dr. Navee C. Dr. Pisal Y. Dr. Waree K.</td>
<td>Development of Unsafe Products Surveillance System</td>
<td>Office of the Consumer Protection Board</td>
<td>3,000,000</td>
<td>May 2010-Present</td>
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<td>Dr. Pakorn O. Dr. Pakorn O. (with 6 universities)</td>
<td>Preparation and Characterization of Drug Controlled-Release Materials from Nanofibers Polylactide and Its Derivatives</td>
<td>TRF Research-Team Promotion Grant: (TRF Senior Research Scholar: Prof. Dr. Pramuan Tangboriboonrat)</td>
<td>Sub-project of 7,500,000 baht project</td>
<td>Jul. 2008-Jun. 2011</td>
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<td>Dr. Rachnarin N. Dr. Bundit L. Dr. Supachart C.</td>
<td>Measures for Development of Low-Carbon Society in the Cities of Asia - Thailand</td>
<td>Kyushu University</td>
<td>608,383</td>
<td>May 2010-Feb. 2011</td>
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<td>Dr. Satha A.</td>
<td>Development of a Pumpless Jet Refrigeration Cycle for Actual Application</td>
<td>The Thailand Research Fund (TRF)</td>
<td>1,200,000</td>
<td>May 2008-Apr. 2011</td>
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<td>Dr. Siwarutt B.</td>
<td>Mimics of Mycobacterial Surface Components as Synthetic Antigens for a Vaccine Candidate against Tuberculosis</td>
<td>Thammasat University Research Fund</td>
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<td>May 2009-Apr. 2011</td>
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<td>Durability of Concrete under Marine Environment of Thailand</td>
<td>Siam Research and Innovation Co., Ltd.</td>
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<td>Apr. 2008-Mar. 2013</td>
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<td>Experimental Study on Durability Performance and Crack Sealing Properties of Concrete Enhanced by Xypex</td>
<td>XYPEX Co., Ltd.</td>
<td>1,800,000</td>
<td>Nov. 2008-Oct. 2010</td>
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<td>Civil Inspection, Structural Analysis and Stability Assessment of Power House</td>
<td>Electricity Generating Authority of Thailand (EGAT)</td>
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<td>Dec. 2008-Jun. 2010</td>
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<td>A Study of Factors Affect Deterioration Rate of Steel Structure for Maintenance Planning of Structure of High Voltage Transmission Line of EGAT</td>
<td></td>
<td>5,048,000</td>
<td>Aug. 2009-Jul. 2011</td>
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<td>Dr. Suebsak N.</td>
<td>Development of Non-destructive Testing Methods and Construction Material for RC Structures</td>
<td>National Metal and Materials Technology Center (MTEC)</td>
<td>2,000,000</td>
<td>Feb. 2010-Jan. 2011</td>
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<tr>
<td>Dr. Chawalit J</td>
<td>Study on Properties of BLCP Fly Ash</td>
<td>BLCP Power Limited</td>
<td>1,850,000</td>
<td>May 2009-Apr. 2011</td>
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<td>Dr. Navee C.</td>
<td>The Utilization of Bottom Ash as an Internal Curing Material</td>
<td>BLCP Power Limited</td>
<td>1,450,000</td>
<td>May 2009-Apr. 2011</td>
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<tr>
<td>Dr. Boontariga K.</td>
<td>Study &amp; Promotion of Expansive Concrete in Thailand – Third Stage</td>
<td>Taiheiyo Material Corporation (Japan)</td>
<td>557,500</td>
<td>Oct. 2009-Sep. 2010</td>
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<tr>
<td>Dr. Suchada R.</td>
<td>Study on Compatibility of Superplasticizer with Asia Cement and Improvement of Compressive Strength of Concrete Made from the Asia Cement</td>
<td>Asia Cement and Concrete Products Co., Ltd.</td>
<td>230,000</td>
<td>Nov. 2009-Jun. 2010</td>
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<td>Dr. Aussadavut D.</td>
<td>Improvement of DCON Products by Advanced Mix Proportion Design</td>
<td>DCON Products Public Company Limited</td>
<td>414,000</td>
<td>Jan. 2010-Jan. 2011</td>
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<td>Dr. Nattharika R.</td>
<td>Experimental Study on Performance of CSA Expansive Additive</td>
<td>SIKA (Thailand) Co., Ltd.</td>
<td>244,030</td>
<td>Apr. 2010-Jul. 2010</td>
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<td>Dr. Thanwanadee C.</td>
<td>Restrained Expansion of Concrete with Expansive Additive</td>
<td>Flaminco (Thailand) Co., Ltd.</td>
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<td>Dr. Surapa T.</td>
<td>Toward a Hand-Eye Classification Framework for Activity Recognition and Its Applications in Surgical Episode Analysis</td>
<td>The Thailand Research Fund (TRF)</td>
<td>360,000</td>
<td>Mar. 2009-Mar. 2011</td>
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<td>Dr. Taweep C.</td>
<td>Study and Making Report and Explanation of Changes in Details of No. 4 Wang-noi Thermal Power Plant</td>
<td>Southeast Asia Technology Co., Ltd.</td>
<td>2,205,600</td>
<td>Apr. 2008-Present</td>
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<td>Dr. Thananchai L.</td>
<td>Control of Pneumatic Muscle Actuator via Hydrogen Driving Metal Hydride</td>
<td>The Thailand Research Fund (TRF)</td>
<td>1,200,000</td>
<td>May 2008-Apr. 2011</td>
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<tr>
<td>Dr. Thananchai L.</td>
<td>A Study on Potential of Wind Energy for Power Plant in Central Region of Thailand</td>
<td>National Research Council of Thailand (NRCT)</td>
<td>4,600,000</td>
<td>Aug. 2010-Jul. 2011</td>
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<tr>
<td>Dr. Surapa T.</td>
<td>Enhancement of Wireless Communication and Applications Research Laboratory Phase II</td>
<td>Telecommunications Research and Industrial Development Institute (TRIDI)</td>
<td>6,760,000</td>
<td>Dec. 2009-Nov. 2010</td>
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<td>Principal Investigator</td>
<td>Title</td>
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<tr>
<td>Dr. Thanaruk T.</td>
<td>Plasma Behaviors During the Pellet Injection in Tokamak Plasmas</td>
<td>Thailand Toray Science Foundation</td>
<td>180,000</td>
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<td>The Study of Plasma and Nuclear Fusion in H-mode Tokamak Plasma with ETBs and ITBs</td>
<td>The Thailand Research Fund (TRF)</td>
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<td>Bangkok Municipal Authority Roads Maintenance Management System</td>
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<td>Dr. Winyu R.</td>
<td>Mathematical Model for Computing Representative Wave Heights Transformation</td>
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## Numbers of SIIT Graduates, Academic Years 1998 – 2010

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<td>Management Technology (MT)</td>
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* including Joint Program with TU Faculty of Engineering

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SIIT Graduate Students, 2nd/2010 Semester

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<td>Information and Communication Technology for Embedded Systems</td>
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<td>Logistics and Supply Chain Systems Engineering</td>
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SIIT Doctoral Faculty Members' 2010 Publications

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<th>Publications (1)</th>
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<tr>
<td>Regional/National Journal Papers</td>
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<td>International Conference Papers</td>
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<td><strong>Total</strong></td>
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<td><strong>Total Equivalent International Journal Papers</strong> (2)</td>
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<tr>
<td><strong>No. of International Journal Papers/Faculty Member</strong></td>
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<td><strong>No. of Equivalent International Journal Papers /Faculty Member</strong></td>
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(1) Publications with non-SIIT co-authors are weighted according to the number of SIIT authors
(2) Equivalent Number: International Journal Paper in International Database x 1.0, International Journal Paper x 0.75, National Journal Paper x 0.5, International Conference Paper x 0.25
(3) 26.99 International Journal Papers in International Databases (x 1.0) and 9.38 International Journal Papers (x 0.75)
Royal Golden Jubilee Scholarships for Graduate Students, 1999 – 2010

<table>
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<tr>
<th>SIIT Faculty Member</th>
<th>Number of Royal Golden Jubilee (RGJ) Scholarships</th>
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<th>Current Graduate Students</th>
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<th>Available Scholarships for Recruiting New Students</th>
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<td>Dr. Sandhya Babel, Assoc. Prof.</td>
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ADB Scholarships for Graduate Students, 2000 – 2010

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Access to SIIT at Bangkadi

Access to SIIT at Rangsit

Sririndhorn International Institute of Technology (SIIT) at Bangkadi
Thammasat University
131 Moo 5, Tivanond Road, Bangkadi, Mueang, Pathum Thani 12000, Thailand
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http://www.siit.tu.ac.th

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Thammasat University
P.O. Box 22, Thammasat-Rangsit Post Office, Pathum Thani 12121, Thailand
Tel. +66 (0) 2986 9009, (0) 2564 3226. Fax. +66 (0) 2986 9112~3
http://www.siit.tu.ac.th
**SIIT at Rangsit**

- School of Bio-Chemical Engineering and Technology
- School of Civil Engineering and Technology
- School of Manufacturing Systems and Mechanical Engineering
- Department of Common and Graduate Studies

**SIIT at Bangkadi**

- School of Information, Computer, and Communication Technology
- School of Management Technology