

Intelligent Innovation Engineering

Program Specification

Program: Bachelor of Engineering

Major: Intelligent Innovation Engineering

New Program, Academic Year 2565 BE (2022 CE)

Institution : Naresuan University
Faculty/Department : Faculty of Engineering
Department of Electrical and Computer Engineering

Section 1 General Information

1. Program Title

Thai : หลักสูตรวิศวกรรมศาสตรบัณฑิต สาขาวิชาวิศวกรรมนวัตกรรมอัจฉริยะ
(หลักสูตรภาษาอังกฤษ)

English : Bachelor of Engineering in Intelligent Innovation Engineering
(English Program)

2. Title of the Degree and Field of Study

Full Title Thai : วิศวกรรมศาสตรบัณฑิต (วิศวกรรมนวัตกรรมอัจฉริยะ)

English : Bachelor of Engineering (Intelligent Innovation Engineering)

Abbreviated Title Thai : วศ.บ. (วิศวกรรมนวัตกรรมอัจฉริยะ)

English : B.Eng. (Intelligent Innovation Engineering)

3. Major Subject (If any)

None

4. Total Credits Required

A minimum of 129 credits

Program Structure

No.	Category	MoE 2015 Criteria	New Program 2022
1	General Education	a minimum of	30
	1.1 Languages	a minimum of	12
	Required		
	- English	a minimum of	3
	- Thai	a minimum of	3
	Elective		
	Select from English, Thai, or Foreign language group		
	a minimum of		6
	1.2 Humanities	a minimum of	6
	1.3 Social Sciences	a minimum of	6
	1.4 Science and Math	a minimum of	6
	1.5 Physical Education (required non-credit)		1
2	Specialization	a minimum of	72
	2.1 Core Course		31
	2.1.1 Fundamental courses in Science		19
	2.1.2 Fundamental courses in Engineering		12
	2.2 Major Specific Courses	a minimum of	62
	2.2.1 Major Required Courses		28
	2.2.1.1 Application Technologies		3
	2.2.1.2 Software Methods and Technologies		6
	2.2.1.3 Systems Infrastructure		6
	2.2.1.4 Computer Hardware and Architecture		13
	2.2.2 Program Specific		16
	2.2.2.1 Technical Skills		3
	2.2.2.2 Soft Skills and Life Skills		8
	2.2.2.3 Practice-oriented		5
	2.2.3 (*) Internship		(6)
	2.2.4 Major Elective Courses		18
3	Free Elective	a minimum of	6
Total number of credits		a minimum of	120
			129

Notes (*) Requirements for graduation. Students must enroll for internship and must pass the criteria defined by the program.

4.1.1 Courses

(1) General Education a minimum of 30 credits

(1.1) Language courses a minimum of 12 credits

(1.1.1) English language a minimum of 3 credits

001211	English Listening and Speaking for Communication	3(2-2-5)
001212	English Critical Reading for Effective Communication	3(2-2-5)
001213	English Writing for Effective Communication	3(2-2-5)

(1.1.2) Thai language a minimum of 3 credits

Select from the following courses

001301	Thai Language for Academic Communication	3(2-2-5)
001302	Thai Language for Communication in the 21st Century	3(2-2-5)
001303	Reading in the Digital Age Century	3(2-2-5)

(1.1.3) Foreign language a minimum of 6 credits

Select from the non-required English language courses or the non-required Thai language courses or the following courses

001311	Korean for Communication	3(2-2-5)
001312	Japanese for Communication	3(2-2-5)
001313	Chinese for Communication	3(2-2-5)
001314	Myanmar for Communication	3(2-2-5)
001315	French for Communication	3(2-2-5)
001316	Spanish for Communication	3(2-2-5)
001317	Lao for Communication	3(2-2-5)
001318	Indonesian for Communication	3(2-2-5)
001319	Vietnamese for Communication	3(2-2-5)
001320	Hindi for Communication	3(2-2-5)
001321	Khmer for Communication	3(2-2-5)

(1.2) Humanities**a minimum of 6 credits**

Select from the following courses

001221	Information Science for Study and Research	3(2-2-5)
001222	Language, Society and Culture	3(2-2-5)
001224	Arts in Daily Life	3(2-2-5)
001226	Ways of Living in the Digital Age	3(2-2-5)
001227	Music Studies in Thai Way of Life	3(2-2-5)
001228	Happiness with Hobbies	3(2-2-5)
001238	Media Literacy	3(2-2-5)
001241	Western Music in Daily Life	3(2-2-5)
001242	Creative Thinking and Innovation	3(2-2-5)
001253	Entrepreneurship for Small Business Start-up	3(2-2-5)
001276	Energy and Technology around Us	3(2-2-5)
001331	Social Innovation	3(2-2-5)
001332	Introduction to Data Management in Digital Era	3(2-2-5)

(1.3) Social Sciences**a minimum of 6 credits**

Select from the following courses

001231	Philosophy of Life for Sufficient Living	3(2-2-5)
001232	Fundamental Laws for Quality of Life	3(2-2-5)
001233	Thai State and the World Community	3(2-2-5)
001234	Civilization and Local Wisdom	3(2-2-5)
001235	Politics, Economy and Society	3(2-2-5)
001236	Living Management	3(2-2-5)
001237	Life Skills	3(2-2-5)
001239	Leadership and Compassion	3(2-2-5)
001251	Group Dynamics and Teamwork	3(2-2-5)
001252	Naresuan Studies	3(2-2-5)
001254	The King's Philosophy for Living	3(2-2-5)
001351	From Sufficiency Economy Philosophy (SEP) to Practice	3(2-2-5)
001352	Peace and Religion for Human Kinds	3(2-2-5)
001353	Principles of Accounting for Entrepreneur	3(2-2-5)

(1.4) Science and Math**a minimum of 6 credits**

Select from the following courses

001271	Man and Environment	3(2-2-5)
001272	Introduction to Computer Information Science	3(2-2-5)
001273	Mathematics and Statistics in Everyday Life	3(2-2-5)
001274	Drugs and Chemicals in Daily Life	3(2-2-5)
001275	Food and Life Style	3(2-2-5)
001277	Human Behavior	3(2-2-5)
001278	Life and Health	3(2-2-5)
001279	Science in Everyday Life	3(2-2-5)
001291	Consumption in Daily Life	3(2-2-5)
001292	Circular Economic Lifestyle for 21st Century	3(2-2-5)

(1.5) Physical Education**1 credit**

001281	Sports and Exercises	1(0-2-1)
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(2) Specialization Courses**A minimum of 93 credits****(2.1) Core Courses****a minimum of 31 credits****(2.1.1) Fundamental Courses in Science****19 credits**

252182	Calculus 1	3(3-0-6)
252183	Calculus 2	3(3-0-6)
252284	Calculus 3	3(3-0-6)
261103	Introductory Physics	3(3-0-6)
261113	Laboratory in Introductory Physics	1(0-2-1)
316131	Computer Mathematics 1	1(0-2-1)
316132	Computer Mathematics 2	2(2-0-4)
316231	Applied Statistics	3(2-2-5)

(2.1.2) Fundamental Courses in Engineering**12 credits**

302151	Engineering Drawing	3(2-3-5)
316121	Computer Programming	3(2-3-6)
316122	Object-Oriented Programming	3(2-3-6)
316232	Data Structures and Algorithms	3(2-2-5)

(2.2) Major Specific Courses		a minimum of 62 credits
(2.2.1) Major Required Courses		28 credits
(2.2.1.1) Application Technologies		3 credits
316311	Database	3(2-2-5)
(2.2.1.2) Software Methods and Technologies		6 credits
316221	Artificial Intelligence	3(2-2-5)
316321	Introduction to Machine Learning	3(2-2-5)
(2.2.1.3) Systems Infrastructure		6 credits
316331	Computer and Information Security	3(2-2-5)
316333	Distributed and Cloud Computing	3(2-2-5)
(2.2.1.4) Computer Hardware and Architecture		13 credits
316141	Introduction to Internet of Things	3(2-2-5)
316241	Introduction to Digital Logic	3(2-2-5)
316242	Computer Networks	3(2-2-5)
316243	Electronics and Circuits	4(3-3-8)
(2.2.2) Program Specific Courses		16 credits
(2.2.2.1) Technical Skills		3 credits
316351	Innovation Design and Development	3(2-2-5)
(2.2.2.2) Soft Skills and Life Skills		8 credits
300301	Technopreneur	3(2-2-5)
316101	Soft Skill 1: Exploration	1(0-3-2)
316102	Soft Skill 2: Personal Growth	1(0-3-2)
316201	Soft Skill 3: Engineering Teamwork	1(0-3-2)
316202	Soft Skill 4: Community Collaboration	1(0-3-2)
316301	Soft Skill 5: Professional Practices	1(0-3-2)
(2.2.2.3) Practice-oriented		5 credits
316191	Field Experience 1	1(0-3-2)
316291	Field Experience 2	1(0-3-2)
316292	Field Experience 3	1(0-3-2)

316391	Field Experience 4	1(0-3-2)
316392	Field Experience 5	1(0-3-2)

If students would like to learn through additional practical work, they may enroll in the following two optional practice-oriented courses.

316190	Work Integrated Learning 1	3(0-9-5)
316290	Work Integrated Learning 2	3(0-9-5)

(2.2.3) Internship (*) 6 credits

316390	Internship	6 credits
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Notes (*) Requirements for graduation. Students must enroll in 316390 internship and must pass the criteria defined by the program.

(2.2.4) Major Elective Courses a minimum of 18 credits

Select from the following 3 tracks

(2.2.4.1) Coursework Track a minimum of 18 credits

For students who would like to gain knowledge and skills through course work and a senior project, they must

- (a) Select a minimum of 12 credits from the list of elective courses.
- (b) Enroll in the two engineering project courses.

i.	316491	Engineering Project 1	3(0-6-3)
ii.	316492	Engineering Project 2	3(0-6-3)

(2.2.4.2) Practicum Track a minimum of 18 credits

For students who would like to learn from the practical work experience, they must

- (a) Select a minimum of 6 credits from the list of elective courses.
- (b) Get an approval from the course instructor for the two practicum courses listed below.
- (c) Enroll in the following two practicum courses.

i.	316493	Industrial Practicum 1	6(0-18-9)
ii.	316494	Industrial Practicum 2	6(0-18-9)

(2.2.4.3) Research Track a minimum of 18 credits

For students who would like to learn from conducting in-depth research, they must

- (a) Select a minimum of 6 credits from the list of elective courses
- (b) Get an approval from the course instructor for the two research courses listed below.
- (c) Enroll in the following two research courses
 - i. 316495 Undergraduate Research 1 6(0-12-6)
 - ii. 316496 Undergraduate Research 2 6(0-12-6)
- (d) To graduate under this tracks, student's academic article must be submitted and accepted for publication or presenting at a conference.

List of elective courses

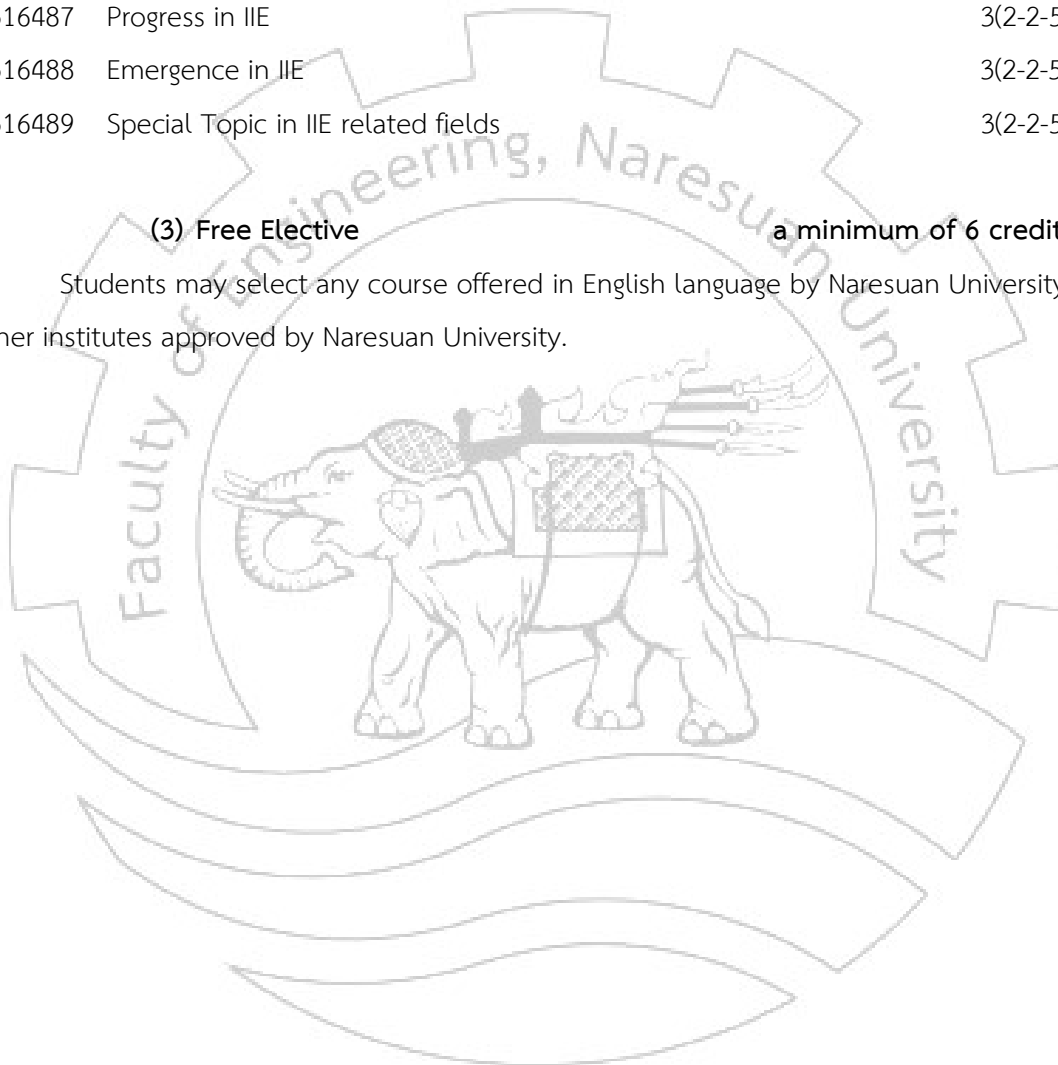
316322	Introduction to Data Analytics	3(2-2-5)
316332	Cybersecurity	3(2-2-5)
316352	Personal Process for Product Development	3(2-2-5)
316353	Software Engineering for IIE	3(2-2-5)
316411	Computer Graphics	3(2-2-5)
316412	Computer Vision	3(2-2-5)
316413	Digital Image Processing	3(2-2-5)
316414	Game Programming	3(2-2-5)
316421	Big Data Analysis	3(2-2-5)
316422	Blockchain Technology	3(2-2-5)
316423	Data Analysis and Visualization	3(2-2-5)
316424	Knowledge Representation and Reasoning	3(2-2-5)
316425	Natural Language Processing System	3(2-2-5)
316431	Network Integration	3(2-2-5)
316432	Sensor Networks	3(2-2-5)
316433	Parallel Computing	3(2-2-5)
316434	Advanced Statistics	3(2-2-5)
316435	Digital Signal Processing	3(2-2-5)
316436	Signals and Systems	3(2-2-5)
316441	Industrial Robot	3(2-2-5)
316442	Embedded System for IIE	3(2-2-5)
316443	Unmanned System Application for IIE	3(2-2-5)

316481	Special Topic in IIE	3(2-2-5)
316482	Current Interest in IIE	3(2-2-5)
316483	New Development in IIE	3(2-2-5)
316484	New Application in IIE	3(2-2-5)
316485	Selected Topic in IIE	3(2-2-5)
316486	Advancement in IIE	3(2-2-5)
316487	Progress in IIE	3(2-2-5)
316488	Emergence in IIE	3(2-2-5)
316489	Special Topic in IIE related fields	3(2-2-5)

(3) Free Elective

a minimum of 6 credits

Students may select any course offered in English language by Naresuan University or other institutes approved by Naresuan University.



4.1.2 Study plan

Year 1

First Semester

001xxx	General Education (English Language)	3(2-2-5)
001xxx	General Education (Thai Language)	3(2-2-5)
252182	Calculus 1	3(3-0-6)
261103	Introductory Physics	3(3-0-6)
261113	Laboratory in Introductory Physics	1(0-2-1)
316101	Soft Skill 1: Exploration	1(0-3-2)
316121	Computer Programming	3(2-3-6)
316131	Computer Mathematics 1	1(0-2-1)
316141	Introduction to Internet of Things	3(2-2-5)
Total		21 credits

Year 1

Second Semester

001xxx	General Education (Language)	3(2-2-5)
001xxx	General Education (Humanities)	3(2-2-5)
252183	Calculus 2	3(3-0-6)
302151	Engineering Drawing	3(2-3-5)
316102	Soft Skill 2: Personal Growth	1(0-3-2)
316122	Object-Oriented Programming	3(2-3-6)
316132	Computer Mathematics 2	2(2-0-4)
316191	Field Experience 1	1(0-3-2)
Total		19 credits

Year 1

Summer Semester (*)

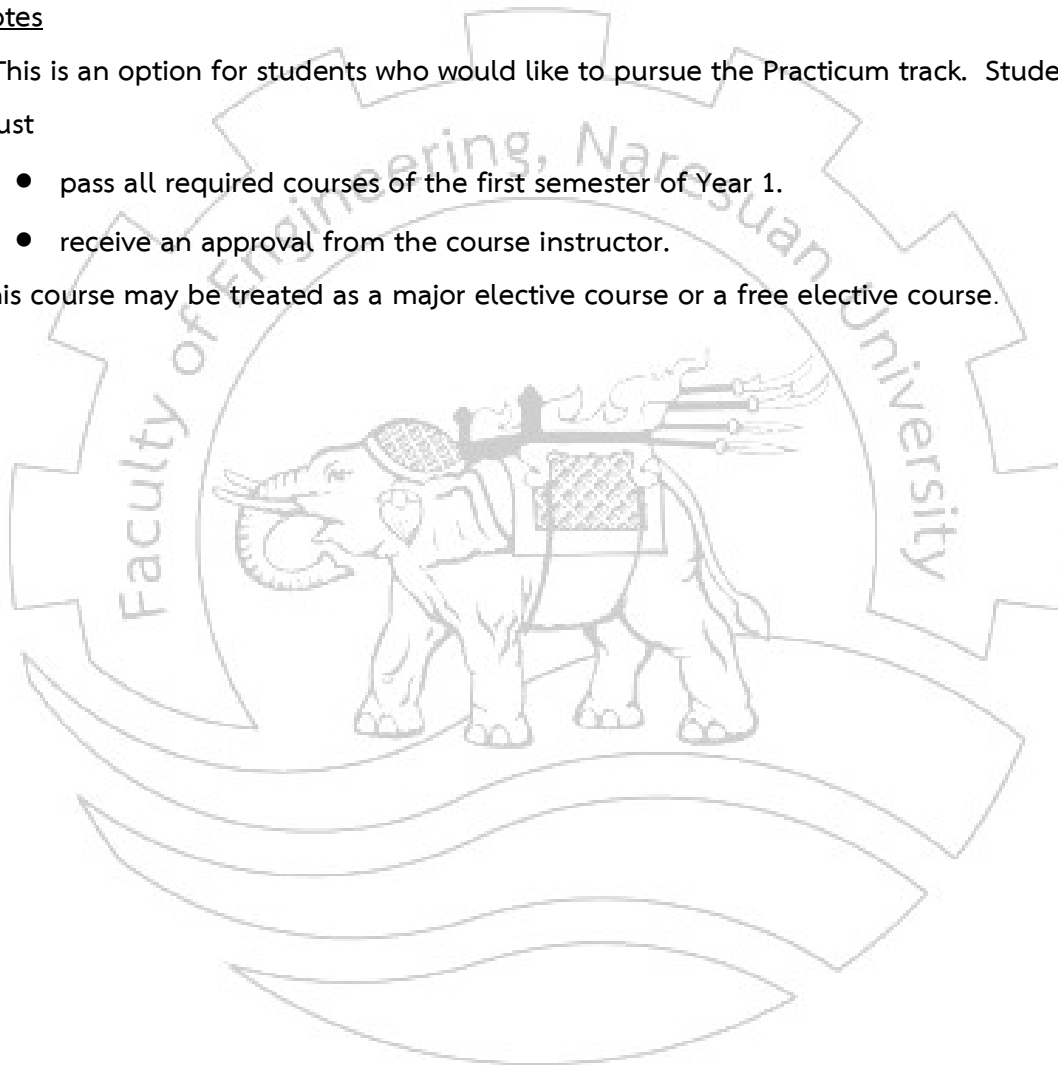
316190	Work Integrated Learning 1	3(0-9-5)
	Total	3 credits

Notes

* This is an option for students who would like to pursue the Practicum track. Students must

- pass all required courses of the first semester of Year 1.
- receive an approval from the course instructor.

This course may be treated as a major elective course or a free elective course.



Year 2
First Semester

001xxx	General Education (Language)	3(2-2-5)
001xxx	General Education (Social Sciences)	3(2-2-5)
252284	Calculus 3	3(3-0-6)
316201	Soft Skill 3: Engineering Teamwork	1(0-3-2)
316231	Applied Statistics	3(2-2-5)
316232	Data Structures and Algorithms	3(2-2-5)
316241	Introduction to Digital Logic	3(2-2-5)
316291	Field Experience 2	1(0-3-2)
Total		20 credits

Year 2
Second Semester

001xxx	General Education (Humanities)	3(2-2-5)
001xxx	General Education (Science and Math)	3(2-2-5)
316202	Soft Skill 4: Community Collaboration	1(0-3-2)
316221	Artificial Intelligence	3(2-2-5)
316242	Computer Networks	3(2-2-5)
316243	Electronics and Circuits	4(3-3-8)
316292	Field Experience 3	1(0-3-2)
Total		18 credits

Year 2
Summer Semester (*)

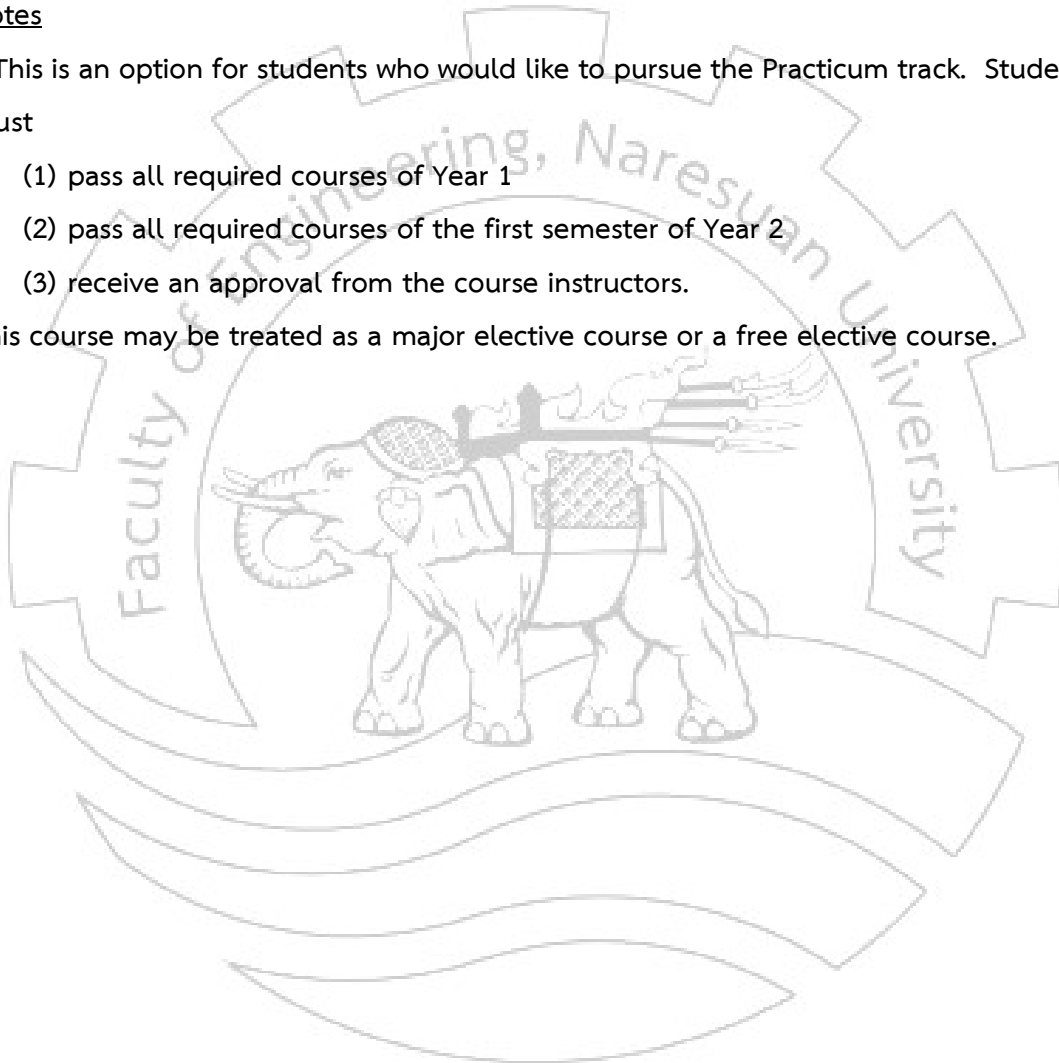
316290	Work Integrated Learning 2	3(0-9-5)
	Total	3 credits

Notes

* This is an option for students who would like to pursue the Practicum track. Students must

- (1) pass all required courses of Year 1
- (2) pass all required courses of the first semester of Year 2
- (3) receive an approval from the course instructors.

This course may be treated as a major elective course or a free elective course.



Year 3

First Semester

001xxx	General Education (Social Science)	3(2-2-5)
001281	Sports and Exercises (Required non-credit)	1(0-2-1)
316301	Soft Skill 5: Professional Practices	1(0-3-2)
316311	Database	3(2-2-5)
316321	Introduction to Machine Learning	3(2-2-5)
316331	Computer and Information Security	3(2-2-5)
316333	Distributed and Cloud Computing	3(2-2-5)
316391	Field Experience 4	1(0-3-2)
xxxxx	Free Elective	3 credits
Total		20 credits

Year 3

Second Semester

001xxx	General Education (Science and Math)	3(2-2-5)
300301	Technopreneur	3(2-2-5)
316351	Innovation Design and Development	3(2-2-5)
316392	Field Experience 5	1(0-3-2)
316xxx	Elective Course	3(x-x-x)
316xxx	Elective Course	3(x-x-x)
xxxxx	Free Elective	3 credits
Total		19 credits

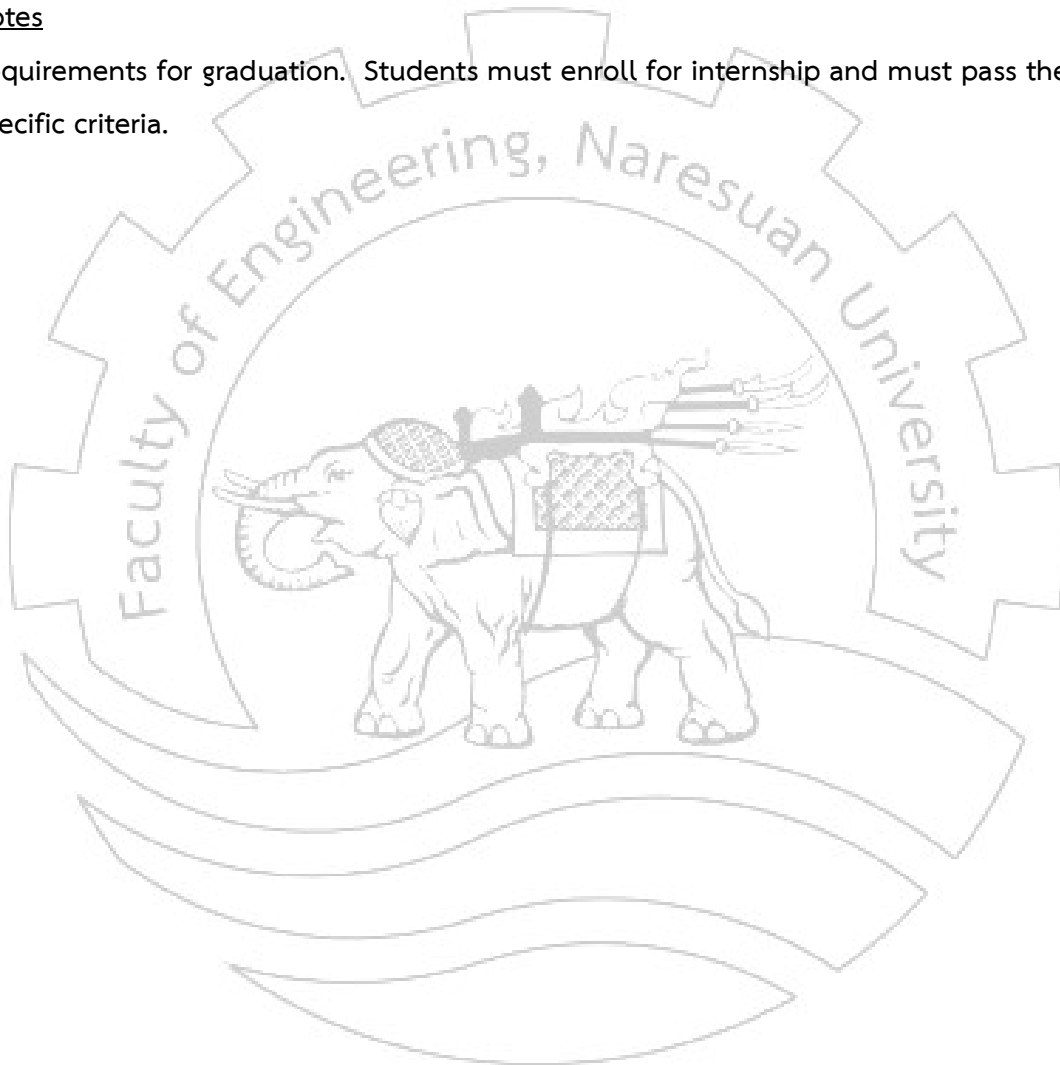
Year 3

Summer Semester

316390	Internship (Required non-credit)	6 credits
	Total	6 credits

Notes

Requirements for graduation. Students must enroll for internship and must pass the specific criteria.



Year 4
First Semester

Students may select one of the following three tracks.

1. Coursework Track¹

316xxx	Elective Course	3(x-x-x)
316491	Engineering Project 1	3(0-6-3)
Total		6 credits

2. Practicum Track²

316493	Industry Practicum 1	6(0-18-9)
Total		6 credits

3. Research Track³

316495	Undergraduate Research 1	6(0-12-6)
Total		6 credits

Notes

1. For students who would like to gain knowledge and skills through coursework and conducting a senior project.
2. For students who would like to learn from practical work experience. Students must get an approval from the course instructor before enrolling in this track.
3. For students who would like to learn from conducting in-depth research. Students must get an approval from the course instructor before enrolling in this track. Student's academic article must be submitted and accepted for publication or presenting at a conference.

Year 4
Second Semester

Students may select one of the following three tracks.

1. Coursework Track¹

316xxx	Elective Course	3(x-x-x)
316492	Engineering Project 2	3(0-6-3)
Total		6 credits

2. Practicum Track²

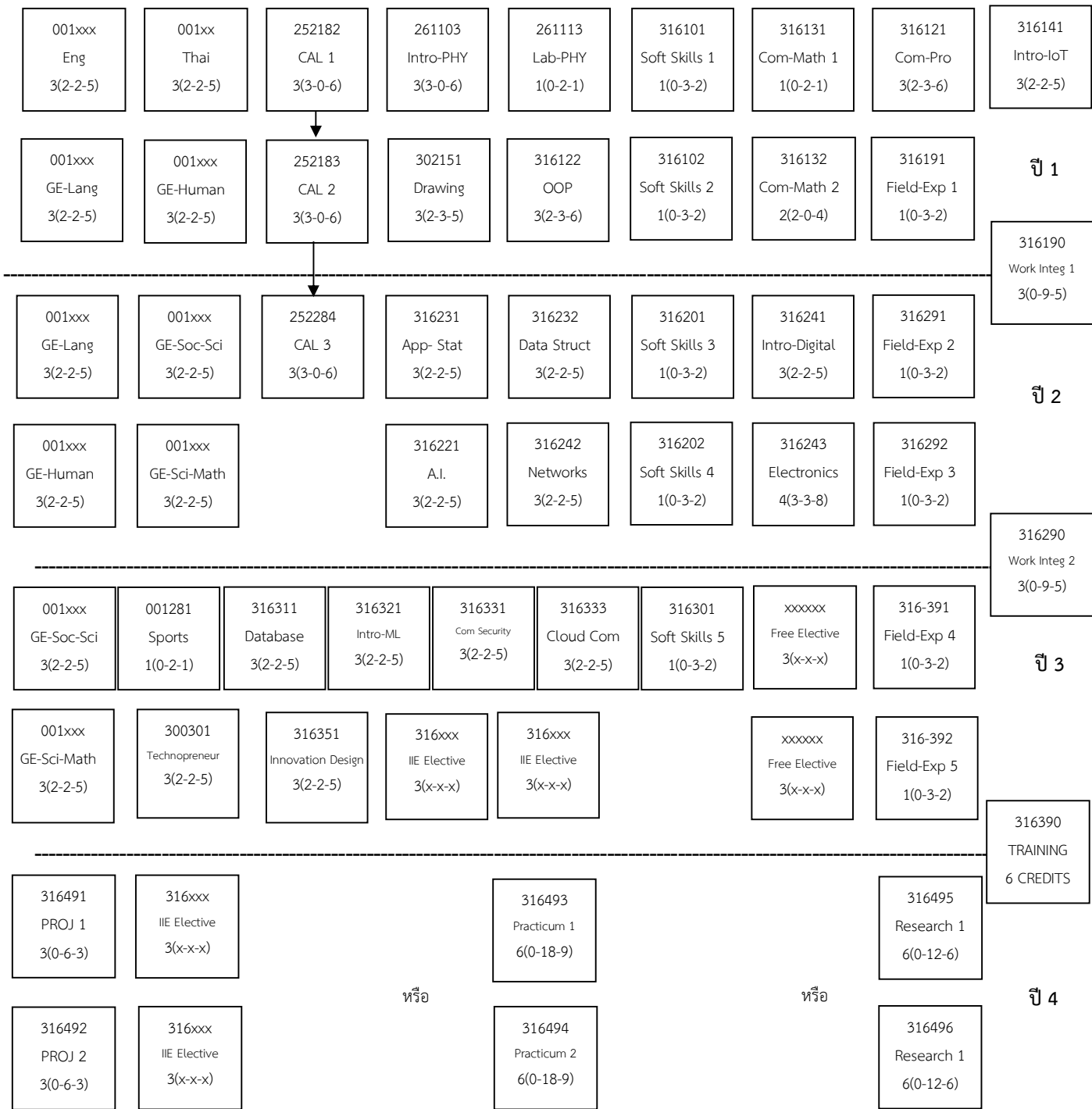
316494	Industry Practicum 2	6(0-18-9)
Total		6 credits

3. Research Track³

316496	Undergraduate Research 2	6(0-12-6)
Total		6 credits

Notes

1. For students who would like to gain knowledge and skills through coursework and conducting a senior project.
2. For students who would like to learn from practical work experience. Students must get an approval from the course instructor before enrolling in this track.
3. For students who would like to learn from conducting in-depth research. Students must get an approval from the course instructor before enrolling in this track. Student's academic article must be submitted and accepted for publication or presenting at a conference.



Coursework Track

Practicum Track

Research Track

students must receive an approval from the course instructor in order to enroll in this course.