**Program**: ESSE
**Degree Level**: Master

**Faculty/College**: TGGS

# Course 090245099

# Industrial Internship

King Mongkut's University of Technology North Bangkok
The Sirindhorn International Thai-German Graduate School of Engineering
Electrical and Software Systems Engineering Program

## Section 1: General Information

1. Course code and course Title
   090245099 Industrial Internship
2. Total credits
   4 credits
3. Curriculum and course category:
   Curriculum: *Master of Engineering in Electrical and Software Systems Engineering*
   Course category: Required Courses
   ☐ Core Course ☐ Specific Core Course
   ☑ Industrial Internship ☐ Master Thesis
   Elective Courses
   ☐ General Elective ☐ Specific Elective ☐ Other Elective
4. Course coordinator/ instructors
   Course coordinator .....
   Instructors All lecturers
5. Semester/ year of study
   ☑ Semester 1 (Aug. to Dec.) ☐ Semester 2 (Jan. to May) Academic Year: 2020
6. Pre-requisite (if any)
   ☑ No ☐ Yes, please provide: .....
7. Co-requisites (if any)
   ☑ No ☐ Yes, please provide: .....
8. Information for quality assurance in education
   This course shows evidence of:
   - Involvement from professional bodies/ external agencies in instruction; thus enhancing student academic and professional experiences
   - Integration of research or creative activities with instruction; use of research-based
   - learning management; knowledge management practices for learning improvement
   - Integration of academic services and course implementation

9. Date of latest revision

July 2020

## Section 2: Course Description and Implementation

1. Course Description

The list of specific qualifying internship activities depends on the field of study and is part of the prevailing internship regulations for each course. This list may be supplemented by individual agreement between the prospective industry mentor and the university advisor, if activities shall be covered which are not listed as standard topics.

2. Number of hours per semester

| Lecture | Practice | Self-study |
|---|---|---|
| -- | Full time | -- |

Course Category ☑ Practice ☐ Cooperative Education

Course Evaluation ☐ A-F ☑ S/U ☐ P

3. Number of hours per week for academic guidance to individual students

Giving academic advice (minimally 1 hour per week)

4. Course Learning Outcomes (CLOs): Students should be able to:

CLO 1 To become acquainted with the activities of engineers in enterprises in different areas, in particular development, production and applications-oriented research, equipment and production optimization as well as project planning, acquisition and organization,

CLO 2 To get insight into the structure, organization and operation of enterprises considering aspects of quality, economy, ecology, acceptance of products by the market and adherence to delivery dates,

CLO 3 To contribute to the development, production and quality assurance of goods, components and systems in the field of study.

CLO 4 To become acquainted with the company cultures, social structures (among other things team work, hierarchy, social situation) and safety at work, from the point of view of a higher level employee.

CLO 5 To develop the students' own initiative and problem solving capability, taking into account the boundary conditions under which industry operates.

CLO 6 To utilize all knowledge to solve or analyze engineering problems that occur in a plant, as well as to work in an industrial environment.

5. The mapping between the curriculum's Expected Learning Outcomes (ELOs) and Course Learning Outcomes (CLOs) (*Table 5.1: for subject-specific courses designed for a specific curriculum; Table 5.2 is purposed for courses designed for various curriculums)*

Table 5.1 ELOs-CLOs Consistency: for subject-specific courses for a specific curriculum

| ELOs/CLOs consistency | CLO 1 | CLO 2 | CLO 3 | CLO 4 | CLO 5 | CLO 6 |
|---|---|---|---|---|---|---|
| ELO1 | | | ✓ | | | |
| ELO2 | | | | | | |
| ELO3 | | | | | | ✓ |
| ELO4 | | | | | | |
| ELO5 | | | | | | |
| ELO6 | | | | ✓ | ✓ | |
| ELO7 | | | ✓ | | | |
| ELO8 | | | | | | |
| ELO9 | ✓ | ✓ | | ✓ | | |
| ELO10 | | | ✓ | | | |

Table 5.2 Mapping of desirable characteristics of KMUTNB graduates and CLOs (for non-specific courses, designed for various curriculums)

| Consistency between desirable characteristics of KMUTNB Graduates- CLOs | CLO 1 | CLO 2 | CLO 3 | CLO 4 | CLO 5 | CLO 6 |
|---|---|---|---|---|---|---|
| 1. Professional credentials with critical thinking skills | | | | | ✓ | ✓ |
| 2. Integrity and social responsibility | | | ✓ | ✓ | | |
| 3. Innovative and technopreneur mindset | | ✓ | | | | ✓ |
| 4. Global Competence | | | | | | |

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## Section 3: Student Improvement in relation to Course Learning Outcomes (CLOs)

Organizing learning experiences to develop skills/knowledge; assessment of CLOs in accordance with the ones identified in Section 2.4

| Course Learning Outcomes (CLOs) | Teaching Methods compliant with CLOs | Evaluation Methods compliant with CLOs |
|---|---|---|
| CLO 1 | • The student will learn of best-practice techniques of ethics in software engineering via the participation in industry/organization. | • Feedback from the industry/organization |
| CLO 2 | • The student will learn of best-practice techniques of ethics in software engineering via the participation in industry/organization. | • Feedback from the industry/organization |
| CLO 3 | • This ability will be developed by the discussion during the meeting with the advisor(s). When the student presents the progress of the internship work, the results and relevant phenomena must be explained by referring well-accepted theories. This procedure will be iteratively repeated, so that the student gets used to the approach and automatically builds up this ability.<br>• During the internship, the student will be integrated to the working team at the company. The student will gain experience how to communicate in the team. By the assignments, the students basically work with the team at the company to solve the given problems or tasks.<br>• During the course, several aspects concerning the standardization and regulations are covered. Along with the technical content, morality and regulation on how such techniques should be implemented are given. | • The advisor(s) assesses this ability at every meeting and gives the appropriate guidance.<br>• The internship approval committee will evaluate the student's development from the report, the presentation, and questioning the students. This ability will be assessed by the report presented.<br>• The students will be observed and evaluated by the company's supervisor during the internship period.<br>• This CLO will be evaluated by oral interview or questions during the class. For written assignments, the students have to submit paper works for corrections. |
| CLO 4 | • During the internship, the assigned project will be so designed, that the student has to work with self-reliance. The teamwork skill can be developed, when the student must acquire help form someone in the working place.<br>• The student will learn of best-practice techniques of ethics in software engineering via the participation in industry/organization. | • This CLO will be assessed by the supervisor's observation together with the work progress reported in every meeting.<br>• Feedback from the industry/organization |
| CLO 5 | • During the internship, the assigned | • This CLO will be assessed by the |

| Course Learning Outcomes (CLOs) | Teaching Methods compliant with CLOs | Evaluation Methods compliant with CLOs |
|---|---|---|
| | project will be so designed, that the student has to work with self-reliance. The teamwork skill can be developed, when the student must acquire help form someone in the working place. | supervisor's observation together with the work progress reported in every meeting. |
| CLO 6 | • During the internship, the assigned project will be so designed, most likely it will be problem-based project in which student needs to utilize knowledge to analyze the problem and find suitable solution. | • This CLO will be assessed by the supervisor's observation together with the work progress reported in every meeting. |

## Section 4: Learning Activities

1. Student activities

The list of specific qualifying internship activities depends on the field of study and is part of the prevailing internship regulations for each course. This list may be supplemented by individual agreement between the prospective industry mentor and the university advisor, if activities shall be covered which are not listed as standard topics.

2. Reports or assignments

| Reports or assignments | Deadline |
|---|---|
| Internship report | After the internship period |

3. Monitoring student learning outcome in an internship experiences

Both supervisors from the industry and university will evaluate the performance of students in each listed aspects and provide the grade on the evaluation form. Students will be informed in order to improve those aspects.

4. Duties and responsibilities of a workplace internship mentor

The industry mentor in the respective enterprise should be an experienced engineer preferably with at least having a Master's degree him/herself. Since currently the South East Asian industry will not yet employ engineering masters to sufficient extent, an industry mentor with a Bachelor's degree, 5-10 years of experience in the respective technical field and with engineering development background is acceptable as a transitional alternative. This person serves as an

advisor and point of contact for any problem arising within the enterprise. He is responsible there for the fulfillment of the internship guidelines and for issuing the final reference letter.

5. Duties and responsibilities of the advisor / faculty supervisor

The university supervisor should be a professor actively engaged in the respective engineering field of study and qualified to supervise the master thesis (must have a Ph.D. degree in engineering). He is the contact person for the industry mentor if a problem with the student and his internship arises. At the end of the internship, the industry mentor has to issue a written approval statement and brief judgment of the student's performance. The TGGS Cooperative Engineering Education/Internship office then is responsible for a final check of the internship record (report with list of daily activities, company reference letter, and supervisor's technical judgment), for completeness and formal correctness and will then give the final approval signature and stamp for the acceptance of the internship as part of the studies.

6. Preparation in guiding and assisting the students

(1) Orientation Day (During the first week of the first semester of the first year):

- Previous interned students give the presentation of their work at the industries to the new students.
- The TGGS Internship Guidelines and Procedures will be provided to students.
- New students will discuss all the issues with students whom had been at the company.

(2) Course Work: Provide all the skills that students need during the internship. For example,

- Research and Presentation Skills: Students will have to do the projects in all the courses and then they have to present their findings to the audience.
- Computer Programming Skill: Students will learn how to write the computer programming in solving engineering problems within the related courses.

7. Facilities and support required by the workplace

The focus group is engineering- and technology-related industry with a sufficient number of engineers (minimum of 5). In the respective branch/department selected for the students internship work; SMEs with less than 50 employees qualify only under exceptional circumstances (e.g. if the SME is an entrepreneurial high-tech company) to be recorded in writing by the university supervisor. These enterprises should typically provide opportunities to get acquainted with development and industry-oriented research, simulation and design (in particular CAD, Computer-aided Design), conceptual planning, construction, production, assembly, machine operation, maintenance and testing.

## Section 5: Planning and Preparation

1. Work place identification

The coordinator will send the internship proposal letter to the selected/qualified companies in Thailand and foreign countries requesting for the internship support along with the TGGS Internship Guidelines and Procedures. The coordinator will coordinate this activity and also provide additional information to the companies to establish the understanding about the Aachen model for internship program. The students will go through the same selection process as they are seeking for a job at the company. The selection process involves the following aspects: preparation for CV, applying for a position at the company, interview with the company. After this selection process, the company will select the internship student that appropriate to the internship project. In addition, the company will assign the company supervisors/mentors for this internship project.

2. Student preparation

To review and gain understanding of the objectives of the internship and prepare the students for the internship, the internship orientation will be held prior the internship period. In order to have a success internship, students must have the following skills which are taught in the related courses:

2.1 Research skill
2.2 Experimental skill including in the laboratory and simulations
2.3 Solving problems skill
2.4 Presentation skill
2.5 Writing the project and/or technical report skill
2.6 Social skill

3. Advisor/ supervisor preparation

The coordinator will assign the lecturer to advise the internship project based on his/her experience and provide the internship plan for 18 weeks and the internship project topic in advance. The advisor must be familiar with the TGGS Internship Guidelines and Procedures and following the procedures and regulations very closely.

4. Preparation of mentor at work place

Since, the supervisors/mentors are already familiar with the internship project; they only need to understand the TGGS Internship Guidelines and Procedures. The coordinator will provide the internship plan for 18 weeks and stress the important of the visit and the monthly meeting.

5. Risk management

(1) The internship student is selected by the company based on his/her background that appropriate to the internship project.

(2) The internship student has been supervised by the advisors and supervisors/mentors that are familiar with the internship project.

(3) The supervisors/mentors have clearly planned the internship project tasks for the internship student.

(4) The internship student receives the orientation and safety training from the company during the first several weeks of internship.

## Section 6: Student Evaluation

1. Evaluation criteria

According to the Evaluation Form for Internship Project, the students will be evaluated in the followings:

- Was the student scientifically approached the project in a systematic way?
- Has the student obtained and evaluated available scientific literature in sufficient detail?
- Has the student developed a fundamental understanding of the research topic?
- Was the student worked independently?
- Has the student efficiently taken into account suggestions and specifications?
- Did the student contributed own ideas for solving the task?
- Has the student completely solved the task with appropriate means, worked thoroughly with sufficiently sophisticated methods?
- Is the written report written comprehendible and logically structured?
- Has the student worked carefully when writing the report?
- Has the student worked efficiently on the project (motivation, commitment)?

2. Evaluation process

Both supervisors from the industry and university will evaluate the performance of students in each listed aspects and provide the grade on the evaluation form. Students will be informed in order to improve those aspects.

3. Responsibilities of monitoring and student evaluation by the mentor

Both supervisors from the industry and university will evaluate the performance of students in each listed aspects and provide the grade on the evaluation form. Students will be informed in order to improve those aspects. In addition, the supervisors/mentors can discuss freely with the advisors on any aspects related to the internship project including the performance of the internship student.

4. Responsibilities of evaluation by the faculty in charge

Both supervisors from the industry and university will evaluate the performance of students in each listed aspects and provide the grade on the evaluation form. Students will be informed in order to improve those aspects. In addition, the advisors will discuss with supervisors/mentors on any aspects related to the internship project including the performance of the internship student.

5. Conclusion of assessment discrepancies

The students will be informed in order to improve those aspects during the internship. The advisors and supervisors/mentors can observe the improvement of the student's performance.

## Section 7: Evaluation and Improvement of an Internship Program

1. Evaluation process conducted by:

1.1 Student intern

The internship student will evaluate the internship course using the Course Evaluation form provided from the TGGS.

1.2 Mentor at work place

The supervisors/mentors will evaluate the internship student using the Evaluation Form for Internship Project in which they can provide additional comment.

1.3 Advisor/ teacher in charge

The advisors will evaluate the internship student using the Evaluation Form for Internship Project in which they can provide additional comment.

1.4 Others

None

2. Review of evaluation procedures and improvement planning

The internship evaluation results will be discussed with the supervisors/mentors and the advisors at the final meeting. The new strategies and procedures will be suggested to improve the internship program. The revision and improvement planning of internship procedure and program will be discussed prior to the internship period.