DOCTOR OF PHILOSOPHY PROGRAM IN MANAGEMENT ENGINEERING

- FACULTY OF ENGINEERING

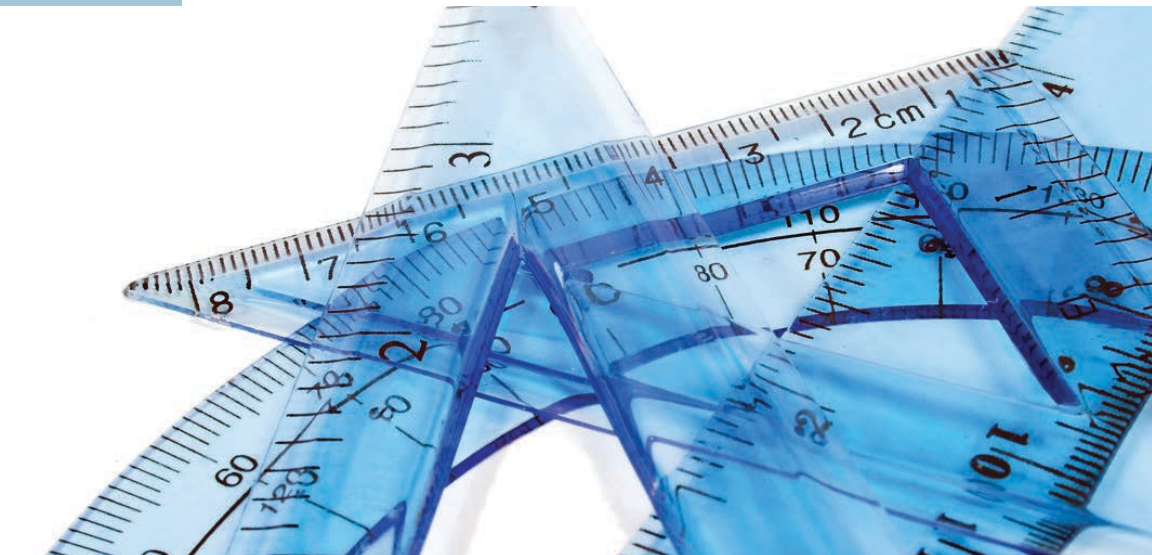
DOCTOR OF PHILOSOPHY PROGRAM IN MANAGEMENT ENGINEERING

A combination of engineering and business training is one of the most sought after qualifications, and a well-educated technical professional with a management background is invaluable. Our doctoral program provides the stepping stones for such a professional.

Most engineering in the modern world is done as a team, working together with like minds toward outcomes from a shared vision. A doctorate in engineering commonly represents expertise in advanced knowledge of the procedures and techniques of engineering. However, a management engineer is much more-a mainstay who facilitates best possible results from a group of engineers.

Two research centers are focused on management engineering, namely, the Integrated Facility Engineering and Management Research Unit: IFEM and the Center for Operations Research and Industrial Application: CORIA.

Our program is proud of the faculty member and a doctoral student who received the Royal Golden Jubilee Research Grant from the prestigious Thailand Research Fund (TRF).



Objectives

Expected outcomes of graduates are as follows:

- Possessing an inquiry mind, analytical and synthetical thinking, mandatory in research and the creation of new knowledge, technology. and innovation.
- An academic leader in applying management engineering for the benefits of localities, nations, and international areas at high standard.
- Adhering to professional ethics, acceptable as a model in leading the society forward.

Admission

In accordance with the Graduate School Rules and Regulations. The program committee reserves the rights to require more qualifications as deemed appropriate.

Medium of Instruction

Thai and English

Research Focus

- Operations Research
- Industrial Application
- Metaheuristics
- Integrated Facility Engineering and Management

Requirement for Graduation

In accordance with the Graduate School Rules and Regulations.

Doctor of Philosophy Program in **Management Engineering**

■ FACULTY OF ENGINEERING

Structure of the Program

1. Credit Requirements.*

Requirements	Option 1.1	Option 1.2	Option 2.1	Option 2.2
Coursework	-	-	12	24
Core Courses	-	-	3	12
Electives	-	-	9	12
Required Non-credit Courses	4	7	4	7
Dissertation	48	72	36	48
Total	**48**	**72**	**48**	**72**

* Minimum credits required.

2. Core Courses

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Advanced Problem Solving Techniques for Management Engineering	-	-	-	-	301600	3	301600	3
Production Management	-	-	-	-	-	-	301502	3
Operations Management	-	-	-	-	-	-	301503	3
Applied Statistics for Management Engineering	-	-	-	-	-	-	301505	3
Total	**0**	**0**	**0**	**0**	**1**	**3**	**4**	**12**

3. Electives

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Advanced Quality Engineering	-	-	-	-	301611	3	301611	3
Information System Engineering	-	-	-	-	301612	3	301612	3
Advanced Engineering Stochastic Processes	-	-	-	-	301621	3	301621	3
Advanced Optimization Processes	-	-	-	-	301622	3	301622	3
Advanced Simulation Modeling and Analysis	-	-	-	-	301623	3	301623	3
Problem Solving using Advanced Heuristic Approaches	-	-	-	-	301624	3	301624	3
Advanced Production Planning and Control	-	-	-	-	301631	3	301631	3
Modern Production and Industrial Systems	-	-	-	-	301632	3	301632	3
Advanced Manufacturing Processes and Technologies	-	-	-	-	301641	3	301641	3
Advanced Product Design and Development	-	-	-	-	301642	3	301642	3
Selected Topics in Advanced Management Engineering	-	-	-	-	301697	3	301697	3
Design and Analysis of Experiments	-	-	-	-	-	-	301514	3
Simulation	-	-	-	-	-	-	301515	3
Total Quality Management	-	-	-	-	-	-	301516	3
Optimization and Applications	-	-	-	-	-	-	301521	3

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Operations Research in Production Planning and Control	-	-	-	-	-	-	301522	3
Stochastic Processes	-	-	-	-	-	-	301524	3
Applied Fuzzy Set Theory in Operations Research	-	-	-	-	-	-	301526	3
Numerical Methods in Management Engineering	-	-	-	-	-	-	301527	3
Metaheuristic	-	-	-	-	-	-	301528	3
Stochastic Modeling for Logistics and Supply Chain Management	-	-	-	-	-	-	301529	3
Maintenance Management	-	-	-	-	-	-	301530	3
Project Management	-	-	-	-	-	-	301531	3
Supply Chain Management	-	-	-	-	-	-	301533	3
Inventory Management	-	-	-	-	-	-	301534	3
Marketing Engineering	-	-	-	-	-	-	301535	3
Ergonomics and Work Design	-	-	-	-	-	-	301536	3
Safety Engineering and Management	-	-	-	-	-	-	301537	3
Eco-Design and Product Life Cycle Assessment	-	-	-	-	-	-	301540	3
Enterprise Resource Planning	-	-	-	-	-	-	301542	3
Computer Integrated Manufacturing	-	-	-	-	-	-	301544	3
Flexible Manufacturing Systems	-	-	-	-	-	-	301545	3
Applications of Industrial Robot	-	-	-	-	-	-	301546	3

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Product Design and Development	-	-	-	-	-	-	301547	3
Lean Production Systems	-	-	-	-	-	-	301548	3
Manufacturing Strategy	-	-	-	-	-	-	301549	3
Selected Topic in Management Engineering	-	-	-	-	-	-	301591	3
Total	**0**	**0**	**0**	**0**	**11**	**≥9**	**37**	**≥12**

* In Option 2.2, Minimum credits required for 3016XX are ≥ 6 credits.

4. Required Non-credit Courses.

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Seminar I	301681	1	301681	1	301681	1	301681	1
Seminar II	301682	1	301682	1	301682	1	301682	1
Seminar III	301683	1	301683	1	301683	1	301683	1
Seminar IV	301684	1	301684	1	301684	1	301684	1
Research Methodology in Science and Technology	-	-	301504	3	-	-	301504	3
Total	**4**	**4**	**5**	**7**	**4**	**4**	**5**	**7**

5. Dissertation Credit Requirements.

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Dissertation 1	301691	8	301791	9	301891	6	301991	8
Dissertation 2	301692	8	301792	9	301892	6	301992	8
Dissertation 3	301693	8	301793	9	301893	6	301993	8
Dissertation 4	301694	8	301794	9	301894	6	301994	8
Dissertation 5	301695	8	301795	9	301895	6	301995	8
Dissertation 6	301696	8	301796	9	301896	6	301996	8
Dissertation 7	-	-	301797	9	-	-	-	-
Dissertation 8	-	-	301798	9	-	-	-	-
Total	**6**	**48**	**8**	**72**	**6**	**36**	**6**	**48**

Course Descriptions

301502 Production Management 3(3-0-6)

Concepts and principles of the design of manufacturing systems including the following: production planning and control including forecasting, inventory control, master production schedules, and material requirement planning.

301503 Operations Management 3(3-0-6)

Operations management and competitiveness, managing quality, statistical process control and capability analysis, product design, and aggregate planning.

301504 Research Methodology in Science and Technology 3(3-0-6)

Defining the research, research type, objectives, and processes; research problem determination; research variables and hypotheses; data collection and analysis; research proposal and report writing; research evaluation; research application; ethical considerations in research; and research techniques in science and technology.

301505 Applied Statistics for Management Engineering 3(2-2-5)

The role of statistics in engineering, probability, discrete and continuous random variables and probability, joint probability distributions, random sampling and data description, point estimation of parameters, hypotheses testing; simple and linear regression, design and analysis of single-factor and several-factors in experiments, response surface, and nonparametric statistics.

301514 Design and Analysis of Experiments 3(3-0-6)

Basic principles and strategies of experimentation, simple comparative experiments, analysis of variance for single factor experiments, factorial designs, fractional factorial design, randomised blocks and Latin square design, fitting regression models, and response surface and other approaches to process optimization.

301515 Simulation 3(3-0-6)

Principles of simulation, review of probability and statistical models in simulation, simulation software, random number and random variant generation, selection of probability distributions, verification and validation of simulation models, and simulation output analysis.

301516 Total Quality Management 3(2-2-5)

Principles and concepts of total quality management, quality "gurus" and their quality management philosophies, tools and techniques for quality planning, quality control and quality improvement, process management, customer focus and customer satisfaction, and benchmarking and other quality management systems.

301521 Production Systems Optimisation and Applications 3(3-0-6)

Optimisation to solve problems related to the planning, design, and control of production systems; classic non-linear optimisation and algorithm procedures; and primal and dual problems with post-optimality analysis.

301522 Operations Research in Production Planning and Control 3(3-0-6)

Application of a scientific approach in solving production planning and control problems in order to make better decisions, inventory management, and scheduling and forecasting.

301524 Stochastic Processes 3(3-0-6)

Concepts of stochastic processes, Poisson processes, Markov processes, renewal theory, and applications to engineering problems.

301526 Applied Fuzzy Set Theory in Operations Research 3(3-0-6)

Applications of fuzzy set theory, fuzzy operations research problems, basic fuzzy set theory, possibility theory, fuzzy linguistic systems, fuzzy linear programming, and other fuzzy optimization techniques.

301527 Numerical Methods in Management Engineering 3(3-0-6)

Numerical methods and algorithms for solving management engineering problems, methods for solving optimisation problems, production planning problem definition and solution approaches, and discrete event simulation to search for good solutions.

301528 Metaheuristics 3(3-0-6)

Basic concepts of optimisation problems, classification of optimisation methods, definition and concepts of metaheuristics, local search, simulated annealing, Tabu search, variable neighborhood search, genetic algorithm, ant colony optimization, swarm intelligence optimization, and other recent metaheuristic methods.

301529 Stochastic Modeling for logistics and Supply Chain Management 3(3-0-6)

The Beer Game, bullwhip effects, multi-echelon inventory replenishment systems, information sharing, distribution network design, and forward and reverse logistics.

301530 Maintenance Management 3(2-2-5)

Principles of maintenance management; maintenance policies and strategies; equipment failure, repair, and damage control; inspection and quality control; preventative maintenance programs; monitoring and measurement; reliability maintenance; computerised maintenance management; total productive maintenance (TPM); and TPM to achieve world class manufacturing.

301531 Project Management 3(3-0-6)

Overview of projects and project management; project initialization; project feasibility studies; project management and organization; project planning and scheduling (CPM and PERT); and monitoring, controlling, auditing, and terminating.

301533 Supply Chain Management 3(3-0-6)

Management engineering aspects of supply chain management including design and control of material flow systems, network design, production inventory, and information technology in the supply chain.

301534 Inventory Management 3(2-2-5)

Inventory systems, classification and analysis of inventory models based on customer demands, managing inventory including single-level independent demand, and dependent demand inventories and multi-echelon inventories in supply chains.

301535 Marketing Engineering 3(2-2-5)

Marketing strategies; market planning for engineering; consumer/buyer behavior; marketing research and information systems; product, service, and branding strategies; pricing strategies; marketing channels and product distribution; marketing communication strategy; product promotion and advertisement; and enhancing competitive advantage.

301536 Ergonomics and Work Design 3(2-2-5)

Related work systems amongst humans, machines, and the work environment; principles and methods in ergonomics; designing suitable work systems to include human factors, comfort, reducing fatigue, and increasing work efficiency and safety.

301537 Safety Engineering Management 3(2-2-5)

Principles of safety engineering and safety management, safety awareness, tools and techniques, work safety design, evaluation of safety and work environments, fire protection systems, and industrial psychology and ergonomic methodology.

301540 Eco-design and Product Life Cycle Assessment 3(2-2-5)

The role of eco-design and product life cycle assessment in industry, processes and techniques of eco-design, life cycle assessment processes, a study of environmental impacts, case studies, and a mini eco-design project.

301542 Enterprise Resource Planning 3(3-0-6)

Concepts and principles of enterprise resource planning systems and their roles in modern organizations, analysing cross-functional business process integration, and enterprise resource planning system software (SAP).

301544 Computer Integrated Manufacturing 3(2-2-5)

Design and implementation of computer integrated manufacturing, components of computer integrated manufacturing including production planning and control, CAD/CAM in computer integrated manufacturing, computer aided process planning and control, integrated maintenance systems, and material handling.

301545 Flexible Manufacturing Systems 3(2-2-5)

Concepts of factory automation, flexible manufacturing systems, automated quality control systems, sensors and data acquisition, cellular manufacturing techniques, simulation and intelligence in manufacturing, and strategies for factory automation.

301546 Applications of Industrial Robots 3(2-2-5)

Spatial descriptions and transformations, forward and inverse kinematics, design of manipulators and end-effectors, geometric computation for design and manufacturing, automation and robots in manufacturing, and robotic manufacturing skills and autonomous systems.

301547 Product Design and Development 3(2-2-5)

Principles of product design and development, advanced intelligent design, a study of the impact of design and manufacturing, and the environment and ecology.

301548 Lean Production Systems 3(3-0-6)

Principles and concepts of lean production systems, tools and techniques of lean production systems, identifying waste, pull production, continuous flow processes, visual controls, standard work, the Kanban system, quick changeover, and mistake proofing and cellular manufacturing.

301549 Manufacturing Strategies 3(2-2-5)

Principles and concepts of manufacturing strategies, the relationship of manufacturing strategies to business strategies, financial and marketing strategies, technology and process choices, capacity and location decisions, capacity planning, and global manufacturing and virtual corporations.

301591 Selected Topic in Management Engineering 3(3-0-6)

The development of models and techniques for planning and controlling a production system, resource limitations, production capacity constraints and uncertain demand, comparative studies among models, and methods of modern production management published in technical or academic journals.

301600 Advanced Problem Solving Techniques for Management Engineering 3(3-0-6)

Advanced problems in the field of management engineering, qualitative and quantitative techniques for obtaining solutions, model building, product design methodology, decision support systems, advanced manufacturing technology and systems, and productivity and quality management.

301611 Advanced Quality Engineering 3(3-0-6)

Advanced techniques for statistical quality assurance, economic design of acceptance sampling plans and control charts, process capability analysis, inspection errors, and selected papers from recent literature.

301612 Information Systems Engineering 3(2-2-5)

Frameworks for enterprise information systems, engineering and scientific systems, requirements definition, enhanced entity relationship modeling, logical modeling, structured query language, relational models, and referential integrity.

301621 Advanced Engineering Stochastic Processes 3(3-0-6)

Stochastic processes to solve large sized problems with multiple states and stages, the analysis of large engineering processes by approximations and simulations, applications in analysis and design of large queuing networks, and large scales engineering systems reliability.

301622 Advanced Optimisation Processes 3(3-0-6)

Numerical techniques for large scale discrete and continuous optimizations, decomposition and partitioning principles, dynamic and stochastic optimization, infinite dimensional optimization, and applied optimisation in engineering designs.

301623 Advanced Simulation Modeling and Analysis 3(3-0-6)

Principles of simulation and modeling, analysis and methodology of simulation, on-line simulation, recent advances in simulation, and application of simulation to manufacturing and industry.

301624 Problem Solving using Advanced Heuristic Approaches 3(3-0-6)

Principles of optimization and heuristic design, traditional methods in problem solving, intelligent heuristic methods, and heuristic methods recently published in technical or academic journals.

301631 Advanced Production Planning and Control 3(3-0-6)

The development of models and techniques for planning and control of a production system, resource limitations, production capacity constraints and uncertain demand, and comparative studies amongst models or methods of modern production management published in technical or academic journals.

301632 Modern Production and Industrial Systems 3(2-2-5)

Concepts and principles of automated production lines, analysis of transfer lines, flexible manufacturing systems, cellular manufacturing systems, concepts of group technology and system design considerations, governing the movement of industrial robots and automated guided vehicles, numerical controls, CAD/CAM computer aided processes, and resource planning and utilisation.

301641 Advanced Manufacturing Processes and Technologies 3(2-2-5)

Structural properties of engineering materials, subtractive manufacturing processes, advanced manufacturing processes, additive manufacturing processes, rapid prototyping technology, and other types of advanced manufacturing technology.

301642 Advanced Product Design and Development 3(2-2-5)

The role and importance of product design and development, product design concepts and processes, quality function deployment, functional decomposition, modular design, computer based design systems, eco-design, environmental based design, and the role of packaging design.

301681 Seminar 1 1(0-2-1)

Practicing how to research, read, analyse, and orally present research or an article of current interest in management engineering.

301682 Seminar 2 1(0-2-1)

Presenting and discussing a topic of research interest in theoretical or applied management engineering.

301683 Seminar 3 1(0-2-1)

Presenting and discussing the current research in different fields of management engineering of relevance to the proposed dissertation.

301684 Seminar 4 1(0-2-1)

Practicing how to write and present research in management engineering.

301691 Dissertation 1, Option 1.1 8Credits

Undertaking a literature review of basic knowledge and research relevant to the topic, creating guidelines and hypotheses for the proposed research, and submitting a summary research and progress report to the academic supervisor.

301692 Dissertation 2 Option1.1 8 Credits

Undertaking a further literature review and intensive study of basic knowledge and research relevant to the topic, reviewing frameworks and guidelines, and submitting a summary report of the research and progress to the academic supervisor.

301693 Dissertation 3, Option 2.2 8 Credits

Establishing research hypotheses, conducting research within the frameworks and guidelines, and submitting a summary research and dissertation progress report to the academic supervisor.

301694 Dissertation 4, Option 1.1 8 Credits

Preparing a dissertation proposal; conducting the research following the defined methodology, frameworks, and guidelines; and submitting a progress report to the academic supervisor.

301695 Dissertation 5, Type 1.1 **8 Credits**

Reviewing and summarising the research results, preparing an articles(s) suitable for publication in national or international journals, undertaking and improving or modifying due to expert opinions, and submitting a report of their dissertation results to the academic supervisor.

301696 Dissertation 6, Option 1.1 **8 Credits**

Completing the research results, writing up the complete dissertation, passing the dissertation defense, making any required corrections to the dissertation, and submitting a copy of the completed dissertation to the Graduate School.

301697 Selected Topics in Management Engineering **3(2-2-5)**

A study of interesting topics in management engineering with an emphasis on new and advanced knowledge. The topics may be subject to change.

301791 Dissertation 1, Option 1.2 **9 Credits**

Conducting a literature review of relevant journals, data bases, and research articles on fundamental knowledge of topics of interest; and submitting a summary report of the research and progress to the academic supervisor.

301792 Dissertation 2, Option 1.2 **9 Credits**

Researching and compiling further information relevant to the research and within the frameworks and guidelines, and submitting a summary research and progress report to the academic supervisor.

301793 Dissertation 3, Option 1.2 **9 Credits**

Undertaking a literature review of basic knowledge and research relevant to the topic, creating possible guidelines and hypotheses for the proposed research, and submitting a summary report of the research progress.

301794 Dissertation 4, Option1.2 **9 Credits**

Conducting preliminary research, establishing hypotheses within the allocated guidelines and frameworks, and submitting a summary research and dissertation progress report to the academic supervisor.

301795 Dissertation 5, Option 1.2 **9 Credits**

Conducting in-depth research within allocated frameworks and guidelines, presenting a dissertation proposal, and submitting a summary report of the research and dissertation progress to the academic supervisor.

301796 Dissertation 6, Option 1.2 **9 Credits**

Reviewing and summarising the research results, preparing an articles(s) suitable for publication in national or international journals. and submitting a report of the dissertation results to the academic supervisor.

301797 Dissertation 7, Option 1.2 **9 Credits**

Conducting a review of the research, making any improvements or modifications to the research articles based on expert opinions, and presenting a summary of the research and progress.

301798 Dissertation 8, Option 1.2 **9 Credits**

Passing the dissertation defense, making any required corrections to the dissertation based on the examiners' comments and recommendations, and submitting a copy of the completed dissertation to the Graduate School.

301891 Dissertation 1, Option 2.1 **6 Credits**

Conducting a literature review of relevant journals, data bases, and research articles on fundamental knowledge of topics of interest and submitting a progress report to the academic supervisor.

301892 Dissertation 2, Option 2.1 **6 Credits**

Researching and compiling further information relevant to the research and within the frameworks and guidelines, and submitting a summary research and progress to the academic supervisor.

301893 Dissertation 3, Option 2.1 **6 Credits**

Establishing research hypotheses, conducting research within guidelines and frameworks, and submitting a summary report of the research and progress to the academic supervisor.

301894 Dissertation 4, Option 2.1 **6 Credits**

Conducting in-depth research within the established frameworks and guidelines, presenting a dissertation proposal, and submitting a summary report of the research and progress to the cademic supervisor.

301895 Dissertation 5, Type 2.1 **6 Credits**

Reviewing and summarising the research results, preparing an articles(s) suitable for publication in national or international journals, making any modifications or improvements to the dissertation based upon expert opinion, and submitting a report of the dissertation results to the academic supervisor.

301896 Dissertation 6, Option 2.1 **6 Credits**

Completing the dissertation, preparing the research contents for publication, passing the dissertation defense, and submitting the completed dissertation to the Graduate School.

301991 Dissertation 1, Option 2.2 **8 Credits**

Conducting a literature review in various databases and research articles on fundamental knowledge on topics of interest, creating guidelines for hypotheses establishment, and submitting a report on research and progress to the academic supervisor.

301992 Dissertation 2, Option 2.2 8 Credits

Conducting further research; compiling further information, guidelines, and frameworks; and submitting a summary research and progress report.

301993 Dissertation 3, Option 2.2 8 Credits

Establishing research hypotheses, conducting research within the frameworks and guidelines, and submitting a summary research and progress report to the academic supervisor.

301994 Dissertation 4, Option 2.2 8 Credits

Conducting research within allocated guidelines and frameworks, and presenting a dissertation proposal and a summary report of the research findings to the academic supervisor.

301995 Dissertation 5, Option 2.2 8 Credits

Reviewing and summarising the research results, preparing an articles(s) suitable for publication in national or international journals, making any improvements or modifications necessary based on expert opinions, and presenting a report of the dissertation results to the academic supervisor.

301996 Dissertation 6, Option 2.2 8 Credits

Completing the dissertation, passing the dissertation defense, making any required corrections to the dissertation based on the examiners' comments and recommendations, and submitting a copy of the completed dissertation to the Graduate School.