BİLKENT UNIVERSITY

Department of Industrial Engineering

Graduate Handbook

# September 2018

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Introduction

The purpose of this handbook is to provide you with guidelines for the Industrial Engineering graduate programs and to inform you of the various policies and regulations. This document is complementary to but *does not* replace the regulations of the Graduate School of Engineering and Science (available at

http://www.bilkent.edu.tr/bilkent-tr/admin-unit/hukukm/lisansustu_yonetmelik.html.

Please get familiar with the information available in this document. When in doubt, please refer to the regulations of the Graduate School for clarification. If still in doubt, please see chair Prof. M. Selim Aktürk (akturk@bilkent.edu.tr) or the Graduate Program Coordinator Dr. Alper Şen (alpersen@bilkent.edu.tr). Please make sure that your progress in the graduate program is consistent with the guidelines provided in this document as well as with the requirements in the regulations of the Graduate School.

Objective

The overall objective of our programs is to conduct fundamental research in industrial engineering and operations research in accordance with scientific and technological developments, and to provide the students with a strong analytical basis for innovative applications and advanced theoretical work. The primary research is focused on modeling and optimization, stochastic systems and statistics, with a wide range of applications in manufacturing, production, scheduling, logistics, finance, health care, energy and sustainability. For more details on faculty and their research interests please refer to http://w3.ie.bilkent.edu.tr .
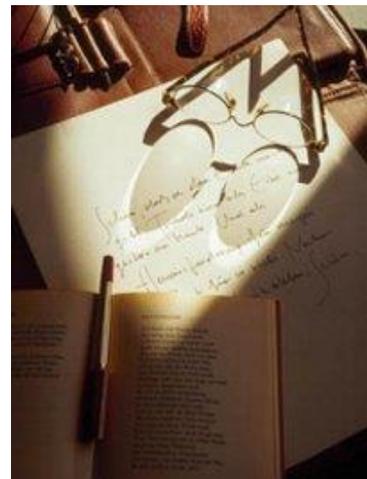
Application and Admission to the Degree Programs

The Department offers M.S. and Ph.D. degrees.

M.S. Program

Applicants must have a B.S. or B.A. degree in engineering, science, or a related field. Admissions are granted to qualifying individuals based on their performance in their previous schooling, ALES or GRE scores, reference letters, statements of purpose, results of the interview, and the availability of a faculty member who is willing to supervise the applicant's thesis. Scholarships and financial aid are available for qualifying applicants.

Qualifying applicants whose B.S. or B.A. degrees are in fields other than industrial engineering or a closely related field may be accepted to the Deficiency Program. In this case, students are required to take at most two semesters of courses from the IE undergraduate program as recommended by the department.

For the requirements and the application package, please refer to http://mfbe.bilkent.edu.tr/

Doctor of Philosophy (directly after a B.S. degree)

This option is offered to promising applicants upon the completion of a B.S. or B.A. degree in a relevant field. The applicant should have a CGPA of 3.00/4.00 or equivalent.

Doctor of Philosophy (after an M.S. or M.A. degree)

Applicants must have an M.S. or M.A. degree in a relevant field.

Qualifying applicants whose proficiency in English is not sufficient may be accepted to the English Language Preparatory Program if they pass the first level of the COPE exam (no tuition waiver for this program). A student can be enrolled in the Language Preparatory Program for at most two semesters and the unsuccessful students are dismissed.

For the requirements and the deadlines, please refer to http://mfbe.bilkent.edu.tr/

Applicatons for the graduate programs are accepted online (http://stars.bilkent.edu.tr/gradapp)

Degree Requirements

Please check the regulations at

http://www.bilkent.edu.tr/bilkent-tr/admin-unit/hukukm/lisansustu_yonetmelik.html

Master of Science

The M.S. degree requires the completion of at least 21 credit units of graduate coursework (seven graduate courses, a seminar course, an academic practice course and a research methods and publication ethics course) and a successful defense of a thesis. The normal duration to complete the courses (including the seminar course) is two semesters and the maximum duration to complete the courses is four semesters. The normal duration of M.S. study is four semesters (excluding the time spent in the deficiency program). The maximum duration is six semesters. The students who cannot complete the courses or the program by their respective maximum durations are dismissed.

Doctor of Philosophy (directly after a B.S. degree)

Students who are admitted to the Ph.D. program after a B.S. degree are required to complete at least 42 credit units of graduate coursework (14 graduate courses, summer research, two seminar courses, an academic practice course and a research methods and publication ethics course), pass a qualifying examination, and prepare and successfully defend a dissertation based on original research. The normal duration to complete the courses (including the seminar courses) is four semesters and the maximum duration to complete the courses is six semesters. The qualifying exam must be taken within the first seven semesters of entry into the program. The exam can be taken only after the courses are completed. The normal duration for this Ph.D. program is ten semesters (excluding the time spent in the deficiency program). The maximum duration is 14 semesters. The students who cannot complete the courses or the program by their respective maximum durations are dismissed.

Doctor of Philosophy (after an M.S. or M.A. degree)

Students who are admitted to the Ph.D. program with an M.S. or M.A. degree are required to complete at least 21 credit units of graduate coursework beyond the M.S. degree (seven graduate courses, a seminar course, an academic practice course and a research methods and publication ethics course (if not taken during M.S.)), pass a qualifying examination, and prepare and successfully defend a dissertation based on original research. The normal duration to complete the courses (including the seminar course) is two semesters and the maximum duration to complete the courses is four semesters. The qualifying exam must be taken within the first five semesters of entry into the program. The exam can be taken only after the courses are completed. The normal duration for this program is eight semesters (excluding

the time spent in deficiency program). The maximum duration is 12 semesters. The students who cannot complete the courses or the program by their respective maximum durations are dismissed.

Notes for all programs: 1. Delivery of the final copies of the thesis must be completed within the maximum time limits.

2. For students who were registered in Spring 2016, if the courses or the program cannot be completed by their respective maximum durations, tuition waiver will be discontinued; other scholarships are quite likely to be terminated, as well. However, scholarships may be extended beyond the maximum duration, upon application, and only if the thesis work is ongoing successfully. Extensions for MS students are unlikely; limited extensions may be possible for PhD students.

Switching Degree Programs

An M.S. student with a minimum GPA of 3.00 may apply to switch to the Ph.D. Program after a B.S. degree after completing at least one semester in the M.S. program if the entrance requirements for the Ph.D. program are satisfied. A student in the Ph.D. program after a B.S. degree may apply to switch to the M.S. Program if he/she has enough time left to complete the program successfully. A switch between programs is possible only with the approval of the Graduate School.

Graduate Curricula

M.S. Program

3 Core Courses:
    IE500 Mathematics of Operations Research
    IE505 Mathematical Programming
    IE523 Probabilistic Analysis
4 Electives (At least 2 from the IE pool)
IE590 IE Graduate Seminars
GE590 Academic Practices
GE500 Research Methods and Academic Publication Ethics
IE599 Master's Thesis (*starting from the second semester*)

Direct Ph.D. Program (after a B.S. degree)

6 Core Courses:
    IE500 Mathematics of Operations Research
    IE505 Mathematical Programming
    IE523 Probabilistic Analysis
    IE 521 Stochastic Processes
    MATH 500-1 Mathematical Analysis
    One of the following courses:
        IE 513 Linear Programming
        IE 518 Discrete Optimization
        IE 614 Nonlinear Programming
8 **Electives** (At least 4 from the IE pool)
IE691 Research Practice

IE590 and IE690 IE Graduate Seminars
GE690 Academic Practices
GE500 Research Methods and Academic Publication Ethics
IE699 PhD Dissertation (*starting from the second semester*)

Ph.D. Program (for students with M.S. or M.A degrees)

3 Core Courses:
IE 521 Stochastic Processes
MATH 500-1 Mathematical Analysis
One of the following courses:
IE 513 Linear Programming
IE 518 Discrete Optimization
IE 614 Nonlinear Programming

4 **Electives** (at least 2 from the IE pool)
IE690 IE Graduate Seminars
GE690 Academic Practices
GE500 Research Methods and Academic Publication Ethics (if not taken during M.S. studies)
IE699 PhD Dissertation (*starting from the second semester*)

Students should choose their courses with their advisors.
Students may also take graduate courses from other universities with an approval from the Graduate School.

Please refer to https://stars.bilkent.edu.tr/homepage/curriculum.php?DEPT=IE for details on course descriptions and for semester specific course offerings: https://stars.bilkent.edu.tr/homepage/offerings.php?DEPT=IE

Deficiency Program

Students with non-IE backgrounds may be requested to attend a deficiency program to fill the gap regarding the basic notions of industrial engineering. Students accepted to the deficiency program are required to take one or two semesters of courses, as necessary, from the undergraduate IE program. The courses to be taken are decided by the Department and approved by the Graduate School.

Time spent in the deficiency program cannot exceed two semesters and will not count within the normal duration of the specific graduate program it precedes.

With the Department's permission and the Graduate School's approval, some graduate courses may also be taken during the deficiency program, in which case, these courses will count towards degree requirements subject to the approval of the Graduate School. The credit of these courses cannot exceed $1/4^{th}$ of the total curriculum credits.

The student must have a CGPA of at least 3.00 and receive no grade lower than "C" in the courses of the deficiency program if the student is an MS student and no

grade lower than "B" if the student is a PhD student. The student is dismissed from the program if he/she obtains a failing grade.

Satisfactory Academic Performance

The passing (satisfactory) grade for a course is "C" for M.S. students and "B" for Ph.D. students.

The students must have a "curriculum GPA" of at least 3.00 by the time limit to complete the courses.

Qualifying Exam

The student notifies the department at the beginning of the semester in which he/she wants to take the qualifying exam. Qualifying exam can only be taken after completing the course requirements.

The exam is administered by a jury of six faculty members. The advisor must be one of the six members of the jury, but has no voting privileges. At least two jury members must be from another university.

The exam consists of a written and an oral part. The first part of the written exam is to assess the proficiency in the core courses IE500, IE505, IE523, IE521, and one of IE513/IE518/IE614 (based on the choice of the candidate). The students will be provided with a list of suggested books and their related chapters. In the second part of the written exam, the candidate is required to answer one question from each of two IE graduate electives selected by him/her. The candidate is expected to perform satisfactorily in both parts of the written exam. In the oral part of the qualifying exam the student is expected to present and discuss an article assigned by the exam committee. The aim is to assess the in depth understanding of the scientific research methods and perspectives. Questions from the course material may also be asked.

The jury considers both the written exam results and the oral performance and makes a final decision. If a student fails his first qualifying exam, he/she has to take it again in the following semester. The jury decides whether the written part should be taken again, or not, if a student fails the first exam.

A student who fails the qualifying exam twice is dismissed.

The jury may impose additional course requirements. The credits of these courses cannot exceed a third of the curriculum credits. These courses must be successfully completed within two semesters; grades are included to all grade point averages.

Thesis/Dissertation

Advisor

Each student in the graduate program is assigned to a faculty member who will guide the student through the program. The assigned faculty member will also supervise the student's thesis or dissertation. Initial assignment is based on shared research interests between the faculty member and the student in terms of willingness for collaborative work. It may be possible to change the advisor later with an approval the Graduate School.

A student may have co-advisors in addition to the advisor. Co-advisors do not have a right to vote in the defense jury.
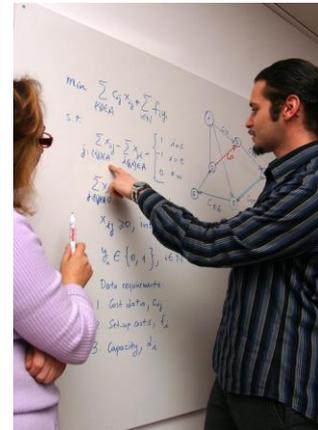
M.S. Thesis

The thesis topic must be approved by the Graduate School by the end of the second semester. An M.S. student who has completed his/her thesis work must defend the thesis. The jury consists of three or five faculty members. One of the members should be the advisor and one should be from outside Bilkent University. The jury may find the thesis satisfactory or may reject the thesis. If the thesis is rejected, the student is dismissed. The jury may also ask for a revision in which case the revised thesis must be defended in front of the same jury within three months (without exceeding the maximum duration). A Turnitin report (or equivalent) should be submitted with the thesis.

Ph.D. Thesis Progress Committee and Defense

Within a month of passing the qualifying exam, a committee is formed to monitor the progress of the thesis upon the recommendation of the department chair and the approval of the Graduate School. This committee has three members, the thesis advisor, a faculty from the IE department who works in a related field and a faculty outside the IE department. A thesis proposal must be submitted to the committee and must be defended within six months after passing the qualifying exam. The committee must meet within three to six months after the proposal is found successful and then meets twice a year, one in each of the periods January-June and July-December, with at least four months between successive meetings. The student reports his/her progress thus far and presents a work plan for the subsequent year. The committee finds the progress either satisfactory or unsatisfactory. The results are transmitted to the Graduate School within three days. The student is dismissed if his/her proposal is found unsatisfactory twice or his/her progress is found unsatisfactory either for two consecutive meetings or for three non-consecutive meetings.

Prior to defending a thesis, the student must have had at least three committee meetings (after the proposal) where his/her progress has been found successful, at

least one accepted paper from his/her PhD studies and that he/she has authored or co-authored in an SCI or SCI Expanded journal. The students are advised to check the list of acceptable journals with the Graduate School. A Turnitin report (or equivalent) should be submitted with the thesis.

A Ph.D. student who has completed his/her dissertation work must defend the dissertation in front of a jury consisting of five primary and two substitute members. Three of the jury members are from the thesis progress committee. Two of the primary and one of the substitute members must be from another university. Additionally, one primary member must be from outside the IE Department.

The jury may find the dissertation satisfactory or may reject it. If the thesis is rejected, the student is dismissed. The jury may also ask for a revision in which case the revised dissertation must be defended in front of the same jury within six months (without exceeding the maximum duration).

Further guidelines for submission of the successfully defended thesis/dissertation to the institute can be found at;

http://www.bilkent.edu.tr/~mfbe/TezTeslimIslemleri.doc

IE 691 Summer Research:

Students starting to direct Ph.D. program are required to fulfill the summer research requirement in the first summer after enrollment. In the following Fall semester, the students must register to the non-credit IE 691 course. This course is coordinated by a faculty member. Each student works on a research project under the supervision of a faculty member chosen by the student upon mutual agreement. The results of the study are compiled as a research report, which is submitted to the course coordinator during the fifth week of the fall semester. The report is evaluated by a committee of three members composed of the coordinator, the supervisor of the research and a third faculty determined by the coordinator. The evaluation may result in a Satisfactory (S) or an Unsatisfactory (U) grade. If U is received the course should be repeated.

Scholarship

Scholarship is given on the basis of academic merit in the program.

Tuition waiver: The student is exempt from paying the yearly tuition.

Stipend: This includes a monthly stipend based on academic achievements and personal health insurance.

Housing: Scholarship students may be provided with free on-campus housing. There are limited spaces available in housing units (lojman) that are allocated on an availability basis. Additional spaces from the dormitories are also provided as necessary and upon availability.

The scholarship status of a student can change based on the performance evaluation of the student by the Department.

A student on scholarship is expected to perform assistantship duties for the department.

Assistantship

All students are expected to contribute to departmental affairs including teaching assistantship (TA) and/or department assistantship. Typical TA duties include conducting recitations, labs; preparation and grading of quizzes and homework, projects etc.; and proctoring exams. Department assistantships (DA) may include duties regarding the conferences, project fairs, computer labs etc. TA's are expected to see the instructors of the courses that they are assigned as soon as such assignments are announced and learn about the specifics of their duties. The duties of the DA's are specified by the department chair or a faculty in charge of a particular task. All TA's and DA's are expected to be punctual, responsible, cooperative and participative in their duties.

The proctoring or departmental duty assignments are automatically performed by the Departmental Information System (IE-DAIS) regarding the total workload of the assistants. All TA's and DA's should complete an online form available at http://www.ie.bilkent.edu.tr/sis for each activity (other than Midterm, Quiz and Final Exam proctoring) that they have performed during the semester. Each activity should be approved by the faculty member of the course (for TA's) or the department secretary (for DA's) to be counted as the workload of the assistant.

Offices

Every student is provided with an office space in a shared office within the department. Therefore, creating a serene work environment is essential. This is only possible with a joint effort on the students' side. Please avoid having guests in the offices for more than 5 or 10 minutes to respect the studying rights of your office-mates in a quiet environment. Please also avoid long phone calls, loud music etc. in the office environment.

Computing Facilities

Upon registration, every student gets a university e-mail account at the very beginning of his/her first semester to use the university computing facilities and to effectively communicate with the department/university. Students are expected to acquire an account immediately and check their e-mails frequently since e-mail is the major means of communication for all duties and departmental affairs.

All the graduate offices are equipped with a number of PCs. The PCs in the offices are for shared use by the office occupants. Please be considerate of others in using your office computers.

For computer related problems, initial reporting must be done by e-mail to Department's Administrative Assistant Aslı Koca (aslikoca@bilkent.edu.tr) If the problem cannot be handled within the department, BCC services will be called for.

Excellence Awards

Excellent performance of our graduate students during their MS or PHD studies and their valuable contributions in TA and departmental duties are acknowledged and awarded by the department at the end of each academic year. These awards are offered in the following categories:

Outstanding Scholarly Achievement Award in Ph.D

Outstanding Scholarly Achievement Award in M.Sc

Outstanding Teaching Assistance Award

Outstanding Departmental Service Award

Although the awards are intended to be given to a student who stands out with an excellent performance in the related category, there may be more than one award recipient if students' achievements are comparable. Besides the general assessments of the students, the award decisions are mainly based on the publication records in Ph.D research and on the course achievements for M.S. For the teaching assistance awards nominations are expected from the course instructors and the department chair nominates the candidates for departmental service award.

Other Resources

There are several resources in the campus to support your academic studies. Here are just a few:

BilWrite: You can receive help and feedback on your writing assignments. Visit http://www.bilkent.edu.tr/~bilwrite/ for more information.

Online Catalog Bliss: You can search the holdings of the library (books, journals, etc.) using this catalog which can be accessed from library's website. Visit http://library.bilkent.edu.tr/ for more information

E-Journals: You can electronically access several journals through this system. Visit http://library.bilkent.edu.tr/ for more information.

Inter-library Loan (ILL) System: For those items (books, papers, etc.) that are not available at Bilkent Library, you can make a request by completing ILL Request Form. Visit http://library.bilkent.edu.tr/ for more information.