



Technion – Israel Institute of Technology

**Faculty of Education in Science
and Technology**

Graduate Studies

For Masters and Doctoral Degrees

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1. Graduate Studies at the Faculty of Education in Science and Technology

Within its graduate programs (Master's and Doctoral), the Faculty of Education in Science and Technology offers specializations with an emphasis on scientific content: Physics Education, Chemistry Education, Biology Education, Mathematics Education, Computer Science Education, Mechanical Engineering Education, Electrical Engineering Education, and Science and Technology Education for Upper Secondary Schools (STE). In addition, the faculty offers interdisciplinary specializations such as Advanced Educational Technologies, Science Learning in Informal Settings, Learning Sciences, Education and Neuroscience (Neuro-education), Science Communication, and Medical Education.

Depending on the student's chosen specialization, the curriculum for a thesis-based degree is determined in consultation with the advisor. The curriculum for a non-thesis degree is determined by the advisor or the program coordinator.

The faculty awards four degrees: three at the Master's level and one at the Doctoral level, as detailed in the following sections.

2. Master's Degree Programs

Admission Requirements

Master's programs in the Faculty of Education in Science and Technology are intended for candidates holding a three- or four-year Bachelor's degree in the exact sciences, engineering, education, life sciences, or social sciences (psychology, statistics, communication).

The minimum admission requirement is a weighted average of 80 or higher in the Bachelor's degree. Applicants who did not complete their undergraduate studies at the Technion must also rank in the top 30% of their cohort.

The faculty awards three Master's degrees: two through a thesis track and one through a non-thesis track.

Thesis Track:

1. For graduates holding a teaching certificate or who have earned 20 credits, the degree awarded is **Master of Science in Education in Technology and Science (M.Sc.)**.
2. For graduates without a teaching certificate, the degree awarded is **Master of Science (M.Sc.)**. These students are required to complete additional coursework as determined by the advisor and approved by the Vice Dean for Graduate Studies.

Non-Thesis Track:

- Graduates are awarded the degree **Master of Education in Technology and Science (M.Ed.)**.

The duration of study is determined according to the student's previous degree and the total credit requirements at admission:

Without a scholarship:

Graduates of a four-year (or longer) Bachelor's degree: up to 8 semesters

Graduates of a three-year Bachelor's degree: up to 10 semesters

With a scholarship: up to 24 months

2.1 Master's Degree – Thesis Track

The thesis track (with or without a teaching certificate) is designed to train students in research methods and to foster knowledge and experience in conducting theoretical or experimental research, whether basic or applied, with an emphasis on an analytical scientific approach. A thesis is a research project, with an innovative foundation, that is documented in an extensive written dissertation completed as part of the Master's program.

Admission to the thesis track requires the agreement of a faculty advisor and approval of the Teaching Committee.

The Faculty of Education in Science and Technology encourages all students to complete a teaching certificate, which can be pursued concurrently with the Master's degree.

Graduates holding a teaching certificate in mathematics, science, or technology for secondary schools are awarded the degree **Master of Science in Education in Technology and Science (M.Sc.)**.

Graduates without a teaching certificate are awarded the degree **Master of Science (M.Sc.)**.

Study Requirements – Thesis Track

- Completion of 18–22 credit points in the required courses, as detailed below:
 - Graduates of a four-year program in science or engineering holding a teaching certificate – 18 credits
 - Graduates of the Faculty of Education in Science and Technology at the Technion holding a teaching certificate – 18 credits
 - Graduates with a Bachelor's degree without a background in education, science, or engineering – 22 credits
- A high level of academic performance with an overall average of at least 75, and with no single course grade below 65.
- Participation in at least one educational research seminar course during the degree.
- Attendance at six faculty seminar (colloquium) meetings per semester, over four semesters.
- Passing the Extended English Exam (2.0 credits) during the first semester of study. Failure in the first semester requires participation in the regular course in the second semester (course code 3280014).
- Passing grade in the course *Academic Writing for Master's Students* (course code 03280017).
- Passing grade in the online course *Research Ethics* during the first year, prior to submitting a research topic.
- Submission of a research topic - to be approved by the advisor and in accordance with the Graduate School requirements; for scholarship recipients,



by the end of the second semester, and for non-recipients, by the end of the fourth semester.

- Fulfillment of all [Graduate School requirements](#), including conducting research, delivering a seminar presentation, submitting a dissertation, and passing a final examination.

Full or partial scholarships are available only for the research track. Additional information is available from the [Scholarships Department](#) of the Graduate School.

Thesis Track – Course Details

Faculty Seminar – Participation in the faculty seminar (colloquium) at least six times per semester, over four semesters. The faculty seminar consists of a series of lectures on various topics. Information about the lectures is available on the [faculty website](#).

Thesis Seminar – Course: *Educational Research Seminar*. Attendance is mandatory at least once, with the option of attending up to twice during the program.

The course is offered every semester under different course numbers (02180122, 02180123, 02180156, 02180157, 02180158, 02180159).

Notes:

- Attendance is not allowed in the first semester of study.
- It is recommended to attend once before submitting the research proposal and once more during the research execution.
- Course enrollment is limited; students must register before the semester begins.

Statistics –

02160033 – *Basic Quantitative Research Methods*, 2.5 credits

Students may request to substitute another statistics course at the Technion, either at the undergraduate (joint) or graduate level, with the approval of the advisor and the Vice Dean for Graduate Studies.

Research Methods – Students are required to complete two or more of the following courses:

02160027 – <i>Evaluation of Educational Projects</i> , 2.0 credits
02160037 – <i>Tests and Measurement in Education</i> , 2.0 credits
02160038 – <i>Design-Based Research in Education</i> , 2.0 credits
02160126 – <i>Science Practicum Workshop with Action Research</i> , 3.0 credits
02180007 – <i>Quantitative Research Methods and Advanced Data Analysis</i> , 3.0 credits
02180103 – <i>Foundations of Educational Research</i> , 2.0 credits
02180319 – <i>Qualitative Research: Practical Aspects</i> , 2.0 credits
02180322 – <i>Qualitative Research: Theoretical Aspects</i> , 2.0 credits
Elective Courses – To be selected in consultation with the supervisor to complete the remaining credits required for the degree, according to the list provided in the link in Section 4.

2.2 Master's Degree – Non-Thesis Track

The non-thesis track is an academic program that includes participation in courses in mathematical, scientific, and engineering education. This track is intended for students who wish to acquire knowledge and skills in learning sciences without engaging in research.

The program is designed for graduates with a bachelor's degree in exact sciences, engineering, education, life sciences, or social sciences (psychology, statistics, communication), with or without a teaching certificate. Students may complete a teaching certificate concurrently with the master's program (the certificate is awarded with the diploma upon graduation).

A supervisor from the faculty will be appointed for the non-thesis track.

Requirements for the Non-Thesis Track

- Completion of 40 credit points.

- High academic standing, with a minimum overall average of 75 and no grade lower than 65 in any individual course.
- Participation in six faculty seminar (colloquium) meetings per semester, across four semesters.
- Advanced English (2.0 credits): passing the exemption exam in the first semester or achieving a passing grade at the end of the course (regular study) in the second semester (03280011).
- Graduates of a three-year bachelor's degree without a teaching certificate are required to complete 20 additional credit points.
- Fulfillment of all [Graduate School requirements](#).

Non-Thesis Track – Course Details

Faculty Seminar – Participation in the faculty seminar (colloquium) at least six times per semester, over four semesters. The faculty seminar consists of a series of lectures on various topics. Information about the lectures is available on the [faculty website](#).

Project – Students are required to complete one of the following courses:

02180134 – STEM Curriculum Development Project, 3.0 credits

02180131 – STEM Curriculum Development Project, 5.0 credits

Research Methods – Students are required to complete two or more of the following courses:

02160027 – Evaluation of Educational Projects, 2.0 credits

02160037 – Educational Tests and Measurement, 2.0 credits

02160038 – Design Research in Education, 2.0 credits

02160126 – Science Practicum Workshop with Action Research, 3.0 credits

02180007 – Quantitative Research Methods and Advanced Data Analysis, 3.0 credits

02180103 – Foundations of Educational Research, 2.0 credits



02180319 – Qualitative Research: Practical Aspects, 2.0 credits

02180322 – Qualitative Research: Theoretical Aspects, 2.0 credits

External Course – Students are required to take a course worth up to 3.0 credits in another Technion faculty, in consultation with and with the approval of their advisor.

Elective Courses – To be selected in consultation with the supervisor to complete the remaining credits required for the degree, according to the list provided in the link in Section 4.

3. Doctor of Philosophy (Ph.D.) Studies

The program is intended for candidates holding a Master's degree with a thesis, with a minimum weighted average of 85, in the exact sciences, engineering, education, life sciences, or social sciences (psychology, statistics, communication).

In addition to meeting the above admission requirements, acceptance into the program requires the consent of an advisor from among the faculty members. Advisor consent is expressed through approval to submit a 'preliminary research proposal' to the Faculty Teaching Committee.

The preliminary proposal shall describe the planned doctoral research and must include the following sections: literature review, research objectives and questions, data collection methods, and the novelty and contribution of the research. The proposal should be up to five pages in length (excluding cover page and references; an appendix may be added).

The Teaching Committee will review the preliminary proposal, academic transcripts, and letters of recommendation before communicating its decision to the applicant.

Students without prior academic background in education and learning sciences are required to complete supplementary coursework in education totaling 6 credits.

Applicants who did not study statistics as part of their Master's degree are required to complete supplementary coursework in statistics.

Three study tracks are available toward the Doctor of Philosophy (Ph.D.) degree: the regular track, the direct track, and the special track.

Study Requirements for the Doctor of Philosophy (Ph.D.) Degree

- Completion of graduate-level coursework totaling 10–14 credits, as detailed below:
 - Holders of a Master's degree who completed two or more courses in advanced research methods, as listed in the coursework specification table, are required to complete 10 credits.
 - Holders of a Master's degree who completed only one research methods course listed in the coursework specification table are required to complete 12 credits.
 - Holders of a Master's degree who completed none of the above research methods courses are required to complete 14 credits.
- Submission of a concise description of the research plan (up to 25 pages) and successful completion of the written and oral candidacy examination within 11 months of the start of the program.
- Participation in an educational research seminar once or twice during the degree.
- Participation in six colloquium (faculty seminar) meetings per semester over the course of six semesters.
- A passing grade in the course *Academic Writing for Doctoral Students* (3280016), 2 credits.
- A passing grade in the online course *Research Ethics* during the first year of study and prior to submission of the concise research description (i.e., before the candidacy examination).
- Written and oral candidacy examination.
- Fulfillment of all [Graduate School](#) requirements, including conducting the research, delivering a seminar presentation, submitting the dissertation, and successfully passing the final examination.

Requirement for Supplementary Coursework



- Holders of a Master's degree in the sciences or engineering without a teaching certificate or without a background in education are required to complete an additional 6 supplementary credits, as determined by the Faculty Teaching Committee and the supervisor.
- Holders of a Master's degree in Education or Learning Sciences without a background in mathematics, science, or engineering are required to complete supplementary coursework, as determined by the Faculty Teaching Committee and the supervisor.

Detailed Curriculum for the Doctor of Philosophy (Ph.D.) Degree

Faculty seminar – Participation in the faculty seminar (colloquium) at least six times per semester, over six semesters. The faculty seminar consists of a series of lectures on a wide range of topics. Information about the lectures is available on [the faculty website](#).

Thesis seminar – Participation in the course *Seminar in Educational Research* is mandatory once. The course may be taken up to twice during the course of study and is offered every semester under a different course number.

Notes:

- Participation in the seminar is not permitted during the first semester of studies.
- It is recommended to take the seminar prior to submitting the research proposal and once again during the research phase.
- Enrollment in the course is limited; therefore, registration must be completed before the beginning of the semester.

Statistics (for students who did not study statistics in their undergraduate or master's degree):

216009 – *Basic Research Methods and Data Analysis*, 3.0 credits.

A request may be submitted to substitute this course with another statistics course at the Technion, at the undergraduate or graduate level, subject to approval by the supervisor and the Vice Dean for Graduate Studies.

Research Methods: Students are required to complete two of the following courses (for those who did not complete them during the master's degree, subject to approval by the Vice Dean for Graduate Studies):

02160027 – *Evaluation of Educational Projects*, 2.0 credits

02160037 – *Tests and Measurement in Education*, 2.0 credits

02160038 – *Design-Based Research in Education*, 2.0 credits

02160126 – *Experiential Science Workshop Accompanied by Action Research*, 3.0 credits

02180007 – *Quantitative Research Methods and Advanced Data Processing*, 3.0 credits

02180103 – *Foundations of Educational Research*, 2.0 credits

02180319 – *Qualitative Research: Practical Aspects*, 2.0 credits

02180322 – *Qualitative Research: Theoretical Aspects*, 2.0 credits

Research Proposal and Candidacy Examination – Regular Track

The concise description of the research proposal (up to 25 pages) will serve as the basis for the candidacy examination and must be submitted to the examining committee, through the supervisor and the Graduate Studies Coordinator, within 11 months from the start of the program. The candidacy examination, which will take place approximately one month after submission of the concise research proposal, is a comprehensive examination, partly written, covering topics that constitute the background and foundations of the research. Details regarding the candidacy examination procedures may be obtained from the faculty secretariat.

3.1 Direct Track for Doctoral Studies

The Dean of the Graduate School may transfer a student enrolled in a research-based Master's program to the status of a doctoral student in the direct track, provided that the student has demonstrated, during the course of their research, exceptional ability and achievements that justify such a transfer, based on the recommendation of the faculty.

To apply for admission to this track, the student must meet the following requirements:

- Completion of at least one full semester following approval of the research topic. **Add information from the Graduate School website.**
- Completion of at least half of the required coursework credits with a grade point average of 90 or higher.
- Submission of evaluations from the supervisor and an additional referee, together with a recommendation from the faculty Graduate Studies Committee, supporting the student's suitability for doctoral studies and the feasibility of expanding the Master's research topic to the scope required for a doctoral dissertation.
- Submission of a concise summary of the Master's research and a research plan for the doctoral degree.
- Fulfillment of the study requirements as specified in the sections "Master of Science in Education in Technology and Science" and "Doctor of Philosophy."

Students transferring to the direct doctoral track will be awarded the degree of "Master" (not "Master of Science") after successfully passing the doctoral candidacy examination and completing the required credit quota for the Master's degree.

Students in the direct track are required to complete the full credit requirements for the Master's degree and, in addition, to accumulate 10–14 credits toward the doctoral degree, as detailed at the beginning of this chapter in the section "Study Requirements for the Doctor of Philosophy."

Direct Track Research Proposal and Candidacy Examination

The concise research proposal (up to 25 pages) will serve as the basis for the candidacy examination and must be submitted to the examination committee through the supervisor and the Graduate Studies Coordinator within five months of entering the direct track. The candidacy examination, held approximately one month after the submission of the research proposal, will be a comprehensive exam, partially written, covering topics that provide the foundational background for the research. Details regarding the procedures for the candidacy examination can be obtained from the faculty secretariat.

3.2 Special Track for Doctoral Studies

Candidates eligible for this track are graduates of a four-year bachelor's degree from Technion with a cumulative average of 95 or higher, or recipients of the President's Award for Excellence in their last four semesters of study. Applicants must meet all faculty admission requirements for the master's degree. Students in this track are required to complete advanced coursework, including the master's thesis requirements and the regular doctoral track requirements.

Research Proposal and Candidacy Examination in the Special Track

The candidacy examination will take place 18 months from the start of the program.

4. Graduate Courses in the Faculty of Science and Technology Education

[Syllabus of Courses in the Faculty of Science and Technology Education, Graduate School](#)