The Faculty of Computer Science Curriculum Catalog 2024-2025

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About the Faculty

The Technion's Faculty of Computer Science offers undergraduate programs in computer science, software engineering, and computer engineering; combined degrees in computer science and mathematics and computer science and physics; a double degree in medicine and computer science, and MSc and PhD programs. The faculty aspires to educate outstanding scientists and engineers by providing them with extensive, comprehensive knowledge and giving them a variety of opportunities to develop managerial and technological skills, thus preparing them to lead the knowledge-intensive industries of the present and the future. The faculty selects the best candidates and maintains high academic standards, providing students with in-depth knowledge to help them succeed in the rapidly changing field of computer science.

The education and research at the Faculty of Computer Science covers a broad range of topics including theory of computation, algorithms, coding and cryptography, cyber security, machine learning, artificial intelligence, natural language processing, computer vision, image processing, computer graphics, computational geometry, robotics and automation, software engineering, compilation, formal verification of software and hardware systems, programming languages, data processing, operating systems, computer architecture, computer and internet networks, parallel and distributed algorithms, logic for computer science, bioinformatics, quantum information processing, databases, parallel and distributed programing, sorting and routing networks, geometric design, applied mathematics, numerical algorithms, optimization, and specialty courses in applied engineering and sciences.

The faculty is located in a state-of-the-art building designed for the convenience of the students and faculty members. The building's resources include auditoriums and classrooms equipped with advanced multimedia systems, a large multi-purpose center that offers a contemporary learning environment, and a modern library. The faculty building features teaching and research laboratories designed for a variety of fields, including robotics, computer vision, artificial intelligence, geometric processing, computer graphics and geometric computing, computer communication networks, software systems, computer systems, natural language processing, cyber

and information security, machine learning, information and knowledge, information and memory storage, bioinformatics, and quantum information processing.

Undergraduate Studies

The Technion's Faculty of Computer Science offers several undergraduate programs - a general three-year program that features a track in machine learning and data analysis, and a general four-year program that features tracks in cyber and computerized system security. In addition, the faculty offers tracks in computer science and bioinformatics, software engineering, and computer engineering. Other options are combined B.Sc. programs in computer science and mathematics and in computer science and physics, and a double degree in medicine and computer science.

The curricula at the Faculty of Computer Science can be divided into three categories. The first, taught during the first three semesters, provides fundamental knowledge in the basic fields of mathematics, physics, programming, and more. The second comprises the courses required by the relevant faculties as well as courses offered by the faculties that participate in the combined B.Sc. programs. The courses in this category ensure that students acquire fundamental knowledge in the fields in which their faculties specialize so that they graduate with extensive knowledge in their selected field. The third category comprises elective courses, which allow students to specialize and delve deeper into the subjects that interest them. The program also includes lab projects, giving students practical experience as well.

Candidates must apply specifically for the B.Sc. programs in computer engineering, computer science and mathematics, computer science and physics, and the double degree in medicine and computer science when enrolling at the Technion. Students generally select the other tracks offered by the faculty towards the end of their second semester, although they can choose a specialty at a later time as well. Students also have the option of switching tracks during their studies.

Computer science programs offered by the faculty:

General computer science programs

There are two general B.Sc. programs in computer science - a three-year program and a four-year program. These are intended for students interested in a range of fields in computer science, including software and hardware, computer design and applications, artificial intelligence, computer science theory, and more.

- Students in the **three-year program** may select one of the following specialties:

Machine learning and data analysis

The goal of this program is for graduates to specialize in information and signal collection, processing, and analysis, and in researching methods and algorithms in these fields. Students will learn how to process information and generate knowledge from it using signal processing tools, statistical inference, and machine learning. They will gain extensive knowledge of computer sciences and mathematical enrichment, and complete courses on collecting, processing, and learning from information. Graduates are awarded a B.Sc. in Computer Science and a certificate indicating their specialty, which is attached to their diploma and transcripts. The same applies for students in the general four-year program and the software engineering program who complete the extra requirements for this program.

Computer science and bioinformatics

This program is offered in conjunction with the Faculty of Biology to provide students with extensive knowledge in a wide range of fields in computer science, as well as fundamental knowledge of molecular and cell biology. The program focuses on computational biology and bioinformatics software and systems, so that its graduates can join and lead the bioinformatics industries, or pursue graduate studies that combine knowledge of life sciences and computer science. Students apply for this program via the Faculty of Computer Science, and academic responsibility for their studies is shared by the Faculty of Computer Science and the Faculty of Biology. Graduates are awarded a B.Sc. in Computer Science and a certificate indicating their specialty, which is attached to their diploma and transcripts.

- Students in the **four-year program** may choose one of the following specialties:

Cyber and computer systems security

The goal of this program is to produce graduates who specialize in cyber security. Students obtain extensive knowledge of computer science, with an emphasis on the theoretical and practical aspects of security in the digital world. Graduates are awarded a B.Sc. in Computer Science and a certificate indicating their specialty, which is attached to their diploma and transcripts.

Software engineering

The four-year program for a B.Sc. in Software Engineering trains students who will specialize in large software systems. The program teaches a range of programing methods and systematic software analysis, design, implementation, testing, verification, maintenance, assessment, and conversion. Students acquire extensive knowledge of applied computer science and in-depth practical experience in developing software and using advanced software engineering tools.

Computer engineering

The four-year program offers graduates a B.Sc. in Computer Engineering and an engineering degree and is run in conjunction with the Faculty of Electrical Engineering. The program aims to educate computer engineers with extensive software and hardware knowledge, who specialize in designing and developing computer-based systems.

Combined degree in computer science and mathematics

This three-year program is run in conjunction with the Faculty of Mathematics and awards its graduates a B.Sc. in Computer Science and Mathematics. The track is intended for students with exceptional grades who are interested in gaining extensive knowledge of both computer science and mathematics, in order to join and lead in areas in the world of research and the industry that require in-depth knowledge and capabilities in both fields. This program differs from the double-degree program as students must apply separately and once accepted, enroll in a defined program in advance.

Computer science and physics

This four-year program is offered in conjunction with the Faculty of Physics and awards its graduates a B.Sc. in Computer Science and Physics. The track is intended for students with exceptional grades who are interested in gaining extensive knowledge of both Computer Science and physics, in order to join and lead in areas of the world of research and the industry that require in-depth knowledge and capabilities in both fields. This program differs from the double-degree program as students must apply separately and register for a predefined program.

Double degree in medicine and computer science

The Faculty of Medicine and the Faculty of Computer Science offer a program that grants a double degree for outstanding students with exceptional grades. Graduates of this program will have extensive knowledge of both computer science and medicine, enabling them to join and lead in either of the two fields and to take significant roles in research, development, and the industry in areas that require in-depth knowledge of both computers and medicine. Graduates are awarded a B.Sc. in Computer Science and a B.Sc. in Medical Sciences. The program is intended for students who are admitted for medicine studies and are interested in a second degree in Computer Science.

Secondary Specialization

Quantum computing

The Faculty of Computer Science also offers a scientific enrichment program in quantum computers and quantum information. Students in all tracks at the Faculty of Computer Science, including the combined tracks, can add this specialization. Students who complete this program will be awarded a certificate.

Excellence Programs and Scholarships

The LAPIDIM - Entrepreneurship Excellence Program

This excellence program is supported by leading companies in the industry. Its goal is to produce outstanding computer science graduates with exceptional leadership, entrepreneurship, and management skills and prepare them to take on key roles in the industry. Participants must meet all the academic requirements of the program they choose (including combined programs), and complete several managerial and entrepreneurial courses as well. Participants enjoy special benefits, including mentorship by a faculty member, tuition waivers, and a subsistence scholarship. A special state-of-the-art study area has been allocated for students in this program as well.

The LAPIDIM - Research Excellence Program

This excellence program trains outstanding students with the potential to pursue academic careers as researchers and university faculty members. Participants must meet all the academic requirements of the program of their choice (including combined programs), complete specific program requirements and courses based on their field of research, and also attend special activities for students in this program. Participants enjoy special benefits, including mentorship by a faculty member, tuition waivers, and a subsistence scholarship. Students in this program have access to a new, modern, designated learning space.

Enhanced Software Engineering and the PSAGOT Program for Outstanding Academic Reserve Students

The software engineering excellence program trains the next generation of research and development leaders in technology-intensive industries and in the security forces. Participants in this four-year program must meet all the academic requirements for a B.Sc. in Software Engineering and complete most of the required courses for a master’s degree.

SAMBA – Outstanding Computer Science Students

To promote excellence, the faculty provides one-time scholarships to outstanding undergraduate students. The program is intended for all faculty students, in all tracks, including combined tracks. Scholarships will be awarded based on criteria that are updated periodically.

Graduate Studies

Graduates with a B.Sc. in Computer Science or related fields with outstanding achievements can apply for MA or Ph.D. studies in one of the faculty's graduate programs. Students who graduate with a degree in computer engineering can choose to continue their graduate studies at the Faculty of Electrical Engineering as well. Students who specialize in bioinformatics can apply for graduate studies in molecular biology at the Faculty of Biology; students from the Computer Science and Mathematics program can continue their studies at the Faculty of Mathematics; and graduates of the Computer Science and Physics program can choose to continue their studies at the Faculty of Physics.

Curricula

To meet the requirements for a BSc, students must accumulate as specified for each curriculum below, from each of the three categories of courses - compulsory courses, elective faculty courses, and elective Technion courses.
Each curriculum comprises 12 credits (or 10 credits in three-year programs) for elective Technion courses, of which at least 6 credits are for enrichment courses (with the exception of the double degree track in medicine and computer science); at least two credits for courses in physical education; and courses that students can choose from any of the Technion programs, provided they are eligible to register.

The General Four-Year Track

Students must accumulate 155.0 credits, according to the following specifications:

Compulsory courses	**87.0 credits**
Elective faculty courses	**56.0 credits**
Elective Technion courses	**12.0 credits**

Le – lecture; **E** – exercise; **La** – lab; **P** – project; **C** – credits

Compulsory Courses

Recommended courses, by semesters:

Semester 1		Le	E	La	P	C
01040031	Infinitesimal calculus 1M	4	3	-	-	5.5
01040166	Algebra AM	4	3	-	-	5.5
02340114*	Introduction to computer science M*	2	2	2	-	4.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
03240033	Technical English – Advanced B	4	-	-	-	3.0
		16	10	2	-	21.0
	Physical education (choose from a list)	-	2	-	-	1.0
			12			22.0

* This course must be taken in the 1st semester.
Please note: Students interested in bioinformatics should also take Biology 1 (01340058) and General Genetics (01340020) as early as possible.

Semester 2		Le	E	La	P	C
01040032	Infinitesimal calculus 2M	4	2	-	-	5.0
01140071	Physics 1M	3	1	-	-	3.5
02340124	Introduction to systems programming	2	2	-	2	4.0
02340125	Numerical algorithms **	2	2	-	-	3.0
02340141	Combinatorics for computer science	2	1	-	1	3.0
		13	8	-	3	18.5
	Physical education (choose from a list)	-	2	-	-	1.0
			10			19.5

** The Numerical Algorithms course can be taken in the 2nd semester and Modern Algebra (Electrical Engineering) in the 3rd semester, or vice versa.

Semester 3		Le	E	La	P	C
00940412	Probability M	3	2	-	-	4.0
01040134	Modern algebra H ***	2	1	-	-	2.5
02340218	Data structures 1	2	1	1	-	3.0
00440252/ 02340252	Digital systems and computer structure	4	2	-	-	5.0
02340292	Logic for CS	2	1		-	3.0
		13	7	1		17.5

*** Students can take Introduction to Groups (01040158) and Introduction to Rings and Fields (01040279) instead of Modern Algebra and an additional math course.

Semester 4		Le	E	La	P	C
	An additional math course*					2.5/5.0
	A scientific course**					3.0/5.0
02340118	Computer organization and programming	2	1	1	-	3.0
02340123	Operating systems	2	2	3	6	4.5
02340247	Algorithms 1	2	1	-	-	3.0
						16/20.5

** See science courses below.

*** One of the following mathematics courses:**

		Credits
01040135	Ordinary differential equations t [(1)]	2.5
01040033	Vector analysis	2.5
01040174	Algebra BM	3.5
01040122	Complex function theory 1	3.5
01040142	Introduction to metric and topological space	3.5
01040285	Ordinary differential equations A [(2)]	3.5
01040295	Infinitesimal calculus 3	5.0

[(1)] This course is considered an additional math course only for students take one of the following courses: Quantum physics for engineering (01140073), Quantic physics 1 (115203), Quantic chemistry 1 (01240400), or Analytic mechanics (01140101).
[(2)] Limited to 10 students per semester.

Semester 5		Le	E	La	P	C
	A scientific course**					3.0/5.0
02360267	Computer architecture	2	1	-	1	3.0
02360343	Theory of computation	2	1	-	1	3.0
02360360	Theory of compilation	2	1	-	-	3.0
						12/14

**Scientific Courses

Students must choose at least 8 credits from the following scientific courses, in accordance with chains of requirements below. If students take more than 8 credits, they will be considered elective courses from List B:

01140075	Physics 2MM	5.0
01140052	Physics 2	3.5
01140054	Physics 3	3.5
01140073	Quantum physics for engineering	3.5
01140101	Analytical mechanics	4.0
01140246	Electromagnetism and electrodynamics	5.0
01240120	Principles of chemistry	5.0
01250001	General chemistry	3.0
01250801	Organic chemistry	5.0
01240510	Physical chemistry	4.0
01340058	Biology 1	3.0
01340020	General genetics	3.5

Students must choose courses that complete one of the following chains:

1. Physics

		Credits
01140075	Physics 2MM	5.0
	Or the two following courses:	
01140052	Physics 2	3.5
01140054	Physics 3	3.5

2. Biology

		Credits
01340058	Biology 1	3.0
01340020*	General genetics *	3.5

* Available for all Technion students only once a year.

3. Chemistry

		Credits
01240120	Principles of chemistry	5.0
01250801	Organic chemistry	5.0
Or		
01240510	Physical chemistry	4.0

4. Physics-chemistry

		Credits
01240120	Principles of chemistry	5.0
01140052	Physics 2	3.5

Elective Courses

Students are required to take 56 elective faculty credits from three of the eleven specialization groups listed below. This means students will attend nine different courses, three from each group, and meet any requirements defined for those groups. At least 26 credits must be accumulated from the three specialization groups selected.

Another 15 credits must be chosen from List A (all computer science faculty courses) and an 15 credits from List A or List B (elective Technion courses).

All students are required to participate in either two projects or one project and one seminar (see the Miscellaneous section for more information on the follow-up software project course).

Specialization Groups

1. Computational complexity

02360011	Topics in Dynamic Graph Algorithms	3.0
02360306	Random graphs	2.0
02360309	Introduction to coding theory	3.0
02360313	Complexity theory	3.0
02360315	Algebraic methods in computer science	3.0
02360318	Boolean Function Analysis	2.0
02360359	Algorithms 2	3.0
02360374	Probabilistic methods and algorithms	3.0
02360377	Distributed graph algorithms	3.0
02360378	Principles of managing uncertain data	2.0
02360508	Cryptography and complexity	2.0
02360518	Communication complexity	2.0
02360521	Approximation algorithms	2.0
02360525	Introduction to network coding, bounds and construction	3.0
02360755	Distributed algorithms	3.0
02360760	Computational learning theory	2.0

Course number 02360313 is compulsory.

2. Algorithm theory

02360011	Topics in Dynamic Graph Algorithms	3.0
02360315	Algebraic methods in computer science	3.0
02360357	Distributed algorithms A	3.0
02360359	Algorithms 2	3.0
02360377	Distributed graph algorithms	3.0
02360521	Approximation algorithms	2.0
02360715	Methods in analysis of algorithms	3.0
02360719	Computational geometry	3.0
02360755	Distributed algorithms	3.0
02360760	Computational learning theory	2.0
02360779	Foundations of algorithms for massive datasets	2.0
02380739	Discrete algorithmic geometry	2.0

3. Logic and its applications

02360025	Automata logic and games	2.0
02360026	Knowledge and games in distributed systems	2.0
02360304	Logic for computer science 2	3.0
02360342	Introduction to software verification	3.0
02360345	Automatic verification of hardware and software systems	3.0
02360356	Introduction to database theory	3.0
02360378	Principles of managing uncertain data	2.0

4. Cryptology, cyphers, and information

02360309	Introduction to coding theory	3.0
02360350	Network security	3.0
02360379	Coding and algorithms for memories	3.0
02360500	Cryptanalysis	3.0
02360506	Modern cryptology	3.0
02360508	Cryptography and complexity	2.0
02360520	Coding for storage systems	2.0
02360525	Introduction to network coding, bounds and construction	3.0
02360990	Introduction to quantum information processing	3.0

Students must take either course 02360309 or course 02360506.

5. Software system development

02360268	Constructive computer architecture	3.0
02360271	Android development	2.0
02360278	Computational accelerators and accelerated systems	3.0
02360319	Programming languages	3.0
02360321	Software engineering methods	3.0
02360332	The internet of things – technologies and implementations	2.0
0236342	Introduction to software verification	3.0

02360347	Software synthesis and automated reasoning	3.0
02360363	Databases	3.0
02360369	Programing web systems	3.0
02360376	Operating systems engineering	4.0
02360490	Computer security	3.0
02360491	Secure programming	3.0
02360496	Reverse engineering	3.0
02360700	Software design	3.0
02360703	Object-oriented programming	3.0
02360712	Agile software engineering	2.0
02360780	Algorithms for dynamic memory management	2.0

Course number 02360319 is compulsory.

6. Distributed systems and communication networks

02360026	Knowledge and games in distributed systems	2.0
02360322	Information storage systems	3.0
02360334	Introduction to computer networks	3.0
02360341	Internet networking	3.0
02360350	Network security	3.0
02360351	Distributed systems	3.0
02360357	Distributed algorithms A	3.0
02360369	Programing web systems	3.0
02360370	Concurrent and distributed programming for data processing and machine learning	3.0
02360377	Distributed graph algorithms	3.0
02360422	Advanced storage system and technologies	3.0
02360490	Computer security	3.0
02360510	Database management systems implementation	3.0
02360668	Advanced topics in blockchain and cryptocurrency protocols	2.0
02360700	Software design	3.0
02360755	Distributed algorithms	3.0

Students must take either course 02360334 or course 02360370.

7. Computer systems

02360003	Selected topics on data management algorithms for decision making	2.0
02360207	Advanced topics in adversarial attacks on deep learning models and cyber security systems	3.0
02360268	Constructive computer architecture	3.0
02360278	Computational accelerators and accelerated systems	3.0
02360322	Information storage systems	3.0
02360334	Introduction to computer networks	3.0
02360347	Software synthesis and automated reasoning	3.0
02360350	Network security	3.0
02360363	Databases	3.0
02360369	Programing web systems	3.0

02360376	Operating systems engineering	4.0
02360379	Coding and algorithms for memories	3.0
02360422	Advanced storage system and technologies	3.0
02360490	Computer security	3.0
02360491	Secure programming	3.0
02360496	Reverse engineering	3.0
02360510	Database management systems implementation	3.0
02360703	Object-oriented programming	3.0
02360780	Algorithms for dynamic memory management	2.0

Course number 02360363 is compulsory.

8. Computer vision and robotics

02360201	Introduction to data processing and representation	3.0
02360330	Introduction to optimization *	3.0
02360372	Bayesian networks	3.0
02360759	Diffusion models in deep learning	2.0
02360777	Deep learning and its applications	3.0
02360781	Deep learning on computation accelerators	3.0
02360860	Digital image processing	3.0
02360861	Geometric computer vision	3.0
02360862	Sparse and redundant representations and applications	3.0
02360873	Computer vision	3.0
02360875	Visual recognition	3.0
02360767	Algorithmic robot motion planning	3.0
02360927	Introduction to robotics	3.0
02380100	Reliability in modern machine learning	2.0
02380790	Multi-grid methods	2.0
01040177	Differential geometry	3.5

* Or course number 00460197, computational methods in optimization.
Course number 02360201 is compulsory.

9. Computational geometry and computer graphics

02360216	Computer graphics 1	3.0
02360324	Computer graphics 2	3.0
02360329	Digital geometry processing	3.0
02360373	Image synthesis	3.0
02360716	Geometric models in CAD systems	3.0
02360719	Computational geometry	3.0
02360759	Diffusion models in deep learning	2.0
02360861	Geometric computer vision	3.0
01040177	Differential geometry	3.5
02380739	Discrete algorithmic geometry	2.0

Course number 02360216 is compulsory.

10. Machine learning and artificial intelligence

02360003	Selected topics on data management algorithms for decision making	2.0
02360004	Selected topics in transformers and attention-based networks	3.0
02360201	Introduction to data processing and representation	3.0
02360207	Advanced topics in adversarial attacks on deep learning models and cyber security systems	3.0
02360299	Introduction to natural language processing	3.0
02360372	Bayesian networks	3.0
02360501	Introduction to artificial intelligence	3.0
02360667	Advanced topics in machine learning and human behavior L+T	3.0
02360759	Diffusion models in deep learning	2.0
02360766	Introduction to machine learning	3.5
02360767	Algorithmic robot motion planning	3.0
02360760	Computational learning theory	2.0
02360763	Deep learning and approximation theory	3.0
02360777	Deep learning and its applications	3.0

02360779	Foundations of algorithms for massive datasets	2.0
02360781	Deep learning on computation accelerators	3.0
02360861	Geometric computer vision	3.0
02380100	Reliability in modern machine learning	2.0
00940423	Introduction to statistics	3.5

Course number 02360501 is compulsory.

11. Bioinformatics

02360522	Algorithms in computational biology	3.0
02360523	Introduction to bioinformatics	2.5
00940423	Introduction to statistics	3.5
01240120	Principles of chemistry	5.0
01250001	General chemistry	3.0
01250801	Organic chemistry	5.0
01340019	Introduction to biochemistry and enzymology	2.5
01340020	General genetics	3.5
01340058	Biology 1	3.0
01340082	Molecular biology	2.5

Courses 02360522 and 00940423 are compulsory.

Please note: All the biology and chemistry courses in this specialization group, except for one, are equivalent to elective courses from List B.

List A: Computer science faculty courses:

		Credits
02340268	Data structures and algorithms	3.0
02340302	Project in compilation U	3.0
02340303	Project in operating systems U	3.0
02340304	Project in artificial intelligence U	3.0
02340313	Industrial project	3.0
02340326	Project in computer graphics U	3.0
02340329	Project in image processing and analysis	4.0
02340493	Introduction to cyber security	1.0

02340901	Workshop in competitive programming	3.0
02360002	Topics in computer science innovation	2.0
02360003	Selected topics on data management algorithms for decision making	2.0
02360004	Topics in transformers and attention	3.0
02360005	Advanced topics in operating systems	2.0
02360006	Advanced topics in AI and robotics	3.0
02360007	Advanced topics in computer vision	2.0
02360008	Advanced topics in learning in hardware security applications	3.0
02360009	Selected topics in Linux Kernel Development in the Open Source Community	3.0
02360010	Selected topics on seminar on responsible data management	2.0
02360011	Selected topics in dynamic graph algorithms	3.0
02360012	Topics in concurrent and distributed systems	2.0
02360013	Advanced topics on seminar on performance engineering of software systems	2.0
02360014	Selected topics on Applied Geometry – Introduction and Applications in image analysis and processing, and robotics	2.0
02360016	Selected topics on algorithms for submodular optimization	2.0
02360025	Automata logic and games	2.0
02360026	Knowledge and games in distributed systems	2.0
02360125	Projects in AI and system security	3.0
02360201	Introduction to data processing and representation	3.0
02360203	Advanced topics in collaborative artificial intelligence systems	3.0
02360204	Seminar on formal methods	2.0
02360205	Advanced topics in geometric deep learning	3.0
02360206	Topics in sequences and De Bruijn graphs	2.0
02360207	Advanced topics in adversarial attacks on deep learning models and cyber security systems	3.0
02360216	Computer graphics 1	3.0

02360268	Constructive computer architecture	3.0
02360270	Software project management	3.0
02360271	Android development	2.0
02360272	Project in Android development	3.0
02360278	Computational accelerators and accelerated systems	3.0
02360299	Introduction to natural language processing	3.0
02360303	Project in natural language processing	3.0
02360304	Logic for computer science 2	3.0
02360306	Random graphs	2.0
02360309	Introduction to coding theory	3.0
02360310	Formal language theory	3.0
02360313	Complexity theory	3.0
02360315	Algebraic methods in computer science	3.0
02360318	Boolean function analysis	2.0
02360319	Programming languages	3.0
02360321	Software engineering methods	3.0
02360322	Information storage systems	3.0
02360323	Project in data processing M	3.0
02360324	Computer graphics 2	3.0
02360328	Project in computer graphics M	3.0
02360329	Digital geometry processing	3.0
02360330	Introduction to optimization	3.0
02360332	The internet of things – technologies and implementations	2.0
02360333	Project in the internet of things	3.0
02360334	Introduction to computer networks	3.0
02360336	Numerical solution of partial differential equations	3.0
02360340	Project in computer communication	3.0
02360341	Internet networking	3.0
02360342	Introduction to software verification	3.0
02360345	Automatic verification of hardware and software systems	3.0
02360346	Project in computer-aided verification	3.0
02360347	Software synthesis and automated reasoning	3.0

02360348	Introduction to human-computer interaction	3.0
02360349	Project in information security	3.0
02360350	Network security	3.0
02360351	Distributed systems	3.0
02360356	Database theory	3.0
02360357	Distributed algorithms A	3.0
02360358	Advanced topics in distributed algorithm	2.0
02360359	Algorithms 2	3.0
02360360	Theory of compilation	3.0
02360361	Project in compilation M	3.0
02360363	Databases	3.0
02360366	Project in operating systems M	3.0
02360369	Programing web systems	3.0
02360370	Concurrent and distributed programming for data processing and machine learning	3.0
02360371	Project in parallel and distributed computation	3.0
02360372	Bayesian networks	3.0
02360373	Image synthesis	3.0
02360374	Probabilistic methods and algorithms	3.0
02360376	Operating systems engineering	4.0
02360377	Distributed graph algorithms	3.0
02360378	Principles of managing uncertain data	2.0
02360379	Coding and algorithms for memories	3.0
02360381	Project in VLSI B	4.0
02360388	Project in storage systems	3.0
02360422	Advanced Storage System and Technologies	3.0
02360490	Computer security	3.0
02360491	Secure programming	3.0
02360496	Reverse engineering	3.0
02360499	Project in firewalls	3.0
02360500	Cryptanalysis	3.0
02360501	Introduction to artificial intelligence	3.0
02360502	Project in artificial intelligence	3.0

02360503	Project in CS advanced programming 1	3.0
02360504	Project in software	3.0
02360506	Modern cryptology	3.0
02360508	Cryptography and complexity	2.0
02360509	Advanced topics in computer architecture	3.0
02360510	Database management systems implementation	3.0
02360512	Project in software development systems	3.0
02360513	Advanced project in software development systems	3.0
02360515	Advanced topics in coding theory	2.0
02360518	Communication complexity	2.0
02360520	Coding for storage systems	2.0
02360521	Approximation algorithms	2.0
02360522	Algorithms in computational biology	3.0
02360523	Introduction to bioinformatics	2.5
02360524	Project in bioinformatics	3.0
02360525	Introduction to network coding, bounds and construction	0.3
02360526	Project in CS advanced programming 2	3.0
02360612	Advanced topics in cryptology	3.0
02360613	Advanced Topics in Cryptology L	2.0
02360620	Advanced Topics in Algorithms L	2.0
02360621	Advanced Topics in Algorithms L+T	3.0
02360622	Advanced Topics No. 2 in Algorithms L	2.0
02360623	Advanced Topics No. 2 in Algorithms L+T	3.0
02360624	Advanced Topics in Formal Verification Methods L	2.0
02360625	Advanced Topics in Formal Verification Methods L+T	3.0
02360627	Advanced Topics in Computer Vision and Image Processing L+T	3.0
02360628	Advanced Topics in Computer Graphics L	2.0
02360629	Advanced Topics in Computer Graphics L+T	3.0
02360630	Advanced topics in Natural Language Processing L	2.0
02360631	Advanced Topics in Natural Language Processing L+T	3.0
02360632	Advanced Topics in Bioinformatics L	2.0

02360633	Advanced Topics in Bioinformatics L+T	3.0
02360634	Advanced Topics in Computer Communication Networks L	2.0
02360635	Advanced Topics in Computer Communication Networks L+T	3.0
02360637	Advanced Topics in Logic and Computation L+T	3.0
02360638	Advanced Topics in Networks Design and Analysis L	2.0
02360640	Advanced Topics in Quantum Information L	2.0
02360641	Advanced Topics in Quantum Information L+T	3.0
02360643	Advanced Topics in Robotics L+T	3.0
02360644	Advanced Topics in Scientific Computing L	2.0
02360645	Advanced Topics in Scientific Computing L+T	3.0
02360646	Advanced Topics in Theoretical Computer Science L	2.0
02360647	Advanced Topics in Theoretical Computer Science L+T	3.0
02360648	Advanced Topics in Complexity L	2.0
02360649	Advanced Topics in Complexity L+T	3.0
02360650	Advanced Topics in Software Engineering L	2.0
02360651	Advanced Topics in Software Engineering L+T	3.0
02360652	Advanced Topics in Information Security L	2.0
02360653	Advanced Topics in Information Security L+T	3.0
02360654	Advanced Topics No. 2 in Software Engineering L	2.0
02360655	Advanced Topics No. 2 in Software Engineering L+T	3.0
02360657	Advanced Topics in Database Theory L+T	3.0
02360658	Advanced Topics in Natural Computing L	2.0
02360660	Advanced Topics in Computational Learning L	2.0
02360661	Advanced Topics in Computational Learning L+T	3.0
02360662	Advanced Topics in Algorithmic Game Theory L	2.0
02360663	Advanced Topics in Algorithmic Game Theory L+T	3.0
02360664	Advanced Topics in Biological Computing L	2.0
02360667	Advanced Topics in machine learning and human behavior L+T	3.0
02360668	Advanced topics in blockchain and cryptocurrency protocols	2.0
02360669	Advanced topics in introduction to property test	3.0
02360670	Advanced topics in algorithms 2	3.0

02360698	Software quality assurance	2.0
02360700	Software design	3.0
02360703	Object-oriented programming	3.0
02360712	Agile software engineering	2.0
02360715	Methods in analysis of algorithms	3.0
02360716	Geometric models in CAD systems	3.0
02360719	Computational geometry	3.0
02360729	Project in computational geometry	3.0
02360754	Project in intelligent systems	3.0
02360755	Distributed algorithms B	3.0
02360757	Project in machine learning	3.0
02360759	Diffusion models in deep learning	2.0
02360760	Computational learning theory	2.0
02360763	Deep Learning and Approximation Theory	3.0
02360766	Introduction to machine learning	3.5
02360767	Algorithmic robot motion planning	3.0
02360768	Project in robotics	3.0
02360777	Deep learning and its applications	3.0
02360779	Foundations of algorithms for massive datasets	2.0
02360780	Algorithms for dynamic memory management	2.0
02360781	Deep learning on computation accelerators	3.0
02360800	Seminar in software engineering	2.0
02360811	Numerical analysis seminar 1	2.0
02360812	Numerical analysis seminar 2	2.0
02360813	Seminar in Algorithms	2.0
02360814	Seminar in Formal Verification Methods	2.0
02360815	Seminar in Computer Vision	2.0
02360816	Seminar in Computer Graphics	2.0
02360817	Seminar in Natural Language Processing	2.0
02360818	Seminar in Bioinformatics	2.0
02360819	Seminar in Computer Communication Networks	2.0
02360820	Seminar in Coding Theory	2.0

02360821	Seminar in Image Processing	2.0
02360822	Seminar in Interconnection and Sorting Networks	2.0
02360823	Seminar in Quantum Information processing	2.0
02360824	Seminar in Robotics	2.0
02360825	Seminar in Distributed Algorithms	2.0
02360826	Seminar in Databases	2.0
02360827	Seminar in computer systems	2.0
02360828	Project in Computer Systems	3.0
02360829	Seminar in Approximation Algorithms	2.0
02360830	Seminar in Concurrent Algorithms	2.0
02360831	Seminar in Discrete Geometry	2.0
02360832	Seminar in Concurrent Programming	2.0
02360833	Seminar in Automata and Formal Languages	2.0
02360834	Seminar in Information Storage Systems	2.0
02360835	Seminar in Artificial Intelligence	2.0
02360836	Seminar in Incentives and Learning	2.0
02360837	Seminar on Coding in Information Storage Systems	2.0
02360838	Seminar in Machine Learning Systems	2.0
02360839	Seminar on failure modes in machine learning	2.0
02360860	Digital image processing	3.0
02360861	Geometric computer vision	3.0
02360862	Sparse and redundant representations and applications	3.0
02360873	Computer vision	3.0
02360874	Project in computer vision	3.0
02360875	Visual recognition	3.0
02360927	Introduction to robotics	3.0
02360990	Introduction to quantum information processing	3.0
02360991	Project in quantum computing	3.0
02380100	Reliability in modern machine learning	2.0
02380125	Numerical algorithms m	3.0
02380739	Discrete algorithmic geometry	2.0
02380790	Multi-grid methods	2.0

02380900	Theory of computation research seminar	2.0
02380901	Logic and combinatorics research seminar	2.0
02380902	Research seminar in combinatorics and graph theory	2.0

List B: Elective Technion courses

		Credits
00360044	Robot path-planning and sensor based navigators	3.0
00440105	Theory of electronic circuits	4.0
00440127	Basics of semiconductor devices M	3.5
00440131	Signals and systems	5.0
00440137	Electronic circuits	5.0
00440157	Electrical engineering laboratory 1A	2.0
00440167	Laboratory project A	4.0
00440169	Laboratory project B	4.0
00440202	Random signals	3.0
00460201	Random signal processes	3.0
00460206	Introduction to digital communication	3.0
00460332	Visual and auditory systems	3.0
00460880	Logic design of VLSI systems	3.0
00480878	VLSI architecture	2.0
00480921	Advanced topics in vision, image structure and computer vision	2.0
00860761	Vision-aided navigation	3.0
00940222	Model-based system engineering	3.5
00940313	Deterministic models in operations research	3.5
00940314	Stochastic models in operations research	3.5
00940333	Dynamic models in operation research	3.0
00940334	Digital simulation of systems	3.0
00940423	Introduction to statistics	3.5
00940591	Introductory economics	3.5
00960200	Mathematical tools for data science	3.5

00960211	E-commerce models	3.5
00960224	Distributed data management	3.0
00960250	Distributed information systems	3.5
00960262	Information retrieval	3.5
00960326	Algorithms in scheduling	3.5
00960411	Statistical learning with data	3.5
00970317	Cooperative game theory	2.5
01040122	Complex function theory 1	3.5
01040135	Ordinary differential equations/t	2.5
01040142	Introduction to metric and topological space	3.5
01040157	Introduction to number theory	3.5
01040165	Real functions	3.5
01040174	Algebra BM	3.5
01040158	Introduction to theory groups	3.5
01040177	Differential geometry	3.5
01040192	Introduction to applied mathematics	3.0
01040221	Complex functions and integral transforms	4.0
01040223	Partial differential equations and Fourier series	4.0
01040276	Introduction to functional analysis	3.5
01040279	Introduction to rings and fields	2.5
01040293	Measure theory	2.5
01040294	Int. to Numerical Analysis	5.0
01060378	Set theory	3.0
01060383	Algebraic topology	3.0
01140101	Analytical mechanics	4.0
01140246	Electromagnetism and electrodynamics	5.0
01150203	Quantum physics 1	5.0
01150204	Quantum physics 2	5.0
01140036	Statistical and thermal physics	5.0
01160217	Solid state physics	3.5
01160354	Astrophysics and cosmology	3.5
01240120	Principles of chemistry	5.0

01240400	Quantum Chemistry	5.0
01240503	Physical chemistry 1B	2.5
01240801	Organic chemistry 1B	2.5
01250801	Organic chemistry	5.0
01340019	Introduction to biochemistry and enzymology	2.5
01340020	General genetics	3.5
01340058	Biology 1	3.0
01340082	Molecular biology	2.5
01340113	Metabolic pathways	3.5
01340128	Cell biology	3.5
01340119	Regulation of gene expression	2.5
01340142	Molecular genetics laboratory	2.5
02140909	Computer Science Problems – Soft Skills	2.0

Students can also choose courses from the list of additional math courses featured as part of the general four-year study track, or other courses with the advisor's approval.

The Cyber and Computer Systems Security Specialization Program

The goal of this program is to produce graduates who specialize in cyber security. Students will obtain an extensive background in computer science with an emphasis on theoretical and practical aspects of security in the digital world. Graduates receive a B.Sc. in Computer Science and a conformation document indicating their specialization attached to their diploma and transcripts.

Please note: This recommended curriculum only applies to the winter semester.

Students must accumulate 155 credits as follows:

Compulsory courses	106.0 credits
Core courses	8.0 credits
Elective faculty courses	29.0 credits
Elective Technion courses	12.0 credits

Le – Lecture; E – Exercise; La – Lab; P – Project; C – Credits

Compulsory courses

Recommended courses, by semesters:

Semester 1		Le	E	La	P	C
01040031	Infinitesimal calculus 1M	4	3	-	-	5.5
01040166	Algebra AM	4	3	-	-	5.5
02340114	Introduction to computer science M*	2	2	2	-	4.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
03240033	Technical English – advanced B	4	-	-	-	3.0
		16	10	2	-	21.0
	Physical education (choose from the list)	-	2	-	-	1.0
			12			22.0

* This course must be taken during the 1st semester.

Semester 2		Le	E	La	P	C
01040032	Infinitesimal calculus 2M	4	2	-	-	5.0
01140071	Physics 1M	3	1	-	-	3.5
02340124	Introduction to systems programming	2	2	-	-	4.0
02340125	Numerical algorithms **	2	2	-	-	3.0
02340141	Combinatorics for computer science	2	1	-	1	3.0
02340493	Introduction to cyber security	1	-	-	-	1.0
		14	8	-	3	19.5
	Physical education (choose from the list)	-	2	-	-	1.0
			10			20.5

** Numerical algorithms (02340125) can be taken in the 2nd semester and Modern algebra (01040134) in the 3rd semester, or vice versa.

Semester 3		Le	E	La	P	C
00940412	Probability M	3	2	-	-	4.0
01040134 ***	Modern algebra H*	2	1	-	-	2.5
02340218	Data structures 1	2	1	1	-	3.0
00440252 / 02340252	Digital systems and computer structure	4	2	-	-	5.0
02340292	Logic for CS	2	1	-	-	3.0
02360491	Secure Programming	2	1	-	1	3.0
		15	8	1	1	20.5

*** Students can take Introduction to groups (01040158) and Introduction to rings and fields (01040279) instead of Modern algebra H and the additional math course.

Semester 4		Le	E	La	P	C
	An additional math course*					2.5/5.0
	A scientific course**					3.0/5.0
02340118	Computer organization and programming	2	1	1	-	3.0
02340123	Operating systems	2	2	3	6	4.5
02340247	Algorithms 1	2	1	-	-	3.0
						16/20.5

* One of the **math courses** specified in the general four-year study track.
** The scientific course requirements are the same as those for the general four-year study track, i.e., at least 8 credits from the courses on the scientific course list in the general four-year track, while meeting the requirements of one of the chains.

Semester 5		Le	E	La	P	C
	A scientific course**					3.0/5.0
02360267	Computer architecture	2	1	-	1	3.0
02360343	Theory of computation	2	1	-	1	3.0
02360360	Theory of compilation	2	1	-	-	3.0

02360334	Introduction to computer networks	2	1	-	1	3.0
02360350	Network security	2	1	-	1	3.0
						18/20

Semester 6		Le	E	La	P	C
02360506	Modern cryptology	2	1	-	1	3.0
02360490	Computer security	2	1	-	1	3.0
02360496	Reverse engineering	2	1	-	1	3.0
		6	3	-	3	9.0

Elective courses

Students are required to take 37 elective faculty credits, as follows. They must complete three different courses (at least 8 credits) from the list of core courses below, and one of the 11 specialization groups defined for the general four-year track. Completing a group means taking three different courses from the group (at least 8 credits) that are not part of the compulsory or core requirements, and meeting any requirements defined for that group.

Twelve additional credits need to be chosen from List A (computer science faculty courses) and another 9 credits from List A or List B (elective Technion courses) of the general four-year study track.

Each student is required to participate in either at least two projects or one project and one seminar. These must include at least one of the following projects: Information security (02360349) or Firewalls (02360499).

Core courses

Students are required to take three of the following courses (at least 8 credits):

		Credits
02360501	Introduction to artificial intelligence	3.0
02360342	Introduction to software verification	3.0
02360500	Cryptanalysis	3.0

02360508	Cryptography and complexity	2.0
02360990	Introduction to quantum information processing	3.0
02360376	Operating systems engineering	4.0
02360341	Internet networking	3.0

The General Three-Year Study Track Curriculum

Students must accumulate 118.5 credits as follows:

Compulsory courses	84.0 credits
Elective faculty courses	24.5 credits
Elective Technion courses	10.0 credits

The division to semesters is only a recommendation.
The 1st, 2nd, 3rd, and 4th semesters are the same as the general four-year program.
Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses, by semesters:

Semester 5		Le	E	La	P	C
	A scientific course**					3.0/5.0
02360343	Theory of computation	2	1	-	1	3.0
02360360	Theory of compilation	2	1	-	-	3.0
						9/11

** The scientific course requirements are the same as for the general four-year program, i.e., at least 8 credits from the list of scientific courses for the general four-year program, in accordance with one of the chains.

Elective Courses

Students are required to complete 24.5 elective faculty credits, including at least 18 credits from List A (faculty courses) and at least one project. The remaining elective courses can be chosen from Lists A or B of the general four-year program.

The Machine Learning and Data Analysis specialization program

Graduates of this program will specialize in information and signal collection, processing, and analysis; and method and algorithm research in these fields. The track focuses on the principles of handling information and generating content from it using signal processing tools, statistical inference, and machine learning. The program provides its graduates with a broad background in computer science,

mathematical enrichment, and information collection, processing, and learning. Graduates are awarded a B.Sc. in Computer Science, and a conformation document indicating their specialization attached to their diploma and transcripts.

Please note: Students will only be admitted to this track during the winter semester.

To complete the three-year degree program, students must accumulate 121 credits as follows:

Compulsory courses	86.0 credits
Core courses	12.0 credits
Elective faculty courses	13.0 credits
Elective Technion courses	10.0 credits

Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses, by semesters:

Semester 1		Le	E	La	P	C
01040031	Infinitesimal calculus 1M	4	3	-	-	5.5
01040166	Algebra AM	4	3	-	-	5.5
02340114	Introduction to computer science M*	2	2	2	-	4.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
03240033	Technical English – advanced B	4	-	-	-	3.0
	Physical education courses	16	10	2	-	21.0
	Physical education (choose from the list)	-	2	-	-	1.0
			12			22.0

* This course must be taken during the 1st semester.

Semester 2		Le	E	La	P	C
01040032	Infinitesimal calculus 2M	4	2	2	-	5.0
01140071	Physics 1M	3	1	1	-	3.5
02340124	Introduction to systems programming	2	2	2	2	4.0
02340141	Combinatorics for computer science	2	1	1	1	3.0
01040174	Algebra BM (1)	3	1	1	-	3.5
		14	7	7	3	19.0
	Physical education (choose from a list)	-	2	2	-	1.0
			9	9		20.0

(1) Or Modern Algebra H (01040134) for 2.5 credits, in addition to an elective faculty credit.

Semester 3		Le	E	La	P	C
00440252/ 02340252	Digital systems and computer structure	4	2	-	-	5.0
00940412	Probability M	3	2	-	-	4.0
02340125	Numerical algorithms	2	2	-	-	3.0
02340218	Data structures 1	2	1	1	-	3.0
02340292	Logic for computer science	2	1	-	-	3.0
		13	8	1	-	18

Semester 4		Le	E	La	P	C
02340247	Algorithms 1	2	1	-	-	3.0
02340118	Computer organization and programming	2	1	1	-	3.0
02340123	Operating systems	2	2	3	6	4.5
02360766	Introduction to machine learning	2	1	2	-	3.5
	A scientific course**					3.0/5.0
						17/19

Semester 5		Le	E	La	P	C
02360343	Theory of computation	2	1	-	1	3.0
02360201	Introduction to data processing and representation	2	1	-	1	3.0
	A scientific course**					3.0/5.0
						9/11

** The scientific course requirements are the same as for the general four-year program, i.e., at least 8 credits from the list of scientific courses for the general four-year program, while meeting the requirements of one of the chains.

Elective Courses

Students must complete 25 elective faculty credits, including at least four courses (12 credits) from the list of core courses below.

Each student must participate in at least one faculty project constituting at least 3 credits (aside from those defined as “not recognized for the project requirements for the degree”). The other elective courses can be chosen from List A (faculty courses) in the general four-year program.

Core Courses

Students are required to take at least four courses from the following list (at least 12 credits):

		Credits
00940423	Probability M	3.5
02360330	Introduction to optimization	3.0
	Or	
00460197	Computational methods in optimization	3.0
02360299	Introduction to natural language processing	3.0
02360363	Databases	3.0
02360370	Concurrent and distributed programming for data processing and machine learning	3.0
02360501	Introduction to artificial intelligence	3.0
02360667	Advanced topics in machine learning and human behavior I T	3.0
02360860	Digital image processing	3.0

02360777	Deep learning and its applications	3.0
02360781	Deep learning on computational accelerators	3.0
02360767	Algorithmic robot motion planning	3.0

Completion of the machine learning and information analysis program will be noted in a conformation document that will be attached to the graduate's diploma for the general four-year program or the software engineering program, provided that the graduates met all the requirements and reached the quota of credits needed to receive a degree in the regular program they selected. In addition, graduates must meet all special core and compulsory requirements for the machine learning and information analysis program.

Compulsory subjects for this program that are not required for the general four-year program or the software engineering program are Introduction to data processing and representation (02360201) and Instruction to machine learning (02360766).

Compulsory and core courses for this specialization that are included in the four-year program's specialization groups will be counted towards completing the requirements for the selected group.

Introduction to artificial intelligence (02360501) will be counted towards meeting the requirements for core courses in the software engineering program. The stage 2 project in software engineering will be counted towards the requirement to complete a project for the specialization program.

The Computer Science Bioinformatics Specialization Program

(In collaboration with the Faculty of Biology)

The rapid advancements in modern biology are facilitating extensive use of innovative computational methods and algorithms. The decoding of the human genome is revolutionizing our understanding of evolution and human biology and changing our approach to diseases and to the development of medications and early diagnosis methods.

This goal of this program is to qualify graduates who will join and lead bioinformatics industries, or pursue graduate studies in biology and computer science.

Graduates receive a B.Sc. in Computer Science and a confirmation document indicating their specialization along with their diploma and transcripts.

The curriculum

Students must accumulate 124 credits as follows:

Compulsory courses	91.5	Credits
Elective faculty courses	22.5	Credits
Elective Technion courses	10.0	Credits

Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses, by semesters:

Semester 1		Le	E	La	P	C
01040031	Infinitesimal calculus 1M	4	3	-	-	5.5
01040166	Algebra AM	4	3	-	-	5.5
02340114	Introduction to computer science M*	2	2	2	-	4.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
01340058	Biology 1	3	-	-	-	3.0
		15	10	2	-	21.0

	Physical education (choose from the list)	-	2	-	-	1.0
			12		-	22.0

* This course must be taken during the 1st semester.

Semester 2		Le	E	La	P	C
01040032	Infinitesimal calculus 2M	4	2	-	-	5.0
01140071	Physics 1M **	3	1	-	-	3.5
01340020	General genetics	3	1	-	-	3.5
02340124	Introduction to systems programming	2	2	-	2	4.0
02340141	Combinatorics for computer science	2	1	-	1	3.0
		14	7	-	3	19.0
	Physical education (choose from the list)	-	2	-	-	1.0
			9			20.0

** Physics 1M (01140071) can be deferred to later semesters.

Semester 3		Le	E	La	P	C
00940412	Probability M	3	2	-	-	4.0
00440252/ 02340252	Digital systems and computer structure	4	2	-	-	5.0
02340218	Data structures 1	2	1	1	-	3.0
02340292	Logic for computer science	2	1	-	-	3.0
01250001	General chemistry***	2	2	-	-	3.0
03240033	Technical English – Advanced B	4	-	-	-	3.0
		17	8	1	-	21.0

*** Students can take Principles of chemistry (01240120) instead.

Semester 4		Le	E	La	P	C
00940423	Introduction to statistics	3	1	-	-	3.5
02340118	Computer organization and programming	2	1	1	-	3.0
02340247	Algorithms 1	2	1	-	-	3.0
01340019	Introduction to Biochemistry and enzymology	2	2	-	-	2.5
		9	5	1	-	12.0

Semester 5		Le	E	La	P	C
01040134	Modern algebra H	2	1	-	-	2.5
02340123	Operating systems	2	2	3	6	4.5
02360523	Introduction to bioinformatics	2	1	-	-	2.5
		6	4	3	6	9.5

Choose from the Biology A list: Molecular biology or Genetics lab

Semester 6		Le	E	La	P	C
02360343	Theory of computation	2	1	-	1	3.0
02360522	Algorithms in computational biology	2	1	-	-	3.0
02360524	Project in bioinformatics	2	-	-	3	3.0
		6	2	-	4	9.0

Note: Students can only join this program for the winter semester.

Elective courses

Students must complete 22.5 credits as follows:

1) At least 8 credits from List A (faculty courses) for the general four-year computer science track.
2) At least 14.5 elective biology credits as follows:

Biology A:

Students must choose one of the following course clusters (7.5 credits)****

Molecular cluster		
01250801	Organic chemistry	5.0
01340082	Molecular biology	2.5

Microbiology and evolution cluster		
01340121	Microbiology and virology	3.0
01340133	Evolution	2.0
01340142	Genetics laboratory	2.5

**** It is advised to begin during Semester 4

Biology B:

Students must choose at least two additional courses from the following list:

01340119	Regulation of gene expression	2.5
01340128	Biology of the cell	3.5
01340113	Metabolic pathways	3.5
00660529	Bioinformatics of cancer	3.0
01340156	Molecular biophysics	3.0
01250801	Organic chemistry	5.0
01340082	Molecular biology	2.5
01340121	Microbiology and virology	3.0
01340133	Evolution	2.0
01340142	Genetics laboratory	2.5

The remaining credits (to reach a total of 14.5) shall be taken from List A or List B of the B.Sc. track in biology.

The Software Engineering Track

This track trains its graduates to specialize in large software systems. The track focuses on a range of programing methods and systematic handling of software analysis, content, application, testing, verification, maintenance, assessment, and conversion. The track provides graduates with extensive knowledge of applied computer science and in-depth practical experience in creating software and using advanced software engineering tools. Graduates receive a B.Sc. in Software Engineering. This track is open to any student in the faculty who's academic status is in order.

Curriculum

Students must accumulate 159.5 credits as follows:

Compulsory courses	109 credits
Core courses	9.0 credits
Elective faculty courses	29.5 credits
Elective Technion courses	12.0 credits

Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses, by semesters:

Semester 1		Le	E	La	P	C
01040031	Infinitesimal calculus 1M	4	3	-	-	5.5
01040166	Algebra AM	4	3	-	-	5.5
02340114	Introduction to computer science M *	2	2	2	-	4.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
03240033	Technical English – Advanced B	4	-	-	-	3.0
		16	10	2	-	21.0
	Physical educations (choose from the list)	-	2	-	-	1.0
			12			22.0

* This course must be taken in the 1st semester.

Semester 2		Le	E	La	P	C
01040032	Infinitesimal calculus 2M	4	2	-	-	5.0
01040134	Modern algebra H	2	1	-	-	2.5
01140071	Physics 1M	3	1	-	-	3.5
02340124	Introduction to systems programming	2	2	-	2	4.0
02340141	Combinatorics for computer science	2	1	-	1	3.0
		13	7	-	3	18.0
	Physical educations (choose from the list)	-	2	-	-	1.0
			9			19.0

Semester 3		Le	E	La	P	C
00440252/ 02340252	Digital systems and computer structure	4	2	-	-	5.0
	A scientific course**					3.0/5.0
00940412	Probability M	3	2	-	-	4.0
02340218	Data structures 1	2	1	1	-	3.0
02340292	Logic for computer science	2	1	-	-	3.0
02360319	Programming languages	2	1	-	-	3.0
						21/23.0

Semester 4		Le	E	La	P	C
	A scientific course**					3.0/5.0
02340118	Computer organization and programming	2	1	1	-	3.0
02340247	Algorithms 1	2	1	-	-	3.0
02340123	Operating systems	2	2	3	6	4.5
02360703	Object oriented programming	2	2	-	-	3.0
						16.5/18.5

** Scientific course requirements are the same as those for the general four-year study track: at least 8 credits from the scientific course list in the general four-year track, while completing one of the chains.

For students who begin their studies in the winter semester:

Semester 5		Le	E	La	P	C
02360267	Computer architecture	2	1	-	1	3.0
02360322	Information storage systems	2	1	-	1	3.0
02360342	Introduction to software verification	2	1	-	1	3.0
02360343	Theory of computation	2	1	-	1	3.0
02360360	Theory of compilation	2	1	-	-	3.0
02360370	Concurrent and distributed programming for data processing and machine learning	2	1	-	1	3.0
		12	6	-	5	18.0

Semester 6		Le	E	La	P	C
02340125	Numerical algorithms	2	2	-	-	3.0
02360334	Introduction to computer networks	2	1	-	1	3.0
		4	3	-	1	6.0

We recommend completing a project during the 6th semester.

Semester 7		Le	E	La	P	C
02340311	Yearly Project in Software Engineering - Stage A	2	-	-	4	3.0

Semester 8		Le	E	La	P	C
02340312	Yearly Project in Software Engineering - Stage B	2	-	-	6	3.5

For students who begin their studies in the spring semester:

Semester 5		Le	E	La	P	C
02360267	Computer architecture	2	1	-	1	3.0
02340125	Numerical algorithms	2	2	-	-	3.0
02360334	Introduction to computer networks	2	1	-	1	3.0
02360343	Theory of computation	2	1	-	1	3.0
02360360	Theory of compilation	2	1	-	-	3.0
		102	6	-	3	15.0

Semester 6		Le	E	La	P	C
02360322	Information storage systems	2	1	-	1	3.0
02360342	Introduction to software verification	2	1	-	1	3.0
02340311	Yearly Project in Software Engineering - Stage A	2	-	-	4	3.0
02360370	Concurrent and distributed programming for data processing and machine learning	2	1	-	1	3.0
		8	3	-	7	12.0

We recommend completing a project during the 6th semester.

Semester 7		Le	E	La	P	C
02340321	Yearly Project in Software Engineering— Stage B	2	-	-	6	3.5

Semester 8						
	Elective courses					

Elective Courses

Students must complete 38.5 elective faculty credits, including at least three courses (9.0 credits) from the list of core courses below. 29.5 of the elective faculty credits must include at least 15 courses from List A (faculty courses) and at least one project. The other elective courses can be taken from Lists A or B (see the general four-year program) or as approved by the advisor.

Note: Students can choose to take Micro Economics 1 (00940503) as an elective course from List B in the software engineering track.

Core Courses

Students are required to take three of the following courses:

		Credits
02360270	Software project management	3.0
02360321	Software engineering methods	3.0
02360347	Software synthesis and automated reasoning	3.0
02360350	Network security	3.0
02360363	Databases	3.0
02360501	Introduction to artificial intelligence	3.0
02360700	Software design	3.0

The Excellence Program for Advanced Software Engineering

The program produces highly skilled software engineers by teaching scientific-technological knowledge in a broad range of software engineering fields and enriching fundamental fields in science and design.

The track is intended for outstanding students, specifically outstanding academic reserve students in the Psagot program. The program allows participants to complete their undergraduate studies in software engineering and take master's courses toward their M.Sc. over the course of four years.

Students must meet all the requirements of the software engineering track and complete an additional 14 credits based on the requirements for a master's degree.

Some clarifications:

1. Students will be accepted for this program in the first semester if they have especially high grades, as determined periodically. Being accepted for this program guarantees admission to the software engineering track.
2. Students may join this track at any time during their computer science studies. However, a cumulative GPA of 90 or higher is required, not including elective courses.
3. Students must maintain a GPA of at least 85 throughout the entire course of their studies to remain in this track.
4. We recommend taking an additional scientific course or the Numerical Algorithms course in the 4th semester.
5. We recommend taking elective faculty courses beginning from the 5th semester and advanced courses during the 7th and 8th semesters.
6. We recommend taking most of the core courses required for the software engineering track as elective faculty courses.
7. Students who receive approval for their M.Sc. thesis proposal will require only 12 credits (instead of 14) to complete their studies. These students will complete an additional 6 credits later on, during their master's studies.
8. The additional 14 credits will be recognized for a master's degree only if approved in advance by the vice dean of the Technion's Graduate School before taking the course (and provided that the minimum required grade is obtained).
9. Students who meet the admission requirements for a master's degree will be able to register for at the end of the third year of their undergraduate studies.
10. Graduates can specialize in any topic researched at the faculty during their master's studies.
11. Only students who are admitted to the track and complete their studies within five years will be recognized as track graduates.
12. Graduates will be awarded a certificate by the faculty.

The Computer Engineering Track

The track provides a framework for undergraduate studies that produces computer engineers with extensive software and hardware knowledge who specialize in designing and building electronic systems (including computers).
The computer engineering track is run jointly by the Faculty of Electrical and Computer Engineering and Computers and the Faculty of Computer Science – and is fully subordinated to both faculties, its parent faculties. Computer engineering does not constitute an independent academic unit. Instead, it is run by the directors of the parent units and the curriculum comprises courses from faculties. Graduates receive a B.Sc. in Computer Engineering when they complete their requirements.

Students must accumulate at least 158.5 credits from the following four groups of courses: compulsory courses, core courses, elective faculty courses, and Technion elective courses (including 6 enrichment credits).

The requirements for obtaining 158.5 credits shall be filled as follows:

1. All compulsory courses specified in the recommended plan below must be taken, constituting 112.5–114.5 credits.
2. At least **two** courses from the list of core courses must be selected.
3. Several courses from the lists of elective courses offered by the Faculty of Computer Science and Faculty of Electrical and Computer Engineering must be taken to complete at least two specialization groups. If a course that appears on the list of core courses is also compulsory for a specialization group, it can either be considered part of the specialization group (and then will not be considered as a core course) or a core course (which will not be considered part of the specialization group). At least 146.5 credits in total must be accumulated from compulsory, core, and elective courses (see also the section on elective courses below).
4. 12 credits from elective Technion courses, comprising at least 6 credits from enrichment courses, 2 credits from PE courses, and elective Technion courses, subject to the enrollment terms defined for each course.

Students interested in obtaining a high school teaching certificate should contact the undergraduate studies secretariat at the parent unit for details.

The number of students permitted to switch to different tracks that require registration will be limited to a figure defined each year by the heads of the parent units. The criteria for switching to a different track will be published on the websites of the parent units.

Admission

1. A limited number of students are admitted to this track each year. The number of students admitted is determined every year by the heads of both parent units.

2. Students admitted to the track will be affiliated with one of the two parent units, based on the year of registration. All students who register in a given year will be affiliated with the same parent unit, and the students who register the following year will be affiliated with the other unit. The parent unit will handle any administrative requests that the student may have. Therefore, all academic, administrative, and disciplinary matters will be addressed by the head of that unit. Students may register for any courses offered by either of the units, regardless of their administrative affiliation with a parent unit.

3. Students who complete their studies in the computer engineering track can pursue graduate studies in either of the parent units without having to complete any additional courses, provided this is congruent with the Technion's Graduate School regulations.

4. Student advisors: The parent unit appoints special advisors for students in the computer engineering track. Students admitted to the track are referred to their respective advisors.

Students in this track will have the option of receiving secondary-specialization certification in quantum computing.

Curriculum

Students are required accumulate 158.5 credits as follows:

Compulsory courses	112.5–114.5 credits
Core courses	6.0 credits
Elective faculty courses	26.0–28.0 credits
Elective Technion courses	12.0 credits

Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses by semesters:

Semester 1		Le	E	La	P	C
00440102	Safety in electrical engineering laboratories*	4	-	-	-	-
01040012	Differential and integral calculus 1T.	4	3	-	-	5.5
01040064 Or 01040016	Algebra 1M1 Algebra 1M	4	2	-	-	5.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
01140071	Physics 1M	3	1	-	-	3.5
02340114	Introduction to computer science M	2	2	2	-	4.0
		19	10	2	-	21.0

* Once during the semester, according to instructions to be published separately.

Semester 2		Le	E	La	P	C
01040013	Differential and integral calculus 2T (1)	4	3	-	-	5.5
02340125	Numerical algorithms	2	2	-	-	3.0
01040136	Ordinary differential equations M	3	2	-	-	4.0
01140075	Physics 2MM	4	2	-	-	5.0
00440252	Digital systems and computer structure	4	2	-	-	5.0
		17	11	-	-	22.5
	Physical education (choose from the list)*	-	2	-	-	1.0
		17	13			23.5

*Compulsory course taken as part of the 12 general Technion elective credits.

Semester 3		Le	E	La	P	C
02340124	Introduction to systems programming	2	2	-	-	4.0
02340141	Combinatorics for computer science	2	1	-	-	3.0
00440105	Theory of electronic circuits	3	2	-	-	4.0
01040220	Partial differential equations T	2	1	-	-	2.5
01040215	Complex functions A	2	1	-	-	2.5
01040214	Fourier series & integral transforms	2	1	-	-	2.5
		13	8	-	-	18.5
03240033	Technical English – Advanced B	4	-	-	-	3.0
		17	8	-	-	21.5

Semester 4		Le	E	La	P	C
00440131	Signals and systems	4	2	-	-	5.0
01040034	Introduction to probability H	3	1	-	-	3.5
00440127	Basics of semiconductor devices	3	1	-	-	3.5
02340218	Data structures 1	2	1	1	-	3.0
02340118	Computer organization and programming	2	1	1	-	3.0
01140073	Introduction to quantum physics for engineering	3	1	-	-	3.5
		-	7	-	-	21.5
	Physical education (choose from the list)*	-	2	-	-	1.0
		17	9	2	-	22.5

*Compulsory course taken as part of the 12 general Technion elective credits.

Semester 5		Le	E	La	P	C
00440137	Electronic circuits	4	2	-	-	5.0
00440157	Electrical engineering laboratory1A	-	-	3	3	2.0
02340123	Operating systems	2	2	3	6	4.5

	Or*					
00460209	Structure of operating systems	2	2	-	-	3.5
	And					
00460210	Laboratory in operating systems	-	-	4	-	1.0
01040134	Modern algebra H	2	1	-	-	2.5
02340247	Algorithms 1	2	1	-	-	3.0
00460267	Computer architecture**	2	1	-	-	3.0
	Or					
02360267	Computer architecture	2	1	-	1	3.0
		12	7	6/7	3/10	20.0

* Students can choose either Operating Systems (02340123) or Structure of Operating Systems 00460209 + Laboratory in Operating Systems 00460210.
** Students can choose one of these two courses.

Semester 6		Le	E	La	P	C
00440167	Project A	2	-	4	-	4.0
	Or					
	A computer science project*					3.0/4.0
						3.0/4.0

Semester 7		Le	E	La	P	C
00440169	Project B	-	-	4	-	4.0
	Or					
	A computer science project*					3.0/4.0
						3.0/4.0

* All project courses at the Faculty of Computer Science (aside from those defined in the syllabus as “not recognized for fulfilling the project requirements for a degree”).

Core Courses

Students are required to choose two courses from the following list:

		Credits
00440198	Introduction to digital signal processing	3.0
00440202	Random signals	3.0
02360334	Introduction to computer networks	3.0
	Or	
00440334	Computer networks and internet 1	3.0
02340292	Logic for computer science	3.0
02360343	Theory of computation	3.0

One course will not be considered both a core course and a specialization course for accumulating the required number of credits.

Elective Courses

Specialization groups:

The recommended elective courses have been divided into 12 specialization groups. Each student is required to complete at least two different groups. Completing a group means taking the courses that are compulsory for the group and a minimum of three additional courses from the list. Two groups will be considered different if they include at least six different courses. The other elective courses can be chosen from all the full list of courses offered by the Faculty of Electrical and Computer Engineering and the Faculty of Computer Science.

1. Computer networks, distributed systems, and computer structures

00440334	Computer networks and internet 1*
	Or
02360334	Introduction to computer networks*
00460005	Computer networks and internet 2*
	Or
02360341	Internet networking
02360755	Distributed algorithms
00460237	Integrated circuits-introduction to VLSI

02360351	Distributed systems
00460272	Distributed systems principles
02360322	Information storage systems
02360370	Concurrent and distributed programming for data processing and machine learning
02360376	Operating systems engineering
02360490	Computer security
02360491	Secure programming
02360496	Reverse engineering
02360350	Network security
00460853	Advanced Computer Architecture
00460268	Constructive Computer Architecture
	Or
02360268	Constructive computer architecture
00460275	Dynamic binary translation optimization
00460278/ 02360278	Computational accelerators and accelerated systems
00460265	Architectures and circuits with memristors
00460279	High performance parallel programming
00460280	Principles and tools for computer security
00460881	Hardware formal verification
00460864	High-speed communication channels

00440334/02360334 is compulsory.
* Students who take 00440334 can only take 00460005; students who take 02360334 can only take 02360341.

2. Communication theory

00440334	Computer networks and internet 1*
	Or
02360334	Introduction to computer networks*
00460005	Computer networks and internet 2*
	Or
02360341	Internet networking*
00440148	Waves and distributed systems
00440198	Introduction to digital signal processing
00440202	Random signals
00460201	Introduction to random signal processing
00460204	Analog communication
00460205	Introduction to coding design
00460206	Introduction to digital communication
00460208	Modern communication techniques
00460733	Information theory
00460734	Quantum information theory
00460743	Spatial Signal Processing
00460868	Foundations of Stochastic Processes
02360309	Introduction to cypher theory
02360525	Introduction to network coding, bounds and construction
02360520	Coding for storage systems

00440202 and either 00460206 or 00460204 are compulsory.
* Students who take 00440334 can only take 00460005; students who take 02360334 can only take 02360341

3. Algorithms, cyphers, cryptography, and complexity

00460205	Introduction to cypher theory in communication
02340129	Introduction to set theory and automata for CS
02360309	Introduction to cypher theory
02360313	Complexity theory
02360343	Theory of computation
02360359	Algorithms 2

02360374	Probabilistic methods and algorithms
02360500	Cryptanalysis
02360506	Modern cryptology
02360525	Introduction to network coding, bounds and construction
02360520	Coding for storage systems
02360522	Algorithms in computational biology
02360719	Computational geometry
02360760	Digital image processing
02360990	Introduction to quantum information processing

02360343 is compulsory.

4. Signal and image processing

00440198	Introduction to digital signal processing
00440202	Random signals
00460200	Image processing and analysis
	Or
02360860	Digital image processing
00460010	Statistical inference
00460345	Computer graphics
	Or
02360216	Computer graphics 1
00460197	Computational methods in optimization
	Or
01040193	Optimization theory
	Or
02360330	Introduction to optimization
00460201	Introduction to random signal processes
00460332	Visual and auditory systems
00460745	Digital signal processing
00460746	Applications and algorithms in computer vision
	Or
02360873	Computer vision

02360373	Image synthesis
02360861	Geometric computer vision
00460733	Information theory
00460747	Deep learning: Speech signals
00460831	Introduction to medical imaging
00460195	Machine learning
	Or
02360766	Introduction to machine learning
02360329	Digital geometry processing
02360862	Sparse and redundant representations and applications

00440198 and either 00440202, 00460200, or 02360860 are compulsory.

5. Intelligent systems

00460345	Computer graphics
	Or
02360216	Computer graphics 1
02360501	Introduction to artificial intelligence
02360927	Introduction to robotics
	Or
00460212	Introduction to robotics H
00460010	Statistical inference
00460213	Mobile robots
02340292	Logic for computer science
02360372	Bayesian networks
02360373	Image synthesis
02360716	Geometric models in CAD systems
02360766	Introduction to machine learning
	Or
00460195	Machine learning
02360760	Computational learning theory
02360781	Deep learning on computation accelerators
	Or

00460211	Deep learning
00460203	Planning and reinforcement learning
00460215	Deep learning and groups
02360329	Digital geometry processing
02360861	Geometric computer vision
02360873	Computer vision
	Or
00460746	Applications and algorithms in computer vision
00460747	Deep learning fot speech signals
00460853	Advanced Computer Architecture
00460200	Image processing and analysis
	Or
02360860	Digital image processing
02360862	Sparse and redundant representations and applications
02360767	Algorithmic robot motion planning

00460345 / 02360216 or 02360501 or 02360927 / 00460212 are compulsory.

6. Integrated electronic circuits

00460045	Design of switched-mode power converters
00440139	DC-dc converters
00440231	Electronic devices 1 (MOS)
00460237	Integrated circuits-introduction to VLSI
00460903	RF CMOS integrated circuits
00460265	Architecture and circuits with memristors
00460129	Solid state physics EE
00440140	Electromagnetic fields
00440148	Waves and distributed systems
00460187	Analog circuit design
00460189	Design of active filters
00460773	Electro-optic semiconductor devices - detectors
00460851	Semiconductor lasers
00460864	High-speed communication channels

00460880	Logical design of VLSI systems
00460881	Hardware formal verification

00440231 and 00460237 are compulsory.

7. Software systems and advanced programming

02360319	Programming languages
02360322	Information storage systems
02360321	Software engineering methods
02360490	Computer security
02360491	Secure programming
02360496	Reverse engineering
02360350	Network security
00460266	Formal languages and compilation
	Or
02360360	Theory of compilation
02360363	Databases
02360370	Concurrent and distributed programming for data processing and machine learning
02360376	Operating systems engineering
02360703	Object-oriented programming
	Or
00460271	Object-oriented Programming and Design
02360351	Distributed systems
02360501	Introduction to artificial intelligence
02360700	Software design
02360780	Algorithms for dynamic memory management
02360781	Deep learning on computation accelerators
00460272	Distributed systems principles
00460275	Dynamic binary translation optimization
00460277	Correctness guarantees for software
00460278	Computational accelerators and accelerated systems
	Or

02360278	Computational accelerators and accelerated systems
00460279	High performance parallel programming
00460280	Principles and tools for computer security

8. Control and robotics

00440139	DC-dc converters
00440191	Control systems 1
00460192	Control systems 2
00460203	Planning and reinforcement learning
00440198	Introduction to digital signal processing
00440202	Random signals
00460042	Introduction to power systems smart grids
00460189	Design of active filters
00460196	Nonlinear control systems
00460197	Computational methods in optimization
	Or
02360330	Introduction to optimization
	Or
01040193	Optimization theory
02360766	Introduction to machine learning
	Or
00460195	Machine learning
02360767	Algorithmic robot motion planning
02360927	Introduction to robotics
	Or
00460212	Introduction to robotics
00460213	Mobile robots

00440191 is compulsory.

9. Programming languages, formal and natural languages

02340129	Introduction to set theory and automata for CS
02340292	Logic for computer science

02360319	Programming languages
02360299	Introduction to natural language processing
02360342	Introduction to software verification
02360345	Automatic verification of hardware and software systems
00460277	Correctness guarantees for software
00460266	Formal languages and compilation
	Or
02360360	Theory of compilation
02360780	Algorithms for dynamic memory management

02340129 is compulsory.

10. Quantum technologies

Please note: Introduction to quantum physics for engineering (01140073) is a prerequisite for the group so we recommend taking it as early as possible.

00460243	Quantum technologies
01260604	Laboratory in Quantum Technologies A
	Or
01260605	Laboratory in Quantum Technologies B
02360990	Introduction to quantum information processing
	Or
01160031	Introduction to quantum information and computation
00460052	Quantum optoelectronics
00460054	Modern quantum computing
00460232	Topics in nano electronics
00460240	Superconducting quantum devices
00460241	Quantum mechanics
00460734	Quantum information theory
01160037	Noisy quantum computing

Course number 00460243 and either 02360990 or 01160031, 00460734 are compulsory.

Three courses are required to complete this group.

11. Energy and power systems

00460042	Introduction to power systems and smart grids
00440139	Dc-dc converters
00340034	Electric actuators
00440191	Control systems 1
00440198	Introduction to digital signal processing
00460044	Renewable energy systems
00460045	Design of power electronics circuits
00460197	Computational methods in optimization
00340035	Thermodynamics 1

Students can choose one of two alternative courses – Optimization theory (01040193) or Introduction to optimization (02360330).

The compulsory courses are 00460042 and either 00440139 or 00340034.

Three courses are required to complete this group.

12. Principles in physics for computer engineering

00440124	Physical electronics
00460225	Physical principles of semi-conductors
00440231	Electronic devices 1 (MOS)
00460237	Integrated circuits – Introduction to VLS1
00460052	Quantum optoelectronics
00460129	Solid state physics Ee
00460241	Quantum mechanics
00440239	Microelectronics processing
00460012	Introduction to flexible organic electronics
00460230	Advanced electron devices
00460235	Integrated power management devices
00460239	Laboratory course in nano-electronics
00460242	Statistical physics for electrical engineering
00460243	Quantum technologies
00460265	Advanced memristor-integrated circuits and architectures
00460773	Electro-optical semi-conductor devices detectors

00460968	Micro-machining and micro electromechanical systems

Physical electronics (00440124) is a compulsory course.

The B.Sc. Program in Computer Science and Mathematics

(In collaboration with the Faculty of Mathematics)

The Faculty of Computer Science and the Faculty of Mathematics offer a combined program for students with particularly high admission scores.

Graduates receive a B.Sc. in Computer Science and Mathematics.

Admission

1. The program is intended for outstanding students, or those who at least meet the admission requirements of each of the faculties.
2. Students can choose to belong to either of the faculties. The faculty they choose will be considered their “parent unit.”
3. Both faculties will define the same criteria for allowing students to transfer to this program based on their academic achievements.
4. All students in this program whose academic status is in order may switch to any other program offered by either of the two faculties.

Students must accumulate 152.0 credits as follows:

Compulsory courses	107.5–109.5 credits
Elective faculty courses	32.5–34.5 credits
Elective Technion courses	10.0 credits

Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses by semesters:

Semester 1		Le	E	La	P	C
01040195	Infinitesimal calculus 1	4	3	-	-	5.5
01040066	Algebra A	4	3	-	-	5.5
02340114	Introduction to computer science M	2	2	2	-	4.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
03240033	Technical English-Advanced B	4	-	-	-	3.0
		16	10	2	-	21.0
	Physical education (choose from the list)	-	2	-	-	1.0
			12			22.0

Semester 2		Le	E	La	P	C
01040281	Infinitesimal calculus 2	4	2	-	-	5.0
01040168	Algebra B	4	2	-	-	5.0
02340124	Introduction to systems programming	2	2	-	2	4.0
02340141	Combinatorics for computer science	2	1	-	1	3.0
01140071	Physics 1M	3	1	-	-	3.5
		15	8	-	3	20.5
	Physical education (choose from the list)	-	2	-	-	1.0
			10			21.5

Semester 3		Le	E	La	P	C
01040295	Infinitesimal calculus 3	4	2	-	-	5.0
01040293	Set theory	2	1	-	-	2.5
01040222	Probability Theory	3	1	-	-	3.5
02340218	Data structures 1	2	1	1	-	3.0
00440252/ 02340252	Digital systems and computer structure	4	2	-	-	5.0
		15	7	1	-	19.0

Semester 4		Le	E	La	P	C
01040142	Introduction to metrics and topological space	3	1	-	-	3.5
01040285	Ordinary differential equations A	3	1	-	-	3.5
01040158	Introduction to theory of groups	3	1	-	-	3.5
02340118	Computer organization and programming	2	1	1	-	3.0
02340247	Algorithms 1	2	1	-	-	3.0
		13	5	1	-	16.5

Semester 5		Le	E	La	P	C
01040122	Complex function theory 1	3	1	-	-	3.5
01040279	Introduction to rings and fields	2	1	-	-	2.5
01040294	Introduction to numerical analysis*	4	2	-	-	5.0
Or						
02340125	Numerical algorithms	2	2	-	-	3.0
02360343	Theory of computation	2	1	-	1	3.0
	A scientific course**					5.0
						17/ 19

* Students starting in the spring will take the course "Introduction to numerical analysis" in the 6th semester.
** Students are required to choose one or two scientific courses to complete one of the following chains. Any credits beyond the required 5 credits will be considered elective faculty credits.

1. The physics chain

		Credits
01140075	Physics 2MM	5.0
	Or the two following courses	
01140052	Physics 2	3.5
01140054	Physics 3	3.5

2. The biology chain

		Credits
01340058	Biology 1	3.0
01340020	General genetics*	3.5

* 01340020 opens for enrollment only once a year for all Technion students.

3. The chemistry chain

		Credits
01240120	Principles of chemistry	5.0
01250801	Organic chemistry	5.0
Or		
01240510	Physical chemistry	4.0

Semester 6		Le	E	La	P	C
01040192	Introduction to applied mathematics	3	-	-	-	3.0
01060156	Mathematical logic*	3	-	-	-	3.0
02340123	Operating systems	2	2	3	6	4.5
02360360	Theory of compilation	2	1	-	-	3.0
		10	3	3	6	13.5

* Students starting in the spring will take the course "Mathematical logic" in the 5th semester.

Semester 7

Elective courses

Elective Courses

Students can choose from the list of compulsory and elective courses offered by the Faculty of Mathematics or the Faculty of Computer Science that are not compulsory courses in this program and do not overlap with any compulsory courses. Elective courses must include at least one seminar from the Faculty of Mathematics and one project from the Faculty of Computer Science. In any event, students must accumulate at least 14 credits from each faculty.

The B.Sc. Program in Computer Science and Physics

(In collaboration with the Faculty of Physics)

The Faculty of Computer Science and the Faculty of Physics offer a combined program for students with particularly high admission scores.

Graduates receive a B.Sc. in Computer Science and Physics.

Admission

1. The program is intended for a limited number of outstanding students, or those who at least meet the admission requirements of each of the faculties.
2. Students will only be admitted for the winter semester.
3. Students can choose to belong to either of the faculties. The faculty they choose will be considered their “parent unit.”
4. Both faculties will define the same criteria for allowing students to transfer to this program based on their academic achievements.
5. All students in this program whose academic status is in order may switch to any other program offered by either of the two faculties.

Students must accumulate 163.5 credits as follows:

Compulsory courses	127.5 credits
Elective faculty courses	26.0 credits
Elective Technion courses	10.0 credits

Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses by semesters:

Semester 1		Le	E	La	P	C
00440102	Safety in electrical engineering laboratories *	4*	-	-	-	-
01040031	Infinitesimal calculus 1M	4	3	-	-	5.5
01040166	Algebra AM	4	3	-	-	5.5
02340114	Introduction to computer science M	2	2	2	-	4.0
02340129	Introduction to set theory and automata for CS	2	2	-	-	3.0
03240033	Technical English – Advanced B	4	-	-	-	3.0
		16	10	2	-	21.0
	Physical education (choose from the list).	-	2	-	-	1.0
			12			22.0

* Once during the semester, according to instructions that will be published separately.

Semester 2		Le	E	La	P	C
00440252/ 02340252	Digital systems and computer structure	4	2	-	-	5.0
01040032	Infinitesimal calculus 2M	4	2	-	-	5.0
02340124	Introduction to systems programming	2	2	-	2	4.0
02340141	Combinatorics for computer science	2	1	-	1	3.0
		12	7	-	3	17.0
	Physical education (choose from the list).	-	2	-	-	1.0
			9			18.0

Semester 3		Le	E	La	P	C
00940412	Probability M	3	2	-	-	4.0
01040134	Modern algebra H	2	1	-	-	2.5
01040033	Vector analysis	2	1			2.5
01140020	Physics lab 1M	-	-	3	-	1.5
01140074	Physics 1P	4	2	-	-	5.0
02340218	Data structures 1	2	1	1	-	3.0
02340292	Logic for computer science	2	1	-	-	3.0
		15	8	4	-	21.5

Semester 4		Le	E	La	P	C
01040285	Ordinary differential equations A *	3	1	-	-	3.5
01140021	Physics lab 2M	-	-	3	-	1.5
01140076	Physics 2P	4	2	-	-	5.0
02340118	Computer organization and programming	2	1	1	-	3.0
02340123	Operating systems	2	2	3	6	4.5
02340247	Algorithms 1	2	1	-	-	3.0
		13	7	7	6	20.5

* Students can replace this course with Ordinary Differential Equations/T (01040135) for 2.5 credits and add another credit from an elective course at one of the faculties.

Semester 5		Le	E	La	P	C
01040214	Fourier Series and Integral Transforms	2	1	-	-	2.5
01040220	Partial Differential Equations/T	2	1	-	-	2.5
01040215	Complex functions A	2	1	-	-	2.5
01140101	Analytical mechanics	3	2	-	-	4.0
01140086	Waves	3	1	-	-	3.5
			6		-	15.0

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Semester 6		Le	E	La	P	C
01140035	Physics Laboratory 3	-	-	3	-	1.5
01150203	Quantum physics 1	4	2	-	-	5.0

01140246	Electromagnetism and electrodynamics	4	2	-	-	5.0
01140036	Statistical and thermal physics	4	2	-	-	5.0
		12	6	3	-	16.5

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Semester 7		Le	E	La	P	C
02340125	Numerical algorithms	2	2	-	-	3.0
01150204	Quantum physics 2	4	2	-	-	5.0
02360343	Theory of computation	2	1	-	1	3.0
01240108	Introduction to chemistry for physicists	3	1	-	-	3.5
		11	6	-	1	14.5

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Semester 8		Le	E	La	P	C
01140037	Physics lab 4MH	-	-	3	-	1.5
Elective courses						

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Elective Courses

Students must choose at least 10 credits from the physics faculty and 10 credits from the computer science faculty. The 10 computer science credits must include at least one project. The 10 physics credits must include at least 9 credits from the CS-P1 list below.

Students who take course 01040135 for 2.5 credits instead of 01040285 for 3.5 credits must complete an additional credit (for a total of 27 elective credits).

Computer Architecture (02360267) is compulsory for students planning to pursue master's studies in computer science.

Courses 02360990, 01160031, and 02360823 on quantum information will be considered elective physics or mathematics courses, according to the student's choice.

The remaining elective courses (6 credits) can be selected from the list of elective computer science and physics courses.

With the approval of the advisor, 6 elective credits can be selected from List B for computer science, or in special cases, can be courses that do not appear on the regular lists.

The CS-P1 list

Credits

01140210	Optics (Semester B)	3.5
01160029	Introduction to biophysics (Semester A)	3.5
01160027	Physics of Fluids	3.5
01160031	Introduction to quantum computation and information (Semester B)	3.5
Or		
02360990	Introduction to quantum information processing	3.0
01160354	Astrophysics and cosmology (Semester A)	3.5
01160004	Physics of nuclear and elementary particles (Semester B)	3.5
01140250	Physics lab 5T	3.0
Or		
01140252	Project T (in the Faculty of Physics)	3.0
01160217	Solid state physics (Semester A)	3.5

Double Degree in Medicine and Computer Science

The Faculty of Medicine and the Faculty of Computer Science offer a double degree program intended for outstanding students with particularly high admission scores. The track's goal is to provide its graduates with extensive knowledge of both computer science and medicine, so that they will be able to join and become leaders in each of the fields, and work in research, development, and industry fields that require in-depth knowledge of both.

The program is intended for students who are accepted for medical school and wish to add a degree in computer science.

Graduates of this unique program are awarded the degrees of B.Sc. in Computer Science and B.Sc. in Medical Sciences. Graduates can earn an M.D. degree after completing all the requirements of the double degree program as well as three years of clinical training and one year of internship (see the Faculty of Medicine's academic regulations regarding clinical training).

About the Program

During the first two years, students complete the basic courses and other computer science courses. In the 5th and 6th semesters, courses from the Faculty of Medicine will be incorporated in the curriculum in addition to computer science courses. In the last semesters (7 – 10), students will complete medical courses only.

Students are required to take scientific courses Physics R 2 (01140249) and General and Physical Chemistry for Med (01240507) in the 4th and 5th semesters, respectively. Students are not given a choice regarding the scientific courses, as these courses are a compulsory part of the medical curriculum.

During this a five-year program, students complete the entire curriculum in computer science and medical sciences.

Students will complete their requirements for each of the degrees based on the regulations of the relevant faculty.

Students may transition to the clinical division only after meeting all the requirements of the double degree, and in accordance with the regulations of the Faculty of Medicine.

All the allowances in this program apply to students who complete both degrees. To complete only one degree, students must fulfill all the requirements of that degree.

Curriculum

To complete a degree in computer science and para-clinical medical studies, students must accumulate 223.5 credits as follows:

Compulsory courses	210.0 credits
Elective engineering courses (*)	8.5 credits
Elective medical courses	-
Advanced technical English B**	3.0 credits
Elective Technion courses: Physical education	2.0 credits

* Elective engineering courses 02360201, 02360501, and 02360523 are an inherent part of the program
** When required, this course must be completed by the 4th semester.
The 1st, 2nd, and 3rd semesters include only computer science courses, just as in the general four-year track.
Le – lecture; E – exercise; La – lab; P – project; C – credits

Compulsory Courses

Recommended courses by semesters:

Semester 4		Le	E	La	P	C
	Computer science courses only					
	An additional math course*					2.5/5.0
01140249	Physics 2 R**	3	1	-	-	3.5
02340118	Computer organization and programming	2	1	1	-	3.0
02340123	Operating systems	2	2	3	6	4.5
02340247	Algorithms 1	2	1	-	-	3.0
02360201	Introduction to data processing and representation	2	1	-	1	3.0
						19.5/22

* One of the courses specified for the 4th semester in the general four-year track.

** Science course is not optional

Semester 5		Le	E	La	P	C
	Computer science					
01240507	General and physical chemistry for Med*	4	2	-	-	5.0
02360501	Introduction to artificial intelligence	2	1	-	-	3.0
02360523	Introduction to bioinformatics	2	1	-	-	2.5
	Medicine					
02740167	Cell Biology	3	1	-	-	3.5
02740142	Clinical Tuesday – Being a Doctor (1) **	-	-	6	-	2.0
02740257	Anatomy A	5	-	3	-	6.0
						22.0

* Scientific course - compulsory
** Clinical Tuesday (1) will be given as a concentrated course during the summer if it cannot be included in the schedule.

Semester 6		Le	E	La	P	C
	Computer science					
02360343	Theory of computation	2	1	-	1	3.0
02360360	Theory of compilation	2	1	-	-	3.0
02360503	Project in CS advanced programming 1 *	-	-	-	7	3.0
	Medicine:					
01250803	Organic Chemistry for Med	2	2	-	-	3.0
02740143	Clinical Tuesday - Being a Doctor (2) **	-	-	6	-	2.0
02740165	General Genetics ***	3	1	-	-	3.5
02740266	Anatomy B	5	-	3	-	6.0
02740320	Medical ethics and law	2	-	-	-	2.0
						25.5

* With the approval of the head of the track, students can also take a different project from those offered by the Faculty of Computer Science.

** Clinical Tuesday (2) will be given as a concentrated course during the summer if it cannot be incorporated in the schedule.
*** Compulsory scientific course
Semesters 7–10 comprise medical courses only, as specified for this track in the Faculty of Medicine's catalogue.

Secondary Specialization in Quantum Computation

Quantum computers and quantum information (including quantum communication and cyphers) is rapidly evolving in Israel and around the globe. The Faculty of Computer Science, in coordination with the Technion's Helen Diller Quantum Center, offers a scientific enrichment program that focuses on this field. The program provides students with a multidisciplinary perspective of this evolving subject.
The program is open to undergraduate students at the faculty. Students can be admitted to the track after completing at least 30 credits with a GPA of at least 85, or a GPA of 80–85 with the approval of an advisor.
Students who complete this specialization are awarded a certificate. The certificate will be signed by the dean of the faculty and the head of the Quantum Center.
The certificate will be awarded after the student has completed all the requirements for one of the tracks offered by the faculty as well as the requirements for this secondary specialization track. The undergraduate secretariat at the faculty will be responsible for monitoring the student's progress and ensuring that all the requirements are met.
To complete this track, students are required to choose one of the following two options:

Option 1: Five courses, one from each group.

Must meet the requirements for Groups A, B, and C1.

Must meet the requirements for two of the three groups D, E, and F.

Option 2: The student must meet the requirements for each of the six groups A, B, C2, D, E, F.

There may be an overlap between courses in the specialization program and compulsory and elective courses that students take as part of their regular studies. Students in three-year tracks are required to complete at least 2.5 credits beyond the required number of credits required for their degree. Students in four-year tracks shall not be required to complete extra credits.

The groups are as follows:

a) The following course in computation

		Credits
02360343	Theory of computation	3.0

b) One of the following two introductory courses

		Credits
02360990	Introduction to quantum information processing	3.0
	Or	
01160031	Theory of computation	3.5

c)

1. One of the following quantum courses

		Credits
01240400	Quantum chemistry 1 *	5.0
	Or	
01150203	Quantum physics 1 (for CS and physics students)	5.0
	Or	
00460241	Quantum mechanics (for computer engineering students)	5.0

*Note the four prerequisites for Quantum Chemistry 1: Physics 2 (01140052) and Principles of Chemistry (01240120), which appear on the list of scientific courses in the physics-chemistry chain.

Ordinary Differential Equations H (01040131) is included in Ordinary Differential Equations T (01040135), and Differential and Integral Calculus 2 (01040004) is included in Infinitesimal Calculus 2M (01040032) along with Vector Analysis (01040033).

Courses 01040135 and 01040033 appear in the list of additional math courses.

The list of scientific courses and additional math courses can be found in the general four-year track section.

2. Choose one of the three options below as pre-quantum courses:

		Credits
Option 1		
01140073	Introduction to quantum physics for engineers	3.5
Option 2	**The following three courses:**	
01140054	Physics 3	5.0
01040004	Differential and Integral Calculus 2	5.0
01040131	Ordinary Differential Equations H	2.5
Option 3	**The following three courses:**	
01140054	Physics 3	5.0
01040033	Vectorial analysis	2.5
01040131	Ordinary Differential Equations H	2.5

d) Advanced course in quantum information: One of the following:

		Credits
02360640	Advanced topics in quantum information L	2.0
02360641	Advanced topics in quantum information L+T	3.0
02360823	Quantum information processing lab	2.0
01160040	Advanced quantum information	2.0
00460734	Quantum information theory	3.0

e) Course in quantum technology: One of the following courses:

		Credits
00460243	Quantum technologies	3.0
01160083	Quantum technologies	2.0
02360991	Project in quantum computing	3.0
01160037	Noisy quantum computing	2.0
01260604	Laboratory in quantum technologies A	2.0
01260605	Laboratory in quantum technologies B	4.0

f) Core courses: One of the following:

		Credits
02360313	Complexity theory	3.0
02360309	Introduction to coding theory	3.0
02360518	Communication complexity	2.0
02360359	Algorithms 2	3.0
02360521	Approximation algorithms	2.0
02360330	Introduction to optimization	3.0
00460197	Computational methods in optimization	3.0
02340292	Logic for CS *	3.0
02360201	Introduction to data processing and representation	3.0
02360350	Network security	3.0
02360334	Introduction to computer networks	3.0
00440334	Computer networks and internet 1	3.0
02360370	Concurrent and distributed programming for data processing and machine learning	3.0
02360501	Introduction to artificial intelligence	3.0
02360766	Introduction to machine learning	3.5

*Logic for CS – for computer engineering students only.

The Lapidim Program

Lapidim programs are excellence programs offered by the Faculty of Computer Science at the Technion for outstanding undergraduate students.

The Lapidim - Entrepreneurship Excellence Program

This excellence program is intended for outstanding students with exceptional leadership and management capabilities, to prepare them for taking on key roles in the industry.

Participants must complete all the academic requirements of one of the tracks offered by the faculty (including joint programs) and accumulate at least 12 credits from managerial and entrepreneurial courses. In addition, they participate in special activities that expose them to the worlds of academia, industry, and technology in meetings with senior executives, entrepreneurs, venture capitalists, incubators, and more.

Students can choose the additional 12 credits from the following list, or other courses with the approval of the program’s coordinator:

		Credits
00940222	Model-based Systems Engineering	3.5
00940423	Introduction to statistics	3.5
00940564	Introduction to financial management	2.5
00940591	Introductory economics	3.5
00940820	Introduction to accounting	2.0
00950605	Introduction to psychology	2.5
00960211	Electronic commerce models	3.5
00960570	Game Theory and Economic Behavior	3.5
00960617	Cognition and decision making	2.5
00960807	Social ventures	3.5
00970317	Corporate game theory	2.5
00970800	Principles of marketing	3.5
02140909	Computer science problems - soft skills	2.0
03240442	Israeli labor law	2.0
03240527	Innovation masterclass	2.0
03240528	Entrepreneurial Leadership	2.0
03240540	Legal aspects of Busine.entrepreneurship	2.0
03250005	Entrepreneurship by entrepreneurs	2.0
03250008	New venture creation and venture capital	2.0
03250009	Leaving your mark in science and art	2.0

Students in the Lapidim Excellence Program are exempt from tuition fees and receive a monthly living stipend (for ten months a year). Additionally, the students receive personal mentoring from a faculty member. Furthermore, a dedicated study area is available to students in the program.

Clarifications:

1. Spaces are limited and are mainly intended for new students with particularly high achievements during their first year. Admission to the program is based on a special screening process.
2. To stay in the program, students must achieve a GPA of at least 86 and accumulate 18 credits or more every semester.
3. Graduates are awarded a Lapidim graduate certificate by the faculty.
4. The scope of financial support will be determined once a year based on the resources available.
5. The required entrepreneurship and managerial courses can be considered elective courses for the degree (provided all the degree requirements are met in full).

For additional information, see the program's website:
http://lapidim.cs.technion.ac.il

The Lapidim – Research Excellence Program

The program trains outstanding students with potential to pursue an academic career as future researchers and university faculty members. Emphasis is placed on the important qualities needed to be successful faculty members, i.e., academic excellence, a passion for science and research, and the ability to drive a research team.

Program participants must meet all the requirements of their selected track (including joint programs) as well as the requirements listed below, and actively participate in the program's special activities.

- Completing Introduction to Departmental Research (02360001).
- Drafting a research proposal that is approved for master's studies during their undergraduate studies, under the supervision of a faculty member.
- Completing three advanced courses that are related to their research topic, in addition to the track requirements and with the approval of the academic director of the program.

Students in the Lapidim Excellence Program are exempt from tuition fees and receive a monthly living stipend (for ten months a year). Additionally, the students

receive personal mentoring from a faculty member. Furthermore, a dedicated study area is available to students in the program.

Clarifications:

1. Spaces are limited and are mainly intended for new students with particularly high achievements during their first year. Admission to the program is based on a special screening process.
2. To stay in the program, students must achieve a cumulative GPA of at least 88 and accumulate 18 credits or more every academic semester for as long as they remain in the program.
3. Graduates are awarded an Academic Leadership Graduate certificate by the faculty.
4. The scope of financial support will be determined once a year based on the resources available.

Miscellaneous

1. The requirement to complete compulsory courses can be met even when there are slight changes in the number of credits granted for certain compulsory courses in the catalogue, provided all the compulsory courses are completed and the total number of credits required for the degree as stipulated in the catalogue is met. Missing credits can be completed by taking elective faculty courses.
2. The requirement to complete two projects can be met by taking a project in one semester and continuing it into the following semester as part of Course 02360504. In such cases the project will be graded at the end of the first semester as well. However, the Project in Software course cannot be taken more than once.
3. Undergraduate students can only enroll in one seminar per semester.

Graduate Studies

The Faculty of Computer Science offers the following continuing education programs: M.Sc. in Computer Science, M.Sc. in Science, and Ph.D. degrees. Outstanding students can transfer to a direct Ph.D. track during their master's studies.

The faculty aims to train students to become outstanding scientists and engineers, provide them with vast knowledge and engineering capabilities, and help them develop managerial and technological skills so they will be able lead present and future science-based industries. To that end, the faculty selects the best candidates and maintains high academic standards, providing students with broad and in-depth knowledge to help them succeed in the rapidly developing field of computer science.

Specialization and Research Fields in the Faculty

Extensive teaching and research on a broad range of topics takes place at the faculty:

- Theory of algorithms (serial and distributed, deterministic and probabilistic)
- Cypher theory (source encryption, channel encryption, and error correction codes)
- Cryptography
- Quantum information processing
- Computational complexity theory
- Logic for computer science
- Data structures
- Databases
- Models and performance assessment of computer systems
- Machine learning
- Numerical algorithms
- Parallel and distributed programming
- Sorting and routing networks
- Geometric design
- Formal specification of complex systems
- Formal verification of software and hardware systems
- Programming languages
- Software engineering

- Simulation
- Computer communication networks
- Computational linguistics and natural language processing
- Artificial intelligence
- Neural networks
- Expert systems
- Computational geometry
- Computer graphics
- Digital image processing
- Computer vision
- Robotics
- Discrete event systems
- Bioinformatics

In addition to the theoretical research possibilities in these fields, the faculty has a wide range of research labs for diverse fields including robotics, computer vision, artificial intelligence, computational geometry, computer graphics, computer communication networks, software systems, computer systems, natural language processing, information and cyber security, machine learning, information and learning, information and memory storage, bioinformatics, and quantum information processing.

The faculty is located in a state-of-the-art building designed for the convenience of the faculty members and students. The building's resources include auditoriums and classrooms equipped with some of the most advanced multimedia systems, a large multi-purpose center that provides a novel learning environment, and a cutting-edge library that serves as a contemporary learning center.

Master's Studies

Admission to the M.Sc. in Computer Science Track

Students who have completed their undergraduate studies with honors at the Faculty of Computer Science, or in one of the tracks the faculty offers in collaboration with other faculties, can be admitted to this track. Candidates who have completed their undergraduate studies in other institutions may need to complete several courses. The professional achievements of candidates and their practical experience and recommendation letters will be taken into account during the screening process. In principle, this program is available to Technion students only, though outstanding external students will be considered in special cases.

Admission to the M.Sc. in Science Track

Students who have completed their undergraduate studies with honors in scientific or engineering programs will be admitted to this track. To apply, students must ask a faculty member to serve as their advisor. The curriculum for these tracks will be coordinated with the advisor and the committee coordinator and approved by the graduate studies committee.

Requirements

Master's students are required to complete several courses and complete a research thesis or final paper under the supervision of a faculty member.

Students who completed B.Sc studies in electrical engineering and physics in the Faculty of Electrical Engineering and Computers will require another 38 credits, of which 16 are dedicated to an academic-related specialization, based on a curriculum coordinated with the advisor. The additional credits shall comprise 2 credits in Advanced Graduate English and 20 credits for an M.Sc. thesis.

Graduates of a four-year B.Sc track must complete 40 credits, of which 18 credits are from their specialty field, according to a curriculum built in coordination with their advisor. In addition, they will require 2 credits in Advanced Graduate English, and 20 credits for an M.Sc. thesis.

Graduates of the general three-year undergraduate program are required to complete 52 credits in total. These must include 30 credits from courses, including at least six elective computer science courses that are not advanced topics; and a project or seminar from at least four of the 11 specialization groups in the general four-year study track, as specified in the Faculty of Computer Science catalog for

graduate studies. Students must complete any extra courses required before beginning the M.Sc. program. Six of the 30 cumulative credits required for the degree can be undergraduate-level credits. In addition, they will require 2 credits in Advanced Graduate English, and 20 credits for an M.Sc. thesis.
Computer Architecture (02360267) and Theory of Computation (02360343) are compulsory courses. Students who did not take them during their undergraduate studies must complete them as part of their continuing education program for a master's degree.
To find a thesis advisor, students need to contact a faculty member who specializes in their fields of interest. External graduate students cannot choose an adjunct professor as their advisor. The research can be theoretical or an advanced engineering project. In special cases, students will be permitted to submit a final paper instead of a thesis, and in such cases they will need to accumulate 8 additional credits.

Doctoral Studies

Admission

Outstanding students with a master's degree in a relevant field will be admitted to this program. Prior to their admission, students must secure an advisor who is a faculty member and define their research field. The PhD curriculum and the course completion program for students without a background in computer science will be determined on an individual basis by the advisor and the graduate studies committee. External students cannot choose an adjunct professor as their advisor. As a rule, students must be full-time internal students at the faculty for at least one year during their studies.

Study Requirements

Course requirements for doctoral students at the faculty are as follows:
1. Advanced computer science courses (or computer science courses that are part of both the undergraduate and graduate programs) - at least 12 credits.
2. Students in the direct Ph.D. track are required to complete 6 credits in addition to the credit requirements for a master's degree.

Additional Information Resources

- A detailed catalogue for graduate studies at the Faculty of Computer Science is available at the graduate studies office at the faculty or on the faculty's website.
- Information for candidates can be obtained from the graduate studies office at the faculty.

Please contact Ms. Anna Kleiner: tel. 073-3784226 email. akleiner@cs.technion.ac.il or Ms. Sharon Emuna: tel. 073-3784342 email. sharonem@cs.technion.ac.il

- Link to the Faculty of Computer Science website: https://graduate.cs.technion.ac.il/en/graduate-studies/