



Committee for the Evaluation of Computer Science Study Programs

Tel Aviv University
School of Computer Science
Evaluation Report

October 2013

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Chapter 1- Background

The Council for Higher Education (CHE) decided to evaluate study programs in the field of Computer Science during the academic year of 2012-2013.

Following the decision of the CHE, the Minister of Education, who serves ex officio as Chairperson of the CHE, appointed a Committee consisting of:

- Prof. Maurice Herlihy – Computer Science Department, Brown University, USA - Committee Chair
- Prof. Robert L. Constable - Computer Science Department , Cornell University, USA
- Prof. David Dobkin - Computer Science Department, Princeton University, USA¹
- Prof. Sarit Kraus - Department of Computer Science, Bar Ilan University, Israel²
- Prof. Dmitry Feichtner-Kozlov, Department of Mathematics, Bremen University, Germany
- Prof. Joe Turner, Jr. - (Emeritus) - Department of Computer Science, Clemson University, USA - ABET Representative
- Prof. Moshe Vardi - Department of Computer Science, Rice University, USA

Ms. Yael Herzstein served as the Coordinator of the Committee on behalf of the CHE.

Within the framework of its activity, the Committee was requested to:³

1. Examine the self-evaluation reports, submitted by the institutions that provide study programs in Computer Science, and to conduct on-site visits at those institutions.
2. Submit to the CHE an individual report on each of the evaluated academic units and study programs, including the Committee's findings and recommendations.

¹ Due to scheduling constraints, Prof. David Dobkin did not participate in the site visits to the Jerusalem College of Technology, Hadassah Academic College, and Ariel University.

² In accordance with the CHE's policy, Prof. Sarit Kraus did not participate in the evaluation of the Computer Science department at Bar Ilan University to prevent the appearance of a conflict of interests.

³ The Committee's letter of appointment is attached as **Appendix 1**.

3. Submit to the CHE a general report regarding the examined field of study within the Israeli system of higher education including recommendations for standards in the evaluated field of study.

The entire process was conducted in accordance with the CHE's Guidelines for Self-Evaluation of (October 2011).

Chapter 2-Committee Procedures

The Committee held its first meetings on May 21, 2013, during which it discussed fundamental issues concerning higher education in Israel, the quality assessment activity, as well as Computer Science Study programs in Israel.

In May - June 2013, the Committee held its visits of evaluation, and visited Ariel University, Bar Ilan University, the Hadassah Academic College, Jerusalem College of Technology and Tel Aviv University. During the visits, the Committee met with various stakeholders at the institutions, including management, faculty, staff, and students.

This report deals with the School of Computer Science at Tel Aviv University. The Committee's visit to the University took place on May 22-23, 2013.

The schedule of the visit is attached as **Appendix 2**.

The Committee thanks the management of Tel Aviv University and the School of Computer Science for their self-evaluation report and for their hospitality towards the committee during its visit at the institution.

Chapter 3: Evaluation of Computer Science Study Program at Tel Aviv University

This Report relates to the situation current at the time of the visit to the institution, and does not take account of any subsequent changes. The Report records the conclusions reached by the Evaluation Committee based on the documentation provided by the institution, information gained through interviews, discussion and observation as well as other information available to the Committee.

1. Executive Summary

Computer science is central to the Israeli economy and even to its security. Among winners of the Turing award (generally considered as the “Nobel Prize” for computer scientists), Israel has more recipients than all but one other country.

The TAU School of Computer Science ranks among the top computer science academic units in the world, and has one of the best academic programs in the university. Given its attractive location and the achievements of the faculty, the school has the potential to become as distinguished as the best computer science departments in Europe.

Nevertheless, the school strains to maintain its world-class reputation with a student to faculty ratio that is well above the CHE standard ratio of 25 students per faculty member. The strains are showing badly. We found a program in fragile condition - a program badly in need of, and greatly deserving of, significantly increased investment by the university. Because the excellence of this program is imperiled, and because leadership in this discipline is central to the excellence of Tel-Aviv University as a whole, the university must take decisive and immediate action to bring the student-faculty ratio into compliance with the CHE standard.

To bring the student-faculty ratio into compliance, the University must hire more computer science faculty in the long term, and reduce the student enrollment in the short term.

The space resources of the TAU School of Computer Science currently are grossly inadequate to its mission. The university must ensure that the school acquires space that is adequate to maintain its excellence in research and teaching. The committee is surprised that the university is planning a new building but without ensuring that there will be space for the whole school (faculty, labs, and students). Comprehensive space planning must be done now, not when the new building is complete. In particular, academic staff members, grad students, and post-docs in the same research group must be co-located.

The Faculty of Exact Sciences does not allocate resources such as scholarships, administrative and technical staff, and the like on a transparent basis. Based on information provided to the committee, the current distribution appears to be not fair and equitable. The Faculty of Exact Sciences must make the basis for resource allocation fully transparent, and allocate resources across schools in a fair and equitable manner.

2. Organizational Structure

Observations and findings

We understand the school has an industrial affiliates program. We encourage the school keep this program healthy, and to go further and set up an industrial advisory board with carefully chosen members. Such a board can advise the school on industry needs and advocate for the school.

Recommendation

Short term [~ within 1 year]:

- a. The school should set up an industrial advisory board.

3. Mission and Goals

Observation and findings

The school has made excellent recent hires in experimental areas, but long-term follow-on efforts will be needed. The school requires a realistic plan to build toward a strong group in experimental computer science, with the goal of having an experimental group with a strong international reputation. When interviewing experimental candidates, they should not compete head-on-head with theory candidates, because Israeli universities have a strong cultural bias in favor of theory.

Recommendation

Intermediate term [~ within 2-4 years]:

- a. The school must designate some number of positions for experimental computer scientists, and only candidates who work in such areas should be interviewed for these positions.

Long term [until the next cycle of evaluation]:

- a. The school must develop a realistic plan to build toward a strong group in experimental computer science. When interviewing experimental candidates, they should not compete head-on-head with theory candidates, because Israeli universities have a strong cultural bias in favor of theory.

4. Study Programs

The total number (according to the report, p. 37) of undergrad, MSc and PhD students and half the joint EE students, was 1,236 in 2011. There should be 49 faculty members according to the CHE guidelines, but there are currently (2013) only 39.5 FTE faculty members, which is far below the CHE standard. The actual situation is worse: because 6 faculty members are on leave, there are only 33.5 FTEs currently working in the school. This understaffing impairs the school's ability to compete for international research funding. This understaffing also has a deleterious effect on the teaching load and the ability to advise MSc students. Similar adjustments of student-faculty ratio have been accomplished in other institutions by a combination of resource enhancement and rebalancing enrollments across the university.

The teaching load would be more manageable if courses had more TA's.

A large number of MSc students either take a very long time to graduate, or never finish their degrees. This is a misallocation of resources, for the students, for the school, and for the university. Students who fail to complete MSc degrees do not become happy alumni. In particular, students do not have an option to switch to a non-thesis degree, nor is there an effective mechanism for terminating students who take too long to finish.

There does not seem to be a school -wide system for tracking progress of Ph.D. students after the proposal.

The study programs themselves are reasonable and comparable to the programs at other first-class computer science programs. It is unclear the extent to which the curriculum designers were aware of internationally-accepted models such as the ACM / IEEE-CS curricula.

The undergraduate seminar program is an exemplary idea well executed.

Recommendations

Due to the exceptionally challenging situation and recent deterioration of the School of Computer Science, it is urgently necessary to take drastic action in order to prevent a total collapse.

Short term [~ within 1 year]:

- a. Within a year, the school must develop and implement a plan for an alternative master's program that will provide a higher graduation rate and shorter time to degree.
- b. Within a year, the school budget must include adequate resources for TAs.
- c. Within a year, the school must develop and implement a mechanism for tracking progress of PhD students annually, especially post-proposal.
- d. Until enough faculty can be hired to bring the student-faculty ratio into compliance, within a year, the number of students admitted must be reduced to compensate.

Intermediate term [~ within 2-4 years]:

- e. The university must take decisive action to bring the student-faculty ratio into compliance with the 25 to 1 CHE standard. This action must start immediately and complete within 4 years.
- f. As a first step, the department must be allowed to hire up to 5 new faculty over the next four years, of which at least one should be in an experimental area. There must be adequate resources (including startup funding and office space) to assure hiring of excellent candidates.

5. Human Resources / Faculty

Observation and findings

The school has a problem with the significant number of faculty members on long-term leave, as it results in overloaded faculty members and less international research funding. These barriers prevent the school from developing and expanding the program to its utmost potential.

The school currently has no incentive to let these people go, unless there is a guarantee that it will be allowed to refill those positions.

Academic staff of this caliber should have more international distinctions such as ACM, IEEE, and AAAS Fellow, Academia Europea, and similar honors. Such distinctions play an increasingly important role in international academic rankings.

Recommendation

Short term [~ within 1 year]:

- a. Within a year, the school must institute an honors committee to promote nominations of faculty members for recognition such as ACM, IEEE, and AAAS Fellow and/or Academia Europea, or other international honors.

6. Students

Observation and findings

The PhD students appear to be happy.

Undergraduates are mostly positive on teaching quality but complain of overcrowding and bureaucracy.

The university does not allow faculty members to use grant money to pay higher stipends to students, which makes it harder to compete with industry.

Many master's students are forced to seek outside work (at attractive salaries) because the MSc stipends are so low in comparison to industrial salaries and the cost of living.

We are under the impression that some kind of international exchange program will be well received at the student level.

The school has made efforts to stay in contact with alumni. We encourage the school to maintain and expand this program.

Although students seem to be able to acquire funding to travel to conferences, the system seems Byzantine in its complexity.

Recommendations

Short term [~ within 1 year]:

- a. Within a year, the university must develop and implement a mechanism whereby researchers can use grant money to pay graduate students higher stipends or salaries.
- b. Within a year, the school must rationalize and simplify the procedures for funding student travel to conferences.

7. Teaching and Learning Outcomes

The teaching and learning outcomes stated are appropriate, but no systematic effort has been made to determine whether they have been achieved.

Recommendation

Short term [~ within 1 year]:

- a. Within a year, the department should set in place a process to reflect on the attainment of outcomes in a planned, periodic manner.

8. Research

Observation and findings

The TAU computer science school's research quality is outstanding.

Given the attractive location and the achievements of the faculty, the school has the potential to become even more distinguished, competing with any computer science department in Europe.

The school is in a position to secure substantially more European funding.

Recommendations

Intermediate term [~ within 2-4 years]:

- a. The school must make a systematic and persistent effort to compete for European funding.

- b. The university must ensure that there is sufficient infrastructure to support a push for European funding.

9. **Infrastructure**

Observation and findings

The allocation of space to the school is grossly inadequate. There are plans for a new building, but this building is not expected to become available for several years.

The committee is convinced that the new building as planned will not solve the school's space problem completely. More space will be needed.

According to the current plan, even after the new building is constructed, graduate students will be housed in a different building than the academic staff. Separating researchers, graduate students, and post-docs is completely unacceptable in computer science because it is essential for research teams to work closely together.

The current classrooms are "ill-equipped for modern teaching." We note that the 2006 evaluation report also noted that the classrooms are inadequate.

The Faculty of Exact Sciences does not allocate resources such as scholarships, administrative and technical staff, and the like on a transparent basis. Based on information provided to the committee, the current distribution appears to be not fair and equitable.

Recommendations

Short term [~ within 1 year]:

- a. Comprehensive space planning must be done now, not when the new building is complete. In particular, academic staff members, grad students, and post-docs in the same research group must be co-located.
- b. Starting immediately, the university should establish and execute a plan for providing adequate modern teaching space.
- c. The Faculty of Exact Sciences must make the basis for resource allocation fully transparent, and allocate resources across schools in a fair and equitable manner.

10. Self-Evaluation Process

Observation and findings

Most of the issues raised in the 2006 evaluation report have not been addressed, and indeed, are substantially the same as many of the issues reported here.

The process of writing the report did not seem to be a process of institutional self-improvement.

The evaluation committee, who took this process very seriously, was disappointed that the university did not take advantage of the 2006 evaluation report. The university and the school must take this report seriously and undertake to address all issues raised in the report.

Chapter 4: Summary of Recommendations and Timetable

Short term [~ within 1 year]:

1. The school should set up an industrial advisory board.
2. Within a year, the school must develop and implement a plan for an alternative master's program that will provide a higher graduation rate and shorter time to degree.
3. Within a year, the school budget must include adequate resources for TAs.
4. Within a year, the school must develop and implement a mechanism for tracking progress of PhD students annually, especially post-proposal.
5. Until enough faculty can be hired to bring the student-faculty ratio into compliance, within a year, the number of students admitted must be reduced to compensate.
6. Within a year, the school must institute an honors committee to promote nominations of faculty members for recognition such as ACM, IEEE, and AAAS Fellow and/or Academia Europea, or other international honors.
7. Within a year, the university must develop and implement a mechanism whereby researchers can use grant money to pay graduate students higher stipends or salaries.
8. Within a year, the school must rationalize and simplify the procedures for funding student travel to conferences.
9. Within a year, the department should set in place a process to reflect on the attainment of outcomes in a planned, periodic manner.
10. Comprehensive space planning must be done now, not when the new building is complete. In particular, academic staff members, grad students, and post-docs in the same research group must be co-located.
11. Starting immediately, the university should establish and execute a plan for providing adequate modern teaching space.

12. The Faculty of Exact Sciences must make the basis for resource allocation fully transparent, and allocate resources across schools in a fair and equitable manner.

Intermediate term [~ within 2-4 years]:

13. The school must designate some number of positions for experimental computer scientists, and only candidates who work in such areas should be interviewed for these positions.
14. The university must take decisive action to bring the student-faculty ratio into compliance with the 25 to 1 CHE standard. This action must start immediately and complete within 4 years.
15. As a first step, the department must be allowed to hire up to 5 new faculty over the next four years, of which at least one should be in an experimental area. There must be adequate resources (including startup funding and office space) to assure hiring of excellent candidates.
16. The school must make a systematic and persistent effort to compete for European funding.
17. The university must ensure that there is sufficient infrastructure to support a push for European funding.

Long term [until the next cycle of evaluation]:

18. The school must develop a realistic plan to build toward a strong group in experimental computer science. When interviewing experimental candidates, they should not compete head-on-head with theory candidates, because Israeli universities have a strong cultural bias in favor of theory.

Signed by:



Prof. Maurice Herlihy
Committee Chair



Robert L. Constable



Prof. David Dobkin



Prof. Dmitry Feichtner-Kozlov



Prof. Kraus Sarit



Prof. Joe Turner, Jr



Prof. Moshe Vardi

Appendix 1: Letter of Appointment



הוועדה לתכנון ותקצוב | Planning & Budgeting Committee

12.5.2013
Jerusalem

Professor Maurice Herlihy
Computer Science Department
Brown University
USA

Dear Professor Herlihy,

The Israeli Council for Higher Education (CHE) strives to ensure the continuing excellence and quality of Israeli higher education through a systematic evaluation process. By engaging upon this mission, the CHE seeks to enhance and ensure the quality of academic studies, provide the public with information regarding the quality of study programs in institutions of higher education throughout Israel, as well as ensure the continued integration of the Israeli system of higher education in the international academic arena.

As part of this most important endeavor we reach out to world-renowned scientists to help us meet the critical challenges confronting Israeli higher education by extending our invitation to participate in an international evaluation committee. This process represents an opportunity to assess the current state of the field and plan for the future. This systematic process of quality assessment also establishes a framework for the interactive consultative process taking place between scientists around the globe regarding common academic dilemmas.

It is with great pleasure that I hereby appoint you to serve as chair of the Council for Higher Education's Committee for the Evaluation of Computer Science. The composition of the Committee will be as follows: Professor Maurice Herlihy, Committee Chair, Professor Moshe Vardi, Professor (Emeritus) Joe Turner Jr., Professor Robert L. Constable, Professor Sarit Kraus, Professor David Dobkin, and Professor Dmitry Feichtner-Kozlov.

Ms. Yael Herzstein will coordinate the Committee's activities.

In your capacity as Chair of the Evaluation Committee, you will be requested to function in accordance with the enclosed appendix.

I deeply appreciate your willingness to join us in this crucial enterprise.

I wish you much success in your role as the Chair of this most important committee.

Sincerely,


Dr. Avital Stein
Director General,
The Council for Higher Education

Enclosures: Appendix to the Appointment Letter of Evaluation Committees

cc: Ms. Michal Neumann, The Quality Assessment Division
Ms. Yael Herzstein, Committee Coordinator

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Appendix 2: Site Visit Schedule

The Blavatnik School of Computer Science– Schedule of Site Visit
Wednesday, May 22, 2013

Time	Subject	Participants
08:45 – 09:30	Opening session with the heads of the institution and the senior staff member appointed to deal with quality assessment	Prof. Aron Shai, Rector Prof. Dina Prialnik, Vice Rector Prof. David Horn, Head, Academic Quality Assessment
09:30-10:00	Meeting with the academic and administrative heads of the Faculty of Exact Science	Prof. Yaron Oz Ms. Varda Bernstein
10:00-10:45	Meeting with the academic and administrative heads of the Department of Computer Sciences	Prof. Yossi Azar Prof. Tova Milo Ms. Pnina Neria-Barzilay
10:45-11:45	Meeting with senior academic staff (and representatives of relevant committees)*	Prof. Yehuda Afek Prof. Amiram Yehudai Prof. Ron Shamir (Appointments and Promotions Committee) Prof. Mooly Sagiv (Undergraduate Teaching Committee – year 1) Prof. Eran Halperin (Undergraduate Teaching Committee – year 2-3) Prof. Roded Sharan (Chairman, Graduate Teaching Committee) Prof. Uri Zwick (Chairman, PhD Teaching Committee) Prof. Lior Wolf
11:45-12:30	Meeting with Junior academic staff	Dr. Eran Tromer Dr. Noam Rinetzky
12:30-13:15	Lunch (in the same room)	Closed door meeting of the committee
13:15-13:45	Tour of facilities: classrooms, library, labs, offices *	Prof. Yossi Azar Ms. Pnina Neria-Barzilay
13:45-14:30	Meeting with Adjunct academic staff	Dr. Yaakov Stein Dr. David Movshowitch Prof. Shmuel Tyszberowicz Prof. Yehuda Roditty
14:30-14:45	Break	Closed door meeting of the committee
14:45-15:30	Meeting with B.Sc. students**	
15:30-16:15	Meeting with M.Sc. students**	

Thursday, May 23, 2013

Time	Subject	Participants
09:00-09:45	Meeting with PhD students**	
09:45-10:30	Meeting with Alumni**	
10:30-10:45	Break	Closed door meeting of the committee
10:45-11:15	Summation meeting with head of Department	In the same room Prof. Yossi Azar Prof. Tova Milo
11:15-11:45	Summation meeting with heads of Faculty and Institution	Prof. Aron Shai, Rector Prof. Dina Prialnik, Vice Rector Prof. David Horn, Head, Academic Quality Assessment Prof. Yaron, Oz Dean

* The heads of the institution and academic unit or their representatives will not attend these meetings

** The visit will be conducted in English with the exception of students who may speak in Hebrew and anyone else who feels unable to converse in English.