



Committee for the Evaluation of Computer Science Study Programs

Ariel University

Department of Computer Science and Mathematics

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 Department of Computer Science and Mathematics at Ariel University. The Committee's visit to Ariel University took place on June 2, 2013.

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

The Committee thanks the management of Ariel University and the Department of Computer Science and Mathematics 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 Ariel 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

The committee is impressed by the dedication of the faculty to undergraduate education, as evidenced by the satisfaction and enthusiasm of the students and the alumni. The students like the collegial atmosphere and the social environment. The involvement of students in research and teaching is also very effective. These are valuable and fragile qualities and the university will have to work hard to maintain them, in the face of the challenges listed below.

The committee is convinced that the transition to a research university is making almost impossible demands on the department. The department is expected to act as a university research department with the resources of a college department. Many of the usual paths for raising funds are closed to the department due to political circumstances. We heard no plan to address this challenge at either the university or the department levels.

A single department encompassing both mathematics and computer science is an anachronism: every other university in Israel and almost every university in the US has found that the two do not coexist well. Separating mathematics and computer science allows both to flourish in their own ways. Furthermore, there is a fundamental imbalance between the needs of the students, who seem to be overwhelmingly interested in CS, the structure of the program, and the composition of the faculty, which is largely mathematics. It is necessary to split the current combined degree program into two separate programs, with a major in CS and a major in Math, followed by splitting the department.

Academic staff growth should be in core CS to compensate for the current imbalance and for the current inability to cover core CS courses with senior faculty members. Despite the imperative to hire, the focus should be on outstanding quality, while recognizing that the process cannot be rushed.

A systematic effort is needed to attract new faculty members. The university needs to have an incentive program for new faculty, such as reduced teaching hours, increased research support, or increased salary.

2. Organizational Structure

Observations and findings

A single department encompassing both mathematics and computer science is an anachronism: every other university in Israel and almost every university in the US has found that the two do not coexist well. Separating mathematics and computer science allows both to flourish in their own ways.

There is a fundamental imbalance between the needs of the students, who seem to be overwhelmingly interested in CS, the structure of the program, which is 2/3 CS, and the composition of the faculty, which is 2/3 mathematics.

The Self-Evaluation report describes a plan to turn the Math and CS department into a school of Computing Science encompassing Math, CS, and Science Teaching. The committee believes this plan is misguided as it will not be effective in addressing the real challenges of transitioning to a research university. First, mathematics and computer science flourish best independently. Second, building a credible program in science teaching will consume resources better directed to computer science.

For the foreseeable future, most of the CS academic staff will be relatively inexperienced and will lack mature mentorship. The department would benefit from hiring a senior academic staff member in computer science to act as mentor and advisor to the younger academic staff.

The alumni were unaware of any existing alumni relations program.

Recommendations

Short term [~ within 1 year]:

- a. Within one year, the university must submit a proposal to CHE to split the *degree program* into two separate programs: a major in CS and a major in Math.
- b. The university should develop an effective alumni relations program to keep regular contact with the alumni.

Intermediate term [~ within 2-3 years]:

- a. The university must split the department into separate departments of CS and Math. This plan must be carried out within three years.
- b. The department should attempt to hire a senior academic staff member in computer science.

3. Mission and Goals

Observation and findings

The committee is convinced that the transition to a research university is making almost impossible demands on the department. The department is expected to act as a university research department with the resources of a college department. Many of the usual paths for raising funds are closed to the department due to political circumstances. *We heard of no plan to address this challenge*, at either the university level, or the department level.

Recommendation

Intermediate term [~ within 2-3 years]:

- a. The university must develop a ten-year plan to transition the department into a research-intensive department. This plan must be concrete and detailed and must address resource needs in academic and non-academic staff, space, and budget, and match them to available funding.

4. Study Programs

Observation and findings

The undergraduate program is labeled as CS and Mathematics, but 2/3 of the hours are in CS. The students overwhelmingly are interested in CS. Nevertheless, the program has the following weaknesses as a CS program.

The size of the mathematics component of the program limits the ability to provide a rich set of advanced CS courses. Many of the required math courses are not traditionally required by CS programs. These issues can be addressed by separating the program into distinct Math and CS programs.

In the judgment of this committee, the department is not ready to launch a CS master's program.

In the committee's count, of the 10 academic staff listed in CS for 2013-14, only 7 are research-active computer scientists. These are too few to sustain a university-level undergraduate program.

The transition to a research university requires reduced teaching load for academic staff.

The department is currently unable to teach all core CS courses with regular academic staff. It is unacceptable to teach so many core computer science courses using part-time staff because it is difficult to guarantee the quality of part-time staff, or to guarantee that courses are taught in a consistent style from one year to the next.

Launching a master's program requires the development and teaching of many advanced courses, a task well beyond the current capacity of this department.

Recommendations

Intermediate term [~ within 2-3 years]:

- a. The department must not launch a CS Master's program until the organizational issues and staffing challenges have been addressed.

5. Human Resources / Faculty

Observation and findings

The department does not have enough research-grade CS academic staff to teach the CS courses needed for a program comparable with other Israeli research universities.

While mathematics and computer science remain together, the department needs to hire more core CS staff to compensate for the current imbalance between math and CS staff, and for the current inability to cover core CS courses with senior academic staff.

Despite the imperative to hire, the department should focus on recruiting new CS academic staff of outstanding quality. Rushing the process risks the

department's long-term quality. Good departments typically do not hire more than one or two new academic staff members per year.

While research universities in Israel manage their own personnel promotions, promotions to senior academic ranks in the colleges are managed by CHE. In the Committee's judgment, the Department does not yet have enough senior faculty in computer science, or the academic experience in computer science, to determine its own promotions to senior faculty ranks in computer science.

Recommendations

Short term [~ within 1 year]:

- a. The CHE must ensure that there is proper oversight over computer science faculty promotions to senior ranks at Ariel University, until the university has sufficient senior faculty members in computer science, with the appropriate experience to make such judgments. This supervision must begin immediately.

Intermediate term [~ within 2-3 years]:

- b. The department must hire more core, research-capable CS academic staff. In particular, once Computer Science and Math have split into two distinct departments, hiring must focus on core CS faculty.

6. Students

Observation and findings

The students and the alumni were enthusiastic about the education received in this department, although there were complaints about the math requirements. The students liked the collegial atmosphere and the social environment. The involvement of students in CS research and in teaching is also very effective.

Some of the students appear to have difficulties with English. This is a disadvantage for graduates in the high-tech industry and in graduate school.

Recommendation

Short term [~ within 1 year]:

- a. The department must take immediate steps to ensure that students have an adequate command of technical English.

7. Teaching and Learning Outcomes

Observation and findings

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

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 committee was impressed by the research presented in the lab visit. Conducting empirical research in an emerging area is a good strategic choice for a new university, and the level of student involvement is both effective as education, and should help attract high-quality students.

9. Infrastructure

Observation and findings

The equipment in the labs is outdated. The wireless network is inadequate. Given the ubiquity of personal mobile computers, the focus on desktop equipped labs is outdated and expensive.

Recommendations

Short term [~ within 1 year]:

- a. Within the next year, the college must set up a process where infrastructure needs are regularly reviewed and improvements are prioritized. The university should change the infrastructure to emphasize wireless networks, servers, and virtualization, technologies more effective, and cheaper in the long run, than the current equipment.

10. Self-Evaluation Process

The committee was impressed with the quality of the self-evaluation report.

Chapter 4: Summary of Recommendations and Timetable

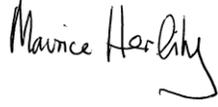
Short term [~ within 1 year]:

1. Within one year, the university must submit a proposal to CHE to split the *degree program* into two separate programs: a major in CS and a major in Math.
2. The university should develop an effective alumni relations program to keep regular contact with the alumni.
3. The CHE must ensure that there is proper oversight over computer science faculty promotions to senior ranks at Ariel University, until the university has sufficient senior faculty members in computer science, with the appropriate experience to make such judgments. This supervision must begin immediately.
4. The department must take immediate steps to ensure that students have an adequate command of technical English.
5. Within the next year, the college must set up a process where infrastructure needs are regularly reviewed and improvements are prioritized. The university should change the infrastructure to emphasize wireless networks, servers, and virtualization, technologies more effective, and cheaper in the long run, than the current equipment.

Intermediate term [~ within 2-3 years]:

6. The university must split the department into separate departments of CS and Math. This plan must be carried out within three years.
7. The department should attempt to hire a senior academic staff member in computer science.
8. The university must develop a ten-year plan to transition the department into a research-intensive department. This plan must be concrete and detailed and must address resource needs in academic and non-academic staff, space, and budget, and match them to available funding.
9. The department must not launch a CS Master's program until the organizational issues and staffing challenges have been addressed.
10. The department must hire more core, research-capable CS academic staff. In particular, once Computer Science and Math have split into two distinct departments, hiring must focus on core CS faculty.

Signed by:



Prof. Maurice Herlihy
Committee Chair



Robert L. Constable



Prof. Dmitry Feichtner-Kozlov



Prof. Kraus Sarit



Prof. Joe Turner, Jr



Prof. Moshe Vardi

Appendix 1: Letter of Appointment



מחלקת תכנון ותקציב | 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

Computer Sciences – Schedule of Site Visit
Sunday, June 02, 2013

Time	Subject	Participants
09:15 - 10:00	Opening session with the heads of the institution and the senior staff member appointed to deal with quality assessment	Prof. Yehuda Danon - President Prof. Michael Zinigrad - Rector Dr. Nitza Davidovich - Head, Quality Assessment System
10:00-10:30	Meeting with the Dean of the Faculty of Natural Sciences	Prof. Alexander Domoshnitsky
10:30-11:00	Meeting with the Head of the Department of Computer Science and Mathematics	Prof. Vadim Levit
11:00-12:00	Meeting with senior academic staff (and representatives of relevant committees)*	Prof. Frank Assous Prof. Gershon Kresin Dr. Boaz Ben-Moshe Dr. Dan Ophir Dr. Dror Tobi Dr. Svetlana Bunimovich Dr. David Tankus Dr. Roman Yavich Dr. Lee-Ad Gottlieb Dr. Gabriel Nivasch Dr. Eran Omri Dr. Yehuda Ashkenazi
12:00-12:45	Meeting with Junior academic staff *	Dr. Alexander Rasin Ms. Elizabeth Itskovich Mr. Roman Shklyar
12:45-13:30	Lunch (in the same room)	Closed door meeting of the committee
13:30-14:15	Tour of facilities: classrooms, library, labs, offices	
14:15-15:00	Meeting with Adjunct (External) academic staff *	Mr. Ran Segal Mr. Lev Kleiner Dr. Irena Lerman Dr. Yair Shaki Dr. Irina Volinsky Dr. Yvgeny Roiz Mr. Oved Mizrahi Ms. Ann Blank
15:00-15:45	Meeting with BA students**	
15:45-16:30	Meeting with Alumni**	
16:30-16:45	Closed door meeting of the committee	

16:45-17:15	Summation meeting with heads of Faculty, Department institution	Prof. Yehuda Danon-President Prof. Michael Zinigrad- Rector Prof. Alexander Domoshnitsky Prof. Vadim Levit Dr. Nitza Davidovich- Head, Quality Assessment System
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* 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.