Committee for the Evaluation of Computer Science Study Programs

Jerusalem College of Technology

Department 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, USA[1]
- Prof. Sarit Kraus - Department of Computer Science, Bar Ilan University, Israel[2]
- 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.

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[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 at Jerusalem College of Technology. The Committee's visit to Jerusalem College of Technology took place on May 29, 2013.

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

The Committee thanks the management of Jerusalem College of Technology and the Department 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 Jerusalem College of Technology

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 college and department are to be commended for their efforts to provide educational opportunities to under-served communities. The students and alumni were proud of their education and recognized the value and quality of the program.

The program is **highly** stressed by the complexity of teaching courses across 5 institutes and 4 campuses. This committee strongly believes a ratio of 40 students to 1 faculty member is a minimal level of staffing appropriate to meet this program's unique needs.

The committee observes that female faculty members do not have the same working conditions as male faculty members. The department and college must take action to ensure that female faculty members have the same working conditions as the male faculty members.

The department must ensure that research in the department be oriented toward enhancing the college's primary mission of education.

The department must undertake an effort to review and refresh the curriculum and to modernize software used in courses.

Although the committee is impressed that some of the senior faculty members were pursuing professional development on their own, there did not seem to be any systematic effort by the department or college to support such development.

While the committee is impressed by technical vitality of the senior faculty members, the committee did not witness the same level of technical vitality among the junior faculty members and the adjuncts. A professional development effort is needed to revitalize the faculty.

The committee was ***appalled*** to discover that the department, with close to 1500 students and multiple campuses, institutes, and majors, has only one secretary.

2. <u>Organizational Structure</u>

<u>Observations and findings</u>

With its multiple campuses and programs, JCT has a unique structure among Israeli colleges, presenting challenges that do not exist at other colleges. The faculty and staff are dedicated and hard-working, but the difficulties of managing such a complex program have placed them under substantial stress. In particular, inefficiencies in planning, travel, and teaching that would be minor at another institution have become major impediments here, and the college administration must address these issues as specified below. Although the department does (barely) meet the CHE student-faculty standard ratio of 50 to 1, the program is ***highly*** stressed by the complexity of teaching courses across 5 institutes and 4 campuses. This has a major impact on the quality of the faculty as discussed below. This committee strongly believes a ratio of 40 to 1 is a minimal level of staffing appropriate to meet this program's unique needs.

The female faculty members have worse working conditions than the male faculty members. As noted in the 2006 evaluation report, because female teachers can teach only at female campuses, female teachers typically teach a larger number of distinct courses than do male faculty members. This disparity means that female teachers require more preparation time. Moreover, we understand that, as noted in the 2006 report, the office space at the women's campuses continues to be inadequate.

The faculty waste too much productive time in transit between campuses, reducing time available for important tasks such as professional enrichment. Teaching schedules are not designed for travel efficiency, and shuttle service is inadequate.

<u>Recommendations</u>

Short term [~ within 1 year]:

    a. The college must reduce the inter-campus travel burden on teaching staff by improving scheduling and transport arrangements. This action must start immediately.

Intermediate term [~ within 2-4 years]:

a. The college must substantially reduce the student to faculty ratio to at most the 40 to 1 level in order to meet the program's unique needs. This action must start immediately and complete within 4 years.

b. The college must allocate funds to improve the working conditions of the female faculty members by taking preparation time into account when assigning teaching duties, and by bringing the office space in the women's campuses up to the standards of the other campuses. This action must start immediately and complete within 2 years.

3. <u>Mission and Goals</u>

<u>Observation and findings</u>

The department carries on a fair amount of research activity, which is commendable, but the committee is concerned that the research described did not contribute directly to the education of the students. While the committee recognizes that research is required for promotion, it is also necessary that research be carried out to enhance the college's primary mission of education.

<u>Recommendations</u>

Short term [~ within 1 year]:

a. The promotions controlled by the college must take into account how research serves the educational mission.

4. <u>Study Programs</u>

<u>Observation and findings</u>

The programs themselves are reasonable, covering appropriate topics and comparable to similar programs elsewhere. It is unclear the extent to which the curriculum designers were aware of internationally-accepted models such as the ACM / IEEE-CS curricula.

Some elements of the curriculum as well as software used in courses are dated. Course content should be reviewed on a regular basis to ensure that topics such as programming languages and tools are up to date.

In violation of the clear recommendation of the 2006 evaluation report, the college continues to operate a special program for high school students that does not fully integrate the students with the regular program of the college. The committee questions the educational value of this program, and is convinced that this program is a waste of resources needed elsewhere.

Recommendations

Short term [~ within 1 year]:

    a. The department must undertake an effort to review and refresh the curriculum and to modernize software used in courses.

Intermediate term [~ within 2-4 years]:

    b. The college must comply fully with the recommendations of the 2006 evaluation report and limit the high school program to a small number of outstanding students who can be integrated with the regular program of the college.

5. Human Resources / Faculty

Observation and findings

In a college, research should be one among several paths of professional development. Although we were impressed that some of the senior faculty members were pursuing professional development on their own, there did not seem to be any systematic effort by the department or college to support such development.

While the committee was impressed by the technical vitality of the senior faculty members, the committee did not witness the same level of technical vitality among the junior faculty members and the adjuncts. The committee was alarmed at the lack of interest in professional development by junior faculty. There is a dire need for JCT to create an environment where professional development is both possible and rewarded. Examples of such professional development efforts include organizing one-day workshops at times suitable for faculty attendance, attending conferences in Israel or elsewhere, attending colloquia in Hebrew University or elsewhere, and so on.

The committee is very concerned by the teaching performance of external lecturer and junior faculty members who teach important courses. JCT is under pressure to staff a very large number of courses, and external and

junior faculty members are hired in an ad-hoc procedure rather than through the careful process used in regular faculty hiring. Various discussions during the committee's visit led to a concern by the committee that the quality of teaching by some of these external lecturers and junior faculty members may not be at the level required by an academic college.

The committee was *appalled* to discover that the department, with close to 1500 students and multiple campuses, institutes, and majors, has only one secretary. It makes no economic sense to force faculty members to do work that could be done more effectively by administrative support staff.

Recommendations

Short term [~ within 1 year]:

a. The department must revitalize the junior faculty and adjuncts by instating a vigorous program of professional development encompassing both technical aspects of the field and pedagogy.

b. The promotions and renewal of contracts controlled by the college must take participation in professional development into account.

c. The college must hire more administrative staff (secretarial support) to support the department.

d. Within a year, the college must hire additional qualified regular faculty members to replace some of the external lecturers and junior faculty members.

6. **Students**

Observation and findings

The students were proud of their education and recognized the value and quality of the program. The students interviewed felt that JCT infused in them a passion for CS studies, that JCT provided them an excellent combination of practical and theoretical courses, and that they were well prepared for work. The alumni program appears to be effective.

The committee was impressed by JCT's mission of educating students with diverse levels of preparation. However, there was some indication that there is a wide range of ability and performance among the students, especially among the different sites where courses are offered. The college needs to

make sure that the weaker students will not jeopardize the level of education received by the stronger ones.

7. <u>Teaching and Learning Outcomes</u>

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

<u>Recommendations</u>

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. <u>Research</u>

<u>Observation and findings</u>

Unlike research at universities, which is undertaken for its own sake, research at colleges should advance the college's teaching mission. Such research should be directed toward keeping faculty up-to-date, and toward involving students in projects that advance their education. JCT is also in a unique position to do research in education, given its substantial experience reaching out to students with non-traditional academic backgrounds.

<u>Recommendations</u>

Short term [~ within 1 year]:

    a. To support the goal that research at JCT should advance the college's educational mission, within a year the department must instate a vigorous program of professional development encompassing both technical aspects of the field and pedagogy.

9. **Infrastructure**

<u>Observation and findings</u>

The IT infrastructure (labs and networks) is not at an appropriate level for a modern technical college. Equipment was outdated and the network was highly overloaded.

<u>Recommendations</u>

Intermediate term [~ within 2-4 years]:

a. The college must modernize its IT infrastructure. It should change the infrastructure to emphasize wireless networks, servers, and virtualization.

10. **Self-Evaluation Process**

<u>Observation and findings</u>

The committee was impressed with how well-written the report was. In particular, the identification of strengths and weakness throughout the report was very insightful and beneficial to the committee.

<u>Recommendations</u>

Short term [~ within 1 year]:

a. Within a year, the college must develop and implement a plan to address the weaknesses identified in the self-study report.

Chapter4:   Summary of Recommendations and Timetable
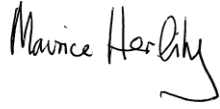
Short term [~ within 1 year]:

1. The college must reduce the inter-campus travel burden on teaching staff by improving scheduling and transport arrangements. This action must start immediately.

2. The promotions controlled by the college must take into account how research serves the educational mission.

3. The department must undertake an effort to review and refresh the curriculum and to modernize software used in courses.

4. The department must revitalize the junior faculty and adjuncts by instating a vigorous program of professional development encompassing both technical aspects of the field and pedagogy.

5. The promotions and renewal of contracts controlled by the college must take participation in professional development into account.

6. The college must hire more administrative staff (secretarial support) to support the department.

7. Within a year, the college must hire additional qualified regular faculty members to replace some of the external lecturers and junior faculty members.

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

9. To support the goal that research at JCT should advance the college's educational mission, within a year the department must instate a vigorous program of professional development encompassing both technical aspects of the field and pedagogy.

10. Within a year, the college must develop and implement a plan to address the weaknesses identified in the self-study report.

Intermediate term [~ within 2-4 years]:

11. The college must substantially reduce the student to faculty ratio to at most the 40 to 1 level in order to meet the program's unique needs. This action must start immediately and complete within 4 years.

12. The college must allocate funds to improve the working conditions of the female faculty members by taking preparation time into account when assigning teaching duties, and by bringing the office space in the women's campuses up to the standards of the other campuses. This action must start immediately and complete within 2 years.

13. The college must comply fully with the recommendations of the 2006 evaluation report and limit the high school program to a small number of outstanding students who can be integrated with the regular program of the college.

14. The college must modernize its IT infrastructure. It should change the infrastructure to emphasize wireless networks, servers, and virtualization.
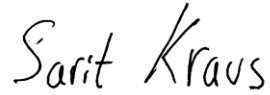
Signed by:

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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

COUNCIL FOR HIGHER EDUCATION

Planning & Budgeting Committee | הוועדה לתכנון ותקצוב

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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www.che.org.il | email: director-general@che.org.il

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Computer Sciences – Schedule of Site Visit
Wednesday, May 29, 2013

Time	Subject	Participants
09:00-09:45	Opening session with the Heads of the institution and the senior staff member appointed to deal with quality assessment	Prof. Noah Dana-Picard, President Prof. Menahem Steiner, Rector Dr. Yitzhak Isaak, In charge of Academic Quality Assessment
09:45-10:15	Meeting with the Head of School Computer Science and Engineering	Dr. Moti Reiff, Head of School
10:15-11:00	Meeting with the Head of Computer Department	Dr. Aryeh Teitelbaum, Deputy Head of Department Dr. Reuven Gallant
11:00-11:45	Meeting with senior academic staff (and representatives of relevant committees)*	Dr. Haim Dayan, Prof. Erick Fredj Dr. Azriel Heuman Dr. Tirza Hirst Mr. Meir Komar, Dr. Ronit Nossenson Prof. Yakov Hcohen-Kerner Dr. Gidi Gradwoll Dr. Hada Yoram Dr. Dan Buchnik Dr. Rina Azulay Dr. Ariel Shtulman
12:00-12:45	Meeting with Junior academic staff *	Prof. Michael Bank Dr. Udi Konely Dr. Moshe Goldshtein Dr. David Dayyan Dr. Yossi Perez Dr. Ilia Mostov Dr. Haim Printe Miss. Hani Nadler Mr. Shmuel Winman
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	Dr. Moti Reiff, Dr. Aryeh Teitelbaum

14:15-15:00	Meeting with Adjunct academic staff *	Dror Mughaz Ezra Dasht Adina Milston Meirav Alush Emuna Frucjtman Oshri Cohen Arie Wissen Orit Rozenblit Joise Vogell Eliezer Ginzburger Eli Grinberg Yhonatan Lavian
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 School and Department	Dr. Moti Reiff Dr. Aryeh Teitelbaum Dr. Reuven Gallant
17:15-17:45	Summation meeting with heads of institution	Prof. Noah Dana-Picard Prof. Menahem Steiner

*   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.