



Committee for the Evaluation of Computer Science Study Programs

Tel-Aviv Yaffo Academic College

Computer Science School

Evaluation Report

April 2014

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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, USA¹
- Prof. David Dobkin - Department of Computer Science, Princeton University, USA²
- Prof. Sarit Kraus - Department of Computer Science, Bar Ilan University, Israel³
- 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. Maria Levinson-Or served as the Coordinator of the Committee on behalf of the CHE.

Within the framework of its activity, the Committee was requested to:⁴

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.

¹ In accordance with the CHE's policy, Prof. Robert L. Constable did not participate in the evaluation of the Computer Science department at Ben Gurion University to prevent the appearance of a conflict of interests.

² Due to scheduling constraints, Prof. David Dobkin did not participate in the site visits to the Jerusalem College of Technology, Hadassah Academic College, Ariel University, the Weizmann Institute of Science, the College of Management Academic Studies, and the Holon Institute of Technology.

³ 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.

⁴ The Committee's letter of appointment is attached as **Appendix 1**.

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.
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 meeting 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 first round of visits of evaluation, and visited the Hadassah Academic College, Jerusalem College of Technology, Ariel University, Tel Aviv University and Bar-Ilan University. In January 2014, the committee held its second round of visits of evaluation, and visited Ben-Gurion of the Negev, the Open University of Israel, the Interdisciplinary Center Herzliya, Tel-Aviv Yaffo Academic College, Netanya Academic College, the Weizmann Institute of Science, the College of Management Academic Studies, and the Holon Institute of Technology. During the visits, the Committee met with various stakeholders at the institutions, including management, faculty, staff, and students.

This report deals with the program in Computer Science at Tel-Aviv Yaffo academic College. The Committee's visit to the University took place on January 9, 2014.

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

As part of the evaluation process, the committee appraised the compliance of Computer Science departments to the CHE standards for studies in Computer Science, set in 2008. The CHE standards are attached as **Appendix 3**.

The Committee thanks the management of Tel-Aviv Yaffo Academic College and the Department of Mathematics and Computer Science for their self-evaluation report and for their hospitality towards the committee during its visit at the institution.

Chapter 3: Evaluation of the Computer Science Study Program at Tel-Aviv Yaffo Academic College

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 committee commends Tel-Aviv Yaffo Academic College for giving disadvantaged and high-risk students an educational opportunity that they would not otherwise have. The college’s program combines intellectual rigor with a flexible admission policy.

The academic staff members have an admirable enthusiasm for teaching and for the mission of the college.

The college has a very high undergraduate attrition rate, partly due to the flexible admissions standards. It is the committee’s judgment that the best measure of undergraduate attrition is the graduation rate for students who complete the first year. A graduation rate below 75% among undergraduate students who successfully complete the first year is evidence that the first-year evaluation and filtering process is not selective enough.

There seems to be a serious misunderstanding that the master’s qualifying exam is required by CHE, but this is not the case; students who complete master’s projects are not required to take a comprehensive exam. This

incorrect interpretation has created a barrier for graduation to master's students, unnecessarily raising the graduate attrition rate.

The study program at the graduate level also suffers from a very high attrition rate. The committee understands that the department would like to give a master's degree with thesis. While the committee is sympathetic, we think the department must lower its attrition rate at both the undergraduate and graduate levels before embarking on new study programs.

The budgeting process is highly centralized. More autonomy for the schools would allow a school to use the available funds in the most effective way to meet its unique needs.

The committee commends the school's policy of teaching classes in relatively small sections. The committee commends the school's enhancement program for marginally-qualified students. It seems to be off to a good start, and it will take some time to evaluate its effectiveness.

The school has difficulty hiring good graders. The school should investigate the use of partially automated and carefully-monitored peer grading.

Overall, the college did a good job addressing and implementing the previous committee's recommendations.

2. Organizational Structure

Observations and findings

There is little or no data on career outcomes of their graduates.

The budgeting process is highly centralized. More autonomy for the schools would allow a school to use the available funds in the most effective way to meet its unique needs.

Recommendation

Short term [~ within 1 year]:

The school must set up a systematic program to keep track of where graduates get jobs after graduation.

3. Mission and Goals

Observations and findings

The college's mission of providing personalized, high-quality education is well executed by the faculty and well received by the students and the alumni.

The college has a very high undergraduate attrition rate, partly due to the flexible admissions standards. It is the committee's judgment that the best measure of undergraduate attrition is the graduation rate for students who complete the first year. A graduation rate below 75% among undergraduate students who successfully complete the first year is evidence that the first-year evaluation and filtering process is not selective enough.

Recommendations

Short term [~ within 1 year]:

The school must collect data on the graduation rate of undergraduate students who successfully complete the first year.

4. Study Programs

Observation and findings

The committee was impressed with the academic staff's dedication to undergraduate teaching. Large classes are split into small sections, and the students feel their needs are attended to. While small sections enhance teaching quality, they place an increased load on academic staff at all levels.

There seems to be a serious misunderstanding that the master's qualifying exam is required by CHE, but this is not the case: students who complete master's projects are not required to take a comprehensive exam. This incorrect interpretation has created a barrier for graduation to master's students, unnecessarily raising the attrition rate. Including undergraduate material in this exam places an additional burden on the students.

The study program at the graduate level suffers from a very high attrition rate. The committee understands that the department would like to give a master's degree with thesis. While the committee is sympathetic, we think the department must lower its attrition rate at both the undergraduate and graduate levels before embarking on new study programs.

The school has difficulty hiring good graders. The school should investigate the use of partially automated and carefully-monitored peer grading.

The undergraduate study program itself is reasonable and comparable to the programs at other Israeli colleges and universities, although somewhat inflexible. It is unclear the extent to which the curriculum designers were aware of internationally-accepted models such as the ACM / IEEE-CS curricula.

Recommendations

Short term [~ within 1 year]:

- a) The school should eliminate the required graduate qualifying exam for students completing a master's project, and consider an option for students to take an exam on graduate material instead of doing a project.
- b) The school must start to track the graduation rate, within 6 years of entering the program, of undergraduate students who successfully complete the first year.

Intermediate term [~ within 2-3 years]:

Major Recommendation: The school must ensure that the graduation rate, within 6 years of entering the program, of undergraduate students who successfully complete the first year is at least 75%.

5. Human Resources / Faculty

Observations and findings

There is no support for professional development for junior and adjunct academic staff.

Recommendation

Intermediate term [~ within 2-3 years]:

The school must institute a professional development program for junior and adjunct academic staff.

6. Students

Observations and findings

The committee was impressed with the entrepreneurial energy of the alumni and with the research aspirations of the master's students.

7. Teaching and Learning Outcomes

Observations and findings

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]:

The school should set in place a process to reflect on the attainment of outcomes in a planned, periodic manner.

8. Research

Observations and findings

The research quality of the academic staff is appropriate for an academic college.

9. Infrastructure

Observations and findings

The infrastructure seems to be adequate.

10. Self-Evaluation Process

Observations and findings

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

Chapter 4: Summary of Recommendations and Timetable

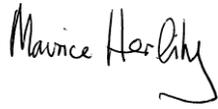
Short term [~ within 1 year]:

- 1) The school must set up a systematic program to keep track of where graduates get jobs after graduation.
- 2) The school should eliminate the required graduate qualifying exam for students completing a master's project, and consider an option for students to take an exam on graduate material instead of doing a project.
- 3) The school must start to track the graduation rate, within 6 years of entering the program, of undergraduate students who successfully complete the first year.
- 4) The school should set in place a process to reflect on the attainment of teaching and learning outcomes in a planned, periodic manner.

Intermediate term [~ within 2-3 years]:

- 1) **Major Recommendation:** The school must ensure that the graduation rate, within 6 years of entering the program, of undergraduate students who successfully complete the first year is at least 75%.
- 2) The school must institute a professional development program for junior and adjunct academic staff.

Signed by:



Prof. Maurice Herlihy
Committee Chair



Prof. 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

Computer Science - schedule of site visit
Tel Aviv Yaffo Academic College

Thursday, January 09, 2014 – Weston Building, Staff meeting room, 3rd floor

Time	Subject	Participants
08:30-09:00	Opening session with the heads of the institution and the senior staff member appointed to deal with Quality Assessment	Prof. Nehemia Friedland, President Mr. Benny Alon, General Director Dr. Nili beck, Staff member appointed to deal with quality assessment Chen-ya Maymon, Head of Academic Administration
09:00-09:30	Meeting with the Dean of the School of Computer Science	Prof. Michal Parnas
09:30-10:30	Meeting with senior academic staff (whom are representatives of relevant committees)*	<ul style="list-style-type: none"> - Dr. Nili beck- Students Achievement Committee, Teaching Committee - Dr. Adi Shribman- Teaching Committee, First year academic advisor - Prof. Danny Levy- Teaching Committee - Dr. Carmi Merimovich- Students Achievement Committee , Computerization and Laboratories Coordinator - Dr. Dorit Shweiki- Students Achievement Committee, Head of excellence program - Dr. Iris Gaber- Admissions Committee - Prof. Ofer Arieli- M.Sc. Studies Committee - Dr. Adi Akavia- M.Sc. Studies Committee - Dr. Alon Schclar- Responsible for exercise graders and teaching assistants - Dr. Ilan Kirsh- Workshops Coordinator - Dr. Osnat Mokryn- Head of Internet and Communications Specialization - Prof. Shmuel Tyszberowicz- Coordinator of studies with the army - Prof. Arie Lev – Head of Enhancement program
10:30-11:15	Meeting with Junior academic staff *	Hadar Binsky Amir Kirsh
11:15-12:00	Meeting with Adjunct academic staff *	Shlomit Arian Osnat Genislav Dr. Tal Hassner Dr. Raid Saabna Dr. Ran Ettinger Dr. Gideon Greenspan
12:00-12:45	Lunch (in the same room)	Closed door meeting of the committee

12:45-13:30	Tour of facilities: labs, classrooms, library, offices	Prof. Nehemia Friedland, Prof. Shlomo Biderman, Benny Alon, Prof. Michal Parnas, Dr. Carmi Merimovich, Ms. Ahuvi Tsadok
13:30-14:15	Meeting with BSc Students, **	
14:15-15:00	Meeting with MSc Students, **	
15:00-15:45	Meeting with Alumni	
15:45-16:00	Closed door meeting of the Committee	
16:00-16:30	Summation meeting with heads of institution and school	Prof. Nehemia Friedland Prof. Shlomo Biderman Prof. Michal Parnas Mr. Benny Alon

* 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.

Appendix 3: CHE standards for studies in Computer Science

CHE decision of 17.7.08 regarding standards for Computer Science Studies

Bachelor's Degree Programs

A. Graduates

1. In determining these criteria, the committee felt that it would be beneficial to define the "final product", or the ideal graduate of a Computer Science bachelor's degree program:
2. A graduate has an in-depth understanding of Computer Science Theory, Computational Theory, Computational Mathematics, and staunch mathematical knowledge.
3. A graduate has broad knowledge in Computer Science applications (programming languages, software engineering, operations systems and computer design).
4. A graduate is capable of joining development teams in computer-related high-tech industries.
5. A graduate is able to carry out computer-based industrial projects.
6. A graduate is competent in applied analytics, and is capable of developing and integrating effective algorithms in software systems.
7. A graduate has independent study skills and can prepare Computer Science presentations.
8. A graduate is aware of the effects of computerization on individuals, organizations and on society, as well as its ethical, legislative and political ramifications.
9. Excellent graduates are capable of continuing their studies in master's degree programs.
10. To assure that their graduates attain these capabilities, bachelor's degree programs must adhere to the following criteria:

B. Curricula

Programs must include required courses as well as an adequate selection of elective courses.

1. Required (core) courses should include:
 - Advanced-level mathematics courses, taught by experienced Ph.D.-level mathematics professors. These should include: Discrete Mathematics, Calculus, Algebra and Introduction to Probability.
 - Courses in Computer Science Theory, including: Automata Theory (or a similar subject), Data Structure, Algorithmic Theory and Computational Theory.
 - At least one seminar and one applications project that includes accepted industry development processes.
 - Applied Computer Science courses in Programming Languages, Software Engineering, Operating Systems, Computer Design and Logical Content.
2. The program should offer as many elective courses as possible in Computer Science and related fields (Economics, Management, Mathematics), as well as Humanities courses, to provide a well-rounded education.
3. The programs should encourage independent study.

C. Students, Teaching and Learning

1. Institutions must adhere to the CHE admissions regulation requiring a matriculation certificate.
 2. Students who matriculated in mathematics at a 3-unit level will not be admitted unless they complete (passing a final exam) a preparatory course at the 4 or 5-unit level.
 3. "Conditional" admissions should not comprise more than 10% of all admissions.
 4. Departments will present detailed support programs for weak students admitted on special terms.
 5. Departments will determine rigorous requirements for continuing studies, and coherent diploma eligibility guidelines.
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6. Departments will maintain adequate teaching assistant staff, and present detailed programs for providing students with feedback and appropriate laboratory experience.
7. At least 80% of required courses will be taught by full-time faculty.

D. Faculty

1. New programs will require at least six senior Ph.D.-level faculty members; three at the program's inception and an additional two to three before the program start its third "cycle" of admissions and as a condition for final/permanent accreditation.
2. Programs will not get final/permanent accreditation if they lack the requisite number of full-time faculty members to teach at least 80% of the required courses.
3. The student-to-faculty ratio will not exceed 50:1 at colleges and 25:1 at research universities.

D. Infrastructure

The institutions must provide adequate facilities for all programs and faculty research – laboratories, appropriate computers, adequate technical support, up-to-date libraries, fully equipped classrooms, secretarial staff and adequate, fully-equipped faculty office space.

Master's Degree Programs

A. Graduates - General

1. Demonstrates good Self Study Abilities.
2. Has depth and systematic understanding of knowledge in academic discipline.
3. Has comprehensive theoretical and applied knowledge in a wide range of Computer Science topics.

B. Graduates – Research-based Master's Degree

1. Able to undertake independent research and present outcomes in writing.
2. Able to use full range of learning resources relevant to the research topic.
3. Has depth and systematic understanding of knowledge in academic discipline.
4. Excellent graduates should be able to continue their studies toward doctoral degrees.

C. Non-Research Master's Degrees

These programs will be offered predominantly at colleges, while universities will offer non-research master's degree programs only to students who can not complete their research projects, or to excellent students whose research results permit continuing directly to doctoral degree programs.

Non-research master's degree programs "produce" graduates with a broad knowledge base and a high level of applications experience, who are increasingly in demand in today's complex computer science market.

The committee found that the grade average in master's degree programs (research and non-research) at all of the universities is exceedingly high. To solve this problem, the committee recommends that at least 50% of required courses in master's degree programs should be advanced graduate-level courses.

The Council for Higher Education approved detailed requirements for accreditation of non-research master's degree programs (the decision taken on July 15, 2003 is attached). All these in addition to the following criteria:

1. Programs should include a major (year-long) applications project.
2. Master's degree students will be required to submit a final paper and/or pass a qualifying exam, to cover all of the Computer Science subjects studied.
3. At least 70% of the required courses in master's degree programs will be advanced graduate-level courses.

D. Research-based Master's Degree Programs

The Council for Higher Education approved detailed requirements for accreditation of research-based master's degree programs at non-university institutions of higher education (the decision taken on October 10, 2004 is attached). All these in addition to the following criteria:

1. Research-based master's degree programs at academic institutions will not be approved unless the faculty includes, at colleges - at least ten full-time senior faculty members at Ph.D. level and involved in active research, and at universities, twenty faculty members with these qualifications.
2. Departments will establish academically acceptable approval procedures for research proposals, and follow-up and final approval procedures.
3. Thesis advisors will be Ph.D.-level faculty members at the rank of Lecturer at least.
4. The total number of advisees (master's and doctoral candidates) per faculty member will be limited to 5-7. Exceptional cases must be approved by special committee.
5. At least 70% of the required courses in master's degree programs will be advanced graduate-level courses.