



**Committee for the Evaluation of Computer Science Study Programs**

**Tel Hai Academic College**  
**Computer Science Department**  
Evaluation Report

**November 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 School, Brown University, USA - Committee Chair
- Prof. Robert L. Constable - Computer Science School , Cornell University, USA
- Prof. David Dobkin - Computer Science School, Princeton University, USA.
- Prof. Sarit Kraus - School of Computer Science, Bar Ilan University, Israel<sup>1</sup>.
- Prof. Dmitry Feichtner-Kozlov, School of Mathematics, Bremen University, Germany
- Prof. Joe Turner, Jr. - (Emeritus ) - School of Computer Science, Clemson University, USA - ABET Representative
- Prof. Moshe Vardi - School of Computer Science, Rice University, USA

Ms. Tal Reichman served as the Coordinator of the Committee on behalf of the CHE.

Within the framework of its activity, the Committee was requested to:<sup>2</sup>

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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<sup>1</sup> Due to scheduling constraints, Prof. Sarit Kraus did not participate in the site visit to Tel-Hai Academic College.

<sup>2</sup> 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 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, Weizmann Institute of Science, College of Management Academic Studies, and Holon Institute of Technology. In May 2014, The committee held its third round of visits of evaluation, and visited the Hebrew University of Jerusalem, the University of Haifa, Tel-Hai Academic College, and the Technion. During the visits, the Committee met with various stakeholders at the institutions, including management, faculty, staff, and students.

This report deals with the Computer Science department at Tel-Hai Academic College. The Committee's visit to Tel-Hai Academic College took place on May 25, 2014.

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

The Committee thanks the senior management of Tel-Hai Academic College and the Computer Science department 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- Hai 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 was impressed by the energy, vision, and commitment of the college’s senior leadership to the development of computer science in the college. This level of support will be essential in addressing the department’s challenges.

The program is severely under-resourced, with only 7.5 positions filled by senior faculty members (and one unfilled position), of which approximately half are in core computer science. These issues were raised in the previous CHE report, they have been partially addressed, but understaffing remains the primary challenge for the department. A minimum of 8 permanent faculty members with PhDs in computer science are needed to sustain the current program.

The department has had difficulty attracting new faculty members. There is a need for energetic and creative approaches to hiring. The location of the college, in the north distant part of the country, is both a plus and a minus. A vigorous recruiting effort is needed to reach out to and identify candidates who find the location attractive.

The committee was impressed by the success of the “Best for Industry” internship program in attracting students. This internship program is consistent with the Computer Science Department mission of advancing the development of the software industry in the Upper Galilee. Overall, the computer science program has improved substantially since the previous evaluation.

## **2. Organizational Structure**

### Observations and findings

The committee was impressed by the energy, vision, and commitment of the college’s senior leadership to the development of computer science in the college. This level of support will be essential in addressing the department’s challenges. The committee was also impressed by the dedication of the academic and administrative staff.

However, the program is severely under-resourced, with only 7.5 positions filled by senior faculty members (and one unfilled position), of which approximately half are in core computer science. These issues were raised in the previous CHE evaluation report and have been partially addressed, but understaffing remains the primary challenge to the department. A minimum of 8 senior faculty members with PhDs in computer science is needed sustain the current program.

The department has had difficulty attracting new permanent staff. There is a need for energetic and creative approaches to hiring. The location of the college is both a plus and a minus. A vigorous recruiting effort is needed to reach out to and identify candidates who find the location attractive. Possibilities include cluster hiring (hiring multiple people in related areas), hiring couples, or academics retired from prestigious universities.

The college does a good job maintaining contact with alumni. We encourage the college to maintain and expand this effort.

#### Recommendations

##### **Short term [~ within 1 year]:**

1. The department must undertake an energetic and creative effort to fill the currently open position(s) with academic staff with a PhD in computer science. This will require the active support of the college's senior administration.
2. The college and the department must formulate a strategic plan to grow the department to include at least 8 core computer scientists.

##### **Medium term [~ within 4 years]:**

The department must reach a goal of 8 senior academic faculty members with PhDs in core computer science.

### **3. Mission and Goals**

#### Observations and findings

A core mission of the college and the Computer Science Department is to further the development of the Upper Galilee. The industrial affiliates program has been successful at contributing to this mission. The industrial-internship program, "Best for Industry", is also a major factor in attracting both students and industries to the area.

Another mission is helping students succeed in the job market. In particular, the college is dedicated to helping students with a wide range of learning abilities. The committee was impressed with both this vision and its implementation.

## **4. Study Programs**

### Observations and findings

The committee was impressed by the success of the “Best for Industry” internship program. Many students cited this program as the reason they came to Tel-Hai College.

However, the committee was concerned about the apparent high student attrition. There is not enough data to understand the full extent of the problem, and whether there is a need for action. It is the committee’s judgment that the best measure of undergraduate attrition is the graduation rate for students who complete the first year. The department 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%. A lower rate might be evidence that the first-year evaluation and filtering process is not selective enough.

Some courses seem to have recitations with a large number of students. Recitations are most effective when there are no more than 40 students.

The report refers to the ACM/IEEE curricular recommendations, but the department has not yet consulted the most recent recommendations (2013). Also the program does not have a mandatory project as required by CHE standards<sup>3</sup>.

The committee learned that the Computer Science program offers two tracks in the single-major program: Software Development and Digital Signal Processing. However the Digital Signal Processing track attracts a small number of students and is no longer a mainstream computer-science topic.

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<sup>3</sup> As stated in the CHE standards for studies in Computer Science, attached as Appendix 3.

The committee learned that it is the department's wish to open a master's program, and a proposal has already been submitted for CHE's approval. Launching a master's program requires the development and teaching of many advanced courses, a task well beyond the current capacity of the department. The committee strongly believes that the department has to strengthen the undergraduate program first, and only after gaining sufficient stability consider opening a graduate program.

#### Recommendations

##### **Short term [~ within 1 year]:**

1. The department must not launch a CS Master's program until the staffing challenges have been addressed.
2. The department must ensure that all students complete a project as required by the CHE standards.
3. The department must start to track the graduation rate, within 6 years of entering the program, of undergraduate students who successfully complete the first year. An effort should be made to understand the student-attrition problem, and the reasons for dropping out of the program.

##### **Intermediate term [~ within 2-3 years]:**

The department 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

Several courses are taught by instructors who are adjunct academic staff members. There appears to be little supervision of the teaching and the syllabi of such courses. Teaching assistants also seem to get little supervision.

The committee believes this kind of supervision is required.

The permanent academic staff has access to funds for professional development, such as attending conferences. However, the teachers' professional development efforts are largely through individual initiative. The college must ensure that these activities are actively encouraged. The adjunct academic staff has no institutional support for professional development.

#### Recommendations

##### **Short term [~ within 1 year]:**

1. The department must ensure adequate supervision of teaching and course syllabi taught by adjuncts to ensure quality of teaching and coherence between courses.
2. The department must ensure that there is a program of professional development for academic staff members at all levels, faculty and adjuncts.

## **6. Students**

#### Observations and findings

The students are very loyal. It seems that many of them chose to come to Tel-Hai after hearing good things about the college, the "Best for Industry" internship program, the atmosphere, and the fact that the academic staff is approachable. The students agreed that the atmosphere is warm and supportive, and the staff members care for their needs.

The students do not have an association at the program level. Such associations provide a useful mechanism for communication between programs and students.

#### Recommendation

##### **Short term [~ within 1 year]:**

The department should encourage the students to form an association.

## **7. Teaching and Learning Outcomes**

### Observations and findings

The teaching and learning outcomes for the program have been clearly articulated, but there is no process for reflecting on the attainment of outcomes in a planned, periodic manner.

### Recommendation

#### **Short term [~ within 1 year]:**

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

## **8. Research**

### Observations and findings

The committee was pleased that the department supports faculty research efforts, but academic staff members interested in research are hampered by the lack of graduate students. An undergraduate research program would help both the academic staff and students.

### Recommendation

#### **Intermediate term [~ within 2-3 years]:**

The department should encourage faculty members to involve undergraduates in research.

## **9. Infrastructure**

### Observations and findings

The committee was impressed with the college's computing facilities and their management.

The department has very cramped office space for academic staff, which is insufficient for the department's planned growth and development.

Recommendation

**Intermediate term [~ within 2-3 years]:**

The college must establish a plan for providing adequate office space for present and future academic staff

**10. Self-Evaluation Process**

Observations and findings

The committee was impressed with the improvement in staffing in response to the last report, although much remains to be done. The quality of the self-evaluation report is uneven.

## **Chapter 4: Summary of Recommendations and Timetable**

### **Short term [~ within 1 year]:**

1. The department must undertake an energetic and creative effort to fill the currently open position(s) with academic staff with a PhD in computer science. This will require the active support of the college's senior administration.
2. The college and the department must formulate a strategic plan to grow the department to include at least 8 core computer scientists.
3. The department must not launch a CS Master's program until the staffing challenges have been addressed.
4. The department must ensure that all students complete a project as required by the CHE standards.
5. The department must start to track the graduation rate, within 6 years of entering the program, of undergraduate students who successfully complete the first year. An effort should be made to understand the student-attrition problem, and the reasons for dropping out of the program.
6. The department must ensure adequate supervision of teaching and course syllabi taught by adjuncts to ensure quality of teaching and coherence between courses.
7. The department must ensure that there is a program of professional development for academic staff members at all levels, faculty and adjuncts.
8. The department should encourage the students to form an association.
9. The department should set in place a process to reflect on the attainment of outcomes in a planned, periodic manner.

### **Intermediate term [~ within 2-3 years]:**

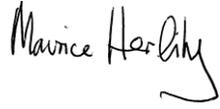
1. The department must ensure that the graduation rate, within 6 years of entering the program, of undergraduate students who successfully complete the first year is at least 75%.
2. The department should encourage faculty members to involve undergraduates in research.

3. The college must establish a plan for providing adequate office space for present and future academic staff

**Medium term [~ within 4 years]:**

The department must reach a goal of 8 senior academic faculty members with PhDs in core computer science.

**Signed by:**



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Prof. Maurice Herlihy  
Committee Chair



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Prof. Robert L. Constable



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Prof. David Dobkin



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Prof. Dmitry Feichtner-Kozlov



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Prof. Joe Turner, Jr.



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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

ת.ד. 4037, ירושלים 91040 סכ"ל. Tel: +972-(0)2-5094500(02) Fax: +972-(0)2-5094686. P.O.B 4037, Jerusalem 91040. ISRAEL. email: [director-general@che.org.il](mailto:director-general@che.org.il) | [www.che.org.il](http://www.che.org.il)

**Appendix 2: Site Visit Schedule**  
**Sunday, May 25, 2014**

<b>Time</b>	<b>Subject</b>	<b>Participants</b>
09:30-10:00	Opening session with the heads of the institution and the senior staff member appointed to deal with Quality Assessment	Prof. Yona Chen, President Prof. Shira Hantman, Vice-President for Academic Affairs
10:00-10:45	Meeting with the Dean of the Faculty of Sciences and Technology	Prof. Gidi Gross
10:45-11:30	Meeting with the Head of the Computer Science Department	Dr. Ran Ziv
11:30-12:30	Meeting with senior academic staff*	Mr. Alexander Ruinsky, Professor Yizhar Lavner, Dr. Donita Cohen, Dr. Tamar Zemach, Dr. Elazar Birnbaum, Dr. Mordechai Shalom, Dr. Daniel Kotlar, Dr. Ofer Shir
12:30-13:15	Lunch (in the same room)	<i>Closed door meeting of the committee</i>
13:15-14:00		Tour of facilities
14:00-14:45	Meeting with Junior academic staff *	Mr. Eiran Danan, Mr. Elad Roda, Mr. Hagai Barmats Mr. Shimeon Kushlin
14:45-15:30	Meeting with Adjunct academic staff *	Dr. Fathi Saleh, Dr. Doron Benzvi , Dr. Anat Aharoni, Dr. Ron Sivan, Dr. Uri Globus
15:30-16:15	Meeting with Undergraduate Students**	
16:15-17:00	Meeting with Alumni**	
17:00-17:15		Closed door meeting of the committee
17:15-17:45	Closing meeting with heads of institution and department	Prof. Yona Chen, President Prof. Shira Hantman, Vice-President for Academic Affairs Prof. Gidi Gross, Dean of the Faculty Dr. Ran Ziv, Head of the Computer Science Department Mr. Ofer Baharal, the academic secretary

\* 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.