The Hebrew University of Jerusalem

The Einstein Institute of Mathematics

Self Evaluation Report for the year 2009

Written by

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Introduction

The Einstein Institute of Mathematics at the Hebrew University hereby presents to the Council for Higher Education the Self-Evaluation Report for the year 2009. The report covers our mathematics teaching program, at all levels (undergraduate, M.Sc. and Ph.D.), as well as research carried out at the Institute. The program in mathematics addresses about 300 undergraduates and 100 graduate students. In addition, hundreds of students from the departments of Computer Science and Physics take some of our courses side by side with math students, and hundreds more from Chemistry, Life Sciences, Engineering, Earth Sciences and Economics take service courses administered by the department (not covered in this report).

The last three years have been particularly difficult to academia in Israel. One war, two prolonged strikes (one by students, one by faculty) and a world-wide economical crisis have left deep marks on the higher education system. To these one may add a decade-long erosion in governmental support, and a decline in the prestige of academia, in particular universities, in the eyes of the public. These unhappy trends have been intensifying since the turn of the millennium and resulted in the loss of over eight hundred academic jobs in Israel. They have been considerably aggravated by the recent developments of the last three years.

To the outsider, it may seem that our Institute has been so far able to cope with these fundamental problems and disruptions. We have maintained the very high standards of research and teaching. We have continued to hire top level young faculty, and educate future generation of mathematicians through our excellent graduate program. Yet, stifling budget cuts and other constraints have already forced us to compromise our principles, especially at the undergraduate level, and resulted in a significant (25%) shrinking in academic staff since the year 2000, and an even more dramatic reduction (37% in nominal value) in the Institute's operating budget over the same period. If the attitude towards higher education in Israel is not radically changed, some long-term effects, such as the gradual disappearance of certain disciplines, due to university decision not to fill vacant positions, might become irreversible.

This report is organized in five chapters followed by appendices. With few exceptions, we adhered to the questions as phrased by the Council for Higher Education. We would like to summarize here briefly our most important findings and conclusions.

Strengths

- We pursue and maintain a high level of excellence, both in research and in teaching. A good age distribution of our faculty members and a carefully contemplated hiring policy guarantee that this will go on in the foreseeable future. Our department is well-balanced and new areas of research that have become the focus of attention in recent years, are well represented in it.
- Our Institute is a vibrant center of mathematical activity at all levels. There is a growing influx of post-doc's and visitors, and we hold seminars, schools, conferences and workshops for experts and advanced students. Our members enjoy an unusual number of research grants that support these activities.

- We offer a rich and diverse study program, with many elective courses and student seminars to choose from, which is constantly being revised according to the needs. We are particularly proud of our graduate study program.
- We have a large and active group of graduate students, many of whom mature to become research mathematicians, and occupy prominent positions at universities in Israel and abroad. Our graduate students play a central role in our teaching program, conducting recitations and grading homework.
- We are reaching out to the community through various extracurricular activities and are working voluntarily on improving K-12 math education in Israel.
- We are lucky to have a small but dedicated administrative staff that runs the department and the study program smoothly and efficiently.

Weaknesses and problems

- We need to strengthen our groups in certain areas, such as analysis, differential geometry and topology, where we have not been able to fill the positions of retired faculty. We would like to expand into Applied Mathematics, almost not represented in the HU at all, but this requires a strategic decision at the university level to expand the department and add more resources.
- We are witnessing a continuous drop in the level of entering undergraduate students, and the first semester, especially the Calculus 1 course, is becoming more and more traumatic. We are forced to teach a large group of unprepared and unmotivated students, many of whom do not major in math, which overshadows the group of students who are enthusiastic about their studies. The drop-out rate after the first year is very high.
- We are conducting recitation sessions in classes which are too big – often over 60 students per class. Individual attention is not possible, and the homework is only partially graded. Our dwindling budget is insufficient for proper teaching.
- The physical condition of some of our offices is very poor, in particular with regard to air conditioning and leakages. There is a severe shortage of offices. Our library suffers from chronic under-budgeting.
- We want to call attention to the *Jerusalem Effect* – the uneasy geographical and demographical environment within which the university operates, that deters students and faculty and damages the attractiveness of studies at the HU. A great deal can be done to improve the situation, both by university authorities and by the municipality.

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Jerusalem, 10 June 2009

Chapter 1

The Hebrew University of Jerusalem

1.1 ***A brief summary (up to one page) describing the institution and its development since its establishment, including details of the campus(es) where the institution's teaching activities take place (number and location), the faculties in the institution, the overall number of students studying towards academic degrees in the institution according to degree (first degree, second degree with thesis, second degree without thesis, doctoral degree), the date of recognition by the Council for Higher Education.***

The proposal to establish a Jewish institution for higher education was first raised as far back as 1882, yet the cornerstone of the Hebrew University was only laid in Jerusalem in 1918. On April 1, 1925, the University was officially inaugurated on Mount Scopus. The academic life of the University (courses and research) took place on Mount Scopus until 1948, the year of the establishment of the State of Israel. During the War of Independence, the road to Mount Scopus was blocked and the University was forced into exile; it continued its activities thereafter in rented facilities scattered throughout various parts of Jerusalem. In 1955, the government of Israel allocated land in the Givat Ram neighborhood for a new Hebrew University campus. In 1967, the road to Mount Scopus was reopened, and in the early 1970s, academic activities were restored on the Mount Scopus campus.

The University has since continued to grow, with the addition of new buildings, the establishment of new programs, and the recruitment of outstanding scholars, researchers and students, fulfilling its commitment to excellence.

The Hebrew University in Jerusalem was accredited as an institution of higher education by the President of Israel, Mr. Itzhak Ben-Zvi, in accordance with the Law of the Council of Higher Education, 1958, on the 23rd of August 1962.

The Hebrew University operates in five campuses:

- Mount Scopus campus, site of the Faculty of Humanities and the School of Education, the Faculty of Social Sciences, the School of Business Administration, the Faculty of Law and the Institute of Criminology, the School of Occupational Therapy, the Paul Baerwald School of Social Work and Social Welfare, the Truman Institute for the Advancement of Peace, the Center for Pre-Academic Studies, the Rothberg International School, and the Buber Center for Adult Education.
- Edmond J. Safra campus in Givat Ram, site of the Faculty of Mathematics and Natural Sciences, The Rachel and Selim Benin School of Engineering and Computer Sciences, The Center for the Study of Rationality, The Institute for Advanced Studies, and the Jewish National and University Libraries.
- Ein Kerem campus, site of the Faculty of Medicine (The Hebrew University–Hadassah Medical School, Braun School of Public Health and Community Medicine, School of Pharmacy, and the School of Nursing) and the Faculty of Dental Medicine.

- Rehovot campus, site of the Robert H. Smith Faculty of Agriculture, Food and Environment (The School of Nutritional Sciences and The Koret School of Veterinary Medicine).
- An additional site is the Interuniversity Institute for Marine Science in Eilat, operated by the Hebrew University for the benefit of allinstitutions of higher learning in Israel.

*Below is the **overall** number of students studying towards academic degrees in the institution according to degree:*

2009 Students of the Hebrew University

1st degree	**2nd degree**		**Ph.D**
	with thesis	**without thesis**	
11,540	2677	2629	2,625

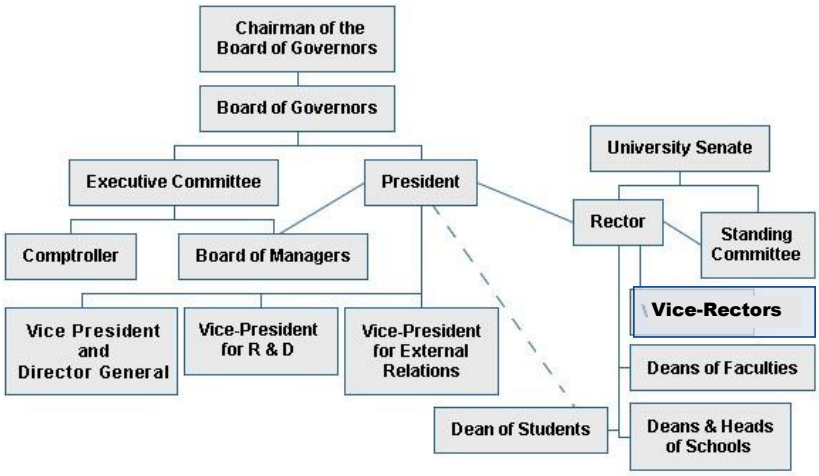
1.2 Mission statement of the institution, its aims and goals

As the first research university in Israel, The Hebrew University's mission is to develop cutting-edge research, and to educate the next generations of leading scientists and scholars in all fields of learning. The Hebrew University is part of the international scientific and scholarly network: we measure ourselves by international standards and we strive to be counted among the best research universities worldwide.

The Hebrew University is a pluralistic institution, where science and knowledge are developed for the benefit of humankind. At the same time, the study of Jewish culture and heritage are a foremost legacy of the Hebrew University, as indicated by both its history and its name.

The Hebrew University strives to be a vibrant academic community, committed to rigorous scientific approach and characterized by its intellectual effervescence. These will both radiate and enlighten the University's surrounding society.

1.3 Description of Institution's organizational structure



1.4 Names of holder of senior academic and administrative positions

Chairman of the Board of Governors:	Michael Federmann
President:	Prof. Menahem Ben-Sasson
Rector:	Prof. Sarah Stroumsa
Vice-President and Director-General:	Elhanan Hacohen
Vice-President for Research and Development:	Prof. Hillel Bercovier
Vice-President for External Relations:	Carmi Gillon
Vice-Rector:	Prof. Yaacov Schul
Vice-Rector	Prof. Oded Navon
Comptroller:	Yair Hurwitz

Deans:

Faculty of Humanities:	Prof. Israel Bartal
Faculty of Social Sciences:	Prof. Avner de Shalit*
Faculty of Law:	Prof. Barak Medina*
Faculty of Mathematics & Natural Science:	Prof. Gad Marom
Faculty of Agriculture, Food & Environment:	Prof. Aharon Friedman*
Faculty of Medicine:	Prof. Eran Leitersdorf*
Faculty of Dental Medicine:	Prof. Adam Stabholtz
School of Business Administration:	Prof. Dan Galai*
School of Social Work:	Prof. Gail Auslander
Dean of Students:	Prof. Esther Shohami

* Effective October 1, 2009

Chapter 2

The Faculty of Science

2.1 ***The name of the parent unit and a brief summary of its "history", its activities and development in the period of its existence.***

The Faculty of Science: The first Dean of the Faculty of Mathematics, Prof. Abraham Halevi Fraenkel, joined the university in 1929, four years after the foundation of the Hebrew University. In the two following years the Microbiology, Chemistry and Physics departments were established and later were joined together to form the Faculty of Science. The War of Independence in 1948 left the University campus cut off from Israeli west Jerusalem, and alternative facilities were located throughout the city. In 1953, construction began on a new main campus at Giv'at Ram in the heart of Jerusalem. During the Sixties and Seventies the research and teaching activities were all transferred to the Giv'at Ram Edmond J. Safra Campus.

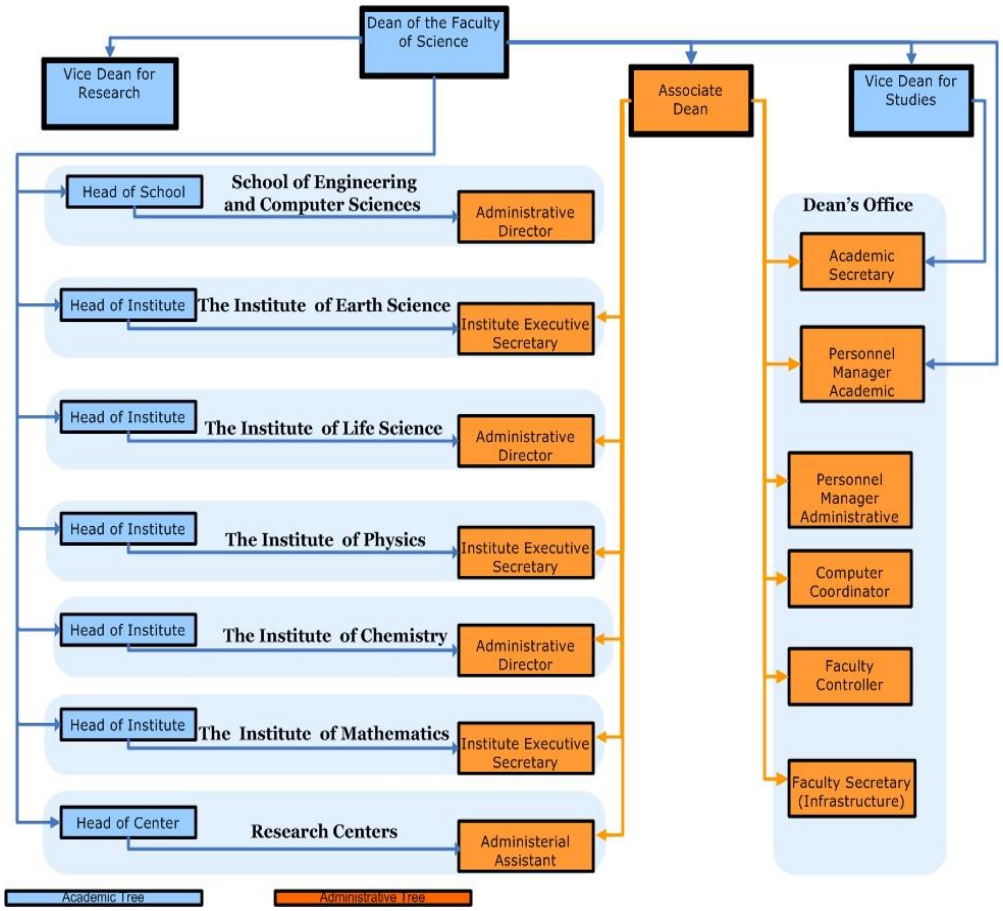
2.2 ***Mission Statement of the Institute, its Aims and Goals****:*

The Faculty of Science and Mathematics has the following two major goals:
Learning, Teaching and Educating – The Faculty of Science attracts some of the best students in Israel. It aspires to offer students a high level of teaching and training at both the undergraduate and graduate levels, which is based on forefront scientific expertise and advanced research facilities. The Faculty aims at generating highly professional graduates who are prepared to cope with future scientific and professional challenges.
Research – The level of research carried out in the Faculty of Science is one of the highest in the world. In their work, spanning many varied disciplines, our scientists and research students contribute to knowledge on the many fronts of science. The Faculty's aim is to maintain top class scientific research in all of its varied disciplines by providing its faculty members, both junior and senior, with a challenging intellectual environment as well as advanced scientific facilities..

2.3 ***Description and chart of the unit's academic and administrative organizational structure (including relevant committees).***

The Faculty of Science consists of five research institutes: *Mathematics, Physics, Life Sciences, Chemistry* and *Earth Sciences*, as well as *"The School of Engineering and Computer Science"*. All these different disciplines are located in the Giv'at Ram Edmond J. Safra Campus in Jerusalem, in close proximity, which enables bridging various scientific and technological fields and creating new research directions. The combination of these different, basic fields is expressed in the development of multidisciplinary teaching and research centers such as: *The Amos de-Shalit Science Teaching Center, The Interdisciplinary Center for Neural Computation, The Center for the Study of Rationality, The Institute for Advanced Studies, The Center for Nanoscience and Nanotechnology and The Sudarsky Center for Computational Biology*. The Faculty has 240 members, about 2,000 undergraduates and 1,400 MSc and PhD students.

Many members of the Faculty of Science have been internationally acclaimed, and this renown has brought them copious awards and honors in their specific fields of expertise. A short list of just some of the recent prizes includes: **The Nobel Prize** (Prof. R. Aumann, Game Theory, 2006); **The Israel Prize** (Prof. Y. Bekenstein, Physics, 2005; Prof. Z. Rapaport, Chemistry, 2006); Prof. Z. Selinger [ז"ל], Biology, 2007); **The Wolf Prize** (Prof. A. Levitzki, Life Sciences, 2005; Prof. H. Furstenberg, Mathematics, 2007; **The EMET Prize** (Prof. H. Furstenberg, Mathematics, 2004; Prof. M. Rabin, Computer Science, 2004; Prof. Z. Selinger [ז"ל] , Biological Chemistry, 2005; Prof. Z. Garfunkel, Geology, 2006; Prof. Batsheva Kerem, Life Sciences, 2008; and Prof. I. Willner, Chemistry, 2008).



The Faculty is headed by the Dean. Two Vice-Deans assist the Dean to coordinate the research and teaching activities. The Associate Dean is the Administrative director of the Dean's Office and the Faculty. Each institute is headed by the institute's Chairperson who is assisted by an administrative director. The teaching activities of each institute are coordinated by the Head the Teaching Program who is an ex-officio member of the Faculty Teaching Committee under the Vice-Dean.

2.4 ***Names of holders of senior positions at the Faculty of Science:***

Dean of Faculty: Prof. Gad Marom
Associate Dean: Dr. Jacob Nissenbaum
Vice-Dean for Studies: Prof. Michael Paul
Vice-Dean for Research: Prof. Yosef Yarom
Assistant to the Dean for Scholarships/Fellowships: Prof. Alan Matthews

2.5 ***The number of study programs (departments, etc.) operating in its framework; the names of the academic degrees (in English and Hebrew) granted to the graduates of these programs (the phrasing that appears in the diploma); the number of students who have studied (and are studying) within the parent unit in each of the last five years according to the level of degree (first degree, second degree with thesis, second degree without thesis, doctoral degree). Please provide this data in the format of a table.***

The Faculty of Science hosts **18** departments and programs of study towards the first degree (**Bachelor of Science**) and **23** departments and programs of study towards the second degree (**Master of Science**) and the **PhD** degree. The studies towards the PhD degree are administered within the framework of the Authority for Research Students.
The Faculty of Science confers the following degrees; the list of Departments and Programs of Study in which the degrees are conferred is given below.

- **Bachelor of Science** Upon successful completion of the required course of studies in the Department(s) of… (with Specialization in ...)
- **Master of Science** Upon completing the required course of studies and submitting the prescribed thesis in the Department of … (with Specialization in …)
- **Master of Science** in the frame of direct studies to PhD in the Department of …
- **Master of Science** Upon completing the required course of studies in the Department of …

2.6 ***The number of graduates of the unit in each of the last five years according the level of degree (first degree, second degree with thesis, second degree without thesis, doctoral degree). Please provide this data in the format of a table.***

Table 2.6a Number of students in the Faculty of Science

Academic Year	BSc	MSc with thesis	MSc without thesis	PhD
2003-04	2006	664	42	558
2004-05	1867	698	41	590
2005-06	1903	668	53	633
2006-07	1997	640	74	667
2007-08	2033	646	75	679

Table 2.6b: List of Departments and Programs of Study

Mathematics	מתמטיקה	BSc	MSc	PhD
Physics	פיסיקה	BSc	MSc	PhD
Chemistry	כימיה	BSc	MSc	PhD
Life Sciences	מדעי החיים	BSc		
Computer Sciences	מדעי המחשב	BSc	MSc	PhD
Earth Sciences	מדעי כדור הארץ	BSc		
Environmental |Sciences	מדעי הסביבה	BSc	MSc	PhD
Mathematics and Math Teaching	מתמטיקה במגמת הוראה	BSc		
Computer Sciences and Computational Biology	מדעי המחשב וביולוגיה חשובית	BSc	MSc	PhD
Computer Engineering	מדעי המחשב	BSc		
Computer Engineering with Specialization in Applied Physics	מדעי המחשב בהתמחות פיסיקה יישומית	BSc		
Applied Physics	פיסיקה יישומית			PhD
Brain Sciences: Computation and Information Processing	מדעי המח: חישוב ועיבוד מידע		MSc	PhD
Specialization in Rationality	התמחות ברציונליות		MSc	PhD
Amirim: Program for Outstanding Students	אמירים: תוכנית מצטיינים	BSc		
Talpiot: IDF Academic Program in Physics and Mathematics	תלפיות: תוכנית אקדמית צה"לית בפיסיקה-מתמטיקה	BSc		
Plant Sciences (Botanics)	מדעי הצמח (בוטניקה)		MSc	PhD
Cellular and Developmental Biology	ביולוגיה תאית והתפתחותית		MSc	PhD
Genetics	גנטיקה		MSc	PhD
Brain and Behavioral Sciences	מדעי המח וההתנהגות		MSc	PhD
Structural and Molecular Biochemistry	ביוכימיה מבנית ומולקולרית		MSc	PhD
Evolution, Systematics and Ecology	אבולוציה, סיסטמטיקה ואקולוגיה		MSc	PhD
Specialization in Genomics and Bioinformatics	התמחות בגנומיקה		MSc	PhD
Biotechnology	ביוטכנולוגיה		MSc	
Bioengineering	ביו-הנדסה			PhD
Exact Sciences (Physics-Chemistry)	מדעים מדויקים (פיסיקה-כימיה)	BSc	MSc	PhD
Chemistry and Life Sciences	כימיה-ביולוגיה	BSc		
Geology	גיאולוגיה	BSc	MSc	PhD
Atmospheric Sciences	מדעי האטמוספירה	BSc	MSc	PhD
Climate, Atmosphere and Oceanography	אקלים, אטמוספירה ואוקאנוגרפיה	BSc		
Science Instruction	הוראת המדעים		MSc	PhD
Oceanography	אוקיאנוגרפיה		MSc	PhD
Management of Technology	נהול טכנולוגיה		MSc	

Table 2.6c Number of graduates of the Faculty of Science

Academic Year	BSc	MSc with thesis	MSc in direct studies to PhD	MSc without thesis	PhD
2003-04	574	162			83
2004-05	611	131	24	15	99
2005-06	552	183		35	73
2006-07	480	145	22	10	67
2007-08	473	154	26	17	82

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Chapter 5

The Self-Evaluation Process, Summary and Conclusions

What did you learn in school today, dear little boy of mine?
I learned that our government must be strong
It's always right and never wrong
Our leaders are the finest men
So we elect them again and again
And that's what I learned in school today
That's what I learned in school

5.1. To what extent do the institution and the parent unit perform self-evaluation on a regular basis? (apart from the evaluation initiated by the Council for Higher Education). If self-evaluation is being performed – please describe and evaluate the way it is carried out and its frequency.

The Hebrew University initiated a systematic process of review and evaluation of all its units at regular intervals (usually each unit is evaluated every 5-7 years). Depending on the nature of the unit being evaluated, the review process relies either on external committees consisting of internationally renowned experts in the reviewed field from leading universities abroad, or on internal committees (based on HUJI personnel) supplemented by one or two external members from other universities either in Israel or abroad. The mandate of the Committees, as stated in the nomination letter, is to evaluate the unit's academic performance in teaching and research, and its standing within the field, in Israel and internationally. The Committees are asked to identify areas of strength and weakness and to advise the University on ways to improve and develop the unit. To achieve that goal, committees examine all aspects of the reviewed unit: the activity of faculty members, in research and teaching, curricula, students' level, infrastructure, and administrative functions.

5.2. Has the institution appointed a senior staff member to deal with self-evaluation? If so, please state his name and his past and present position in the institution. State and evaluate the definition of his task as the staff member in charge of quality evaluation in the institution, including the scope of his authority and his method of operation.

Professor Yaacov Schul is the Vice-Rector responsible for the academic evaluations at the Hebrew University. Assisting him is Professor Oded Navon, who is also a Vice Rector. The process of the review, begins with the appointment of the Committee members, and the preparation of material by the reviewed unit. Preparing the material for the Review Committee also gives the unit an opportunity for self-assessment, itself an important stage in the review. The self-evaluation report is handed to the Committee prior to their visit in the reviewed unit. During the visit, Committee members get access to all relevant material and meet with staff, faculty and students. The Committee's report is submitted to the Rector, and its recommendations are carefully studied by the University administration (The President, the Rector, and the Vice-Rectors). The reviewed unit is asked to prepare a response, which is brought, together with the report of the review committee before the University's Committee for Academic Policy. This Committee, chaired by the President and the Rector,

discusses all the relevant matters and decides on implementing all, or parts, of the recommendations.

5.3. Describe the methods used by the parent unit and the study program in its self-evaluation process, and what are your conclusions with regard both to the methods/the way it was performed and to its results?

Within the department of mathematics, the process of self-evaluation is a continuous process that is conducted on a daily basis in committee meetings as well as in informal discussions. Faculty members are by their nature critical of the system and seeking improvements, and when they fail to be so, one can be sure that the students will prompt them to examine whatever needs to be examined.

The present process of self-evaluation gave us the opportunity to collect our thoughts and organize them. It allowed us to focus on the strengths and weaknesses and define targets more clearly. We hope that the document we have prepared will not be sent to a drawer, and that the concerns expressed in this report issues such as the shrinking size of the department, the erosion of our budget, the "Jerusalem effect", or the deterioration of the Israeli high-school education, will find an attentive audience.

While collecting the figures and preparing the tables we were occasionally surprised by the data. Yet, overall, it reinforced our intuitions. Occasionally, there was disagreement between members of the steering committee about what has to be done to address major problems. For example, it was not clear that the introduction of a slow-pace Calculus 1 class a decade ago (which has been discontinued since), was the right way to confront the poor background of our entering students. Such disagreements are natural, of course.

5.4. Describe the consolidation process of the self-evaluation report, including its preparation and final approval (including a description of the contributions of staff members to the process).

As soon as we received the request from the Rector, the general assembly of the department, in one of its meetings, approved the formation of a *steering committee.* The steering committee was responsible for the collection of data, the preparation of the report, and its members divided between themselves the writing of the individual chapters. Members of the steering committee were:

- Prof. Ehud de Shalit (chairman of the department)
- Prof. Shahar Mozes (head of the studies program and vice-chair)
- Prof. Ron Livne (scheduled to be the next chairman)
- Prof. Tomek Szankowski (twice head of the studies program in the past)
- Mrs. Lucia Orenstein (executive secretary)
- Mrs. Orna Barak (secretary of the studies program)

Sections 3.6.3 and 3.6.5 were written by the system administrator, Lena Obuchovsky, and the by library director, Gila Manusovich-Shamir. Chapters 1 and 2 were supplied by the offices of the Rector and the Dean, respectively.

Members of the department were asked to supply the following data: (1) an updated CV and list of publications (2) a detailed syllabus for each of the courses they have been teaching in 2008/09. For the second purpose we thank Naavah Levin for preparing an interactive form which the teachers filled on-line. These forms were then electronically transcribed to the format you find on the attached CD.

Data gathering and the preparation of the tables were the meticulous work of Mrs. Orenstein and Mrs. Barak. The members of the committee circulated among themselves drafts of what they have written and met 4 times during the year to discuss the progress of the report. Piecing together the report was done by the chairman. Because of the way it was prepared, some repetitions were unaviodable. We hope they didn't make it too lengthy. The committee also met with Ido Samet, a representative of the graduate students, and with selected undergraduates, to hear their views.

Deadlines were set for submitting the required information, and for writing of the various chapters. By the end of May 2009 most of the material has been collected, and most of the report has been written. On June 9 the steering committee met for the last time, to review the final product. It was then distributed among all department members for comments and last-minute changes. We hope to submit it to the Rector by June 30.

5.5. If a mechanism/structure has been decided upon for the future treatment of problematic issues that were highlighted by the self-evaluation activity, specify it while referring to the functionary within the institution who would be responsible to follow up on this activity. Please refer to the question of how the institution and the parent unit intend to deal in the future with quality assessment and its implementation?

Following the discussion and decision by the University's Committee for Academic Policy, the executive summary of the review report is posted on the internet. The Vice-Rector discusses the recommendations and their implementation with the reviewed unit's chairperson. The implementation is monitored by the Implementation Committee, which include the two vice-rectors, three former deans (Social Science, Natural Science, and Agriculture), and two members of the University's Standing Committee.

5.6. Are the results of the self-evaluation open, transparent and accessible to staff (academic as well as administrative) and students?

The Hebrew University regards transparency and accessibility of evaluation reports as essential to the usefulness of the self-evaluation process. Following the discussion by the committee for academic policy (see above), the reports are made public and posted on the University's website.