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COUNCIL FOR HIGHER EDUCATION

The Committee for the Evaluation of Mathematics Study-Programs

The Hebrew University Evaluation Report

August 2010

Contents

Chapter 1 - Background

At its meeting on October 07, 2008 the Council for Higher Education (CHE) decided to evaluate study programs in the fields of mathematics during the academic year 2009-2010.

Following the decision of the CHE, the Minister of Education, who serves ex officio as a Chairperson of the CHE, appointed a Committee consisting of:

- **Prof. Benedict H. Gross,** Mathematics Department, Harvard University, USA - Chair
- **Prof. Ronald Coifman,** Department of Mathematics and the Department of Computer Science, Yale University, USA
- **Prof. Hillel Furstenberg (emeritus),** Department of Mathematics, the Hebrew University, Israel
- **Prof. Gerard van der Geer,** Korteweg-de Vries Institute for Mathematics, University of Amsterdam, the Netherlands
- **Prof. David Jerison[1],** Mathematics Departments, Massachusetts Institute of Technology, USA
- **Prof. Yakar Kannai,** Department of Mathematics, Faculty of Mathematics and Computer Science, Weizmann Institute, Israel

Ms. Noa Nof Steiner - Coordinator of the Committee on behalf of the Council for Higher Education.

Within the framework of its activity, the Committee was requested to:[2]

1. Examine the self-evaluation reports, submitted by the institutions that provide study programs in mathematics, 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.

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 2008).

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[1] Prof. David Jerison did not participate in the second round of visits.
[2] The Committee's letter of appointment is attached as **Appendix 1**.

Chapter 2 - Committee Procedures

The Committee members received the self-evaluation reports in November, 2009, and discussed them via email.

The Committee held its first meeting on January 3, 2010, during which it discussed fundamental issues concerning higher education in Israel, the quality assessment activity, as well as Mathematics study programs.

In January 2010, the Committee held its first cycle of evaluation, and visited the Open University, the Hebrew University, Tel-Aviv University and the Technion. In May 2010, the Committee conducted its second evaluation cycle, and visited Haifa University, Bar Ilan University and Ben-Gurion University of the Negev. During the visits, the Committee met with various stakeholders at the institutions, including management, faculty, staff, and students.

This report deals with the **Einstein Institute of Mathematics, at the Hebrew University of Jerusalem.**

The Committee's visit at the Hebrew University took place on January 6-7, 2010. The participating Committee members were Prof. Benedict H. Gross, Prof. Gerard van der Geer, Prof. David Jerison, and Prof. Yakar Kannai. In order to avoid the appearance of conflict of interests, Prof. Hillel Furstenberg, who has been a faculty member of the Department, did not participate in the evaluation of this Department. The schedule of the visit, including the list of participants from the institution, is attached as **Appendix 2**.

The Committee thanks the management of the Hebrew University and the Einstein Institute of Mathematics for their self-evaluation report and for their hospitality towards the Committee during its visit at the institution.

Chapter 3: Evaluation of the Einstein Institute of Mathematics, at the Hebrew University of Jerusalem.

* This Report relates to the situation current at the time of the visit to the institution, and does not take account of any changes that may have occurred subsequently. 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.

Background

The Einstein Institute of Mathematics (henceforth, "the Department") was established in 1925, and operates in the Faculty of Sciences in the Givat-Ram Campus. Over the years, the Department gained excellent international reputation in various areas and it enjoys fruitful collaboration with other departments and scholars under the auspices of the University's multidisciplinary Center for Rationality and Interactive Decision Theory and the Landau Center for Research in Mathematical Analysis and Related Areas.

During the 2008-09 academic year, The Hebrew University student population was over 21,000, of whom roughly 11,000 were at the undergraduate level and nearly 10,000 at the graduate level. The same academic year 292 undergraduate students, 55 master's level students, and 43 doctoral students enrolled in the Einstein Institute of Mathematics, and it granted 89 B.Sc. degrees, 16 M.Sc. degrees and 6 Ph.D. degrees.

The Department has provided the Committee in its Self Evaluation Report 2009 with an extremely honest assessment of its strengths and weaknesses, as well as the challenges it is facing. Many of the issues raised in their excellent report were present in other Israeli institutions, and some were particular to the Department.

Faculty

The Department is a renowned center for research, and it enjoys a very high international reputation. Indeed, for some time, it has been a flagship of the Hebrew University. The faculty is outstanding, and a lively atmosphere pervades the Department.

The faculty have been very successful in obtaining research grants and awards which

guarantee their ability to perform mathematical work of the highest quality in the near future. The Department also provides a high level of mathematical education to the students of mathematics and of other disciplines. In general, students appreciate the education they get and the dedication of the faculty to teaching. There is some concern on the faculty's part that the level of students entering the programs has declined in the past ten years.

However, financial problems faced by Hebrew University are affecting the Department, and are a threat to its sustained high performance. This results in a declining budget, inability to appoint faculty in vacant positions, uncertainty about the short-term of the Department, and the lack of sufficient assistants to teach exercise classes and to grade exercises.

The funding of the Department by the university is very uncertain, with no long term plans about future funding. The absence of even short-term predictions about its financial situation aggravates this even further. The uncertainty is a serious threat to the good functioning of the Department, as it affects its ability to fill vacancies and could form a threat to its research potential. It also has a dire effect on teaching; there is an acute lack of teaching assistants to teach exercise classes and grade homework and those who teach receive notice on their teaching duties only a few weeks in advance. This problem requires immediate attention and action.

The presence of an excellent center of mathematical research with worldwide renown should not be taken for granted. The success in hiring is due to the high reputation of the faculty, and a small decline, when combined with factors such as the geographic location and the demographics of Jerusalem, will make it extremely difficult to regain stature if it is lost.

Research

The research performance of the Department, most of it in pure mathematics, has been excellent and it has earned it a very high reputation. It has evolved over the years, with more emphasis on areas of algebra, number theory and geometry, where new developments are taking place, and thus has shifted somewhat from traditional research in analysis. Set theory, logic and foundations do not play such a central role

as they used to. The atmosphere in the Department, with its many seminars, workshops and reading classes, is extremely stimulating and all, but especially the graduate students, appreciate it and profit from it.

The hiring policy has been very successful. In particular, the age distribution of the faculty is excellent. The various directions of research are in general well-represented, but there are natural variations, due to developments in research fields and a hiring policy that favors absolute quality. These factors have led to a less prominent presence of analysis, differential geometry and topology.

Applied mathematics is much less present in the research activity. This in itself need not be a problem for a well-balanced department, as neighboring departments might focus on applied mathematics and cooperation might cover possible gaps. Setting up a full-fledged research activity in applied mathematics requires financial resources that at the moment are simply not available at the University level. Also, planning a hiring policy in applied mathematics ahead could prove to be complicated, due to availability of qualified candidates and difficulties in defining departmental needs. Nevertheless, the Department might enhance the presence of applied mathematics by making two or three strategic appointments that reinforce the cooperation with research centers nearby where applied mathematics is present, for example by extending the cooperation with the School of Engineering and Computer Science. Discrete mathematics provides such a possible link with computer scientists.

Teaching

The excellent research atmosphere has a beneficial influence on graduate studies in the Department, and this should be viewed as the strongest part of the teaching program. The B.Sc. program maintains high standards, but experiences high drop-out rates. The curriculum offers a broad spectrum of mathematics education, though applied mathematics is underrepresented due to the focus of the Department. The curriculum that is offered is adequate though maybe not optimal, and a regular general review of the curriculum could address possible imbalances. Exams could be improved by putting less emphasis on memorization. Midterm tests could also improve the efficiency of teaching.

The communication between the professors teaching the courses and the teaching assistants should be improved, e.g. by scheduling a weekly meeting. The lack of sufficient teaching assistants to teach exercise classes and to grade exercises is a strong negative factor to the efficiency of the B.Sc. program. This is a particular problem in mathematics, where careful attention needs to be paid to the arguments in a homework assignment.

The Committee felt that the students in the PhD program would benefit from a regular review of their ongoing thesis work. Also, given the globalization of mathematics, and the desire to attract faculty from outside of Israel, we felt that offering graduate courses in English should be seriously considered.

Infrastructure

The technical and administrative staff seems competent and helpful. The top floor of the Manchester building suffers from shoddy construction, and hence extremes of temperature. It does not offer reasonable working conditions. Apart from this, there is a general lack of office space for new faculty.

The library provides good facilities for the needs of the students and the faculty, but a budget for the purchase of new books is non-existent. Since a good working library is an indispensable research tool for mathematicians (it functions as our laboratory), the inadequate book budget needs to be addressed.

Summary and Recommendations

The Einstein Institute of Mathematics is a renowned center for research, and it enjoys a high international reputation. The faculty is outstanding and the research performance of the Department has been excellent. It also has a beneficial influence on graduate studies in the Department. Nevertheless, the Department is experiencing financial difficulties and budgetary uncertainty that comprises a serious threat to its good functioning and its ability to hire new faculty, especially in light of the demographic issues of Jerusalem. An acute lack of teaching assistants to do exercise classes and to grade exercises has a dire effect on teaching.
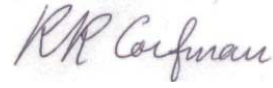
The Committee recommends as follows:

1. The intellectual center of the Department lies securely inside pure mathematics, and the financial situation of the Department and the University, as well as other reasons mentioned above, makes the appointment of a strong research unit in applied mathematics unrealistic at this time. Instead, the Committee suggests that the faculty consider two or three strategic appointments that reinforce the cooperation with existing centers on the campus.

2. The faculty should organize a regular review of the undergraduate curriculum, and consider giving more graduate courses in English.

3. Efforts should be made to improve the communication between the professors teaching a course and the teaching assistants conducting the exercise classes.

4. The structure of exams should be reconsidered, introducing midterms to give students a better idea of their progress, and selecting questions that test areas other than memorization.

5. The deans and rectors need to work with the Department on a long range plan for the hiring of faculty, and in particular, to assess the appropriate size of the Department.

6. University administration should take immediate steps to improve the situation with the exercise classes and the grading of exercises.

7. University administration should provide the necessary information to the teaching assistants as to their funding over a year-long period, and make sure they receive it in the summer before they are teaching.

8. University administration should work with the Department to try to find solutions to the problems of office space, as well as the library budget.

Signed by:

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Prof. Benedict Gross, Chair

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Prof. Gerard van Geer

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Prof. Yakar Kannai

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Prof. Ronald Coifman

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Prof. David Jerison

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Appendices

December 12, 2009

Prof. Benedict H. Gross
Mathematics Department
Harvard University
USA

שר החינוך
Minister of Education
وزير التربية والتعليم

Dear Professor Gross,

The State of Israel undertook an ambitious project when the Israeli Council for Higher Education (CHE) established a quality assessment and assurance system for Israeli higher education. Its stated goals are: to enhance and ensure the quality of academic studies; to provide the public with information regarding the quality of study programs in institutions of higher education throughout Israel; and to ensure the continued integration of the Israeli system of higher education in the international academic arena. Involvement of world-renowned academicians in this process is essential.

This most important initiative reaches out to scientists in the international arena in a national effort to meet the critical challenges that confront the Israeli higher educational system today. The formulation of international evaluation committees represents an opportunity to express our common sense of concern and to assess the current and future status of education in the 21st century and beyond. It also establishes a structure for an ongoing consultative process among scientists around the globe on common academic dilemmas and prospects.

I therefore deeply appreciate your willingness to join us in this crucial endeavor.

It is with great pleasure that I hereby appoint you to serve as the Chair of the Council for Higher Education's Committee for the Evaluation of Mathematics Studies.
The composition of the Committee will be as follows: Prof. Benedict H. Gross – Chair, Prof. Ronald Coifman, Prof. Hillel Furstenberg, Prof. Gerard van der Geer, Prof. David Jerison, Prof. Yakar Kannai. Ms. Noa Nof-Steiner will coordinate the Committee's activities.

In your capacity as the Chair of the Evaluation Committee, you will be requested to function in accordance with the enclosed appendix.

I wish you much success in your role as the Chair of this most important committee.

Yours sincerely,

Gideon Sa'ar
Minister of Education,
Chairperson, the Council for Higher Education

Enclosures: Appendix to the Appointment Letter of Evaluation Committees

cc: Ms. Riki Mendelzvaig, Secretary of the Council for Higher Education
      Ms. Michal Neumann, Head of the Quality Assessment Unit
      Ms. Noa Nof-Steiner, Committee Coordinator

Appendix 2- Site Visit Schedule

האוניברסיטה העברית בירושלים

The Hebrew University of Jerusalem

The Committee for the Evaluation of Mathematics Study Programs-

First day- January 6th, 2010

Time	Subject	Participants
08:30-09:30	Opening Session **President's office, Minhala bldg., 2nd floor, (room no 506) Mount Scopus**	Prof. Menahem Ben Sasson, President Prof. Sarah Stroumsa, Rector Prof. Yaacov Schul, Vice Rector Prof. Oded Navon, Vice Rector
10:15-11:15	Meeting with senior faculty (and representatives of the teaching committee) **All meeting will be held in the Faculty Lounge (room no. 14), The Einstein Institute of Mathematics, Manchester Building Edmond J Safra Compus, Givat Ram**	Prof. E. De-Shalit Prof. D. Kazhdan Prof. R. Kupferman Prof. R. Lawrence Prof. A. Lubotzky Prof. S. Mozes Prof. Z. Sela Prof. A. Szankowski
11:15-11:45	Meeting with the Dean of Faculty of Science	Prof. Gad Marom
11:45-12:15	Meeting with the Chair of the Institute of Mathematics	Prof. Ron Livne
12:15-12:30	Tour of Manchester Building (Library, Computer Lab.)	Prof. R. Livne
12:30- 13:30	Lunch with senior faculty	Prof. M. Ben-Artzi Prof. E. De-Shalit Prof. E. Farjoun Prof. S. Mozes Prof. A. Shalev Prof. S. Shelah
13:30-14:00	Closed-door working meeting of the committee	

Second day- January 7th, 2010

Time	Subject	Participants
9:00-10:00	Meeting with junior academic staff **All meeting will be held in the Faculty Lounge, The Einstein Institute of Mathematics, Manchester Building Edmond J Safra Compus, Givat Ram**	Dr. N. Berger Dr. J. Breuer Dr. Y. Solomon
10:00-11:00	Meeting with undergraduate students	Simcha Barkai Sareet Baskin Oren Becker Noga Rotman Amit Solomon Lior Yanovski Yoav Zemel
11:00-12:00	Meeting with MA students	Shlomi Agmon Adina Cohen Yannai Gonczarowski Asaf Horev Yoav Len Omer Zilberboim
12:00-12:45	Meeting with Ph.D. students	Menny Aka Jan Dolinsky Yonatan Harpaz Iddo Samet Tomer Schlank Uri Shapira Amitai Zernik
12:45-13:45	Lunch Closed-door working meeting	
13:45-14:30	Summation meeting with the Chair of the Institution	Prof. Ron Livne
14:30-15:15	Summation meeting with Heads of the Institution and of the Department	Prof. Yaacov Schul, Vice Rector Prof. Oded Navon, Vice Rector