Committee for the Evaluation of Biology/Life Sciences Study Programs

Bar Ilan University

Life Sciences Teaching Program

The Mina & Everard Goodman Faculty of Life Sciences

Evaluation Report

September 2010

Contents

Chapter 1 - Background

At its meeting on October 23, 2007 the Council for Higher Education (CHE) decided to evaluate study programs in the field of Biology/Life Sciences during the academic year 2007-2008.

Following the decision of the CHE, the Minister of Education, who serves ex officio as the Chair of the CHE, appointed an Evaluation Committee for the evaluation of the academic quality of biology/Life Sciences studies in Israel. The Committee consists of:

- **Prof. Michael Levitt, Department of Structural Biology, School of Medicine, Stanford University, USA - Committee Chair**
- **Prof. Ueli Aebi, M.E. Muller Institute for Structural Biology Biozentrum, University of Basel, Switzerland**
- **Prof. Yigal Cohen, Faculty of Life Sciences, Bar Ilan University, Israel[1]**
- **Prof. Nicole Le Douarin, Institute of Embryology, College de France, France[2]**
- **Prof. Shlomo Rotshenker, Department of Medical Neurobiology, The Hebrew University Medical School, Israel**
- **Prof. Daniel Simberloff, Department of Ecology and Evolutionary Biology, University of Tennessee, USA**

Ms. Marissa Gross- Coordinator of the Committee on behalf of the CHE.

Within the framework of its activity, the Committee was requested to submit the following documents to the CHE:

1. A final report for each of the institutions, which would include an evaluation of Life Science study programs, the Committee's findings and recommendations.
2. A general report regarding the status of the evaluated field of study in Israeli institutions of higher education.
3. Recommendations for standards in the evaluated field of study.

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

The first stage of the quality assessment process consisted of self-evaluation, including the preparation of a self-evaluation report by the institutions under evaluation. This process was conducted in accordance with the CHE's guidelines as specified in the document entitled "The Self-Evaluation Process: Recommendations and Guidelines" (October 2007).

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[1] Prof. Cohen did not attend the site visit at Bar Ilan University.

[2] Prof. Le Douarin did not attend the second round of visits due to personal reasons.

Chapter 2 - Committee Procedures

The Committee held its first meetings on May 8, 2009. At this meeting committee members were given an overview of higher education in Israel and a description of the Israeli CHE. They also discussed Biology/Life Sciences study programs in Israel and fundamental issues concerning the committee's quality assessment activity.

During May 2009 Committee members conducted full-day visits to two of the eight institutions whose Biology/Life Sciences study programs the committee was requested to examine: Hebrew University in Jerusalem and Tel Aviv University. The committee visited the remaining six institutions, the Ariel University Center, Bar Ilan University, the Open University of Israel, the Weizmann Institute of Science, the Technion- Israel Institute of Technology, and Ben Gurion University during March 2010.

During these meetings, the Committee met with the relevant officials at each institution, as well as with faculty members, students and alumni, and also conducted a tour of the campus.

This report deals with the Biology/Life Sciences Programs of the Life Sciences Teaching Program of the Mina & Everard Goodman Faculty of Life Sciences Department at Bar Ilan University.

The Committee's visit to Bar Ilan University took place on March 7-8, 2010.

The schedule of the visit, including the list of participants representing the institution, is attached as **Appendix 2.**

The members of the committee thank the management of the institution and the Faculty of Life Sciences for the self-evaluation report and for the hospitality offered to the Committee during its visit.

Chapter 3 - Evaluation of Biology/Life Sciences Study Programs at Bar Ilan University*

3.1 General Background

Biology studies at Bar Ilan University began in 1956 with the initial teaching of biology courses. A department of Life Sciences was officially founded in 1968 within the Faculty of Natural Sciences. The department became an independent Faculty of Life Sciences in 1998. It offers undergraduate and graduate degrees in several tracks of Life Sciences. In addition, the department offers degrees in Biotechnology and Computational Biology. This report will focus on the Life Sciences program. In the 2007-2008 academic year, 949 students were enrolled in the undergraduate program, 265 MSc students, 187 PhD students and 24 post doctoral fellows. That same year, the department granted 272 BSc, 70 MSc and 28 PhD degrees.

3.2 Executive Summary

The Bar Ilan University senior administration expressed a special commitment towards developing research and teaching in the Life Sciences at BIU to the highest standards. Senior faculty members in the Life Sciences are enthusiastic in supporting this mission. Specifically: (a) the number of new faculty is planned to increase from 42 to 64, (b) a generous tailor-made absorption package is provided to young recruits, (c) a special effort is made to recruit established leading scientists, (d) a new nanotechnology building has been constructed with the aim of bringing together researchers with common interests, thus establishing conditions for collaboration and interdisciplinary research. Indeed many excellent new faculty members were recruited in recent years. Overall, faculty and students are happy with the University policy. There are, however, weaknesses (listed below) that need attention and correction. Amongst these are relatively low research achievement and high student-to-faculty ratio. The commitment and high priority assigned to upgrade the Life Sciences at BIU may correct these major drawbacks.

3.3 Goals and General Situation

The mission statement is given very clearly and succinctly. It states: “The goal of the Faculty of Life Sciences is to prepare the next generation of scientists in the field of the life sciences, who will be able to become integrated in the academy, in teaching, in industry, in medicine and in the public service.” As such, it is exactly what one would expect from a faculty of life sciences striving to provide the best possible education at all levels.

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* *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.*

3.4 Curriculum

Strengths:

- Laboratory classes for BSc students.
- Research projects for BSc students.

Weaknesses:

- Three tracks for a BSc degree in Life Sciences are offered. In practice, there is little difference between them (about 8-10%).
- Consequently, all students in the Life Sciences study together, taking the very same courses for the first two years and much of the third year as well since many of the electives overlap. Indeed, some students are not aware of the different tracks.
- Very few courses in ecology, plant physiology and zoology. This contrasts with considerably more courses and faculty in these areas in the past.
- Heavy load of obligatory courses in Jewish studies, with 14 credit points on top of the 72.5 credit points required for a BSc degree in the Life Sciences. This reflects a substantial increase of about 20% in studies that are not related academically to the Life Sciences. This time could be allocated for missing courses (e.g. ecology) and adding track-specific courses (see item 1, above).

Recommendations:

- The difference between tracks should consist of at least 25% track-specific courses, which need to be added.
- Jewish studies should be voluntary not compulsory.
- Add courses in ecology, plant physiology and zoology.

3.5 Teaching and Learning

Strengths:

- Overall satisfaction is high at all levels.
- Excellent laboratory classes and research projects for BSc students.

Weaknesses:

- The large number of MSc and PhD students in many research labs is an issue. Some students feel that they don't get adequate attention and guidance. The average number of eleven PhD and MSc students per faculty is high in comparison with peer institutions and may be interfering with the quality of scholarship.

Recommendations:

- Reduce pressure to maximize the size of research groups and at the same time place greater emphasis on quality of scholarship.

3.6.1 BS Students

Strengths:

- Overall satisfaction is high.

- 50% of all third year students do a research project that lasts 2 to 3 months. They join a lab where they are supervised by a doctoral or master's fellow and work on the project assigned to them. Students have to write a report that is reviewed by the head of the lab.
- About 70% of the BSc students want to continue on to higher degrees.
- Students are encouraged to work in labs over the summer.
- Laboratory classes are plentiful and well organized.
- Positive experiences with the Faculty and with the other students.

Weaknesses:

- Structure and bureaucracy make it difficult for students who are a bit disorganized or who have special needs to work through the system.
- Seven compulsory Judaism courses over 3 years in Life Sciences. Although students expressed mixed opinions about the value of these courses to their studies, the committee believes that the large number of compulsory courses outside of the Life Sciences curriculum is not beneficial.
- Track-specific courses are taken in the third year. In fact, some students were unaware of these tracks.
- Criticism about the instructors (TAs) because of their lack of knowledge and teaching abilities, especially but not only those coming from other departments.
- TAs and faculty are evaluated for their teaching by the students. However, the students do not believe that their comments are considered, as they do not see much change.
- There seem to be serious problems with scheduling exams. There is not enough time between exams; sometimes students have four exams in one week. There seems to be a serious problem in lack of coordination between exams given by different departments.
- New immigrants need help in understanding the exam questions.
- Issue of accessibility for handicapped people.
- There is a shortage of computers in the library, wireless internet and computer speed is slow.

Recommendations:

- Classes in Jewish studies should be elective and not compulsory.
- Special effort should be made in selecting suitable TAs and teaching them how to teach effectively. The faculty should be more attentive to students' suggestions.
- Exams should be scheduled more reasonably. In particular, scheduling conflicts between exams given by different departments should be avoided.

3.6.2 MSc Students

Strengths:

- High overall satisfaction with the university. Most MSc students did their BSc degree at BIU.
- 60-70% of the students want to go on to get their PhD.
- Students who get scholarships did not have to pay tuition fees.

Weaknesses:

- Frequently, the large number of MSc and PhD students (an average total of 11) in many research labs is an issue. Some students feel that they don't get adequate attention and guidance. The eleven PhD and MSc students per faculty is high in comparison with peer institutions.
- Most people finish their MSc within 2 years as required, but some do not.
- The MSc thesis has to be written in Hebrew, although practically all literature (research articles and textbooks) and much of the nomenclature are in English.
- Poor writing skills both in Hebrew and English.
- Students receive low scholarships relative to the cost of living and compared to other Institutions. If they receive a scholarship, students must sign a form that they will not get jobs outside the University. This makes it very difficult for students to work and earn additional money.
- Inadequate scholarship support is a reason that MSc students do not continue their studies at BIU.
- Grade inflation: most grades are in the 90 to100% range.

Recommendations:

- The number of research students per lab should be carefully considered such that supervision and guidance will not be compromised. The University Faculty of Life Sciences should not pressure faculty members to have more students than they can properly guide and supervise.
- Allow writing the MSc thesis in English.
- Scholarships should be adjusted to a reasonable cost of living.

3.6.3 PhD Students

- PhD students are supported for four years by the faculty.
- There are weekly PhD seminars where students can present their work to other PhD students.
- One third of the PhD students want to do a Post-Doc. There is, however, concern about not finding jobs in academia.

Weaknesses:

- Most (about 80%) did their MSc at BIU, so not many students are attracted from other Institutions. Here we recognize the apparent conflict in our conclusions that while this is perceived as a weakness for the PhD program it is perceived as strength of the MSc program. Such "in-breeding" in frowned upon in the US but may be inevitable in a small country like Israel, hence our ambivalence. Please refer to the general report for a full discussion of this issue.
- The large number of MSc and PhD students in many research labs (average of 11) is an issue. The ratio at Bar Ilan University is exceptionally high and could potentially impact the quality of the research. Some students feel that they don't get adequate supervision and guidance.
- Only 40-50% of the PhD students have a publication emerging from their PhD. As a minimal standard, one would expect that all PhDs would

produce at least one publication. This may be, in part, an outcome of the large research group (see preceding item).

- Shortage of courses for PhD students; many courses offered to PhD students were already taken during MSc studies.
- Students are allowed to take only 2 or 3 courses in other universities per program/degree despite the fact that there is a well-justified need for more courses to be taken outside BIU (see preceding item).
- Scholarship funding is low compared to most other institutions.
- The dissertation must be written in Hebrew, although most literature (research articles and textbooks) and much of the nomenclature are in English.

Recommendations:

- The number of research students per lab should be carefully considered such that supervision and guidance will not be compromised. The University/Faculty of Life Sciences should not pressure faculty members to have more students than they can handle.
- Provide more courses for PhD students. Allow them to take more courses in other universities.
- Attempt to attract more students from outside of BIU.
- Scholarships should be adapted to a reasonable cost of living.
- Allow the PhD dissertation to be in English.

3.7 Human Resources: New Junior Faculty

Strengths:

- Young faculty members receive generous startup funds, lab space, technical assistance and scholarships for their research students.
- The junior faculty feel that the university really wants them to succeed.
- Tough selection process for recent hires has ensured that the very best are recruited.
- Collaboration and multi-disciplinary research are strongly encouraged.

Weaknesses:

- There is a need for structured mentoring of the junior faculty members by the Faculty of Life Sciences.
- The University/Faculty encourages/pressures junior faculty to take too many research students. As already stated above, it is disadvantageous to students who need more guidance. In addition, this may also have a negative impact on the quality of research performed by the students and thus by the PI himself.
- Some expressed dismay at the heavy bureaucracy that must be negotiated to buy equipment; this suggests more mentoring may be needed in the ways of the university.

Recommendations:

- The University/Faculty should not pressure faculty members to have more students than they can properly supervise and guide.
- There should be a structured mentoring program for junior faculty.

3.8 Infrastructure

Strengths:

- The nanotechnology building provides top-quality space for inter-disciplinary research that relates to biology.
- Interdepartmental Microscopy/Imaging facility.

Weaknesses:

- The Animal facility is below standard.
- Major electronic journals are not available.

Recommendations:

- Upgrade animal facility.
- Add missing major e-journals to the library.

3.9 Research

We evaluated research at Life Science Faculties in a consistent manner using the total number of citations to all the papers published by current faculty during the five year period 2004 to 2008. This involved web harvesting from the Web of Knowledge (downloading all papers for 2004-2008), data curation (ensuring names are correct, eliminating duplication), and special purpose programming (summing the citations for the current faculty of Life Sciences). Using the cumulative Impact Factor of the journals in which each paper was published gives a very similar result although the numbers are different as many journals are not assigned an impact factor. These data as well as other summarizing data are given in Table 1.

Table 1: Quantitative Analysis of the Faculty of Life Science at **BAR ILAN**

Topics Evaluated (CHE Appendix)	Evaluation Criteria	Values	Topics Evaluated	Evaluation Criteria	Values
The Academic Faculty	Number of faculty (PI): All	41	Research Papers	Period Analyzed (2004-2008)	0
	Lecturers	3		Total Self-reported	689
	Senior Lecturers	15		Total Web of Science	392
	Associate Profs.	11		Number of Papers per Faculty	9.6
	Full Profs.	12		Number of Citations per Faculty	116.6
	Active Emiriti	4		Annual Publications per PhD/yr	0.74
	New faculty in last five years	13		Annual Faculty Publications /year	1.91
	Retired faculty in last five years	9	Impact	Number Papers	392
The Students	Number of students: Total (2008)	1,425		Number Citations	4,779
	BSc (2006)	936		Total Impact Factor	1,296
	BSc (2010) as percent of 2006	85%		Total Impact Factor/PI	31.6
	BSc (2008)	949		Papers with 2 or more PIs	14
	MSc (2008)	265	Total Support ($x1000)	Total Grant Funds	12,746
	PhD (2008)	187		Total Graduate Student Funds	15,076
	Postdocs (2008)	24		Total Research Funding	27,822
Student / Faculty Ratios	BSc students per faculty (2008)	23.1	Resource/ Faculty	5 Year Total Grants per faculty	$310,866
	MSc students per faculty (2008)	6.5		5 Years PhD Funds per faculty	$367,714
	PhD students per faculty (2008)	4.6		Total Research Funding	$678,580
	Postdocs per faculty (2008)	0.6		Lab. Space per faculty (m2)	85
	Ratio of TAs / Faculty	4.9	Effectiveness	Cost of a Paper	$70,974
The Study Program	Number of Teaching Assistants	202		Cost of a Citation	$5,822
	MSc Student Stipend (NIS/month)	2,080		Relative Cost of Paper	0.84
	PhD Student Stipend (NIS/month)	3,333		Relative Cost of a Citation	1.42

Strengths:

- Recent recruitment of excellent young faculty who are provided with generous startup packages.
- There is a Presidential Master Plan to increase the number of Faculty from 42 to 64.
- The new nanotechnology building is on-line and being used productively.

Weaknesses:

- On average and judged by the quality and effectiveness of research papers, research achievements are low compared to other universities.
- This is particularly clearly reflected in the relatively high cost per citation (Table 1).

Recommendations:

- When hiring junior faculty, it is important not to compromise on the excellence of new recruits.
- Ensure there is a critical mass of researchers in any particular field of research.
- Encourage multidisciplinary research.
- Reconsider the effectiveness of having so many research students in a single laboratory. The ratio of MSc and PhD students per PI is highest in BIU compared to other institutions, yet research achievements are low. Part of the problem may be the difficulty in providing proper guidance and supervision to so many students. This, in turn, reflects on research achievements. PhD students are not qualified to replace the PI in mentoring MSc students.

Chapter 4 – General Recommendations

Strengths:

- Recent recruitment of excellent young Faculty who are provided with generous startup packages.
- A Presidential Master Plan to increase the number of Faculty from 42 to 64.
- The new nanotechnology building is on-line and being used productively.

Weaknesses and Recommendations:

- Teaching programs
  - A clear distinction between tracks in the Life Science program should be made; at least 25% of the courses should be track-specific.
  - The ratio of BSc, MSc and PhD students per PI is too high.
  - The program in ecology, zoology, and whole-organism biology generally has dwindled in terms of faculty and courses. It should be built up. In addition to the lack of ecology in the teaching program, there is also almost a minimal research program in ecology and in whole-organism biology generally. This dearth is out of proportion to the size of the faculty and should be somewhat redressed.
- Research
  - Do not compromise on the quality of new Faculty recruits.
  - Ensure critical mass of researchers in any particular field of research.
  - The ratio of MSc and PhD students per PI is too high for most PIs to supervise effectively.
- These recommendations should be implemented within a timeframe of the next one to two years.

Signed by:

Prof. Michael Levitt, Chair

Prof. Ueli Aebi

Prof. Shlomo Rotshenker

Prof. Daniel Simberloff

Appendix 1: Letter of Appointment (Sample)

מדינת ישראל

STATE OF ISRAEL

Minister of Education

May 6, 2009

Prof. Michael Levitt
Department of Structural Biology,
School of Medicine, Stanford University,
USA

Dear Professor Levitt,

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 Chair of the Council for Higher Education's Committee for the evaluation of Life Sciences/ Biology Studies.
The composition of the Committee will be as follows: Prof. Michael Levitt- Chair, Prof. Ueli Aebi, Prof. Yigal Cohen, Prof. Nicole Le Douarin, Prof. Shlomo Rotshenker and Prof. Daniel Simberloff.
Ms. Lilach Weisz will coordinate the Committee's activities.

In your capacity as a 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 a Chair of this most important committee.

Sincerely,
Gideon Sa'ar
Gideon Sa'ar
Minister of Education
and Chairperson of 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. Lilach Weisz, Committee Coordinator

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Appendix 2: Schedule of Bar Ilan University On-Site Visit

The Mina & Everard Faculty of Life Science - Malag Visit
All meetings in the Faculty seminar room building 212, room 212

First Day: Sunday, March 7, 2010

Time	Subject	Participants	
09:00-09:45	Opening session with the heads of the institution	Prof. Moshe Kaveh, President Prof. Joseph Menis, Rector Prof. Harold Basch, Vice President for Research Prof. Haim Taitelbaum, Vice Rector and Head of University Quality Assessment	
09:45-10:30	Meeting with the academic leadership of the Faculty	Prof. Uri Nir, Dean Prof. Doron Ginsberg Prof. Zvi Malik	 Prof. Shulamit Michaeli Prof. Ron Unger
10:30-11:15	Meeting with the administrative heads of the Faculty	Mr. Benjamin Avramani Mrs. Helena Eyal	Dr. Edith Kahana Dr. Yedida Sharaby
11:15-12:00	Meeting with representatives of relevant Faculty committees	Prof. Doron Ginsberg Prof. Ronit Sarid Prof. Ramit Mehr Prof. Yeshayahu Nitzan	 Dr. Alon Korngreen Dr. Benny Motro Dr. Edith Kahana
12:00-13:15	Meeting with Senior Academic Faculty Staff	Prof. Binyamin Sredni Prof. Haim Breitbart Prof. Shulamit Michaeli	 Prof. Elisha Haas Prof. Zvi Malik
13:15-14:15	Lunch	Prof. Uri Nir, Dean Prof. Chaya Brody Prof. Avi Susswein Prof. Rafi Perl-Treves	Prof. Ron Wides Prof. Ron Goldstein Prof. Gal Yadid Prof. Avidan Neuman
14:15-15:30	Tour of: Classes, Laboratories, Offices of Faculty members, Computer labs	Dr. Yedida Sharaby Prof. Uri Nir, Dean Prof. Doron Ginsberg Dr. Benny Motro Dr. Yedida Sharaby Prof. Zvi Malik Prof. Doron Ginsberg Mr. Idan Klein, Mrs. Sagit Aharon	Student Lab 3rd fl Office & Lab 3rd fl Lab 1st Fl. Library 1st floor Student Lab Ground fl Faculty Scientific Equipment Center Teaching halls, ground fl Computer classes
15:30-16:00	Meeting with Lecturers of the Adjunct Track	Prof. Yedidya Gafni Dr. Yehudit Radnai Dr. Noach Rotary Dr. Eyal Breitbart	
16:00-16:30	Closed-door working meeting of the evaluation committee		

Second Day: Monday, March 8, 2010

Time	Subject	Participants
09:00-10:00	Meeting with Junior Academic Faculty Staff	Dr. Doron Gerber Dr. Yaron Shavtal Dr. Yanay Ofran Dr. Ehud Banin Dr. Tamar Gershon Dr. Shay Ben Aroya Dr. Erez Levanon Dr. Shay Carmi, Postdoc
10:00-10:45	Meeting with B.Sc. students***	Averbuch Dana Botah Meital Buskila Aviad Ben-Ari Tomer Titz Moriya Barby Yehonatan Zehavi Meital Ziloni Neta Amram Noi Kilzi Hila Reis Danny Kastemberg Migel-Michael
10:45-11:30	Meeting with M.Sc. students***	Berkowitz Anat Bel Shay Gertler Asaf Dovnik Ana Halpert Gilad Zehavy Yonatan Chobashi Hadar Lobel Shay Michaeli Miri Noifeld Noa Reicher Barak Neufeld Noa
11:30-12:15	Meeting with Ph.D. students***	Ofir Matan Ben-Yishai Eldad Bar-Zeev Ido Pital Eliya Brody Yehudah Bashari Dana Gil Reuven Feiglin Ariel Ovadiya Sharon Yoffe Itay Levitan Orly Maoz Noam Abada Rinat
12:15-12:45	Lunch	Prof. Uri Nir, Dean Dr. Rami Don Prof. Yosef Steinberger Dr. Orit Shaul Dr. Yarden Opatowsky Dr. Doron Gerber Dr. Ilana Berman-Frank Dr. Cyrille Cohen Dr. Oren Levy Dr. Sol Efroni Dr. Yoav Paas Dr. Sivan Korenblit
12:45-13:15	Closed-door working meeting of the evaluation committee	
13:15-14:00	Summation meeting with heads of the institution and of the Faculty	Prof. Joseph Menis Rector Prof. Haim Taitelbaum Vice-Rector Prof. Uri Nir Dean Prof. Shulamit Michaeli Prof. Doron Ginsberg Mr. Benjamin Avrahami