



**Committee for the Evaluation of Biology/Life Sciences Study  
Programs**

**Tel Aviv University**  
**Faculty of Life Sciences**  
**Evaluation Report**

**September 2010**

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## **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**
- **Prof. Nicole Le Douarin, Institute of Embryology, College de France, France<sup>1</sup>**
- **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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<sup>1</sup> Prof. Le Douarin was unable 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 also conducted a tour of the campus.

***This report deals with the Biology/Life Sciences Programs at the Faculty of Life Sciences at Tel Aviv University.***

The Committee's visit to Tel Aviv University took place on May 11-12, 2009.

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 Tel Aviv University\***

### **3.1 General Background**

Tel-Aviv University was established in 1956 and was fully accredited by the Council for Higher Education in 1969.

During the academic year 2007-8 there were 32,144 students at the university of whom 19,876 were studying for a BA degree, 6,639 for an MA degree, 1,799 for a Ph.D. degree and 377 students were studying in the Ph.D. direct track.

During the 1970's the faculty of Natural Sciences was divided into two separate faculties: The faculty of Life Sciences and the faculty of Exact Sciences. The George S. Wise Faculty of Life Sciences contains six independent departments: Zoology, Plant Sciences, Molecular Microbiology & Biotechnology, Cell Research & Immunology, Biochemistry, and Neurobiology.

The number of students in the Faculty of Life Sciences at Tel Aviv University during the academic year 2007-8 was as follows: 1,082 students were studying for a BA degree, 293 were studying for an MA degree with thesis and 264 were studying for a Ph.D. degree.

### **3.2 Executive Summary**

The Faculty of Life Sciences at Tel Aviv University faces a daunting array of difficult problems including shrinking government support, a deficit budget for the past five years, an aging infra-structure and the high cost of living in the Tel Aviv area. Nonetheless, for five of the six departments we found a dynamic, optimistic forward thinking and tightly integrated faculty tackling these problems under the exceptional leadership of the Dean. The BS, MS and PhD students we met were of the highest quality and showed a dedication to research that was unexpected, especially at the BS level. The young faculty were all happy to be at TAU, some coming from faculty positions abroad. They were given generous start-up packages and general support, and they were enthusiastic about the high quality of the TAU students. The exception was the department of Zoology to which we were given much less access; it was less well-integrated, and seemed to be isolated. Given the increasing importance of organism level biology and ecology, this is seen as a missed opportunity. Other problems included a rapidly dwindling number of teaching assistants, poor teaching of core classes

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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.*

by non-departmental faculty, inadequate class rooms that meant classes had to be taught twice, and an aging infra-structure. These issues did not seem to interfere with the research output that was superior with an average output from 2004 to 2008 of 8.6 papers per faculty member and an average of 15 citations per paper. This research output was achieved at a modest cost of \$92,500 per paper or \$6,300 per citation.

### **3.3 Goals and General Situation**

The mission statement which was supplied to the committee is stated very clearly and succinctly. Most importantly, it emphasizes (i) the importance of multi-disciplinary research in the Biological Sciences and (ii) the teaching of Bio-science in the form of inter-disciplinary studies. Furthermore, the students' attention is drawn to public activities aimed at approaching the community and its needs.

Historically in Israel, zoology and botany research and education, including graduate education, was centered to a great extent at TAU, where most students are still taught and most current Israeli faculty members received their training. Although there are still important researchers and good graduate students, plus substantial undergraduate courses these fields are in decline. TAU is traditionally the leading center for biodiversity research in Israel, where the critical mass of scientists and unique infrastructure (national natural history collections, zoological research garden, botanical gardens) enabled high academic level syntheses of ecology, behavioral biology, evolution, and systematics, and where different taxa and environments were studied and taught. The great majority of such activity is in the Zoology Department, whose size has declined greatly and whose faculty feel themselves besieged and isolated from the rest of the Faculty of Life Sciences. It is unfortunate that we were unable to meet ecology- and evolution-oriented faculty members at TAU in order to understand the situation better.

### **3.4 Curriculum**

#### **Strengths:**

- Emphasis is given to inter-disciplinary studies in the Life Sciences.
- Strong BS and MS curricula in the Life Sciences with a broad coverage of molecular biology, biochemistry, biotechnology and computational biology.
- There is a clear attempt to prepare the students as to how to approach the community and learn about its needs.

#### **Weaknesses:**

The School of Environmental Studies is not part of Life Sciences; their faculty are from different schools including Law and Geophysics. This is a Virtual School of Environmental Sciences with no formal relationship to Zoology, Botany and Ecology in Life Sciences.

- The BS curriculum in Brain Studies is light-weight. In particular, there is no neurophysiology.

- There is not enough cooperation between the Life Sciences departments and the Medical School (for example, to promote Biomedicine).

Recommendations:

- There is a need for a Life Sciences BS in Ecology.
- There is a definite need for better cooperation with the Medical School at TAU so as to augment teaching resources. An MD/PhD program like that at Stanford or Basel is critical for long-term, sustained advances in biomedicine.

### **3.5 Teaching and Learning**

Strengths:

- Students are given an opportunity to do research in labs.
- All the lectures are recorded and available online and attendance of classes is not mandatory. This enables students to follow recordings without having to go to classes and thus allows them to focus on research.
- Extensive campus-wide collaborations include research and teaching in both Chemistry and Computer Science, with a number of critical collaborations.

Weaknesses:

- The ability to teach undergraduates is affected by the lack of sufficient, well-equipped labs.
- There is not enough financial support for Teaching Assistants (TAs). As a consequence, individual PIs pay for TAs as it helps them to recruit MS and PhD students. One reason for the lack of TA support is that the Planning and Budgeting Committee cannot provide a budget for them due to the huge cuts in the Higher Education budget.
- Lecturers need to teach the same course twice in the same term as there are not enough class rooms that are big enough for the core courses.
- The exercise sessions for the first year students are not counted as part of the teaching load.
- There has been a reduction in lab courses and field trips due to financial problems and animal issues.
- The quality of the core Maths and Physics courses for biology students is low. The Life Sciences faculty cannot teach all the core courses themselves so that it has to use Math and Physics faculty.

Recommendations:

- Modernize teaching labs.
- Increase the number of Teaching Assistants and the level of financial support for them.
- Improve the infrastructure so as to have more large class rooms available.
- Find a way to increase lab courses and field trips.
- Find a way to improve the quality of the core Math and Physics courses for the biology students.

### **3.6.1 BS Students**

#### Strengths:

- The students we met with were uniformly enthusiastic.

#### Weaknesses:

- The committee did not find any major weaknesses in the BS program. In addition, several students voiced the desire to do clinical research. The department should consider ways in which to provide them with more experience in these fields.

#### Recommendations:

- Sufficient chemistry and math courses should be offered so as to give the Life Sciences students the necessary choice in terms of breadth and depth.
- A formal cooperation of the Life Sciences program with the Medical School should be established so that students have the opportunity to do clinical research and to specialize in Biomedicine.

### **3.6.2 MSc Students**

#### Strengths:

- The committee was impressed by the interesting and diverse research projects of the MSc students.

#### Weaknesses:

- There is no housing for graduate students.
- There is limited time for discussions with supervisors.
- Masters students get relatively low stipends and many students have extra jobs.
- MSc students are worried about future positions as there are only a small number of new PIs each year. They feel it is hard to get a job in Israel in the long term.

#### Recommendations:

- Try to allay the concerns of the MSc students. In particular, a mentoring program should be established: for example, every MSc student should be assigned a PhD student with whom he/she could meet whenever there is a need for it.

### **3.6.3 PhD Students**

#### Strengths:

- PhD students uniformly and most clearly love their research.
- Almost all have published at least one paper, some in top-ranking journals.
- None of the PhD students had any complaints.



#### Weaknesses:

- The large increase in the number of PhD students is a university policy that has been encouraged by the new Planning and Budgeting Committee formula. It seems that academic not budget concerns should drive this number. Nevertheless, the mean number of PhD students of 3.0 per PI is not seen as excessive in Israel (see Table 1).
- More student support is needed: the PhD students get about 4,200 NIS a month, whereas the MSc students get just 2,500 NIS a month.

#### Recommendations:

- Find funding sources to provide more student support.

### **3.7 Human Resources: New Junior Faculty**

#### Strengths:

- The Junior Faculty we met were without exception extremely enthusiastic and positive about the situation they met including their start-up packages, facilities, departmental support, and the quality of MSc and PhD students they had access to.

#### Weaknesses:

- We did not meet all the new faculty and, in particular, we met no new faculty from the department of Zoology. Hence, the Committee cannot claim that it got a representative picture of the Junior Faculty representing TAU's Life Sciences program. Thus, we were unable to assess their programs and their degree of institutional support

#### Recommendations:

- The Committee lauds the decision on the part of the department to recruit new junior faculty members. Recruiting effort should continue as the number one priority.

### **3.8 Infrastructure**

#### Strengths:

- We were happy to see how the process of self-evaluation has clearly been of great benefit to TAU Life Sciences.
- We were shown some beautifully renovated labs that were world-class.

#### Weaknesses:

- Despite all the positive comments, overall, the buildings are old and underpowered, and in many places the infrastructure appears rather poor or outdated. For example, in many labs there is no air-conditioning and there is no space to house new equipment.
- The library is in critical condition. The selection of available electronic journals is limited.
- There is no funding for shared equipment/facilities, such as, for example, an analytical ultracentrifuge, protein and DNA sequencing, peptide synthesis, etc.

- The Committee saw none of the infrastructure for the Zoology Department or for whole organism biology in general, and therefore we cannot judge the strengths and weaknesses of the infrastructure for that part of the faculty. This gap was surprising, as, in addition to other facilities, TAU houses the national collections of natural history.

Recommendations:

- There is an urgent need for improving the infrastructure, for example, the shared equipment and facilities.
- The library needs to increase access to electronic copies of journals.

### **3.9 Research**

TAU Life Sciences made a huge effort in order to evaluate their own research output. Their method has many merits but it could not be easily applied to other institutions that we had to evaluate. Instead we choose to evaluate research at the Life Sciences Faculties in a consistent manner using the total number of citations to all the papers published by current faculty at TAU during the five year period 2004 to 2008. This involved web harvesting from the Web of Knowledge (downloading all the TAU 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. This data as well as other summarizing data is given in Table 1 below.

Strengths:

- Research output is in the superior category when compared with Life Sciences Faculties in Europe, the US and Japan. It is also economical in terms of the cost of a paper as measured by grant funds and for postgraduate students support.

Weaknesses:

- There has been a reduction in the number of technicians. Currently, the department has half a technician to each PI.

Recommendations:

- Find a way to increase the number of technicians.

Table 1: Quantitative Analysis of the Faculty of Life Science at TAU

Topics Evaluated (CHE Appendix)	Evaluation Criteria	Values	Topics Evaluated	Evaluation Criteria	Values
The Academic Faculty	Number of faculty (PI): All	87	Research Papers	<u>Period Analyzed (2004-2008)</u>	
	Lecturers	3		Total Self-reported	1,175
	Senior Lecturers	24		Total Web of Science	1,094
	Associate Profs.	21		Number of Papers per Faculty	12.6
	Full Profs.	39		Number of Citations per Faculty	208.0
	Active Emiriti	14		Annual Publications per PhD/yr	0.89
	New faculty in last five years	11		Annual Faculty Publications /year	2.51
	Retired faculty in last five years	11			
The Students	Number of students: Total (2008)	1,643	Impact	Number Papers	1,094
	BSc (2006)	1,178		Number Citations	18,092
	BSc (2010) as percent of 2006	101%		Total Impact Factor	4,056
	BSc (2008)	1,082		Total Impact Factor/PI	46.6
	MSc (2008)	293	Papers with 2 or more PIs	20	
	PhD (2008)	264	Total Support (\$x1000)	Total Grant Funds	58,000
	Postdocs (2008)	50		Total Graduate Student Funds	11,212
Student / Faculty Ratios		12.4	Resource/Faculty	Total Research Funding	69,212
	BSc students per faculty (2008)	3.4		5 Year Total Grants per faculty	\$666,667
	MSc students per faculty (2008)	3.0		5 Years PhD Funds per faculty	\$128,875
	PhD students per faculty (2008)	0.6		Total Research Funding	\$795,542
	Postdocs per faculty (2008)	2.6		Lab. Space per faculty (m2)	120
The Study Program	Ratio of TAs / Faculty	226	Effectiveness	Cost of a Paper	\$63,265
	Number of Teaching Assistants	2,520		Cost of a Citation	\$3,826
	MSc Student Stipend (NIS/month)	4,179		Relative Cost of Paper	0.75
	PhD Student Stipend (NIS/month)			Relative Cost of a Citation	0.80

## **Chapter 4 – General Recommendations and Timetable**

### **Strengths:**

- Very strong support for new recruits that are the essential life blood of academic endeavor.
- There are many gifted BSc students who are very well-cared for and are able to progress very rapidly. The faculty cares about the students.
- Many joint programs are being set up on campus.
- Tel Aviv is a major world class metropolis that has the potential to support a commensurate university. The fact that it is easy to find work for spouses here improves the university's ability to attract the best of the best. The university and Life Sciences department should continue their effort to recruit excellent faculty members.

### **Weaknesses:**

- There is a major decline in lab and field classes. Attempts are being made to devote resources to this area but there is no sense of ownership.
- There has been a huge reduction in the funding for teaching assistants. This is seen as a very serious by the faculty although the number of TAs per faculty (2.6, see Table 1) is not particularly low for Israel, probably because faculty are supplementing TAs from their own funds.
- With the exception of chemistry, core teaching must be improved. The exceptional undergraduate program needs the necessary teaching resources.
- There are grave concerns that with the deficit in the budget, it will not be possible to build on the new-faculty influx of the recent past. Long-term funds need to be devoted to recruitment to prevent serious deterioration.
- Achieving a perfect balance between Molecular and Whole Organism Biology is difficult. More attention needs to be focused on ecology and evolution. We recommend the department consider creating a Biology-Ecology degree track. This endeavor should be relatively inexpensive and therefore should be explored immediately.

### **Timetable:**

Given the committee's high-level of confidence in the Dean, it seems best to leave it up to his sound judgment to decide on what matters are most urgent. Nevertheless, we see that the success of Life Sciences at TAU depends on a number of critical factors in the following (approximate decreasing) order of importance:

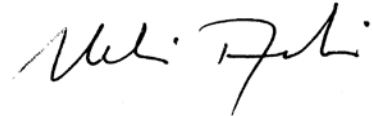
1. Continue to attract the best and the brightest junior faculty.
2. Continue to provide them with the facilities that allow them to be as productive as possible.
3. Continue to offer an exciting array of classes that emphasizes scientific research at all levels.
4. Integrate zoology and whole organism biology in general better into the fabric of Life Sciences.
5. Find a way to renovate buildings, perhaps by attracting one or more of the new centers.

**Signed by:**



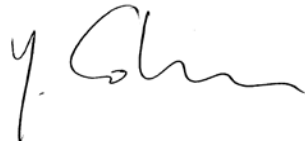
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Prof. Michael Levitt, Chair




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Prof. Ueli Aebi



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Prof. Yigal Cohen



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Prof. Shlomo Rotshenker



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Prof. Daniel Simberloff

## Appendix 1: Letter of Appointment (Sample)



מדינת ישראל

STATE OF ISRAEL

May 6, 2009

### Minister of Education

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 21<sup>st</sup> 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

## Appendix 2: Schedule of Tel Aviv University On-Site Visit

### **Biology/ Life Sciences Studies - schedule of the on-site visit to Tel Aviv University May 11-12, 2009 at the Ephraim Katzir Biotechnology Club (Green Building)**

#### **First day: Monday, May 11, 2009**

<b>Time</b>	<b>Subject</b>	<b>Participants</b>
09:30-10:00	Opening Session: The heads of the institution and the Faculty of Life Sciences	Rector : Prof. Dany Leviatan Deputy Rector : Prof. Aron Shai Head of Quality Assessment: Prof. David Horn Dean of the Faculty of Life Sciences: Prof. Yoel Kloog
10:00-10:30	Meeting with the Dean of the Faculty	Prof. Yoel Kloog
10:30-12:15	Meeting with senior faculty and representatives of relevant committees (such as teaching/curriculum committee, admissions committee, appointment committee, instruments/ equipment committee)*	Prof. Itai Benhar Prof. Daniel Chamovitz Prof. Reuven Stein Prof. Micha Ilan Prof. Sara Lavi Prof. Dan Canaani Prof. Hillel Fromm Prof. Amir Sharon Dr. Azem, Abdussalam
12:15-13:00	Meeting with Junior faculty*	Dr. Eran Halperin Dr. Anat Herskovits Dr. Lilach Hadany Dr. Dan Peer Dr. Gali Prag
13:00-13:45	Lunch with the Dean	Prof. Yoel Kloog
13:45-14:45	Tour of campus (classes, laboratories, library, offices of Faculty, computer labs etc.)	Dr. Hirsch, Joel Dr. Assaf, Yaniv Dr. Frenkel, Dan
14:45-15:30	Closed-door working meeting of the evaluation committee	

\* The heads of the institution and academic unit will not attend these meetings.

## **Second day: Tuesday, May 12, 2009**

<b>Time</b>	<b>Subject</b>	<b>Participants</b>
09:30-10:15	Meeting with undergraduate students *	Cohen Maayan, Frumkin Idan, Kidron Shahr, Ram Yoav, Harpaz Tomer, Tavor Ido, Ben Moshe Assaf, Label Lior
10:15-11:15	Meeting with graduate students *	Barzel Adi, Sorek Nadav, Laudon Einat, Barazany Daniel, Bloch Eyal, Aviner Ranen, Levenstain Ayal, Harel Inbar Noa
11:15-12:15	Review of students' projects	Oded Rechavi, Gal Romano, Mor Sela, Amsalem Etya
12:15-13:00	Lunch and Closed-door working meeting of the committee	
13:00-13:45	Summation meeting with the Dean	Prof. Yoel Kloog
13:45-14:30	Summation meeting with heads of the institution and of the department	Rector : Prof. Dany Leviatan Deputy Rector : Prof. Aron Shai Head of Quality Assessment: Prof. David Horn Dean of the Faculty of Life Sciences: Prof. Yoel Kloog

\* The heads of the institution and academic unit will not attend these meetings.