



DEPARTMENT OF MECHANICAL
ENGINEERING
ORT BRAUDE ACADEMIC COLLEGE FOR
ENGINEERING

EVALUATION REPORT

COMMITTEE FOR THE EVALUATION OF MECHANICAL ENGINEERING STUDY
PROGRAMS IN ISRAEL

JUNE 25, 2018

Section 1: Background and Procedures

- 1.1** In the academic year 2017-18 the Council for Higher Education [CHE] put in place arrangements for the evaluation of study programs in the field of Mechanical Engineering [ME] in Israel.
- 1.2** The Higher Education Institutions [HEIs] participating in the evaluation process were:
- Afeka Academic College of Engineering
 - Ariel University
 - Ben-Gurion University
 - Ort Braude Academic College of Engineering
 - Shamoon Academic College of Engineering
 - Technion – Israel Institute of Technology
 - Tel Aviv University
- 1.3** To undertake the evaluation, the Vice Chair of the CHE appointed a Committee consisting of:¹
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|---------------------------------------|--|
| • Prof. David Norris, Committee Chair | ETH Zurich, Switzerland |
| • Prof. Leslie Banks-Sills | Tel Aviv University, Israel |
| • Prof. Patricia Brackin | Rose-Hulman Institute of Technology, USA (ABET representative) |
| • Prof. David Clarke | Harvard, USA |
| • Prof. Kon-Well Wang | University of Michigan, USA |
| • Prof. William Wepfer | Georgia Tech, USA |
- Ms. Maria Levinson-Or served as the Coordinator of the Committee on behalf of the CHE.
- 1.4** The evaluation process was conducted in accordance with the CHE's Guidelines for Self-Evaluation (June 2017). Within this framework the evaluation committee was required to:
- examine the self-evaluation reports submitted by the institutions that provide study programs in ME
 - conduct on-site visits at those institutions participating in the evaluation process
 - submit to the CHE an individual report on each of the academic units and study programs participating in the evaluation
 - set out the Committee's findings and recommendations for each study program
 - submit to the CHE a general report regarding the evaluated field of study within the Israeli system of higher education including recommendations for standards in the evaluated field of study

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

- 1.5 The evaluation committee examined only the evidence provided by each participating institution — considering this alongside the distinctive mission set out by each institution in terms of its own aims and objectives. This material was further elaborated and explained in discussions with senior management, lecturers, students and alumnae during the course of each one-day visit to each of the institutions.²
- 1.6 This report deals with the School of Mechanical Engineering at **Ort Braude Academic College of Engineering**. The Committee's visit to the college took place on June 18th, 2018. The schedule of the visit is attached as **Appendix 2**.
- 1.7 The Committee thanks the management of Ort Braude College and the Department of Mechanical Engineering for their self-evaluation report and their hospitality towards the Committee during its visit to the college.
- 1.8 N.B. this report will use Committee, with a capitalized first letter to refer to the international evaluation committee conducting this review.

Section 2: Executive Summary

Aspects related to the teaching, study program, research, and students of this program met the acceptable threshold level of performance. Aspects related to the management, administration, vision, QA process, faculty, and infrastructure did not. In particular, the Senior Administration and Department should improve communication, especially considering several recent developments. The program should also adopt more innovative teaching methodologies, especially those that encourage critical thinking. Finally, space is insufficient, especially considering their plans to grow the faculty size.

Section 3: Observations

3.1 Introduction

Ort Braude Academic College of Engineering (OBC) is primarily a teaching institution that prepares engineers well for industry. Their mission is to provide disadvantaged populations, especially from the north of Israel, access to higher education. OBC has 8 bachelor and 5 master's programs. The Department of Mechanical Engineering currently teaches over 500 students. It is well integrated within the institution. The Committee was confident that OBC can sustain and enhance the ME program.

3.2 Management and Administration

²Prof. Leslie Banks-Sills did not participate in the visit to Tel Aviv University or in the panel's discussions concerning the evaluation of this institution.

Upon arrival at OBC, the Committee learned of two potentially transformative initiatives: (1) a possible merger between OBC and Haifa University, and (2) a new donor-funded building for the ME Department. However, because neither has yet been approved, significant uncertainty existed in the Department. Furthermore, a new Department Head began only six weeks before the visit. Going forward, the Senior Leadership of OBC should engage the Department and its faculty regarding these potential changes. They should better communicate and coordinate their development activities.

The Committee was unable to discern the true extent of departmental decision-making and budget autonomy. However, the faculty engage in frequent discussions concerning the curriculum and, to some extent, hiring. It was unclear who makes the final hiring decisions. The Department aims to grow from its current 17 full-time faculty to 25, but a detailed plan needs to be developed.

The Department is committed to diversity and the various communities in the Galilee region. However, the program has relatively few female students and faculty. OBC should provide nursing facilities for female students and faculty.

In this area of evaluation, the Committee determined that OBC does not meet the acceptable threshold level of performance.

3.3 Vision

The Department's strategy is a bit *ad-hoc*, but they have identified four future research thrusts: (1) rehabilitation engineering, (2) robotics, autonomy, and mechatronics, (3) energy, and (4) manufacturing processes. The Committee encourages the Department to refine its strategic plan to leverage opportunities offered by the potential merger with Haifa University and the construction of a new building, especially as space will be critical if the planned growth occurs.

In this area of evaluation, the Committee determined that OBC does not meet the acceptable threshold level of performance.

3.4 QA & Self-Evaluation Process

The President and Vice President initiated the self-evaluation process. The Head of the Department then appointed a coordinator in the Department, with all full-time faculty participating. The evaluation was taken seriously with many dedicated faculty meetings. The final report was approved by the faculty and the Vice President.

However, while weaknesses and strengths were identified in the report, no action was taken by the Department nor the administration. Rather, they are waiting for this CHE report. The Committee urges OBC and the Department in the future to begin addressing problems immediately. Internal self-evaluation processes should also be developed for continual QA.

In this area of evaluation, the Committee determined that OBC does not meet the acceptable threshold level of performance.

3.5 Study Program

Overall, the study program is fulfilling its mission. The program is designed primarily for training students to go to industry. It appears to be effective and up to date although “soft-skill” training could be improved. Also, the Committee believes it is possible to put greater emphasis on fundamentals. In contrast to programs at the Universities, more engineering courses are offered in the first year, *e.g.* in programming, solid mechanics, and electricity and electronics. Two distinguishing features of the curriculum are: (1) a required course in the first year on “Creative Introduction to Mechanical Engineering” and (2) an industrial internship in the fourth year.

In this area of evaluation, the Committee determined that OBC clearly meets the expected threshold level of performance.

3.6 Teaching and Learning

OBC aims to provide the ME graduates with “skills for independent learning, critical thinking, and the ability to adapt to changing needs”³. The teaching within ME is good. Student surveys are conducted for each course and the results are taken seriously. In addition, the Head visits each new lecturer’s class. OBC has a teaching center that provides courses on different teaching methods. Faculty also do self-evaluations of their teaching each year. The faculty provide syllabi that outline the topics covered in the course and the intended learning outcomes (ILOs). Finally, the Department has a committee that looks at the curriculum annually.

The faculty are fully dedicated to the program and the students. The students are also committed and had many interesting suggestions. The Department is encouraged to continue discussions with students to improve their program.

However, the Committee observed that some labs were very prescriptive. The instructions detailed every step that students should perform. The Committee recommends that careful attention be given throughout the curriculum to ensure that students learn to think for themselves. The Committee also observed that some faculty use the same lecture notes, homework problems, and tests every year. This might tempt students to copy homework and tests from prior years rather than gaining an understanding of the material.

The final projects are good. Exemplary projects are completed through the exchange program with the University of Pittsburgh.

³Self-evaluation report, p. 9.

In this area of evaluation, the Committee determined that OBC meets the acceptable threshold level of performance.

3.7 Faculty

In general, the Department includes young, enthusiastic faculty with strong commitment to teaching and research. The faculty size is currently 17 with plans to increase to 25. Over the past 6 years, 9 new faculty were hired, covering a wide range of research fields. The climate among faculty was collaborative. They support each other and communicate well within the Department. Periodic faculty meetings are used to discuss the teaching programs and future directions of the ME program.

A structured mentoring program exists for new faculty. Their teaching efforts are guided and supported, including peer feedback. However, mentoring for tenure and promotion should be improved. The criteria are not sufficiently clear. This is important to strengthen, especially if OBC wants to promote more research and if the merger with Haifa University is realized.

The size of the faculty is inadequate, considering the Department's high student to faculty ratio and teaching load. As new faculty slots are planned, the Department should consider their future space and facility needs, especially given that currently a new building for ME is under discussion. Until the faculty increases in size, the opening of new MS programs should be delayed and the growth in student numbers should be constrained.

In this area of evaluation, the Committee determined that OBC does not meet the acceptable threshold level of performance.

3.8 Research

OBC states that: "faculty members will be active, high-quality researchers participating in significant research projects"⁴. Indeed, many ME faculty wish to pursue research and are capable. The emphasis at OBC is on applied, industrial research. Because research publications are a key criterion for faculty promotions, research output is important. However, the output in ME is minimal due to the high teaching loads and limited funding. Some support is provided by the Research Committee to initiate new research directions and for traveling to conferences. A research authority helps faculty prepare grant proposals.

Areas of research include: (1) rehabilitation biomechanics and biomechanics, (2) robotics, automation, dynamics, and control, (3) energy, and (4) manufacturing processes. The Department would like to add three areas: nano-science, plastics, and materials. Over the last 3 years, the ME faculty have raised \$360K in research support (although 84% is from one faculty member). Industrial collaboration and some international cooperation exist. In 2016, OBC

⁴Self-evaluation report, p. 77.

established its International Relations Office. Several programs for student exchanges were initiated. In ME, only the connection to the University of Pittsburgh was evident. Some students carried out final projects or internships at this institution. As part of their senior projects, students can also pursue research, which can help the faculty. However, in general, it is very challenging for faculty to complete research at OBC.

In this area of evaluation, the Committee determined that OBC meets the acceptable threshold level of performance.

3.9 Students

Students are admitted to the program based on modest admission criteria so those who might not have the opportunity to go to college get a “second chance.” Students appreciate this OBC mission as well as the small class sizes and more personal educational environment. OBC has a high drop-out rate attributed to the broad distribution of the student’s abilities.

The program aims at developing mechanical engineers for industry, and their curriculum is focused on this goal. Students report no problems getting jobs after graduation. The required internship program with academic credit is a strength of the program and distinguishes OBC from other institutions in Israel. Most students enter industry directly after graduation. A few enter graduate studies. Alumni felt well-prepared for jobs in industry.

In this area of evaluation, the Committee determined that OBC clearly meets the expected threshold level of performance.

3.10 Infrastructure

Currently, the Department suffers from a space shortage that will only intensify if its faculty size increases from 17 to 25. Many faculty already share offices. If the anticipated new building is constructed and additional space allocated to ME, this could address these problems. Until then, growth in student numbers should be constrained. The addition of new MS programs should be delayed. Even with the new building, the Committee was told that the Department will not obtain an appreciable increase in space after its move. Such issues need to be clarified with the Senior Leadership of OBC. Moreover, the choice of architect will be critical to optimize the variety of needs within the assigned space.

In this area of evaluation, the Committee determined that OBC does not meet the acceptable threshold level of performance.

Section 4: Recommendations

Essential recommendations:

- Increase the faculty size and stabilize the undergraduate program before pursuing additional graduate degrees.

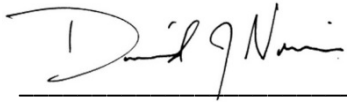
Important recommendations:

- Develop a more detailed plan for growing the ME faculty to 25.
- Develop OBC processes that encourage problems identified in internal self-assessment reports to be addressed as soon as possible.
- Refine the Department's strategic plan to leverage opportunities offered by the potential merger with Haifa University and the construction of a new building.
- Map learning outcomes and objectives across the ME curriculum.
- Give students more open-ended learning to encourage them to think for themselves (*i.e.* avoid "spoon-feeding" the students).
- Increase the quantity and quality of lab and office space.
- Add a more structured faculty mentoring program.

Desirable recommendations:

- Consider enhancing the connection between the Department and its alumni.
- Create nursing facilities for female students and faculty.

Signed By:



Prof. David Norris
Committee Chair



Prof. Leslie Banks-Sills



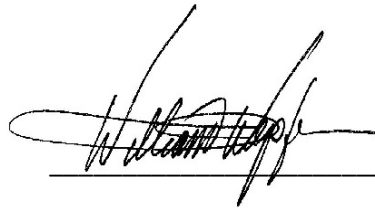
Prof. Patricia (Patsy) Brackin



Prof. David Clarke



Prof. Kon-Well Wang



Prof. William Wepfer

Appendix 1: Letter of Appointment



January 2018

Prof. David Norris
Department of Mechanical and Process Engineering
ETH Zurich
Switzerland

Dear Professor,

The Israeli Council for Higher Education (CHE) strives to ensure the continuing excellence and quality of Israeli higher education through a systematic evaluation process. By engaging upon this mission, the CHE seeks: to enhance and ensure the quality of academic studies, 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.

As part of this important endeavor we reach out to world renowned academicians to help us meet the challenges that confront the Israeli higher education by accepting our invitation to participate in our international evaluation committees. This process establishes a structure for an ongoing consultative process around the globe on common academic dilemmas and prospects.

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

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 the study programs in **Mechanical Engineering**. In addition to yourself, the composition of the Committee will be as follows: Prof. Leslie Banks Sills, prof. Patricia Brackin, prof. David Clarke, prof. Kon-Well Wang and prof. William Wepfer.

Ms. Maria Levinson-Or will be the coordinator of the Committee.

Details regarding the operation of the committee and its mandate are provided in the enclosed appendix.

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

Sincerely,

Prof. Ido Perlamn 
Vice Chair,
The Council for Higher Education (CHE)

Enclosures: Appendix to the Appointment Letter of Evaluation Committees

cc: Dr. Varda Ben-Shaul, Deputy Director-General for QA, CHE
Ms. Maria Levinson-Or, Committee Coordinator

Appendix 2: Visit Schedule

<u>Mechanical Engineering - Schedule of site visit</u>		
<u>Ort Braude Academic College of Engineering</u>		
Monday, June 18 ,2018		
09:00-09:30	Opening session with the head of the institution	Prof. Arie Maharshak, Prof. Sarit Sivan, Dr. Yair Maayan, Dr. Doron Faran
09:30-10:30	Meeting with the Head of the Mechanical Engineering Department	Dr. Abraham Weiss, Prof. Ehud Kroll, Prof. Michael Regev
10:30-10:45	Break	Closed-door meeting of the committee
10:45-11:45	Meeting with senior academic staff – tenured and non-tenured*	Dr. Uri Ben-Hanan, Dr. Shaul Salomon, Dr. Samy Abu-Salih, Prof. Ehud Kroll, Dr. Orit Braun-Benyamin, Mrs. Erella Eisenstadt-Matalon, Dr. Victor Chernov
11:45-12:30	Meeting with Adjunct academic staff *	Mrs. Roth Navit, Dr. Katz-Demyanets Alexander, Mrs. Sonya Arieli, Mr. Adham Salih Dr. Koenig Michael, Zibenberg Alex
12:30-13:15	Lunch (in the same room)	Closed-door meeting of the committee
13:15-14:45	Tour of facilities: Labs, Library and Final Project Presentation	Yogev Baruch, Borisyk Konstantin, Yarden Edenburg, Nimrod Nabi, Harel Elad
14:45-15:30	Meeting with BSc students**	
15:30-16:15	Meeting with Alumni**	
16:15-16:30	Closed-door meeting of the committee	
16:30-17:00	Closing meeting with heads of institution and the Head of the School of ME	Prof. Arie Maharshak, Prof. Sarit Sivan Dr. Yair Maayan, Dr. Abraham Weiss Prof. Ehud Kroll, Prof. Michael Regev Dr. Doron Faran

* The heads of the institution and academic unit or their representatives will not attend these meetings.

** The visit will be conducted in English with the exception of students who may speak in Hebrew and anyone else who feels unable to converse in English