



DEPARTMENTS OF MECHANICAL ENGINEERING SHAMOON 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 of¹:

- | | |
|---------------------------------------|--|
| • 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 alumni during the course of each one-day visit to each of the institutions.²
- 1.6 This report deals with the Departments of Mechanical Engineering (Be'er Sheva Campus and Ashdod Campus) at **Shamoon Academic College of Engineering**. The Committee's visit to the college took place on June 20th, 2018. The schedule of the visit is attached as **Appendix 2**.
- 1.7 The Committee thanks the management of Shamoon College and the Departments 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 Faculty, with a capitalized first letter to refer to the Faculty of Engineering and will use faculty with the first letter not capitalized to denote professors and lecturers of the ME Department collectively. 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 QA process, study program, teaching, research, students, and infrastructure met the acceptable threshold level of performance. Aspects related to the management, administration, vision, and faculty did not. In particular, the Senior Administration should clarify how the two departments in ME will operate independently on the two campuses while simultaneously coordinating their recruiting (students and faculty), teaching, and research efforts. The programs are understaffed, especially at Ashdod.

Section 3: **Observations**

3.1 Introduction

Shamoon Academic College of Engineering (SCE) is primarily a teaching institution that prepares engineers for industry. Their mission is to provide students, especially from the south of Israel, access to higher education. Since 2002, it operates both in Be'er Sheva and Ashdod. In 2016, the departments on the two campuses became independent. The Department of Mechanical Engineering at Be'er Sheva and Ashdod currently teach *ca.* 420 and 280 students, respectively. Both departments are integrated within the institution.

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.

SCE has 6 bachelor and 3 master's programs. The Committee believes that SCE can sustain and enhance ME at Be'er Sheva. The program at Ashdod must be strengthened.

3.2 Management and Administration

The President of SCE oversees programs at the two different campuses in Ashdod and Be'er Sheva. Each campus has its own Dean of Engineering and Department Head of Mechanical Engineering. The Committee observed a close relationship and coordination between the Deans of Engineering and the Departments but felt that the President was less connected to Ashdod.

3.2.1 Ashdod Campus

The Department is supported by the institution. In addition, the campus receives funding from the Ashdod municipal authority. The Committee was unable to discern the true extent of departmental decision-making and budget autonomy. The faculty appeared to have input on decisions regarding hiring, curriculum, and future directions, but not necessarily on policy. The Head was the principal decision-maker at the Department level.

The Head enjoys wide support from the faculty and works as a strong advocate for the program. The Department plans to hire 2.5 faculty, primarily by placing their best undergraduates into graduate programs. However, this approach has been unsuccessful so far and the faculty lacks a sense of urgency. Hiring outside the SCE alumni base would bring greater intellectual diversity to the program. Hiring is a critical issue.

3.2.2 Be'er Sheva Campus

The Department does not have autonomy. Agreement must be obtained with the Dean before requests are presented to the President. Budgets are assigned based on need and available funds. Faculty members provide input for the decision-making process via the Department Head. However, the Committee did not discern a clear and consistent strategy on critical issues, suggesting a lack of coordinated management.

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

3.3 Vision

3.3.1 Ashdod Campus

The Department has a strategic vision. They have added a *Natural Gas* track and seek to introduce tracks in biomechanics as well as in materials and processing. Implementation of the plan is severely hampered by insufficient faculty members. The Department is encouraged to refine and document its strategic plan.

3.3.2 Be'er Sheva Campus

The Department's strategic plan is to increase the number of curriculum tracks as well as develop an MS degree with thesis. They believe this will allow more effective pursuit of its education and research missions. The Committee recommends that the Department develop a documented strategic plan that is discussed and endorsed by the faculty. This plan should include their hiring, space, and research vision.

In terms of Department size, the Head reported that the current number of faculty (9) was sufficient. However, the student-to-faculty ratio is high, and they are exploiting many more adjunct faculty than other Israeli colleges. The Committee strongly urges the Department to consider working with the Dean to hire 3-5 additional faculty.

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

3.4 QA & Self-Evaluation Process

3.4.1 Ashdod Campus

The Department appears to have a good system for QA and improvement in the areas of teaching and learning. The Department relies heavily on the Head of the Center for Quality Assessment and Promotion of Teaching. The syllabi were thorough, and the faculty are extremely attentive and engaged in adjusting their teaching in response to feedback.

3.4.2 Be'er Sheva Campus

The self-evaluation process was led by the Department Head, with active participation from the faculty. One significant outcome was that all syllabi were improved and rewritten. More generally, the process strengthened cooperation within the faculty. The Department hopes to continue applying these evaluation techniques on a continual basis.

Most of the weaknesses described in the report relate to the high teaching load and poor research funding in the college environment on both campuses.

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

3.5 Study Program

3.5.1 Ashdod Campus

The program initially had two specialization tracks, one in *Mechatronics* and the other in *Product Development and Design*. A third track was added in *Natural Gas* to support the Israeli gas industry. The Department

hopes to establish two new tracks in *Biomechanics* (jointly with Chemical Engineering) and in *Materials & Processing*. This planned expansion of the study program will not be possible without additional faculty to support these tracks.

The labs are tightly coupled with the class content as described in the syllabus. The study program is broader than at many other ME departments and includes required courses on *Business Entrepreneurship* and *Introduction to Management in High Technology Environment*. An unusual feature is that attendance in some classes (the first year and labs) is mandatory. Consequently, some courses are offered in the evenings and during the summer. A number of classes are to be offered in English, in part to cater to international students that the program hopes to attract in the future.

The Department also wishes to establish two new degrees: M.Sc. in *Mechanical Engineering* and M.Sc. in *Manufacturing Technology*. These would parallel existing, project-oriented M.Sc. degrees in Electrical Engineering and Industrial Engineering and Management. Even without these new degrees, the existing study program is placing a heavy burden on a small number of young faculty. Thus, the Ashdod Campus employs a very large number of adjunct teachers. The Committee was not convinced that new degree programs should be added at this time.

3.5.2 Be'er Sheva Campus

The study program in Be'er Sheva is similar to that in Ashdod, with three specialized tracks offered: *Product Design*, *Mechatronics*, and *Energy Systems*. Comments in the previous section also apply to Be'er Sheva. More faculty are available at Be'er Sheva than Ashdod, but many adjunct faculty are still required, especially for teaching exercises and projects.

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

3.6 Teaching and Learning

3.6.1 Ashdod Campus

Student surveys are conducted at the end of each course and the results are taken seriously. More generally, SCE has a culture of listening to the students. Issues that they raise must be addressed by the faculty, often via the Head or Dean. While such mechanisms are normally positive, they can also add to the duties of already overworked faculty.

The faculty use a template to provide detailed syllabi that outline the topics covered in their courses and the intended learning outcomes (ILOs). The faculty are fully committed to the program and the students. The final projects are excellent and show imagination and creativity.

3.6.2 Be'er Sheva Campus

The comments in the preceding section also apply to the Be'er Sheva campus.

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

3.7 Faculty

3.7.1 Ashdod Campus

The size of the ME faculty is insufficient. Because they have only 5 full-time faculty, they bear additional administrative loads, serving on required committees, advising students, and performing other service activities for the Department, that should be spread over a larger number of faculty. From a teaching perspective, the faculty are excellent; from a research perspective, the quality is variable. They have two female faculty members and are working to diversify their student body and teaching staff.

3.7.2 Be'er Sheva Campus

The faculty are enthusiastic about teaching and performing their teaching duties well. Faculty also wish to do research but are constrained by insufficient research support and heavy teaching loads.

The climate among the faculty was positive. They support each other and communicate well within the Department. Periodic faculty meetings are used to discuss the teaching programs and future directions.

The faculty understand the promotion criteria. Both the Dean and the Head meet periodically with new faculty members. However, the Department should consider a more structured mentoring program, especially if they are to grow in size. Indeed, more faculty are needed, especially given the President's vision to reach a student-to-faculty ratio of 25:1. As new faculty slots are being planned, the Department should consider future space and facility needs, given that an opportunity currently exists to have new space for ME. The Department requires more technical and clerical support.

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

3.8 Research

3.8.1 Ashdod Campus

A few of the faculty are trying to engage in research. The primary example is in corrosion through a collaboration with Ben Gurion

University and its' facilities. Other research efforts are limited in quantity and quality.

3.8.2 Be'er Sheva Campus

Areas of research include: (1) robotics and control, (2) DNA mechanics, (3) mechanics and materials engineering, (3) product design, (4) energy and numerical simulations, and (5) thermo-mechanics. Practical research is emphasized. The faculty have raised over \$1.4 million in research funds during the last 3 years with 42% coming from SCE. In addition, individual faculty members have collaborations with researchers abroad and within Israel. The Committee encourages these collaborations to allow faculty to perform advanced research. Some undergraduate students are involved in research as part of their final project, which is financially supported by SCE. A program also exists to bring students from abroad to perform research during the summer months.

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

3.9 Students

3.9.1 Ashdod Campus

The admission standards are intentionally lowered to allow students from the periphery to attend college. As a result, the student quality is variable and the drop-out rate is high. Students who complete the ME program are prepared to find jobs after they graduate, although they are sometimes underemployed at first. Most students go to entry-level industry jobs. A few students enter graduate studies.

Alumni felt well-prepared for industry. Alumni remain in contact with the program. They return for open days, attend events held on campus, and arrange plant tours for undergraduates at their work. SCE and the Department should work to maintain contact with its alumni.

3.9.2 Be'er Sheva Campus

Students can participate in international experiences, including workshops with KTH, IIT (India Institute of Technology), Stony Brook University, and University of Porto.

The Department is doing well with promoting diversity. They run outreach programs in nearby high schools to increase female students. In the latest freshmen class, 13% of the students were female. Last year, 8 female students were from the Negev Bedouin communities. Thirteen percent of the students at SCE are Bedouin. A program is planned to have Ethiopian SCE students perform outreach.

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

3.10 Infrastructure

3.10.1 Ashdod Campus

The Department, along with the other engineering departments, is located in two sets of buildings, which were originally high schools. Even though the buildings are dated and not designed for an engineering college, the current space is adequate.

Faculty share offices, but this was not considered to be an issue. The teaching labs are adequately equipped for the current curriculum, but the space and supporting infrastructure are inadequate for research activities. A new campus has recently been approved with expected occupation within three years. The Department believes that they will then have sufficient space for their teaching and research needs, although the latter has not yet been defined.

3.10.2 Be'er Sheva Campus

The Committee was very impressed with the space and facilities of the Department. The students have access to a modern library with various publisher databases (shared with both campuses). The labs and workshops are well developed and are sufficient for their education and research purposes. A new building is also planned, which may provide additional space for the ME program. SCE should consider providing space to Adjunct Faculty so they can meet with students.

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

Section 4: Recommendations

Essential recommendations:

- The Senior Administration should clarify how the two departments in ME should operate independently on the two campuses while simultaneously coordinating their teaching, outreach, hiring, and research efforts.
- The faculty should be increased in both Departments, but especially at Ashdod.
- The two undergraduate programs should be stabilized before pursuing additional graduate degrees.

- At Ashdod, the space and supporting infrastructure are inadequate for research activities and should be enhanced.

Important recommendations:

- The Departments should refine and document their strategic plans, including hiring, space, and research vision.
- The Departments should add a more structured faculty mentoring program.

Desirable recommendations:

- SCE and the Departments should enhance their connection with their alumni.

Signed By:



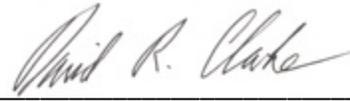
Prof. David Norris
Committee Chair



Prof. Leslie Banks-Sills



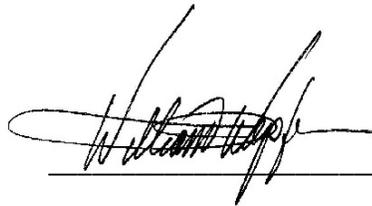
Prof. Patricia (Patsy) Brackin



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.

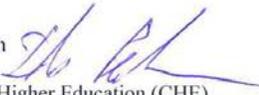
It is with great pleasure that I hereby appoint you to serve as chair of the Council for Higher Education's Committee for the Evaluation of the study programs in **Mechanical Engineering**. In addition to yourself, the composition of the Committee will be as follows: Prof. Leslie Banks Sills, prof. Patricia 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

Shamoon College of Engineering – Be'er-Sheva Campuses

Wednesday, June 20, 2018

	Session	Be'er-Sheva Campus
9:30-10:00	Opening session with the head of the institution and the Deans of Engineering Faculties (via VC)	<i>Prof. Jehuda Haddad</i> , President. <i>Prof. Semyon Levitsky</i> , Dean of Faculty of Engineering Be'er-Sheva. Conference room #310 Shamoon(20)
10:00-10:30	Meeting with the Dean of the Engineering Faculty	<i>Prof. Semyon Levitsky</i> , Dean of Faculty of Engineering Be'er-Sheva Conference room #310 Shamoon(20)
10:30-11:30	Meeting with the Head of the Department	<i>Dr. Gedalya Mazor</i> , Head of ME Department Conference room #310 Shamoon(20)
11:30-11:45	Break	Closed-door meeting of the committee
11:45-12:30	Meeting with senior academic staff – tenured and non-tenured	<i>Dr. Iko Avital; Dr. Nir Trabelsi; Dr. Etan Fisher; Dr. Izhak Ledizhensky; Dr. Yoav Biton; Dr. Elad Priel; Dr. Orly Hakimi; Dr. Zuk Turbovich.</i> Conference room #310 Shamoon(20)
12:30-13:15	Meeting with Adjunct academic staff	<i>Dr. Alexander Shapiro; Dr. Muhamad Drawshi; Dr. Uri Suissa; Mr. Dotan Babai; Mr. Chen Giladi; Ms. Naama Agassi.</i> Conference room #310 Shamoon(20)
13:15-14:00	Lunch (in the same room)	Closed-door meeting of the committee
14:00-15:15	Tour of facilities: Labs, Library & Final Project Presentation	Labs: Automation and Pneumatics Room #212 Katzir(50); Materials Room #157; CIM Room #213 Katzir(50); Robotics Room #214 Katzir(50); Prototype and CNC Room #100; Katzir(50); Machining workshop Room #105 Einstein(40) Library; Final Projects presentation VIP Room #003 Katzir(50)
15:15-16:00	Meeting with BSc students**	
16:00-16:45	Meeting with Alumni**	
16:45-17:15		Closed-door meeting of the committee
17:15-17:45	Closing meeting with head of institution, Deans of the Engineering Faculties, and the Heads of the ME departments (via VC)	<i>Prof. Jehuda Haddad</i> , President <i>Prof. Semyon Levitsky</i> , Dean of Faculty of Engineering Be'er-Sheva <i>Dr. Gedalya Mazor</i> , Head of ME Department Conference room #310 Shamoon(20)

Shamoon College of Engineering –Ashdod Campuses

Wednesday, June 20, 2018

	Session	Ashdod Campus
9:30-10:00	Opening session with the head of the institution and the Deans of Engineering Faculties (via VC)	Prof. Dorith Tavor , Head of The Centre of Quality Assessment and Promoting Teaching Prof. Shlomo Mark , Dean of the Faculty of Engineering Ashdod Conference room #2004 Jabotinsky
10:00-10:30	Meeting with the Dean of the Engineering Faculty	Prof. Shlomo Mark , Dean of the Faculty of Engineering Ashdod Conference room #2004 Jabotinsky
10:30-11:30	Meeting with the Head of the Department	Dr. Guy Ben-Hamu , Head of ME Department Conference room #2004 Jabotinsky
11:30-11:45	Break	Closed-door meeting of the committee
11:45-12:30	Meeting with senior academic staff – tenured and non-tenured	Prof. Amir Eliezer, Dr. Bella Gurevich, Dr. Amir Zohar, Dr. Itzhak Levi, Mr. Emanuel Yair, Mr. Shlomi Hachoer, Mrs. Lucy Shemesh, Mr. Avihai Shurin. Conference room #2004 Jabotinsky
12:30-13:15	Meeting with Adjunct academic staff	Dr. Shake Bilu, Dr. Yoval Kashter, Dr. Ofer Ish-Shalom, Dr. Doron Aloni, Mr. Asher Shtern, Mr. Ofer Medlinsky. Conference room #2004 Jabotinsky
13:15-14:00	Lunch (in the same room)	Closed-door meeting of the committee
14:00-15:15	Tour of facilities: Labs, Library & Final Project Presentation	Bnai-Brith: Labs: Woodworking & Modelling Room #150; Metalworking Room #152; Plastics Manufacturing Room #152A; Materials Room #157; CIM Room #250; Robotics Room #256; Mechatronics Room #257; Strength of Materials/Fluid – Room #259; Library; Final Projects presentation – along the Department hallway
15:15-16:00	Meeting with BSc students**	
16:00-16:45	Meeting with Alumni**	
16:45-17:15		Closed-door meeting of the committee
17:15-17:45	Closing meeting with head of institution, Deans of the Engineering Faculties, and the Heads of the ME departments (via VC)	Prof. Dorith Tavor , Head of The Centre of Quality Assessment and Promoting Teaching Prof. Shlomo Mark , Dean of the Faculty of Engineering Ashdod Dr. Guy Ben-Hamu , Head of ME Department Conference room #2004 Jabotinsky

* 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.