The Committee for the Evaluation of Chemical Engineering Study-Programs

Sami Shamoon College of Engineering

Evaluation Report

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 Chemical Engineering during the academic year 2008-2009.

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

- ***Prof. Thomas F. Edgar*** - Department of Chemical Engineering, University of Texas, Austin, USA - Chair
- ***Prof. Emeritus. Zehev Tadmor,*** Department of Chemical Engineering, the Technion – Israel Institute of Technology, Israel, and Chairman of the S. Neaman Institute of Advanced Studied in Science and Technology, Technion – co-Chair
- ***Prof. Morton M. Denn*** - Department of Chemical Engineering, the City College of New York, USA.
- ***Prof. Josef C. Merchuk*** - Department of Chemical Engineering, Ben Gurion University, Israel.
- ***Prof. Stanley l. Sandler*** - Department of Chemical Engineering, University of Delaware, USA.

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

Within the framework of its activity, the Committee was requested to[1]:

1. Examine the self-evaluation reports submitted by institutions that provide study programs in Chemical Engineering, and to conduct on-site visits at those institutions.
2. Submit to the CHE an individual report on each of the evaluated academic units and study programs, including the Committee's findings and recommendations.
3. Submit to the CHE a general report regarding the examined field of study within the Israeli system of higher education including recommendations for standards in the evaluated field of study.

The entire process was conducted in accordance with the CHE's Guidelines for Self-Evaluation (of October 2007).

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

Chapter 2 - Committee Procedures

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

The Committee held its first meeting on May 3, 2009**,** during which it discussed fundamental issues concerning higher education in Israel and the quality assessment activity, as well as Chemical Engineering study programs.

In May, 2009, the Committee members visited the institutions offering Chemical Engineering study programs. During the visits, the Committee met various stakeholders at the institutions, including management, faculty, staff, and students.

This report deals with the **Department of Chemical Engineering at Sami Shamoon College of Engineering, the Beer-Sheva Campus.** The committee did not visit the study program at the Ashdod campus of the College, but gained some indirect knowledge from the staff at Beer-Sheva (who also teach at Ashdod).

The Committee's visit to the Beer-Sheva Campus of Sami Shamoon College took place on May 04, 2009. The schedule of the visit, including the list of participants from the institution, is attached as **Appendix 2**.

The Committee members thank the management of Sami Shamoon College and of the Department of Chemical Engineering for their self-evaluation report and for their hospitality towards the Committee during its visit at the institution.

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

Chapter 3: Evaluation of the Department of Chemical Engineering at Sami Shamoon College of Engineering

* *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. The study program that was current at the time of the visit to the institution is attached as* ***Appendix 3.***

Background

The Department of Chemical Engineering at Sami Shamoon College (SCE) was established in 1995. The Department was authorized in 1999 to award a B.Tech degree in chemical engineering and completed the transition from a B.Tech to a B.Sc. degree in 2001. The same year, the Department unified the chemical engineering program with the partial complementary program for practical engineers into one program. In 2005, a second Department of Chemical Engineering was opened at the Ashdod Campus of the College, essentially using the same faculty who teach at Beer-Sheva.

During the 2007-08 academic year, the Sami Shamoon student population was a little over 3,000 (at both campuses). 480 undergraduate students were enrolled in chemical engineering studies at the College, of whom 376 reside at the Department of Chemical Engineering at the Beer-Sheva Campus and 104 students at the Ashdod Campus. During the 2005-2006 academic year, the Department granted 30 B.Sc. degrees.

Faculty

The faculty of the Chemical Engineering Department is young, enthusiastic, and hard working. They are maintaining the 12 credit/term teaching requirement and doing research, as discussed below, while keeping a very positive attitude and showing exemplary loyalty to the College. The Chemical Engineering Department must also teach basic chemistry and biology courses. Only three of the nine full-time senior faculty members cover the core chemical engineering subjects. This is an unusual faculty situation, especially in view of the College's mission to prepare students for the traditional chemical industry. We understand that one additional faculty member

has been hired but has yet to arrive, and that there are two open faculty positions. The Committee recommends that all remaining vacancies be filled with traditional chemical or biochemical engineers who can teach the full range of core chemical engineering subjects. In some cases, a faculty member with a background in materials engineering, mechanical engineering, or applied chemistry, with a strong process focus and chemical industry experience, might be able to carry out this function. The Committee was impressed by the devotion and support of the adjunct faculty; their participation helps somewhat to moderate this issue and to provide deeper insight into the chemical engineering profession in classroom instruction. The Committee found the devotion of the Department leadership (both the Chairman and the Dean) to the faculty, the students, the Department and the College to be exemplary. They clearly view their work as a mission and not just a profession.

Undergraduate Study program

The Chemical and Biochemical Engineering Program at SCE is a traditional applied program geared to produce practicing engineers, especially for the chemical industry in the south of Israel. The program uses textbooks and covers material that is typical of chemical engineering programs in the U.S. The program at SCE is successful in serving students at the periphery of Israeli society, both by providing preparatory courses for students who are underprepared for higher education or need refresher courses in high school mathematics, physics and chemistry and by taking measures to retain them as students in good academic standing (e.g., tutoring and recitation sections). The low dropout ratio may result because students are allowed to extend their studies up to a 6-year duration (including the first preparatory year), usually due to part- or full-time employment or family responsibilities. The faculty “open door” policy ensures good assistance and advisement to meet the needs of the students. The department uses the HighLearn system for maintaining communication between the students and faculty, providing resource materials, posting course information, syllabi, homework and solutions, past examinations, and other relevant course material. According to College representatives, the Chemical Engineering Program at the Ashdod campus, which the Committee did not visit, is identical to that at the Beer Sheva Campus and is taught by the same faculty.

The student body is highly motivated. Many of the students have to work part- or full-time and/or have family obligations. The College responded to this need in a commendable way by having one full day of lectures per week, while the rest of the teaching occurs in the evening for the two last years of studies. The length of study for the B.Sc. degree may stretch out to 6 years (including one preparatory year –in some cases one semester - that provides preparatory and refresher courses in high school mathematics, physics and chemistry). For students who cannot afford tuition, need-based scholarships or assistance with loans are available. The students like the faculty and they have a 'family' like identification with the College; they feel that they are getting "value for their tuition" and that they are well prepared for the marketplace. The fact that almost all of the graduates found employment in the chemical industry in the south supports this view.

Many of the interviewed students indicated a desire to continue to a M.Sc. degree, but they feel that the required remedial courses for higher studies in chemical engineering at the Israeli research universities are a major obstacle that many students deem to be unfair. Most students would like to have the possibility to pursue a M.Sc. program at SCE.

The committee was deeply impressed by the devotion of the department to the students, especially since SCE has a very important social role in that a large proportion of the students apparently come from families where the opportunity for higher education is not taken for granted.

Students have a limited number of elective courses in their degree programs, and none outside of chemical engineering. The main choices students have in tailoring their programs are between the Biotechnology and Industrial Processes tracks, together with a recently approved Water Track. However, students cannot mix-and-match courses between these tracks. All students are required to do a final project. The projects we examined ranged from modern to very traditional. The students expressed a desire to be able to take some courses in the humanities and social sciences, which are not offered at SCE but may be available at Ben Gurion University (BGU).

The present faculty has only three traditional chemical engineers to teach all the core courses. As a result, there is a high student-to-core faculty ratio. This problem of the small number of core faculty members has been recognized by the College authorities: another faculty member has been hired, and two faculty vacancies exist. While the students learn about design from an adjunct faculty member, they do not perform an integrated chemical process design project using modern computational tools, as is common in chemical engineering programs in the U.S and in Israeli universities. The students do benefit from contact with two practicing engineers (adjunct faculty) who teach chemical engineering courses.

Research

The departmental senior faculty members are committed to research. They see it as an important part of their professional development, and they recognize that it is an essential component of their own professional advancement through the academic ranks. However, they are severely constrained in their ability to do research by the heavy teaching commitment of twelve hours/week, the absence of major research equipment and a supporting infrastructure, and by the absence of a cadre of research students in M.Sc. or Ph.D. programs. Faculty members have taken two different routes to carrying out research. One group, consisting primarily of the core chemical engineering faculty, has identified projects that can be carried out with very limited facilities and with the assistance of undergraduate researchers working on final projects or as paid assistants. This contributes directly to the educational mission of the institution. The other group has established bases of operation for research at other institutions. This is a viable, although inefficient, solution to the problem. A few faculty members are publishing papers in good journals, and others appear to be on the way to establishing at least minimal research programs. The institution has allocated an annual average of NIS 240,000 towards research between 2003-04 and 2007-08, which is a modest amount but a helpful and supportive gesture. It is unrealistic to believe, however, that overall faculty research productivity can be comparable to what might be expected at a research university.

The faculty are enthusiastic supporters of the establishment of a research M.Sc. degree program in Chemical Engineering with a specialty in Green Engineering.

According to the Chair, the primary motivation is to establish the infrastructure and student body for a SCE-based research enterprise, and current students have expressed an interest in participating. The Committee believes that this is an unrealistic goal, however, in light of staffing and facilities limitations. The three current core chemical engineering faculty are already overextended; two or three additional faculty in the core areas are required just to maintain the viability of the B.Sc. program to educate high quality engineers, which is the primary mission of the College.

The administration of the Institution should consider steps that might be taken to enable faculty members to enhance their research activity within the constraints of the College mandate and structure. Institutional funds might be made available, for example, to permit faculty members to periodically spend a semester in residence at an Israeli research university, where they could do their own research and establish or maintain continuing collaborations. Similarly, summer appointments that would gain uninterrupted access to facilities at research universities could be encouraged.

Infrastructure

The committee evaluated the infrastructure for the Department of Chemical Engineering with respect to laboratories (both undergraduate and research), computing laboratories, and the library. The undergraduate laboratory experiments are very traditional and reside in a building off campus that is shared with a technical college. Technician support is fairly limited. The department is excited that it will be moving into a new facility in the next few years (funded by the founder of the College) that will greatly upgrade its teaching and research laboratories. The library, classroom, and computer facilities were found to be satisfactory, and the nearby location of the library to the Chemical Engineering Department provides a pleasant environment for study and accessing information resources.

Long-Range Planning

The need for making curriculum changes and associated faculty hiring are being addressed through the formulation of a new water track and a proposed M.Sc. program in the area of green engineering. However, as the Department seeks to improve the quality and capabilities of undergraduate programs in an environment of

limited resources, it is important to be able to prioritize the future curriculum changes and move into new research areas along with associated space requirements. The Department indicated that it has great difficulty in finding appropriate faculty to hire with a chemical engineering background, so it will take a number of years to fill existing vacant positions. This argues against trying to add new degree programs in the future unless the faculty size and research capability can be increased.

The collaborative spirit of the faculty should allow them to reach a shared vision of where the Department wants to be in five years, especially in terms of new faculty hiring and the goals for managing the size and quality of the program. Constraints such as teaching load and the difficulty of hiring will require the Department to develop realistic, achievable goals. As stated earlier in the section on faculty, the Committee does not support the addition of a M.Sc. degree in green engineering at this time.

Collaboration with BGU

The proximity of BGU suggests collaboration should be possible in a number of areas. This would enable the SCE students to take technical electives at BGU, take courses in humanities and social sciences not offered at SCE in order to expand the horizons of future engineers, and to freely use library facilities. Such cooperation does not presently occur. Therefore, the Committee wishes to encourage the leadership of Sami Shamoon and BGU to explore the feasibility of such cooperation, as well as reexamining the possibilities for SCE graduates to pursue M.Sc. degrees at BGU, and for Sami Shamoon faculty to spend summers or semester-long sabbaticals at BGU. We would expect that the Planning and Budgeting Committee would look favorably on such collaboration and perhaps support it financially.

Self Evaluation Process

The faculty were broadly involved in the preparation of the self-study document and expressed a certain amount of pride in their participation in the self-evaluation.

Summary Recommendations

The College is clearly meeting the essential parts of its stated missions: (a) to offer higher education learning opportunity to young men and women for whom the universities were out of reach, and (b) to provide the chemical industry in the South of the State of Israel with qualified chemical engineers. The green technology effort and the new water track represent interesting educational niches that are important to Israel.

Hiring of several additional faculty members who can teach core chemical engineering courses is required in the near future just to maintain the viability of the B.Sc. program. The faculty members are highly motivated and dedicated to the students, and the Dean and Chairman of the Department offer them strong leadership. Faculty are hampered professionally by having to do research with undergraduate students or by establishing research programs elsewhere. They are stretched by the need to offer a complete chemical engineering program with a small number of core faculty.

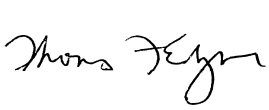
The program is successful in graduating students who come from the periphery of Israeli society through a strong academic support system and family atmosphere.

The Committee recommends exploring avenues of collaboration between SCE and BGU in enabling students to take electives and humanity courses and to use the library at BGU, as well as having faculty spend summers and semester-long sabbaticals at BGU or other research universities.

The Committee does not support the faculty desire to implement a M.Sc. program at the present time. Steps to improve faculty research opportunities within the current structure might include opportunities for faculty to spend a semester in residence at an Israeli research university and/or summer appointments, which would provide faculty access to research facilities not available at SCE.

The facilities for instruction and research will be upgraded significantly with the move to a new building.

Signed by:



Prof. Thomas F. Edgar, Chair

Prof. Zehev Tadmor, Co-Chair

Prof. Josef C. Merchuk

Prof. Morton M. Denn

Prof. Stanley I. Sandler

Appendices

مجلس التعليم العالي
המועצה להשכלה גבוהה
COUNCIL FOR HIGHER EDUCATION
Planning & Budgeting Committee | הועדה לתכנון ולתקצוב

February 4, 2009

Prof. Thomas F. Edgar
Department of Chemical Engineering
University of Texas, Austin
USA

Dear Professor Edgar,

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 scholars and experts in the international arena in a national effort to meet the critical challenges that confront the Israeli higher education system today. The formation 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 and professionals 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 Chemical Engineering Studies.
The composition of the Committee will be as follows: Prof. Thomas F. Edgar – Chair, Prof. Zehev Tadmor– co-Chair, Prof. Jose' C. Merchuk, Prof. Denn Morton and Prof. Stanly l. Sandler.
Ms. Noa Nof-Steiner will coordinate the Committee's activities.

In your capacity as the Chair of the Evaluation Committee, you will be requested to function in accordance with the enclosed appendix. I wish you much success in your role as a member of this most important committee.

Sincerely,

Professor Yuli Tamir
Minister of Education, Culture and Sport
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. Noa Nof-Steiner, Committee Coordinator

October 2009

Appendix to the Letter of Appointment for Evaluation Committees (Study Programs)

1. General

On June 3, 2003 the Council for Higher Education (CHE) decided to establish a system for quality assessment and assurance in Israeli higher education, which came into effect in the academic year of 2004-2005. Within this framework, study-programs are to be evaluated approximately every six

The main objectives of the quality assessment activity are:

- To enhance the quality of higher education in Israel;
- To create an awareness within institutions of higher education in Israel to the importance of quality evaluation and to develop an internal culture of self-evaluation, as well as the required mechanisms;
- To provide the public with information regarding the quality of study programs in institutions of higher education throughout Israel;
- To ensure the continued integration of the Israeli system of higher education in the international academic arena.

It is not the CHE's intention to rank the institutions of higher education according to the results of the quality assessment processes. The evaluation Committee (hereinafter "Committee") should refrain from formal comparisons.

2. The Work of the Evaluation Committee

2.1 The Committee shall hold meetings, as needed, before visiting the institution, in order to evaluate the material received.

2.2 The Committee shall visit the institutions and the academic units being evaluated – if possible - within 4-6 months of receiving the self-evaluation reports. The purpose of the visit is to verify and update the information submitted in the self-evaluation report, clarify matters where necessary, inspect the educational environment and facilities first hand, etc. During the visit, the Committee will meet with the heads of the institution, faculty members, students, alumni, administrative staff, and any other persons it considers necessary.

2.3 The duration of the visits (at least one full day) will be coordinated with the chairperson of the Committee.

2.4 Following the visit, the Committee will submit the CHE with:
1. A final report on each of the evaluated departments,
2. A general reports on the state of the discipline in the Israeli higher education system. The general report will include recommendations to the CHE for standards and potential state-wide changes in the evaluated field of study.

2.5 The reports will be sent to the institutions and the academic units for their response.

2.6 The reports and Committee's findings will be submitted to the CHE and discussed within its various forums.

3. Conflict of Interest Policy

3.1 In order to avoid situations that may question the credibility and integrity of the evaluation process, and in order to maintain its ethical, professional and impartial manner, before issuing their Letter of Appointment members and chairperson of the evaluation Committee will sign a Declaration on Conflict of Interest and Confidentiality.

3.2 In the event that a member of the Committee is also a current or former faculty member at an institution being evaluated, he/she will not take part in any visits or discussions regarding that institution.

4. The Individual Reports

4.1 The final reports of the evaluation Committee shall address every institution separately.

4.2 The final reports shall include recommendations on topics listed in the guidelines for self-evaluation, including:

- The goals, aims and mission statement of the evaluated academic unit and study programs
- The study program
- The academic faculty
- The students
- The organizational structure
- Research
- The broader organizational structure (school/faculty) in which the academic unit and study program operate
- The infrastructure (both physical and administrative) available to the study program
- Internal mechanisms for quality assessment
- Other topics to be decided upon by the evaluation Committee

5. The Recommended Structure of the Reports

Part A – General background and executive summary:

5.1 General background concerning the evaluation process; the names of the members of the Committee and its coordinator; and a short overview of the Committee's procedures.

5.2 A general description of the institution and the academic unit being evaluated.

5.3 An executive summary that will include a brief description of the strengths and weaknesses of the academic unit and program being evaluated.

Part B – In-depth description of subjects examined:

5.4 This section will be based on evidence gathered from the self-evaluation report and the topics examined by the Committee during the site visit.

5.5 For each topic examined, the report will present a summary of the Committee's findings, the relevant information, and their analysis.

Part C –Recommendations:

5.6 This section will include comprehensive conclusions and recommendations regarding the evaluated academic unit and the study program according to the topics in part B.

5.7 Recommendations may be classified according to the following categories:

- ***Congratulatory remarks and minimal changes recommended, if any.***
- ***Desirable changes recommended*** at the institution's convenience and follow-up in the next cycle of evaluations.
- ***Important/needed changes requested for ensuring appropriate academic quality*** within a reasonable time, in coordination with the institution (1-3 years)
- ***Essential and urgent changes required, on which continued authorization will be contingent*** (immediately or up to one year).
- ***A combination of any of the above.***

Part D - Appendices:

5.8 The appendices shall contain the Committee's letter of appointment and the schedule of the on-site visit.

6. The General report

In addition to the individual reports concerning each study program, the Committee shall submit to the CHE a general report regarding the status of the evaluated field of study within the Israeli institutions of higher education. The report should also evaluate the state and status of Israeli faculty members and students in the international arena (in the field), as well as offer recommendations to the CHE for standards and potential state-wide changes in the evaluated field of study.

We urge the Committees to clearly list its specific recommendations for each one of the topics (both in the individual reports and in the general report) and to prioritize these recommendations, in order to ease the eventual monitoring of their implementation.

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Dorith Tavor, Ph.D.

Chemical Engineering, Dean

Chemical Engineering- Schedule of site visit to the SCE College

Time	Subject	Participants
09:00-09:30	Opening Session: The heads of the institution and department	*President (optional)* – Prof. Jehuda Haddad. *General Director* – Prof. George Markovits (Uzu). *Head of Quality Assessment System* - Prof. Zohar Laslo *Dean* – Dr. Dorith Tavor
09:30-10:00	Meeting with academic head of the department	Dr. Adi Wolfson
10:00-11:00	Meeting with senior faculty and representatives of relevant committees (teaching/curriculum committee, admissions committee, appointment Committee)*	Dr. Ariela Burg, Dr. Oshra Shapir, Dr. Jeanine Blumunfeld, Dr. Lina Apelbaum, Dr. Michal Goldenberg, Dr. Tamar Barak, Dr. Yoram Shotland, Dr. Julia Penso.
11:00-11:45	Meeting with adjuncts and junior faculty*	Dr. Magal Sapir, Dr. Riki Goldbart, Mr. Igal Antonir, Mr. Alon Tavor, Mr. Inna Leviztky, Mr. Khalil Abu-Revia,
11:45-12:45	Meeting with students*	
12:45-13:30	Lunch with the heads of the institution and academic	*General Director* – Prof. George Markovits (Uzu). *Head of Quality Assessment System* - Prof. Zohar Laslo *Dean* – Dr. Dorith Tavor *Head of department* – Dr. Adi Wolfson
13:30:14:15	Review of students' work/materials*	
14:15-15:15	Tour of campus (classes, laboratories, library, offices of faculty members, computer labs etc.)	*General Director* – Prof. George Markovits (Uzu). *Head of Quality Assessment System* - Prof. Zohar Laslo *Dean* – Dr. Dorith Tavor *Head of department* – Dr. Adi Wolfson
15:15-15:45	Closed-door working meeting of the committee*	
15:45-16:15	Summation Meeting with heads of the institution and of the department	*President (optional)* – Prof. Jehuda Haddad. *General Director* – Prof. George Markovits (Uzu). *Head of Quality Assessment System* - Prof. Zohar Laslo *Dean* – Dr. Dorith Tavor *Head of department* – Dr. Adi Wolfson

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

Sami Shamoon College of Engineering (R.A)

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