



**The Committee for the Evaluation of Chemical Engineering
Study-Programs**

The Academic College of Judea and Samaria in Ariel

Evaluation Report

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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 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 I. 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 to¹:

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.

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 and Biotechnology, the Academic College of Judea and Samaria in Ariel.**

The Committee's visit to the Academic College of Judea and Samaria in Ariel took place on May 13, 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 the Academic College of Judea and Samaria in Ariel and of the Department of Chemical Engineering and Biotechnology for their self-evaluation report and for their hospitality towards the Committee during its visit at the institution.

Chapter 3: Evaluation of the Department of Chemical Engineering and Biotechnology, at the Academic College of Judea and Samaria in Ariel

** 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 and Biotechnology at the Academic College of Judea and Samaria in Ariel (ACJS) was established in 1992. The Department was authorized in 1996 to award a B.Tech degree in chemical engineering and completed the transition from a B.Tech to a B.Sc. degree in 2004. Departmental faculty members collaborate with a few universities that grant M.Sc. and Ph.D. degrees to ACJS graduates who are jointly mentored by ACJS faculty members and use ACJS facilities for their research.

During the 2007-08 academic year, the student population of the ACJS was nearly 8,000, of whom 97% were at the undergraduate level and 3% at the graduate level. In 2007-08, the Department of Chemical Engineering and Biotechnology enrolled 247 undergraduate students and granted 63 B.Sc. degrees.

Faculty

The Department of Chemical Engineering and Biotechnology currently offers a single track to the B.Sc. degree. The faculty members have backgrounds in chemical engineering, mechanical engineering, chemistry, and biological sciences. Only four of the full-time faculty members have the academic backgrounds or professional experience appropriate to the teaching of core chemical engineering subjects; this number is presently adequate as long as no faculty are on leave or on administrative assignment. The Committee is concerned that granting a study leave to one of several core faculty members would make it difficult to meet the teaching requirements for a quality degree program in chemical engineering. The Committee learned at the time of the visit that the Department plans to introduce a new degree track in Chemical Engineering and Materials in the next year, in parallel to the current program, and that

faculty members currently at the College in other programs will offer the required materials courses. The impact of this new degree program, which the Committee has not examined, is not clear, but it is likely to increase enrollments in core courses and thus increase the teaching load. New faculty members in the materials area could contribute to the teaching of some of the core chemical engineering courses, such as thermodynamics, but this does not appear to be part of the planning of the Institution. The Department also mentioned plans to institute a degree track in Chemical and Environmental Engineering, which would have a further but undefined impact on the core Chemical Engineering Program.

The present faculty members are clearly dedicated to providing a quality education, and the students appreciate their accessibility. About half of the current faculty members are engaged in research, as discussed below. The faculty members do not seem to be well informed about institutional procedures and expectations for advancing their careers, including promotion and tenure and sabbaticals.

Six members of the faculty are currently advising M.Sc. and Ph.D. students who are enrolled at other institutions through productive research collaborations. These students also provide the cadre of Teaching Assistants at the ACJS. All TAs who met with the Committee, except one, had received their B.Sc. degrees from the Department.

Undergraduate Study program

The Department Chair interviews each student and decides on his or her acceptance and placement. This is an unusual selection process, which seems to be tailored to the unique character of the College, but it may be subjective. Consideration should be given to including additional faculty members in the process. Approximately 50 to 60% of the applicants are accepted into the program, with many of them having gone through the preparatory unit. Whenever justified, the Department allows students to take a reduced course load and extend their study period to five years. Also, special courses are available in physics, mathematics, chemistry and biology that provide two additional tutorial hours/week for students with weaker backgrounds. This program, which is separate from the pre-academic preparatory system (Mechina) that includes introductory and refresher courses, seems to be successful. It is commendable that the

tuition paid by students in the preparatory unit is partially refunded if they are accepted to the Department.

The chemical engineering curriculum is very demanding and inflexible, with a large number of credit point requirements, and all courses are mandatory, which makes it difficult for students to work while they attend the program. However, it is claimed that most students admitted into the program can finish in four years as a result of taking summer courses.

Two semesters of plant design and two semesters of research are required. The design course involves only small equipment/processes, and is not an overall capstone design, unlike curricula in chemical engineering programs at Israeli universities and in the United States. The limited scope of the design projects are advised only by ACJS faculty, some of whom have industrial experience, but there are no practicing engineers who participate in the class. Instead of using process simulation software, the students use only MATLAB to model small parts of a plant design. The lack of exposure of students to chemical design software and the lack of participation of practicing engineers in the design course are deficiencies. Based on the design and research projects presented by undergraduate students to the Committee, the Committee feels that the 4th year research projects should be more challenging.

The students are not exposed to adjunct professors from industry during their educational program, nor do they hear talks about industry, or have adjuncts from industry teaching a capstone design course or participating in other ways in the educational program. The Committee believes the program could be substantially enriched if those were provided. There is some career guidance of the students, but this seems not to receive much emphasis.

Some of the students who continue to graduate studies at other institutions prefer to do so with local advisors, as they feel comfortable within the supportive environment of the Department. None of these students, however, continued his or her graduate studies in a chemical engineering department, but rather selected a related field. It is not obvious that remaining at the ACJS to do research, rather than becoming fully integrated into the research communities at the universities, is in the best interests of the students, especially those who may wish to continue to the Ph.D., although it clearly benefits the ACJS faculty.

The current students and the former students who are now TAs feel they are part of the Department family, and they appreciate the personal attention. Many students work, and most courses are taught on two different days/two different hours to accommodate this. On some days there are classes from 9 AM to 9 PM, grouped by course year so students can work on the other days.

The overwhelming majority of the students feel the quality of teaching is quite good, including the first year courses, though they feel the courses are difficult. Also, the faculty and Department Chair have an open door policy, allowing good communication between the faculty and students. Students take a large number of laboratory courses and perform many experiments, which they feel provides practical experience and is an advantage of the program.

Faculty use Moodle for posting lectures, etc., and there are also video-taped lectures. Most course materials are available on line. Even with this availability, classroom attendance is very high. The library provides access and study areas until midnight, which is greatly appreciated by the students. Students feel the quality of laboratory/facilities is very good.

The current single track is in Chemical Engineering and Biotechnology, and a track in Chemical and Materials Engineering has just been approved. In addition, the development of a Chemical and Environmental Engineering track is in progress. Students must choose one track for their studies. Other than the track choice, there are no electives, and all courses are obligatory. The Committee believes that the students could benefit if they had the opportunity to enrich their studies with electives. The Committee noted that two currently required courses (technical drawing and electrical engineering) were eliminated many years ago in most chemical engineering departments. The Committee suggests that these courses be eliminated and replaced by two elective courses in science and technology.

The proposed addition of one or more tracks would require a significant increase in the number of faculty members of the Department, mostly in non-core chemical engineering specialties. Should this be accomplished, the Committee wonders whether it would be justified to call the Department a 'Chemical Engineering' Department, since, as already mentioned, there are only four full time faculty

members with a chemical engineering education, and no use of adjunct faculty from industry.

The TAs are ACJS graduates (with one exception) who are now graduate students at other universities (mostly at Bar Ilan and Tel Aviv Universities). The TAs feel they were well-prepared for graduate courses at these universities, though they have been required to take from 2 to 4 undergraduate courses to be admitted into those graduate programs. The TAs report that they have performed well in these make-up (undergraduate) courses, though the mathematical content of the courses at ACJS is somewhat lower than that at the universities. Much of the M.Sc. research can be done at the College, but specialized equipment can be used at the universities as needed.

The Department claimed that 40% of their B.Sc. graduates continue to graduate studies at various universities in Israel and overseas, although the Committee was not provided with detailed statistics. It appears, however, that all or nearly all of these were for advanced study in areas other than chemical engineering, including the environmental and safety areas, MBAs, etc. There is no ACJS graduate currently enrolled in a graduate degree program in chemical engineering at an Israeli university.

The Department is seeking Council for Higher Education approval for a M.Sc. program in chemical engineering. The Committee was provided no information about this proposed program, yet it feels that it may be premature for the Department to move in this direction. Overall, the Committee has a concern that the Department is pursuing too many new directions at once, without sufficient consolidation of the present Department and without a solid foundation in core chemical engineering.

Some of the students interviewed by the Committee indicated that they had selected ACJS because of its proximity to the greater Tel Aviv area, since the alternative for studying chemical engineering would have required travel to Haifa or Beer-Sheva. The new chemical engineering program at Shenkar College was not included in the Committee's charge because it had not received permanent accreditation at the time that the evaluation was initiated. However, it provides a viable alternative to ACJS in the Tel Aviv area for potential chemical engineering students and could have an effect on ACJS enrolments. The Committee believes that long-range planning for chemical engineering at ACJS needs to take into account this possible competition for students

and define unique characteristics of the program that would continue to attract students who have the option of another college program.

Research

Six members of the faculty are engaged in research together with M.Sc. and Ph.D. students who are registered at other institutions. No faculty member with a chemical engineering academic degree is supervising a research student. The nature of much of the research is such that it would be appropriate in some chemical engineering departments in the United States, but it is a cause of concern that it does not involve core chemical engineering faculty members. There were three active research grants at the time that the self-study was prepared, one from the R&D Center of Samaria and Jordan Rift for about \$15,000, one from the Petroleum Research Fund (U.S.) for \$44,000, and one from a private drug therapy company for \$900,000.

Half of the full-time faculty members are publishing research in international journals at a modest rate. The research effort is at a level that is consistent with the teaching loads at the College. The College encourages faculty to perform research by providing a salary supplement if they meet specified research criteria. In addition, faculty members can reduce their teaching loads to 84% through research, and there is a very modest research startup package for new faculty. The ACJS provides scholarship support for their TAs who are M.Sc. and Ph.D. students at other institutions, even though these other institutions receive money from VATAT.

Infrastructure

The Committee evaluated the infrastructure of the Department of Chemical Engineering and Biotechnology with respect to laboratories (both undergraduate and research), computing laboratories, and the library. When the Committee visited the Department, they had recently moved into new facilities for research and teaching activities, and much of the equipment was relatively new. However, it was disturbing to the Committee to see major safety violations in almost every laboratory (no safety glasses, gas cylinders not secured, food and chemicals in the same refrigerator, etc.). The library and computer facilities were found to be excellent, especially electronic access to journals, and the nearby location of the library to the Department provides a pleasant environment for study and access to information resources. It appears that the Department will have adequate financial resources in the future to keep the

laboratories up to date.

Long-range Planning

The Department is seeking Council for Higher Education approval for a M.Sc. program in chemical engineering. It may be premature for the Department to move in this direction as mentioned earlier in this report. The Committee is concerned that the Department is pursuing too many new directions all at the same time (including two new undergraduate tracks) without sufficient consolidation of the present Department and without solid faculty strength in core chemical engineering.

The future staffing in the Department should be addressed through the development of a strategic plan; such planning is now considered to be a best practice for leading departments of chemical engineering in the U.S. As the Department seeks to improve its quality and capabilities in an environment of limited resources, it is important to be able to prioritize the future curriculum changes and moving into new research areas along with associated space requirements. The faculty has shown that they can reach a shared vision of where the Department wants to be in the future, although the Department Chair has had a major influence on such decisions in the past. The teaching and financial resources required to achieve this vision should be identified before moving into new areas of curriculum and research. .

Self Evaluation Process

The faculty were conversant about the content of the study document and found it to be a good summary of their program.

Summary Recommendations

The college is meeting its mission to serve students in the region who want to receive a chemical engineering degree.

The Committee does not recommend development of a M.Sc. program at this time. The Committee further believes that the Department needs to add to its core strength in chemical engineering before undertaking additional B.Sc. tracks that will place additional stress on the small number of core faculty. The core chemical engineering faculty size is marginal even for the existing degree track.

The Department and College should take efforts to inform faculty members about institutional procedures and expectations for advancing their careers, including promotion and tenure and sabbaticals.

The content of the design courses should be revisited in the near future, particularly with regard to the use of process design software and the inclusion of practicing engineers with process design and operation experience. It also is desirable that students receive more exposure to adjunct professors from industry during their education.

Other than the track choice, there are no electives, and all courses are obligatory. The Committee believes that the students could benefit if they had the opportunity to enrich their studies with electives.

The Committee noted that two currently required courses (technical drawing and electrical engineering) were eliminated many years ago in most chemical engineering departments. The Committee suggests that these courses be eliminated and replaced by two elective courses in science and technology in the near future.

Urgent attention is required to create a culture of safety in both teaching and research laboratories. The faculty need to take a leadership role in this activity.

Consideration should be given to including additional faculty members (e.g., an admissions committee) in the process of accepting and placing new students.

Overall, the Committee has a concern that the Department is pursuing too many new directions at once, without sufficient consolidation of the present Department and without a solid foundation in core chemical engineering. Development of a long-range plan may help to find a balance between ambitious plans and available resources.

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

February 4, 2009

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

הוועדה לתכנון ולתקצוב | Planning & Budgeting Committee

Dear Professor Edgar,

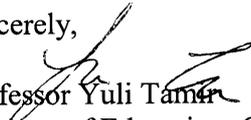
The State of Israel undertook an ambitious project when the Israeli Council for Higher Education (CHE) established a quality assessment and assurance system for Israeli higher education. Its stated goals are: to enhance and ensure the quality of academic studies; to provide the public with information 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 I. 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.

Chemical Engineering- schedule of site visit to the Colleges – 13.05.2009

All the meetings will be held in the upper Campus, building 3 a second floor.

Time	Subject	Participants
09:00-09:30	Opening Session: The heads of the institution and department	President: Prof. Dan Meyerstein Deputy President (Rector): Prof. Michael Zinigrad Dean of the faculty of engineering: Prof. Shmuel Schacham Head, Quality Assessment System: Dr. Nitza Davidovitch
09:30-10:00	Meeting with the head of the department	Prof. David Wolf
10:00-11:15	Meeting with senior faculty and representatives of relevant committees (teaching/curriculum committee, admissions committee, appointment Committee)*	Prof. Joseph Epstein Prof. Edward Bormashenko Prof. Barak Amitzur Dr. Rivka Cahan Dr. Michael Firer Dr. Ilya Polishuk Dr. Marina Nisanevich Dr. Theodor Stern Dr. Gad Pinhasi Dr. Yael Albo
11:15-12:00	Meeting with junior faculty*	Mr. Hen Friman Ms. Anya Pincus Ms. Faina Nakonechny Mr. Sagi Balter Mr. Reuven Brayev Mr. Tamir Stein Mr. Sasi Sigawi Mr. Konstantin Brodetski Ms. Esti Levi Mr. Yaniv Knop Ms. Adi Shapira Mr. Uri Furberg
12:00-12:45	Lunch with students*	
12:45-13:45	Tour of campus (classes, laboratories, library, offices of faculty members, computer labs etc.)	
13:45-14:45	Review of students' work/materials	
14:45 15:15	Closed-door working meeting of the	

	committee*	
15:15-15:45	Summation Meeting with heads of the institution and of the department	President: Prof. Dan Meyerstein Deputy President (Rector): Prof. Michael Zinigrad Dean of the faculty of engineering: Prof. Shmuel Schacham Head of the department: Prof. David Wolf Head, Quality Assessment System: Dr. Nitza Davidovitch