

**החלטת המל"ג מיום 23.07.2013 בנושא דוחות הוועדה להערכת איכות
 בביוטכנולוגיה והנדסת ביוטכנולוגיה**

החלטה:

- המועצה להשכלה גבוהה מאמצת את המלצת ועדת המשנה להבטחת איכות מיום 14.7.13, בעניין דוחות הערכת האיכות בביוטכנולוגיה והנדסת ביוטכנולוגיה, ומחליטה כלהלן:
1. להודות לוועדה להערכת איכות בביוטכנולוגיה והנדסת ביוטכנולוגיה בראשות פרופ' משה רוזנברג, על עבודתה הרבה והמקצועית.
 2. לאמץ עקרונית את דוחות ההערכה של הוועדה.
 3. לפרסם את דוחות ההערכה ותגובות המוסדות באתר האינטרנט של המל"ג.
 4. לבקש מכל מוסד להגיש עד **חודש פברואר 2014** תכנית פעולה ליישום המלצות הוועדה הנוגעות אליו (כולל לו"ז), כמפורט בדוח הוועדה, בדוח הכללי ובנספח המצ"ב.
 5. לבקש מכל מוסד להגיש עד **חודש פברואר 2015** דוח ביניים אודות יישום תכניות הפעולה הנזכרות בסעיף 4 לעיל.
 6. לקיים מפגש של ראשי המחלקות לביוטכנולוגיה והנדסת ביוטכנולוגיה לדיון בסוגיות השונות העולות בדו"ח הכללי של ועדת ההערכה.
 7. להקים ועדת "אד-הוק" בהשתתפות נציגים מהאקדמיה (ראשי/נציגי המחלקות לביוטכנולוגיה והנדסת ביוטכנולוגיה ונציגים מתחומים משיקים) ונציגים מהתעשייה על מנת:
 - א. למפות את כל תכניות לימודים, המסלולים, הקורסים והפעילויות המחקריות המתקיימים בתחום הביוטכנולוגיה והנדסת ביוטכנולוגיה באקדמיה בארץ.
 - ב. להעריך את צרכי תעשיית הביוטכנולוגיה בישראל בהווה ובעתיד (לפחות ל- 10 שנים), בכל הנוגע לכח האדם האקדמי הנדרש (בכל שלוש רמות התואר).
 - ג. לפתח תכנית אסטרטגית לאומית לתחום הביוטכנולוגיה והנדסת ביוטכנולוגיה שתתבסס על הערכת צרכי כח האדם כמוזכר בסעיף ב'.
 8. פתיחת תכניות חדשות בביוטכנולוגיה או בהנדסת ביוטכנולוגיה או הגדלת מספר הסטודנטים בתוכניות הקיימות תתאפשר בכפוף לתכנית האסטרטגית שתגובש (סעיף ג' לעיל).
 9. פתיחת תכניות ללימודים מתקדמים בביוטכנולוגיה ובהנדסת ביוטכנולוגיה תתאפשר בבוא העת בכל מקרה רק במוסדות בהם קיימות תשתיות מחקר ו"תרבות מחקרית" ראויות.
 10. ועדת המינויים של המל"ג למינוי פרופסורים בתחומי הביוטכנולוגיה והנדסת ביוטכנולוגיה מתבקשת לבחון את הערות ועדת ההערכה הבינלאומית באשר לקריטריונים למינוי פרופסורים מהמכללות, המוזכרות בדו"ח הכללי.
 11. המועצה תקיים דיון מקיף בשאלת קיומו של תואר שני (עם תזה וללא תזה) בתחומים מדעיים בהם נדרשת העמדת תשתיות מחקר, הכוללות - בין היתר - מעבדות מחקר.

נספח להצעת החלטה

הערה: אנא תשומת ליבכם כי עיקר ההמלצות להלן מופיעות בכל אחד מהדוחות הפרטניים. יצוין כי בנוסף להמלצות אלו נדרשת תשומת ליבכם גם להתייחסויות השונות ולפירוט ההמלצות וההרחבות המופיעים לאורך הדוחות.

אוניברסיטת בן גוריון

1. Without delay, allocate a larger appropriate modern and well equipped space to house the teaching laboratories of the DBTE. This space should be large enough to accommodate, in one location, all of the teaching laboratories of the DBTE.
2. Establish a reasonable, consistent and guaranteed level of financial support for graduate students and cancel the requirement to pay back (to the university) money that has been granted to graduate students in case they decide to terminate their studies prior to completion.
3. Establish an effective and dedicated Industry Advisory Board to the DBTE.
4. Establish study tracks for the M.Sc. program; increase the number of elective courses to better meet needs of both undergraduate and graduate students; allow graduate students to take courses offered by other departments based on a "per-need" consideration, regardless of how many courses they have taken in the DBTE.
5. Review and adjust the undergraduate study tracks; instruct a compulsory course in technical writing (in English and Hebrew) during the first year of studies.
6. Limit the placing of graduate students on a "fast track" and offer it only to outstanding and uniquely talented students.
7. Better manage the processing of promotion dossiers to prevent unnecessary delays; assign to each junior tenure-track faculty member a senior faculty member who will serve as his/her mentor.
8. Introduce and implement a Learning Outcome Assessment program for assessing the learning outcomes of all of the courses and learning experiences that are offered by the study programs.

Mission, Goals, and Aims

Immediate (full implementation within one year)

1. Establish an effective IAB consisting of leaders from the Biotechnology and related industries in Israel.

Intermediate (full implementation within 2-3 years)

2. Once the strategic plan of the FES has been established, the DBTE will review its mission statement and strategic plan in order to identify and implement necessary adjustments.
3. The committee recommends that specific long- and short-term objectives, derived from the strategic plan of the DBTE and addressing all the academic and infrastructural aspects of the program will be established.

The Study Program

Biotechnology Engineering (B.Sc.)

Immediate (full implementation within one year)

1. Add, as an integral part of the research project and its grading, a compulsory requirement of 15-20 min oral presentation delivered by the student at the end of the project, after the written report has been submitted.
2. Encourage students to select some of their elective courses from relevant courses offered by other programs at BGU.

Intermediate (full implementation within 2-3 years)

3. Strengthen the Environment and Energy track and remove courses that do not belong there (such as - New marine originating drugs).
4. Include a course in Human Physiology and Anatomy in the Medicine track.
5. Instruct, during the first year of studies, a compulsory course in technical writing in Hebrew and in English.
6. Adjust the number of credit points that are required in all the tracks (to 24-24.5) and eliminate the current between-tracks differences in this regard.
7. Develop and introduce more opportunities for students to develop their critical thinking skills.

Long Term (full implementation within 3-4 years)

8. Develop and add more elective courses.
9. Include a course in soft material engineering in the Medicine and Nanobiotechnology track.

The Graduate Studies Program – M.Sc. and Ph.D.

Immediate (full implementation within one year)

1. Allow graduate students to take courses offered by other departments based on a “per-need” consideration, regardless of how many courses they have taken in the DBTE.
2. Limit the placing of graduate students on a “fast track” and offer it only to outstanding and exceptionally talented students.
3. Clearly define study tracks for the graduate studies towards M.Sc.

Intermediate (full implementation within 2-3 years)

4. Include in each track 2 additional compulsory courses addressing advanced topics in the track-specific field.
5. Develop more elective courses to properly address needs of students of the different study tracks.

Teaching & Learning Outcomes

Long term (full implementation within 3-4 years)

1. Introduce and implement a Learning Outcome Assessment program as the main tool for assessing the learning outcomes of all of the courses and learning experiences that are offered by the study programs.

Human Resources

Immediate (full implementation within one year)

1. Better structure and manage the processing of promotion dossiers in a timely manner to prevent unnecessary delays.
2. In order to assist junior tenure-track faculty members in successfully meeting expectation for promotion, assign to each of them a senior faculty member who will serve as his/her mentor.

Students**Immediate** (full implementation within one year)

1. The BGU and the BTE program should secure funds to establish a reasonable and consistent level of financial support that will be known to graduate student, prior to starting their graduate studies, and will be guaranteed for the prescribed duration of the studies.
2. The committee strongly recommends that the University will cancel the requirement to pay back money that has been granted to students in case they decide to terminate their graduate studies prior to completion.
3. Establish and introduce an objective set of unbiased criteria for accepting qualified candidates that graduated a 4-year undergraduate program to the M.Sc. study program. Be very sensitive and protect the interests of all candidates, regardless of where they had their undergraduate studies.

Intermediate (full implementation within 2-3 years)

4. Introduce a structured and effective process aimed at maintaining contacts with alumni and establish data depicting positions and occupation of alumni.

Infrastructure**Intermediate** (full implementation within 2-3 years)

1. The committee strongly recommends that a larger appropriate modern and well equipped space to house the teaching laboratories of the DBTE will be allocated. This space should be large enough to accommodate, in one location, all of the teaching laboratories of the DBTE.
2. The instrumentation for instructing production and purification of biological materials has to be updated.
3. Establish a properly equipped centralized Advanced Equipment Facility within the DBTE to allow graduate students and other researchers to progress fast and effectively in their research.

אוניברסיטת תל אביב

Building on the program's accomplishments and potential along with implementation of recommendations made by this committee will allow the BTP to successfully meet current and future needs and challenges of biotechnology in Israel. The committee has identified several curricular, personnel and infrastructural needs that have to be addressed.

1. The university should launch an immediate effort directed at renovating and re-tooling the teaching laboratories of the BTP. Without delay, provide students (and staff) with a properly furnished, quite, air-conditioned space where they can have their breaks and lunch.
2. Develop a concise and focused mission statement; identifying biotechnology-related strength and excellence areas where the competitiveness of the program can be highlighted, and develop a clear strategic plan for the program.
3. Establish well defined multi-disciplinary research/area-focused groups of faculty members.

4. Establish (3-4) study tracks reflecting the competitive edge and excellence of the program. For each track, appoint a senior faculty member as a leader; Link the study tracks to the relevant research groups.
5. Establish an Industry Advisory Board to the BTP.
6. Revise and enhance the curricula of the program, as detailed in this report.
7. Establish and offer a Ph.D. program in biotechnology.
8. Introduce and implement a Learning Outcome Assessment Concept as the main tool for assessing the learning outcomes of all the courses included in the curricula of the program.

Mission, Goals, and Aims

Immediate (full implementation within one year)

1. Appoint, without delay, an *ad hoc* committee, consisting of senior faculty members from the constituent departments and programs, charged with the task of developing a concise and focused mission statement, identify strength and excellence areas, and develop a clear strategic plan for the program.
2. Establish and install an Industry Advisory Board to the IFBP, consisting of industry leaders and alumni

The Study Program

Biotechnology Engineering (B.Sc.)

Immediate (full implementation within 1-2 years)

1. Develop and instruct (during the first year of studies) a compulsory course in technical writing (in both English and Hebrew)
2. Include in courses more elements where students have to develop and present oral presentations.
3. Include as part of the grade components of the Project Lab an oral presentation.

Intermediate (full implementation within 2-4 years)

4. Revise and enhance the curriculum according to the needs and deficiencies that are detailed in this report: create new and update existing biotechnology-specific courses to allow introducing all the major concepts and disciplines associated with modern biotechnology.
5. Develop and introduce “multi-conceptual” rather than uni-conceptual” courses in biotechnology.
6. Develop a comprehensive list of electives from both the constituent departments of the Faculty of Natural Sciences and other programs.
7. Develop new and update existing laboratory courses to allow instructing students in current approaches and methods that are commonly used in modern biotechnology. Update and upgrade the instrumentation in these labs to what is common in modern biotechnology.
8. Remove the two courses “Organizational behavior” and Project Design” from the curriculum.

*The Graduate Studies Program – M.Sc.*Immediate (full implementation within one year)

1. Establish (3-4) study tracks reflecting the competitive edge and excellence of the program and its constituent departments. For each track, appoint a senior faculty member as a leader and link the study tracks to the relevant research groups (consisting of affiliated faculty members, see section 3.7).

Intermediate (full implementation within 2-4 years)

2. Revise the curriculum according to what is detailed in this report and organize it in the form of track-specific course paths.

*The Graduate Studies Program- Ph.D.*Intermediate (full implementation within 2-3 years)

1. Establish and offer a Ph.D. program in biotechnology

Teaching & Learning OutcomesIntermediate (full implementation within 3-4 years)

1. Introduce and implement a Learning Outcome Assessment concept as the main tool for assessing the learning outcomes of all of the courses and learning experiences included in the curricula of the study programs. Introduce and implement BTP-specific tools to assess the effectiveness and relevance of all instructors and courses attended by the program's students.

Human ResourcesIntermediate (full implementation within 2-3 years)

1. Find ways to enhance the financial support to the BTP in order to enhance the competitive edge of the program.

StudentsImmediate (full implementation within 1-2 years)

1. Identify causes for high attrition rate during first year of study in the B.Sc. program and introduce appropriate remedies.
2. Meet the expectations of students for more and enhanced lab courses in the B.Sc. curriculum
3. Increase the number of TA positions and the level of financial support to both undergraduate and graduate students.

ResearchImmediate (full implementation within one year)

1. Establish well defined multi-disciplinary research groups/ area-focused groups of faculty members according to the identified strength and excellence in biotechnology-related directions.

InfrastructureImmediate (full implementation within one year)

1. The committee urges the university to immediately launch an effort directed at immediately renovating the teaching laboratories and re-tooling these laboratories with modern analytical tools, instrumentation

and instruction means that are needed for conducting high-quality laboratory courses in concepts related to modern biotechnology.

2. Without delay, provide students (and staff) with a properly furnished, quiet, air-conditioned space where they can have their breaks and lunch.

אוניברסיטת עברית

1. Appoint an *ad hoc* committee charged with the task of developing a concise and focused mission statement and a clear strategic plan for the program.
2. Establish an Industry Advisory Board to the IFBP.
3. Define the role of the program's director; appoint a deputy to the program director; establish a steering committee, a research committee and an industry relationships committee.
4. Hold a series of town hall meetings to discuss the future of the program.
5. Establish study tracks in the IFBP and appoint, for each track, a senior faculty member to lead it.
6. Establish a Ph.D. program in biotechnology and offer it in each of the study tracks.
7. Significantly revise and enhance the curriculum along the specific recommendations that are detailed in this report.
8. House all of the agricultural-biotechnology study programs (B.Sc., M.Sc. and Ph.D.) in the Faculty of Agriculture (FOA) home campus; Establish capabilities to "attend" classes offered at different campuses via a satellite link.
9. The university should increase, very significantly and without delay, its financial support (to IFBP) to allow supporting 15 new students every year. This level has to be then increased, proportionally to the growth of the program.
10. Establish interfaculty and multidisciplinary research groups of faculty members.
11. The IFBP should be provided with a designated facility, a Center for Biotechnology, to house a seminar/conference hall, the offices of the program's director and secretary and an advanced instrumentation laboratory.

Mission, Goals, and Aims

Immediate (full implementation within one year)

1. Appoint, without delay, an *ad hoc* committee, consisting of senior faculty members from the constituent faculties, charged with the task of developing a concise and focused mission statement and a clear strategic plan for the program.
2. Establish and install an Industry Advisory Board to the IFBP, consisting of industry leaders and alumni

The Study Program

Immediate (full implementation within one year)

1. Establish study tracks in the IFBP study program.

2. For each of the study tracks appoint a senior faculty member whose responsibility will be to lead the track.

Intermediate (full implementation within 2-3 years)

3. Establish a Ph.D. program in biotechnology and offer it in each of the study tracks.
4. Significantly revise and enhance the curriculum along the guidelines and specific recommendations that are detailed in this report.
5. House all of the agricultural-biotechnology study programs (B.Sc., M.Sc. and Ph.D.) in the FOA home campus.
6. Establish capabilities to allow students that are located at the different campuses that associated with the IFBP “attending” classes via a satellite link.

Teaching & Learning Outcomes

Immediate (full implementation within one year)

1. Establish implement IFBP-specific tools to assess the quality and effectiveness of instruction in all of the courses attended by the students of the IFBP.

Intermediate (full implementation within 3-4 years)

2. Introduce and implement a Learning Outcome Assessment as the main tool for assessing the learning outcomes of all of the courses and learning experiences included in the curriculum of the study program.

Students

Immediate (full implementation within one year)

1. The committee strongly recommends that the university will increase, very significantly and without delay, the number of fellowships provided to the program. The committee strongly recommends that, as the first and immediate step in this direction, the university will support 15 new students every year and will increase this level of support, proportionally to the growth of the program.

Intermediate (full implementation within 2-3 years)

2. Establish and maintain a dialogue with alumni and introduce tools to allow effective evaluation of graduate satisfaction and alumni employment.

Research

Immediate (full implementation within a year)

1. Establish interfaculty and multidisciplinary research groups of faculty members where the excellence and strength of the IFBP can be highlighted and align these groups with the study tracks of the program.

Infrastructure

Immediate (full implementation within 1-2 years)

1. The committee strongly recommends that the IFBP will be provided with a designated facility to house the Center for Biotechnology. The facility should allow housing a seminar/conference hall, the offices of the program’s director and secretary and an advanced instrumentation laboratory to be shared by researchers and students affiliated with the program.

Quality Assessment**Immediate** (full implementation within one year)

1. Establish a Program Quality Assessment and Improvement committee.

Organization**Immediate** (full implementation within one year)

1. Define the role of the program's director.
2. Appoint a deputy to the program director.
3. Establish a steering committee, a research committee and an industry relationships committee.
4. Hold a series of town hall meetings to discuss the future of the program.

הטכניון

1. Establish an effective Industry Advisory Board to the BTFE program.
2. Enhance the engineering and technology components of the teaching and research elements of the program as well as better adjust the balance between food engineering and biotechnology engineering. Lower the proportion of electives in the curriculum.
3. Make the 4th year undergraduate research project a compulsory requirement in both study tracks.
4. Offer an upper division compulsory course where the student's skills to integrate knowledge derived from the exact sciences, engineering/technology and from biological/chemical sciences are challenged.
5. Introduce and implement the concept of Learning Outcome Assessment as the main tool for assessing the learning outcomes of all of the courses and learning experiences that are offered by the study programs.

Mission, Goals, and Aims**Intermediate** (full implementation within 2-4 years)

1. Establish an effective Industry Advisory Board to the BTFE program.
2. Establish a fine balance between the constituent disciplines by enhancing the engineering and technology components of the teaching and research elements of the program; better adjust the balance between food engineering and biotechnology engineering. This effort has to become a top priority objective and an action item of the program's strategic plan.

The Study Program*Biotechnology Engineering (B.Sc.)***Intermediate** (full implementation within 2-4 years)

1. Develop more opportunities for students to have a summer internship (for credit) in the industry.
2. Eliminate content redundancy among courses and list only those elective courses that are offered at least every other year.
3. Increase the proportion of engineering-related courses in the curriculum.

4. Lower the proportion of CP allocated to elective courses to accommodate needs for additional compulsory and laboratory courses.
5. Include a research or design project as a compulsory requirement in both study tracks.
6. Instruct a course in "Ethics in Biotechnology".
7. Instruct, during the first year of studies, a compulsory course in technical writing in both English and Hebrew.
8. Develop and introduce (to both study tracks) an upper division compulsory course where the student's skills to integrate knowledge derived from the exact sciences, engineering/technology and from biological/chemical sciences are challenged.

The Graduate Studies Program – M.Sc., M.E and Ph.D.

Intermediate (full implementation within 3-4 years)

1. Expand and develop the research program to include true cutting edge engineering and technology-related research directions.

Teaching & Learning Outcomes

Intermediate (full implementation within 3-4 years)

1. Introduce and implement the concept of Learning Outcome Assessment, as the main tool for assessing the learning outcomes of all of the courses and learning experiences that are offered by the study programs.

Human Resources

Immediate (full implementation within one year)

1. In order to assist junior faculty members in successfully meeting expectation for promotion, assign to each of them a senior faculty member who will serve as his/her mentor.
2. Include a document highlighting the among-disciplines differences in impact factors in promotion dossiers of the program's faculty members.

Research

Long term (full implementation within 4-5)

1. Develop and introduce research directions aimed at enhancing the extent to which engineering and technology aspects are addressed by the research program.
2. Enhance the extent to which topics related to modern food engineering and technology are addressed by the research program.

המכללה האקדמית הדסה ירושלים

1. Develop a concise and focused mission statement and a detailed strategic plan;
2. Recruit and install an Industry Advisory Board to the program.
3. Pending the introduction of tangible opportunities for conducting research and until the concept of individual-specific job description has been implemented, base the promotion of faculty members, at all ranks,

only on their accomplishments in teaching, community service and outreach activities.

4. Develop and implement the concept of Learning Outcome Assessment.
5. Develop and introduce faculty-member-specific job description and develop a clear set of guidelines that identify and specify, for each promotion steps in each of the academic ranks, the requirements for a successful promotion; once the latter has been developed, fully implement a promotion process that is based on assessing success in meeting the criteria and objectives that are stated in the individual-specific job description.
6. The college together with the relevant governmental agencies should launch an effort aimed at establishing a core research infrastructure that will allow faculty members and students to conduct SOME LIMITED SCOPE research activities.

Mission, Goals, and Aims

Immediate (full implementation within one year)

1. Develop a concise and focused mission statement, reflecting the collective vision of the BTP's faculty members.
2. Develop a detailed strategic plan addressing all of the academic-curricular- and infrastructural-related aspects of the program.
3. Recruit and install an effective and committed Industry Advisory Board to the BTP consisting of leaders from the biotechnology and related industries.

The Study Program

Biotechnology Engineering (B.Sc.)

Immediate (full implementation within one year)

1. Recommendations pertaining to the Research Project:
 - a. Better assist and guide students in identifying and selecting a host laboratory for their research project.
 - b. Enhance the extent to which the BTP monitors the quality of instruction provided to its students at the sites where they conduct their research.
 - c. The coordinator of the research project should visit (at least once every year) all of the sites where the program's students conduct their research.
 - d. Once a new potential host laboratory for conducting Research Project is identified, the coordinator of the course should visit the site, meet with the PI who will instruct the students and make sure that the scope and objectives of the Research Projects are clear.
 - e. The on-site PI/supervisor will be requested to attend the final seminar delivered by the student and his/her involvement in the grading process will be increased.
2. Recommendations pertaining to curricular modifications:
 - a. Develop and implement a better structured and clearly defined procedural path for reviewing and updating the curriculum.
 - b. Establish a process for periodically reviewing the entire curriculum.

- c. Clearly define the specific roles, responsibilities and involvement of the program's Steering Committee, Educational Committee and the head of the program in the curriculum updating processes.
- d. Establish a committee for monitoring and assessing success in implementing curricular modifications.

Intermediate (full implementation within 2-3 years)

3. Develop and offer more elective courses and increase the CP allocated to elective courses to 8-10 CP.
4. Develop a compulsory course in Technical Writing (in both English and Hebrew) and instruct it during the first year of study.

Teaching & Learning Outcomes

Immediate (full implementation within one year)

1. Introduce procedures for assessing, on a regular basis, the quality of teaching of all instructors and mentors, including the off-site instructor of the Research Project

Intermediate (full implementation within 2-4 years)

2. Develop, and implement the concept of Learning Outcome Assessment as the main tool for assessing the learning outcomes of all the courses and learning experiences that are included in the curriculum.

Human Resources

Immediate (full implementation within one year)

1. Pending the introduction of tangible opportunities for conducting research as part of the criteria for promotion, and until the concept of individual-specific job description has been implemented, base the promotion of faculty members, at all ranks, only on their accomplishments in teaching, community service and outreach activities.

Intermediate (full implementation within 2-4 years)

2. Instruct courses and laboratories only by faculty members holding a graduate degree.
3. Develop and introduce faculty-member-specific job descriptions where the proportion of effort to be allocated to each of the academic and administrative activities of the faculty member are clearly defined
4. Once the concept of individual-specific job description has been established and defined, develop and implement a clear set of guidelines that identify and specify, for each promotion step in each of the academic ranks, the requirements for a successful promotion.
5. After establishing and introducing the revisions, as described above, fully implement a promotion process that is based on assessing success in meeting the criteria and objectives that are stated in the individual-specific job description.
6. Include in the promotion process of faculty members (at all ranks) with a significant research component (more than 20%), and faculty members that are considered for promotion to the professorial rank a dossier evaluation by 3 outside reviewers, to be solicited from relevant academic programs abroad.

Students

Intermediate (full implementation within two years)

1. Establish and update on a regular basis an alumni data base and maintain contact with the alumni on a regular basis

ResearchImmediate (to be fully implemented within one year)

1. Develop new tools and mechanisms (and/or improve existing ones) to proactively encourage and support faculty members in developing and submitting research and infrastructure building competitive grant proposals.
2. The college together with the relevant governmental agencies should launch an effort aimed at establishing a core research infrastructure that will allow faculty members and students to conduct **SOME LIMITED SCOPE** research activities.

Quality AssessmentImmediate (full implementation within one year)

1. Establish a Program Quality Assessment and Improvement committee charged it with the task of continuously identifying and addressing aspects of the program's activities that need improvement.

המכללה האקדמית תל-חי

1. Develop a concise and focused mission statement and a detailed strategic plan.
2. Establish an effective Industry Advisory Board to the program.
3. Establish well designed study tracks.
4. Do not develop a Ph.D. program.
5. Revise, enhance and update the curriculum according to what is detailed in the committee's report.
6. Introduce and implement the Learning Outcomes Assessment concept.
7. Develop and introduce faculty-member-specific job description and develop a clear set of guidelines that identify and specify, for each promotion steps in each of the academic ranks, the requirements for a successful promotion; once the latter has been developed, fully implement a promotion process that is based on assessing success in meeting the criteria and objectives that are stated in the individual-specific job description.

Mission, Goals, and AimsImmediate (full implementation within one year)

1. Identify and design the specific competitive strength and desired biotechnology-related directions of the program.
2. Develop a concise and focused mission statement.
3. Develop and implement a strategic plan, consisting of tangible short- and long-term objectives, aimed at meeting the goals and directions included in the mission statement.
4. Establish an effective Industry Advisory Board to the program.

The Study Program*Biotechnology Engineering (B.Sc.)*Immediate (full implementation within 1-2 years)

1. Establish well designed study tracks and clearly define the course path (cluster) for each of the tracks.
2. Introduce to the curriculum of the first year of studies a compulsory course in technical writing (in both English and Hebrew).
3. Introduce a compulsory course in "Ethics in Biotechnology".
4. Revise, enhance and update the curriculum according to what is detailed in section 3.3.1.
5. Identify and address reasons responsible for significant dissatisfaction with the undergraduate research project and change the course from an elective to a compulsory course

*The Graduate Studies Program – M.Sc. and Ph.D.*Immediate (full implementation within one year)

1. The committee strongly recommends **against** developing and offering a Ph.D. study program at the BTP.
2. Design the graduate study program and its defined study tracks to meet the mission statement and objectives of the strategic plan of the program.
3. Graduate study programs without thesis, which are directed at meeting interests of different sectors and/or individuals from the industry, should be offered as series of Extension courses rather than becoming an integral part of the M.Sc. study program.

Intermediate (full implementation within 2-3 years)

4. Review, revise and enhance the curriculum of the Master program, as detailed in section 3.3.2.

Teaching & Learning OutcomesImmediate (full implementation within one year)

1. Assessed on a regular basis the teaching quality of TAs involved in the program.

Intermediate (full implementation within 2-4 years)

2. Introduce and implement the Learning Outcomes Assessment concept as the main tool for evaluating the learning outcomes of all of the courses and learning experiences that are offered by both undergraduate and graduate study programs.

Human ResourcesImmediate (full implementation within one year)

1. Pending the introduction of tangible opportunities for conducting research as part of the criteria for promotion, and until the concept of individual-specific job description has been implemented, base the promotion of faculty members, at all ranks, only on their accomplishments in teaching, community service and outreach activities.

Intermediate (full implementation within 2-4 years)

2. Develop and introduce faculty-member-specific job descriptions where the proportion of effort to be allocated to each of the academic and

- administrative activities of the faculty member are clearly defined
3. Once the concept of individual-specific job description has been established and defined, develop and implement a clear set of guidelines that identify and specify, for each promotion step in each of the academic ranks, the requirements for a successful promotion.
 4. After establishing and introducing the revisions, as described above, fully implement a promotion process that is based on assessing success in meeting the criteria and objectives that are stated in the individual-specific job description.
 5. Include in the promotion process of faculty members (at all ranks) with a significant research component (more than 20%), and faculty members that are considered for promotion to the professorial rank a dossier evaluation by 3 outside reviewers, to be solicited from relevant academic programs abroad.

Research

Immediate (full implementation within one year)

1. The committee strongly recommends that proper mechanisms aimed at avoiding conflict of interests, when instruction and supervision of undergraduate and graduate students of the BTP by employees of MIGAL are considered, will be established, implemented and monitored.

Quality Assessment

Immediate (full implementation within one year)

1. Establish a Quality Assessment committee, charged with the task of continuously assessing the extent and success in meeting objectives of the strategic plan.

המכללה האקדמית להנדסה אורט בראודה

1. Identify and design the specific competitive strength and desired biotechnology-related directions of the program; Develop a concise and focused mission statement and a detailed strategic plan and establish an effective Industry Advisory Board to the program.
2. Place the M.Sc. program of the BTEP on hold and do not offer until all the foundational pre-requisites for a high quality research culture that are detailed in this report have been established.
3. Critically review and re-design the study tracks of the B.Sc. study program; enhance and strengthen the curriculum of the selected study tracks, and specifically enhance and strengthen the Food Biotechnology study track.
4. Restructure the compulsory Research Project to become a 3-4 months course and negotiate opportunities for students to conduct their research at research universities.
5. Develop and introduce faculty-member-specific job description and develop a clear set of guidelines that identify and specify, for each promotion step in each of the academic ranks, the requirements for a successful promotion; once the latter has been developed, fully

implement a promotion process that is based on assessing success in meeting the criteria and objectives that are stated in the individual-specific job description.

6. Pending the introduction of tangible opportunities for conducting research, as part of the criteria for promotion, and until the concept of individual-specific job description has been implemented, base the promotion of faculty members, at all ranks, only on their accomplishments in teaching, community service and outreach activities.
7. The college together with the relevant governmental agencies should launch an effort aimed at establishing a core research infrastructure that will allow faculty members and students to conduct SOME LIMITED SCOPE research activities.

Mission, Goals, and Aims

Immediate (full implementation within one year)

1. Identify and design the specific competitive strengths and desired biotechnology-related directions of the program.
2. Develop a concise and focused mission statement.
3. Develop and implement a strategic plan, consisting of tangible short- and long-term objectives, aimed at meeting the goals and directions included in the mission statement.
4. Establish an effective Industry Advisory Board to the program and interact with it on a regular basis.

The Study Program

Biotechnology Engineering (B.Sc.)

Intermediate (full implementation within 2-4 years)

1. Critically review and re-design the study tracks of the B.Sc. study program, as detailed in this report. Offer only those study tracks that can be justified and sustained, according to the criteria that are detailed in this report.
2. Enhance and strengthen the curriculum of the selected study tracks to meet challenges and deficiencies that are detailed in this report. Specifically, enhance and strengthen the Food Biotechnology study track.
3. Offer “clustered laboratory sessions” only when absolutely needed.
4. Increase the proportion CP allocated to electives courses in the B.Sc. curriculum.
5. Encourage students to enroll in relevant courses offered by other study programs of the college.
6. Restructure the compulsory Research Project to become a 3-4 months course, to be taken either after the third year of studies or after completing all other courses. Negotiate opportunities for students to conduct their research at research universities.
7. Instruct a mandatory preparatory course sequence, aimed at closing the identified knowledge gap of the incoming students. A passing grade of 75-80 should be used as a pre-requisite for admission.
8. Include a minimum grade of matriculation test in physics in the admission criteria.

9. Instruct a compulsory introductory course, (“Seminar in Biotechnology Engineering”) during the first semester.
10. Develop and introduce new elective courses addressing current and advanced topics related to modern biotechnology engineering.
11. Include the concepts pertaining to nano-systems in biotechnology engineering in both compulsory and elective courses.

The Graduate Studies Program – M.Sc.

Immediate (full implementation within one year)

1. Place the M.Sc. program of the BTEP on hold and do not offer it until all the foundational pre-requisites for a high quality research culture that are detailed in this report have been established.

Intermediate (full implementation within 2-4 years)

2. Develop and offer extension courses to advance and update knowledge of professionals from the biotechnology industry

Teaching & Learning Outcomes

Intermediate (full implementation within 2-4 years)

1. Introduce and implement the Learning Outcomes Assessment concept as the main tool for evaluating the learning outcomes of all the courses and other instructional activities that are offered by the study program.

Human Resources

Immediate (full implementation within one year)

1. Pending the introduction of tangible opportunities for conducting research, as part of the criteria for promotion, until the concept of individual-specific job description has been implemented, base the promotion of faculty members, at all ranks, only on their accomplishments in teaching, community service and outreach activities.

Intermediate (full implementation within 3-4 years)

2. Develop and introduce faculty-member-specific job descriptions where the proportion of effort to be allocated to each of the academic and administrative activities of the faculty member are clearly defined
3. Once the concept of individual-specific job description has been established and defined, develop and implement a clear set of guidelines that identify and specify, for each promotion step in each of the academic ranks, the requirements for a successful promotion.
4. After establishing and introducing the revisions, as described above, fully implement a promotion process that is based on assessing success in meeting the criteria and objectives that are stated in the individual-specific job description.
5. Include in the promotion process of faculty members (at all ranks) with a significant research component (more than 20%), and faculty members that are considered for promotion to the professorial rank, a dossier evaluation by 3 outside reviewers, to be solicited from relevant academic programs abroad.

Students

Intermediate (full implementation within 2-3 years)

1. Assign an *ad hoc* committee charged with the task to develop understanding about causes that have led to declined enrollment and identify directions that might be needed in order to enhance enrollment.
2. Review and adjust the minimum requirements for admission to the BTEP, and include the grades of matriculation tests or compulsory preparatory course in Physics in the admission criteria.
3. Launch an effort to significantly increase the proportion of students that graduate the B.Sc. study program after four years.
4. Establish a mandatory preparatory course sequence, aimed at closing the knowledge gap of the incoming students in Mathematics, Physics, English and Chemistry. Successful completion of the preparatory program (passing grade of 75-80) should be installed as a pre-requisite for admission.

Research

Intermediate (to be fully implemented within 2-3 years)

1. The college together with the relevant governmental agencies should launch an effort aimed at establishing a core research infrastructure that will allow faculty members and students to conduct **SOME LIMITED SCOPE** research activities.
2. Design the research programs of the BTEP to highlight the academic strength and competitive edge of the program and its faculty members (see section 3.3 of this report).
3. Establish multi-disciplinary research groups consisting of faculty members of the BTEP as well as of other academic programs/departments and appoint a senior faculty member (at the professor rank) to lead each group.
4. Do not utilize teaching laboratories of the BTEP for developing and supporting research activities of individual faculty members.
5. Maximize the extent to which Research Projects of undergraduate students are aligned with the identified research directions/groups and develop opportunities to conduct at least some of these projects on campus.
6. Develop new tools and mechanisms (and/or improve existing ones) to proactively encourage and support faculty members in developing and submitting research and infrastructure building competitive grant proposals.

Quality Assessment

Immediate (full implementation within 1-2 years)

1. Establish a quality assessment committee to lead the continuous quality assessment effort; launch a systematic self-evaluation process aimed at assessing the extent to which objectives of the strategic plan are met.

המלצות מתוך הדו"ח הכללי של הוועדה¹

Recommendations to CHE

1. Appoint an *ad hoc* committee, consisting of academicians from the BT and related programs at the Israeli institution of higher education, to be charged with the task of:
 - a. Mapping and detailing **all** the Biotechnology- and Biotechnology Engineering-related study programs and/or tracks, curricula and research programs at all the institutions for higher education in Israel.
2. Appoint an *ad hoc committee* of leaders from the Israeli Biotechnology and related industries charged with the task of :
 - a. Assessing and quantifying the current and future (at least 10 years) needs of the Israeli biotechnology industry (IBTI) in terms of professionals at all levels (B.Sc., M.Sc. and Ph.D.).
3. Once the two *ad hoc* committees have met their objectives, appoint a planning committee charged with the tasks of:
 - a. Developing a strategic plan to address the anticipated needs of the IBTI.
4. Do not approve opening new or expanding existing undergraduate study programs (in terms of number of enrolled students) in BT or BTE pending the development and approval of the strategic plan.
5. Do not approve graduate study programs in BT/BTE in institutions of higher education where well established research infrastructure and culture does not exist.

Recommendations to universities and academic colleges

1. Each university or college, where programs related to BT and/or BTE exist, should review, map and detail **all** the Biotechnology- and Biotechnology Engineering-related study programs and/or tracks, curricula and research programs at all of its constituent faculties, departments and programs.
2. Once the information detailed in the previous recommendation has been established, each institution should develop its institution-wide BT/BTE-related mission statement and strategic plan
3. For institutions with significant BT-relevant programs, study tracks and research platforms, establish an Institutional Biotechnology Industry Advisory Board.
4. Encourage incorporating in the study tracks that are offered by the BT/BTE study programs relevant courses that are offered by other programs/faculties on campus.
5. Establish a committee, consisting of representatives of CHE, administrators and program leaders from research universities and colleges with BT/BTE programs, charged with the task of negotiating and developing opportunities for students of the BT/BTE programs in the academic colleges to conduct their research project in the research laboratories of relevant PIs at research universities. Once the latter

¹ נדרשת התייחסות לפירוט וההרחבות בגוף הדו"ח.

has been agreed upon, negotiate with the relevant governmental agencies the financial tools to cover some of the direct cost of the research.

6. Enhance the extent to which students are trained and challenged in “knowledge integration” by developing and introducing study modules where senior-year students will be engaged in problems solving, process development and/or product design projects where knowledge derived from the exact sciences, chemistry, biological sciences and biotechnology-related concepts and methodologies, will be integrated.
7. Continuously update scope and content of laboratory courses to maintain them current with the developments in the field.
8. Develop and offer a designated graduate study program (M.Sc.) in biotechnology management, either as a study track of the BT/BTE program or as a joint program with a business management school or department (when applicable).
9. Introduce and implement a Learning Outcome Assessment program as the main tool for assessing the learning outcomes of all of the courses and learning experiences that are offered by the study programs.

Recommendations to the universities

1. Enhance the extent to which research addresses topics related to the engineering and technological aspects of BT.
2. Maintain the competitive edge of the research infrastructure and keep it current at the fore-front of the field.
3. Develop and offer designated Ph.D. in BT
4. Develop and install research BT/BTE pilot plants

Recommendations to the academic colleges and CHE (and other relevant government agencies)

1. Pending the introduction of tangible opportunities for conducting research, as part of the criteria for promotion, and until the concept of individual-specific job description has been implemented, base the promotion of faculty members, at all ranks, only on their accomplishments in teaching, community service (committee and other administrative tasks) and outreach activities.
2. Develop and introduce the concept of faculty-member-specific job description, where the proportion of effort to be allocated to each of the academic and administrative activities of the faculty member is clearly defined.
3. Once the concept of individual-specific job description has been established and defined, develop and implement a clear set of guidelines that identify and specify, for each promotion step in each of the academic ranks, the requirements for a successful promotion.
4. After establishing and introducing the revisions, as described above, fully implement a promotion process that is based on assessing success in meeting the criteria and objectives that are stated in the individual-specific job description.

5. Include in the promotion process of faculty members (at all ranks) with a significant research component (more than 20%), and faculty members that are considered for promotion to the professorial rank, a dossier evaluation by 3 outside reviewers, to be solicited from relevant academic programs abroad.
6. Together with relevant government agencies develop and install an on-campus core research infrastructure to allow developing limited scope BT-related research program.