



We would like to begin by thanking the committee for the detailed and careful evaluation. We were overwhelmed by the generosity of the committee in terms of time and attention and struck by the depth and insight of the committee's comments. In almost all points, we feel that the committee's comments were accurate and helpful in guiding our future development. We respond to the specific comments below.

Committee comments are provided in a separate font, although the order of the comments is somewhat re-arranged to facilitate providing a unified answer to related points.

Essential: In advance of the 2017/18 faculty hiring cycle, the Department and University leadership make a decision on whether to: (a) largely abandon biomechanics as a hiring area within the Department; or (b) focus significant hiring (c. 5 faculty members) in this area. The Committee suggests that the first of these two options is preferred for reasons articulated above.

Devote substantial strategic planning efforts to the biomechanics track. Within two years, if appropriate FTEs cannot be devoted, phase out this specialization area.

Within two years, recruit new adjunct faculty to strengthen the biomechanics concentration in the curriculum, or alternatively, focus only on signal processing and motor control in the BME undergrad and grad programs (see Section 2).

Identify target areas that further support the Department's uniqueness for potential new hires (e.g. robotics, biomedical optics, signal processing etc.)

In light of this recommendation, the department discussed the possibility of refocusing the current hiring process on a field other than biomechanics. The decision was made to continue searching for biomechanics faculty for this year. It is the opinion of the department that a biomechanics specialization is necessary for a viable Department of Biomedical Engineering and that biomechanics faculty are necessary for a viable biomechanics specialization.

However, if this year also does not produce a hire in biomechanics, the department has decided to initiate a discussion about redefining the core areas of expertise such that biomechanics could be subsumed within a broader expertise. The department feels that we must maintain the core curriculum in biomechanics (Mass and Heat Transfer and Flow), and that students need the opportunity to learn mechanical engineering in depth. However, these topics could be subsumed in a larger subfield. For instance, researchers in the fields of robotics would certainly be relevant to supporting the biomechanics specialization. We foresee this process reaching fruition by the end of 2017.



Essential: Once the above issue of the biomechanics track is resolved, within 4 months, senior leadership must meet and formulate a plan for departmental growth such that all levels of leadership agree on the target number of faculty members and the timeline for achieving this growth.

Increase the number of students after, and not before, the gaps in core faculty have been minimized or closed.

Prioritize recruitment of Israeli Masters and PhD students over foreign students.

The head of the department met with the Dean of Engineering and the Vice Rector in order to discuss this issue. It was decided that the department would formulate a full departmental vision with a concrete plan for departmental growth and bring this to the rector as a basis for further discussion. The process of developing this vision will be undertaken in parallel with a review of the biomechanics concentration, to be completed by the end of 2017.

The growth in the size of the student body, and the timing of that growth, will be a key aspect of the growth plan we propose. The department agrees strongly that growth in the student body should follow, and not precede, an increase in the number of faculty. The department already has one of the highest student / faculty ratio in the entire faculty.

Essential: Prioritize recruitment of Israeli Masters and PhD students over foreign students.

The department, with the backing of the Dean and Vice Rector, strongly reject the idea of refocusing specifically on Israeli graduate students. It is the policy of the university to develop its international presence as a research and teaching institution. We believe that our department has, per faculty member, one of the best research programs in the country. We see ourselves, to our mind justifiably, as a BME department with international impact and we hope to develop this rather than retreat from it.

Essential: Concentrate all faculty members in one building within the next 5 years. Specifically, make all efforts to populate the department – faculty, their research labs and teams, and the administrative staff under one roof, in a dedicated building or floors of a building. The Committee believes this is absolutely essential for research collaborations and efficiency – and should increase the research outcomes when done.

Important/advisable: Address deficiencies in purchasing procedures by changes in the procedures. If changes are not possible, within 12 months the Department should be provided with 0.3 FTE administrative person who will handle these issues for all faculty.

Within two years, move the department computer facility to a larger space, or eliminate it and convert the current space to a different function.

The department agrees strongly that it is critical to bring the entire department together under a single roof as quickly as possible. In the meeting with the Dean and the Vice Rector discussed above, it was made clear to the department that it was unlikely that any of these key issues would be addressed in the near future. Additional space for a computer facility also seems out of reach. However, it is in heavy use and we do not see any value in eliminating it.



The department agrees that purchasing needs to be streamlined at the university level. We recognize that the department has made efforts to provide support for purchasing, and this solution serves some of the faculty. However, others feel that valuable time on their part and on the part of the technical staff is wasted on this issue. Our understanding from the discussion with the Dean and Vice Rector was that university policy is reduce rather than increase support staff, and we were unlikely to receive additional support.

Essential: The University not change the dual Faculty structure (Engineering and Health Sciences) for supporting the Department, which appears to be working well.

Within two years, the cell biology course be given by a faculty member, either internal to the department or as a service course from another department/faculty.

There are ongoing discussions with the Faculty of Health Sciences that may lead to a resolution of the ongoing disagreements over the division of teaching responsibilities. The department believes a fruitful collaboration with the Faculty of Health Sciences can be of enormous benefit to our students, and it believes that our students have much to offer the Faculty of Health Sciences.

The issue is quite complex. While both sides are motivated to continue running the joint program, their view of the collaboration is different. From the department's perspective, collaboration with the Faculty of Health Sciences complicates the process of creating a coherent, organized curriculum and limits the flexibility of the department head in staffing of courses. Additionally, the department is concerned that adjunct faculty teach at least one course for which the Faculty of Health Sciences has responsibility, adding a layer of unnecessary bureaucracy to the management of the adjunct teaching staff. The FOHS, in contrast, supports splitting responsibility, as common in joint programs, giving FOHS full and direct responsibility for the courses in the curriculum that are relevant to FOHS.

On the other hand, there are many pre-clinical and, even more so, clinical subjects where the Faculty of Health Sciences has expertise that the department does not. In addition, there is room for productive collaboration in joint teaching. Undergraduate projects conducted in the medical school and hospital are an important benefit to both sides. We believe it is possible to develop very exciting joint degrees. Close collaboration with the Faculty of Health Sciences is a distinguishing feature of our department compared with other Israeli departments of biomedical engineering. Finally, the plan for the department approved by the Council of Higher Education included this collaboration. It also included two tenured faculty positions inside the Faculty of Health Sciences in exchange for which the faculty took on teaching responsibility within the department. Unwinding these bureaucratic issues would be complicated.

In sum, successful collaboration with the Faculty of Health Sciences depends on building a mechanism where both sides feel that they have the appropriate input to the curriculum and the overall structure of the degree. The department is committed to this process.

The Cell Biology course remains another issue that needs to be resolved. However, both sides agree that the course should be taught by a faculty member with expertise in the topic.



Essential: Within eight months, complete a strategic planning process to redesign and update the curriculum so that students are better prepared for industry. Incorporate course content relevant to industry (Design Thinking, entrepreneurship, etc.) and establish appropriate goals for industry participation in student projects. Plan for annual updates.

Make the Entrepreneurship and Regulation in Development of Biomedical Products course required for all undergraduate students.

Establish a course in communication skills and require it for all undergraduate and graduate students.

Strengthen ties with the biomedical industry by offering more undergrad 4th-year projects directly co-supervised by industry, and by bringing in industry key opinion leaders to teach guest lectures and courses on relevant topics such as clinical trials, regulation and ethics.

Important/advisable: Within one year, better inform faculty and PhD students about the technology transfer activity within the University, perhaps by inviting a representative from this office to visit the Department and give a seminar on the activities of the technology transfer office.

The department is working on a number of fronts to develop our ties with industry and to expose students and better prepare them for potential work in industry. Some of this work is explained in detail below. At the same time, the department seeks to balance this preparation for industry with two important considerations. First, a significant number of our best students continue on to higher degrees and some continue to careers in academia. The department feels it is crucially important to serve these students as well as the majority that continue to careers in industry. This means that we are not willing to sacrifice depth of knowledge and critical thinking for the sake of highly tailored preparatory courses. Second, our contacts with industry have led us to believe that employers expect to do significant on-the-job training, and that they value students with basic skills over students with a highly focused skill set. However, these two considerations do not mean that we do not recognize that there are ways the department could improve student exposure to the biomedical tech industry and their preparedness for it.

Relationships with industry:

The department is actively recruiting new firms to take part in supervising undergraduate projects. This is being done by reaching out to our alumni who are working in the industry, as well as strengthening our relationships with firms who have supervised projects for the department in the past. We have an ongoing commitment to building a list of firms, in Israel and abroad, with which we have a real relationship over the course of the next two months. In order to make these projects successful, the faculty responsible for undergraduate projects are reviewing closely the process by which these industry projects are supervised. We believe that engaging industry with our students will succeed if the projects themselves are successful, and that the projects will be successful if communication between the department and the projects supervisors is clear and expectations are clearly laid out on both sides.

Another way we are strengthening our relationships with industry is through regularly sponsoring trips by students of the department to industry. For instance, on April 5, 2017, 40



students from 3rd and 4th years and graduate studies visited the Mazur Industries facility and learned about projects in that company.

Curriculum:

Some of the educational needs raised by the committee can be addressed by expanding the topics covered for students doing undergraduate 4th year projects. Already this year, we have included several hours of instruction focusing on developing communication and presentation skills. We hope to introduce more by working in collaboration with the Bengi's center for innovation. In the context of this collaboration, the department is developing curriculum for courses in entrepreneurship, biodesign, clinical trials, regulation and ethics that will be included in the redesigned curriculum discussed above. We are not certain if any or all of these courses will be required, but we believe that they should be available to our students.

It is worth noting that many of our 4th year undergraduates are already working in commercial settings on relevant projects during their final year. This is an important bridge between their undergraduate studies and successful absorption into the industry.

The department is also working to develop collaborative seminars with clinicians in Soroka Medical Center and biomedical companies in the adjacent high tech complex, called Gev Yam Negev. These seminars should give our students opportunities to interact directly with people interested in the application of their knowledge in real settings. We plan to begin with these seminars in the second semester of the 2017-2018 academic year.

Finally, over the course of the 2017-2018 academic year, we plan to establish ties, facilitated by the students, with the students in the school for business management. These ties will be both social and academic, revolving around potential incubation of startup ideas and learning how collaboration can drive innovation.

Essential: Continue to push other departments to provide high quality teaching for service courses.

The Faculty of Engineering is engaged in an ongoing process with the Departments of Mathematics and Physics to improve procedures for monitoring teaching and identifying problems. The feeling of the department is that this process has been largely successful.

In addition, this has been the first year of the redesigned mathematics curriculum. Our feeling is that the new curriculum was much more successful in bringing the students to successfully facing the challenge of the high level of mathematics we require from them.

Essential: Within 8 months, establish departmental learning outcomes by consensus.

Within 8 months, list learning outcomes in the syllabi of all departmental courses, and establish mechanisms for reviewing and updating all outcomes regularly.

The university has a commitment to bringing all department syllabi to the Bologna standard established by the European Union to promote credit mobility between universities. This standard includes detailed learning outcomes, which are defined in reference to departmentally developed learning outcomes. To this end, the university supports a center



for development of Bologna curricula. The department has made plans with this center for the development of appropriate syllabi over the course of the 2017-2018 academic year in preparation for incorporation in the overall curriculum in the following year. This will dovetail nicely with the re-evaluation of the curriculum described above.

Essential: Undertake marketing targeted to improve undergraduate applicant quality, in preparation for possible increase in numbers. The marketing materials indicate the breadth of training provided by the program, and why that is a strength.

The department has worked closely with the marketing department over the last years on a number of initiatives. Over the last years, the department has seen a reversal of a declining trend that had been worrying us. This year, the department is one of the only departments in the university to see growth in the number of students applying as enrollment declines to all universities. It is the intention both of the marketing department and the department to continue this collaboration.

The work done so far includes:

1. A survey of alumni and potential employers that focused on the relative strengths of the department and the potentials for improvement. This survey was used both for internal re-evaluation of issues like undergraduate curriculum, industry relations and alumni outreach and for use by the marketing department in developing marketing materials.
2. A short animated video was developed for us in recruiting students and for departmental branding.
3. Constant monitoring and promotion of the websites for information and registration to the department.
4. Development and management of a marketing campaign for the department over a three year period which included:
 - a. Acceptance letters tailored for specific student groups
 - b. Digital advertising campaigns targeting specifically selected audiences.
 - c. Billboard advertising in the context of the University's marketing campaign that highlighted the department
 - d. "Newsletters" focused on specific target audiences
5. Support of the marketing department for national and international conferences sponsored by or associated with the department.
6. Promotion of the department to news outlets and other media
 - a. Special effort is devoted to support a Facebook group that attracts job postings and discussions with prospective students
7. The department website was improved to include:
 - a. Up to date information about recent achievements of faculty and students
 - b. Job postings for department graduates
 - c. Calls for graduate students

The department will continue to work closely with the marketing department to advance the following issues:



1. Clarification of the department's specific advantages over other departments in the country, with reference to departmental expertise and resources.
2. Documenting and promoting the success of the department's graduates in both industrial and academic settings, including the highly developed startup industry in Israel.
3. Marketing focused on clarifying the difference between biomedical engineering and biotechnology and reaching the students who have the skills and inclination for biomedical engineering.
4. Developing a strategy for dealing with students who must make a choice between biomedical engineering and medicine.
5. Increasing retention of students in both undergraduate and master's degrees for continuing to higher degrees here in our department.
6. Scholarships targeted for specific issues and specific students.
7. Improvement of department website

Essential: Continue to be attentive to the significant value that support staff bring to the Department and maintain this level of support.

Continue with the practice of providing technical staff to the research labs by sharing their time between teaching lab duties and research lab duties.

The department is extremely lucky in the quality of its technical and logistical support staff. We are also glad that we have had the support of the university in helping our support staff find personal satisfaction and growth through both expanded teaching duties and personal studies. We join with the committee in hoping that the level of support continues in precisely the current spirit, and the department will do all it can to make sure that our support staff feels appreciated.

Essential: Establish effective mechanisms for sharing best practices in grant writing and coaching amongst the faculty members to ensure all are successful in winning competitive research grants.

The department is strongly committed to the faculty mentoring program developed by the Engineering Faculty and the university to support incoming young faculty members. This has been successful in the development of all aspects, including the research program, for absorption of our last two hires. The department's success in this matter is evidenced by the fact that nearly all of our faculty are supported by extensive external competitive research grants.

Desirable: Since the self-evaluation exercise worked very well for this Department, incorporate elements of departmental self-evaluation into the regular activities by running an abbreviated version of the activity once every 5 years. This will help the Department to benchmark if it is on track or not.

We understand that the Council for Higher Education intends for this self-evaluation process to be repeated approximately every 5 years. As explained to us, in follow up evaluations, we



will not only go through the full process of evaluating the status of the department but also refer back to our previous evaluation, your recommendations, and our own response to highlight also longer term processes and our effectiveness in bringing about desired changes.

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