Minutes of the inter-university meeting UGent/VUB Master of Science in Biomedical Engineering – February 15th 2017

Present: Patrick Segers, Johan Stiens, Luc Fockedey, Peter Dubruel, Vincent Van Eeghem, Hannah Notebaert, Laure Van De Steene, Seline Tas


Location: VUB, campus Etterbeek, building Ke, room Ke.2.24 (entrance via building K)

1. Formal approval of the minutes of the meeting of October 26th, 2016

The study programme committee of the Master of Science in Biomedical engineering (SPCmaBME) formally approves the minutes of the previous meeting of October 26, 2016.

2. Announcements/communications/events

2.1. Internationalization

2.1.1. Erasmus exchange - outgoing students in 2017-2018

<table>
<thead>
<tr>
<th>Student</th>
<th>Institution</th>
<th>University</th>
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<tbody>
<tr>
<td>Len Liefooghe</td>
<td>Czech Technical University</td>
<td>UGent</td>
</tr>
<tr>
<td>Renée Vanheule</td>
<td>EPFL, Lausanne</td>
<td>UGent</td>
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<tr>
<td>Ruben Schoeters</td>
<td>EPFL, Lausanne</td>
<td>UGent</td>
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<tr>
<td>Lore Maudens</td>
<td>NTNU, Trondheim</td>
<td>UGent</td>
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<tr>
<td>Jolan Heyse</td>
<td>NTNU, Trondheim</td>
<td>UGent</td>
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<tr>
<td>Louis Verdonckt</td>
<td>NTNU, Trondheim</td>
<td>UGent</td>
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<tr>
<td>Arne Vandekerkhove</td>
<td>CUIAE, Havana</td>
<td>UGent</td>
</tr>
<tr>
<td>Zhongyun He</td>
<td>RWTH, Aachen</td>
<td>VUB</td>
</tr>
<tr>
<td>Elisabeth Winderickx</td>
<td>Valencia</td>
<td>VUB</td>
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2.1.2. Study results international students

The large majority of our international students in Master 1 have failed several courses. Adequate screening of applicants remains crucial. The problem is particularly pertinent for students in the International MSc in Biomedical Engineering who get screened by the coordinator (Groningen). Patrick Segers will insist with the coordinator on a more rigorous screening, especially on the level of mathematical background.

2.1.3. Admission of international students
Students from countries that ratified the Lisbon Recognition Convention with a degree/diploma that is of a similar level as our own degrees/diplomas that give direct access to the master will be automatically admitted, unless it can be demonstrated that the students do not have the necessary knowledge to start the master. There will be database that keeps track of decisions.

2.1.4. Grants for international students in English master programs

- UGent provides Top-up grants for international students

Students from developing country (OESO /DAC list): 650 €/month for 2 years (Sept 2017-August 2019) + all-in insurance. Students need to pass 54 credits in year 1 to keep scholarship. Pre-screening by OC by April 10\textsuperscript{th} (max. 3 candidates). Students registered at VUB can apply because we provide joint diplomas, but master thesis will have to be done at UGent.

- Flemish community: Master Mind scholarships (Flanders Knowledge Area)

Non-OESO/DAC countries: 7500 €/year + min 45 credits in year 1 to keep scholarship. Pre-screening by OC by April 10\textsuperscript{th} (max. 3 candidates)

2.2. Calendar - planning

<table>
<thead>
<tr>
<th><strong>OC meetings</strong></th>
<th><strong>Events</strong></th>
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<tbody>
<tr>
<td>OC meeting I</td>
<td>National Day on Biomedical Engineering</td>
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<tr>
<td>OC meeting II</td>
<td>MEDICA</td>
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<tr>
<td>OC meeting III</td>
<td>Biomedical Industry Day</td>
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<tr>
<td>OC meeting IV</td>
<td>Thesis defense</td>
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<thead>
<tr>
<th><strong>Events</strong></th>
<th><strong>Tentative program of the Biomedical Industry Day:</strong></th>
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<tbody>
<tr>
<td>Deliberation July @ UGent</td>
<td>09:00 Arrival and poster set-up</td>
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<tr>
<td>Proclamation July @ UGent</td>
<td>09:55 Welcome and introduction</td>
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<tr>
<td>Deliberation September @ UGent</td>
<td>10:00 Materialise</td>
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<tr>
<td>Proclamation September @ UGent</td>
<td>10:15 Siemens Healthcare</td>
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<tr>
<td>Graduation (diploma) ceremony @ VUB</td>
<td>10:30 St-Jude Medical</td>
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<td></td>
<td>10:45 IBA (new)</td>
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<td></td>
<td>11:00 Cochlear</td>
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<td></td>
<td>11:15 Coffee Break</td>
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<td></td>
<td>11:45 Master thesis pitch presentations</td>
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Note: presence of students during events like National Day on Biomedical Engineering (5 registered students were absent) and the Biomedical Industry Day is compulsory.
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>12:30</td>
<td>Lunch – poster viewing</td>
</tr>
<tr>
<td>14:00</td>
<td>MedTech Flanders <em>(new)</em></td>
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<tr>
<td>14:15</td>
<td>GSK</td>
</tr>
<tr>
<td>14:30</td>
<td>Medtronic <em>(new)</em></td>
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<tr>
<td>14:45</td>
<td>Barco <em>(new)</em></td>
</tr>
<tr>
<td>15:00</td>
<td>HiCT</td>
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<tr>
<td>15:15</td>
<td>Wrap up and conclusion</td>
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<tr>
<td>15:30</td>
<td>Networking reception</td>
</tr>
</tbody>
</table>

2.3 Company visits

- Cochlear (Design and Technology of Artificial Organs) (Ma2): Wed 07/12
- Barco (via BEAM; linked to Neuro-Imaging) -> Thursday 23/02
- ORSI (Medical Equipment) -> Thursday 23/02 and 16/03

On waiting list

- IBA (via BEAM; linked to Medical Physics ?)
- Luxilon (Herbert De Beuck) is willing to organize a company visit.
- NERF is also willing to organize a visit to their lab at imec.
- Siemens would be willing to organize a visit to their CT plant in Nuremberg, Germany.

2.4. Master thesis topics

New master thesis topics: to upload on Plato by Friday, March 3rd. Will be released to students on March 20th.

We will also provide poster boards at the BID where labs can reach out and advertise to the students. 1 poster/lab.

3. BEAM

Beam events in the 2nd semester:

- Monday 13 February, New Year reception
- Wednesday 22 February: Bowling
- Thursday 23 February: Barco company visit

4. Courses

4.1. Course descriptions (studiefiches)

Please make sure that the info in the course descriptions is accurate and complete. This is not the case for several courses. One of our students reported the following missing/incomplete info:
Biomedical imaging: Not filled in: Examination methods in case of permanent evaluation, Calculation of the examination mark. But there are several practica with report which compose ¼ of the points for this course.

Biomechanics: Examination methods in case of permanent evaluation is not filled in, but in the Calculation of the examination mark it says project 20%

Nuclear reactors and cyclotrons: course description is empty!

There is the opportunity to update the course descriptions the latest until May 1st. (via Oasis @ UGent)

4.2. Biomedical Imaging

The use of videoconferencing remains difficult and is not appreciated by the students -> Proposal from prof. Vandenberghe/ Vandemeulebroecke to reduce/drop videoconferencing component.

4.3. Biomaterials

It was difficult to set a final data for the exam this year, and it took until December 23 before the final date was communicated to the students. This is, clearly too late. The proposal from student delegation to work with fixed examination date for Biomaterials (1st and 2nd day of exam period) will be verified with the administrations at UGent (Veerle.Joliet@ugent.be) and VUB (Gerty.Van.Den.Cruijce@vub.ac.be).

4.4. Fluid-structure interaction

Because of the low number of students following the course, prof. De Groote would like to organize the course biannually instead of each year. The program board has all understanding for this solution.

5. Individual student affairs

None

6. Program changes (follow-up)

6.1. MSc in Biomedical Engineering

All changes in curriculum MSc in Biomedical Engineering have been implemented. Our new structure:
Johan Stiens notes that another way to visualize the scheme would be to vertically reverse the schedule, which might better visualize the life science foundation.

6.2. International MSc in Biomedical Engineering

We somewhat overlooked the implementation of the 2nd year International MSc in Biomedical Engineering (last year only students in the 1st year), but we still managed to implement the following scheme for students in the 2nd master:

<table>
<thead>
<tr>
<th>Option MEDICAL DEVICES</th>
<th>Option HEALTH CARE</th>
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</thead>
<tbody>
<tr>
<td>Hospital project (3)</td>
<td>Health Information and Decision Support Systems (3)</td>
</tr>
<tr>
<td>Design of Clinical Studies and Biostatistics (3)</td>
<td>Leadership in Health Care (3)</td>
</tr>
<tr>
<td>Design and Technology of Artificial Organs (6)</td>
<td></td>
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<tr>
<td>Elective Courses (18)</td>
<td>Elective courses (18)</td>
</tr>
<tr>
<td>Master thesis (30 credits)</td>
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7. Accreditation – visitation – quality control

- CTI: positive evaluation of the MSc in Biomedical Engineering. Will lead to accreditation by NVAO.

C-N9 Master of Science in Biomedical Engineering & International Master of Science in Biomedical Engineering

- The creation of the Steering Committee in order to develop the Strategic Vision is positive and the formal and thorough analysis of the soft skills developed during the Master 2 Project is to be outlined
- The objective to go for a mandatory internship soon is to be encouraged
- The visibility of the Biomed need to be improved:
  - The creation of a dedicated track at the Bachelor level currently discussed within the Steering Committee would for sure contribute
  - The Students initiatives towards the High Schools deserve support
  - Initiatives to get more visibility within Industry, to better understand Industry needs, have to be strengthened
  - Programme course has been adapting swiftly over the years since its creation less than 10 years ago; the Strategic Vision shall delineate the Programme signature to be sold to the different stakeholders (Hospitals, Companies, Students, …) in the future

- International visibility (beyond the International Master partners) and foreign recruitment deserve to be improved in the frame of an FEA reinforced policy in that direction

- The MSc in Biomedical Engineering has been evaluated by the students in 2016. Below is a summary of the results. See also appendix 1 for answers to open questions.

Results are substantially better than in 2014, but there is obviously still room for improvement.
8. Feedback from working group meeting module coordinators – actions

(invited were module coordinators Patrick Segers, Johan Stiens, Pascal Verdonck, Jef Vandemeulebroucke, Bart Jansen, Maaike Op de Beeck, Peter Dubruel, Christian Vanhove, Stefaan Vandenberghe, Guy Nagels, Klaus Bacher, Dirk Verellen)

- Status portfolio has been discussed. The suggestion has been launched to present one specific topic during the upcoming meetings of the program board (from next meeting on).
- A “toetscommissie” has been installed which will follow-up on contents of exams, modalities, type of examination, does the exam aim to test envisioned competences, etc. It is composed as follows: Peter Dubruel (Chairman), Klaus Bacher, Johan Stiens and Patrick Segers.
- One of the exercises the program board has to make this academic year is a benchmarking exercise. Pascal Verdonck will take the lead in this effort.

9. Strategic Advisory Board - Industrial Advisory Board

Strategic Advisory Board and Industrial Advisory Board will be merged. 1st meeting of new board: March 15 following Biomedical Industry Day.

Impossible to get everyone together on March 15th:
- Confirmed: Jan Cornelis, Pascal Verdonck
- Excused: Rik Van de Walle, Eric Mortier, Piet Hoebeke (to be replaced by Carlos De Wagter), Mark Noppen

We welcome the new member of the industrial advisory board: HiCT (Sebastian Vermeersch)

10. Tuition Fees

No further news. Streamlining with the MSc in Photonics is advisable.

11. Time Tables

- There is a problem of overlap of Medical Physics and Biomedical Product Development for 4 weeks in quartile 1. Ewout Vansteenkiste and Nico Buls are solving the problem.
- The order and time schedule of the electives in the Medical Radiation Physics track should be revised to ensure that students can take 2 or 3 electives in year 1 and the remaining in year 2. The module coordinators will be contacted.

12. Varia

- The chair and co-chair regret the very limited attendance of the program board. We will look into web-based conference tools that can replace one or two physical meetings, but it remains important to meet face-to-face on a frequent basis.
Note that there is the possibility for students to receive feedback on their exams until February 24th. We encourage students, and in particular our international students, to make use of this option.

Interfaculty Honours program in the domain of neuro-engineering has been worked out (Animi Techne) and will probably start from next academic year on.

Context and scope:

Since ancient times the human mind, thought, reasoning, and the brain have intrigued the greatest thinkers. Today, technology has enabled us to visualize the processes occurring in the brain, reshaping our vision on the mind. Brain stimulation challenges our knowledge about decision making processes. Computer scientists and mathematicians dream about human-mimicking computers with unsurpassed reasoning and memory capabilities. Technological developments merge biological systems with computers, even at the level of single neurons. A lot still remains to be explored and uncovered as evidenced by large projects funded by both Europe and USA. It is in this fascinating world of interdisciplinary evolutions that the Animi Techne honors program wants to immerse the top students in Engineering, Medicine, and Psychology. The Latin-Greek name of the program reflects the influence of the alpha, beta and gamma disciplines.
Appendix 1


Open vraag 1: Gebruik onderstaand veld om over de opleiding een aantal positieve commentaren te formuleren.

Open vraag 2: Gebruik onderstaand veld om over de opleiding een aantal negatieve commentaren te formuleren.

Open vraag 3: Gebruik onderstaand veld om over de opleiding een aantal suggesties te formuleren.

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| International Master of Science in Biomedical Engineering |
| Reactie 1/2: The program had very strict curriculum regarding students' specializations so they could delve into their field deeply. This is good. There are still quite some international students so I was able to be exposed to diverse culture. |
| Reactie 2/2: Lecturers and professors were all very professional and well prepared. High quality of research and teaching. |

Reactie 1/2: My general feeling about my study program was that whenever I go to classes, I do not learn much out of classes. The professors were under-prepared for courses and they do not teach in an easy way. I personally believe that if one is an expert enough, he/she should be able to teach in an very easy, understandable way. I did not get that feeling except for 1-2 professors in my program. That certainly has to be improved. I know researches for professors have more weights for them but they should also invest time on becoming good teachers. It is not just me who thinks this way but almost everyone feels so. Some students skip classes because of this reason.

For the workload, it is too much in one lesson. In other places, the one class content here will be taught through 3-4 times. Less is more. I do not think students will remember that much after graduation after all. In some exams, we are expected to memorize every single detail. I think understanding the main principle should be pretty enough.

Also I expect professors do not teach only the theories but also how they are applied. So there should be more practical exercises not just matlab exercises. Last but not least, there should be more thought-provoking environment during the lessons. There is not much interaction between professors and students. Professors are the ones who is responsible to encourage this atmosphere. They always ask the question 'If you have any comment/question, feel free to ask.' But mostly we(students) did not understand the content professor has explained, so we cannot formulate any question.

Reactie 2/2: The huge amount of reading materials given which we had to prepare for the exams.

Reactie 1/2: I think here there is lack of biology-related courses in 1st year curriculum although it is crucial too.

Reactie 2/2: Concentrate the reading materials on the most relevant parts that we need to study.

| Master of Science in Biomedical Engineering |
| Reactie 1/11: A lot of very good professors. |
| Reactie 2/11: I liked the courses which are mainly evaluated on a project that is evaluated during
the semester and constant feedback is provided. Great access to innovative research fields and outstanding professionals.

Reactie 3/11: A lot of classes based on new technologies and new research topics were presented.

Reactie 4/11: The study program is well varied and offers the opportunity to chose courses of our own interest.

Reactie 5/11: vooral de vakken in het eerste semester van het eerste masterjaar waren zeer interessant
- keuze uit breed arsenaal van keuzevakken en master thesis topics

Reactie 6/11: I appreciate how the program brings together students from a different background. The program offers an overview on the different disciplines in biomedical engineering.

Reactie 7/11: Biomedical engineering: More applied, different aspects of the biomedical field are covered in the compulsory courses, while the elective courses allow for specialization in a subject.

Reactie 8/11: Enrichment of my general knowledge

Reactie 9/11: I am of the opinion that this program is the best for me and I have been satisfied by what I have obtained. The courses are very interesting and practical, almost all of them. The professors are very knowledgeable and have practical experience on the subject. I am very moved by the dedication and commitment of all the staff involved in the program, especially the program coordinator. I have obtained specific as well as general knowledge on the state-of-the-art trends in Biomedical Engineering. Overall, I am more than pleased to have the opportunity to study this program in Ghent University. I am very grateful for all the professors involved in this program, for their dedication in their research and teaching to find new methods and technologies in healthcare so as eventually to make this world a healthier place. They inspired me so much and I hope that, one day, I will be able to contribute in my own way, to this endeavor.

Reactie 10/11: Overall programme was really good. The lecture content of most of the courses were from recent scientific literature. Testing methods were tough so that makes students to do their best. Teachers were approachable and helpful.

Reactie 11/11: I was very happy with the quality of this study programme. The content was very diverse and also very different from my original degree, which added to the excitement of the study. In the beginning of the programme, there were many opportunities for practical, hands-on work. This diminished towards the second half of the programme, however the opportunities for practical work during the thesis completion made up for this. Overall, I am very satisfied with the degree I have received after completion of this programme.
More professors which are really focusing on the Biomedical Engineering field would be a great advantage for the students, but this cannot be achieved in a few months and will take time.

Reactie 5/11: Veel herhaling van sommige onderwerpen in verschillende vakken
-Soms echt een chaotische organisatie van de vakken, niet duidelijk wanneer welke les waar doorging (vb Geneeskundige apparatuur)
-Soms was de inhoud van de lessen echt niet meer up-to-date o

Reactie 6/11: I believe the focus is put too much on knowledge and too little on skills, especially for an engineering master. There is too little attention for practical assignments. A large part of the grades can be earned by learning by heart. Little feedback is given on assignments.

Reactie 7/11: the method of examination and evaluation is way to traditional and out of date in my pint of view

Reactie 8/11: The level of the courses is too low for a master program. It assumes almost no prior knowledge and often the mathematical background is sidestepped, while this should be one of the assets of engineers in the biomedical field. The evaluation method used in many courses is arbitrary, giving no chance to stronger students to distinguish themselves, while not failing weaker students at the same time.

Reactie 9/11: Maybe to general

Reactie 10/11: Some courses were focused on far too deep to one end. Ex: Biomechanics. Most important basics can't discussed during the course. Finite element method is an integral part of the biomechanics and it was just covered in one lecture which wasn't good for anyone. Overall, that was a poorly structured course without a good flow.

Reactie 11/11: Although I can understand the appeal to have some of the courses taught by medical doctors, it was often difficult to bridge the gap between engineering and medicine when the doctors were teaching the courses. They did not seem to understand that we preferred to focus on the technical aspects of medicine rather than the medical, economic or even personal aspects.

Reactie 1/12: There should be more coordination between courses, to often time was spent on the same topic in multiple courses which resulted in a waste of time

Reactie 2/12: Develop more hands-on and student interaction teaching.

Reactie 3/12: More practical sessions would be better.

Reactie 4/12: Clearer communication between the VUB and UGent, especially on the courses and when they take place. Add VUB courses that are mandatory, and others, to the lists on Oasis and UGent platforms as to inform students when they take place to be able to plan well with their elective courses.

Reactie 5/12: Nood aan hervorming om overlap tussen verschillende vakken uit te sluiten en de lessen meer up-to-date en interessant maken, sommige proffen moeten echt vervangen worden -Keuzevakken/Verplichte vakken meer opssliten in de verschillende

Reactie 6/12: The programme should be more oriented at current state-of-the-art technology, explaining what is happening in labs all over the world, than explaining textbook theory. Instead of building up from the theory and spending little time on applications, rather work the other way around. I believe it will be more challenging and engaging for the students. Background information that is missing can be researched individually, especially when it comes to the more 'medicine/physiological' side of the story. I think the programme would be even better if more focus was put on technology and the real engineering skills.

Reactie 7/12: The volume or the amount of content is way to much relative to number of credits, some of those big heavy courses can be presented as course of 10 or 12 credits instead of maximum 6 credits. It has been done in some other master study programs of uGent

Reactie 8/12: Merge some courses and increase the workload per course, the first semester of the first master is a good benchmark. Courses such as Human and environment, Healthcare and informatics, Medical devices, artificial organs all seem to fail in their purpose. The master program doesn't make full use of the engineering background of the students, such that graduated students are stuck in the middle. They are neither doctors, nor engineers.
Reactie 9/12: Less guest professors, 1 course: with 1 dedicated professor, not spread over 10 different professors
Reactie 10/12: The class locations, especially for first year first semester courses, are very scattered across many faculties. It would be nice to have them in one location, at least when the class is pure lecture. For lab work it is obviously acceptable to move to
Reactie 11/12: The content of the taught courses should be improved. Rather than lectures from 9 am - 5 pm, if some practicals were introduced that would be good. Practical exposure should be improved.
Reactie 12/12: Further opportunities for research! I know Gent focuses on radiation and radiology, but it was difficult to find a research group that suited my interests. It would be nice if there were more opportunities for students to branch out and hear from various research groups (such as biomaterials, tissue engineering and protein biochemistry groups) before choosing the masters thesis because biomedical engineering can be applied to a very large variety of groups!