BBChina

Master Program
on Bio-Based Circular Economy

Final Feedback from IAB

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Document information

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Members of the International Advisory Board	
Person	**Position**
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As part of the evaluation of the BBChina Project two actions have been performed:

- Students have been asked questions on specific topics by means of a Questionnaire.
- An external expert in the field with a deep knowledge of the Chinese and European Educational System provided an evaluation on the implemented action.

In the following the main results of these evaluation regarding the structure of the developed Master Program were summarised.

The document was then circulated within the members of the International Advisory Board (IAB).

The IAB were asked to provide concise feedback from their side about the action by answering to the **6 questions in RED** in the text.

Four out of the seven IAB members provided feedback, that is summarised in the following.

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Feedback from the students on the Program Structure

On a general level, students from 2020/2021 provided fewer positive responses than students from the 2019/2020 academic year. The only exceptions concern two questions; firstly, "*this programme gave me confidence to do more advanced work in the subject*", which 92% of the students from the 2019/2020 academic year and 91% of the students from the 2020/2021 academic year agreed with. Secondly, "e*xpectations for student learning were clearly defined"*, with which 97% of students from 2019/2020 agreed, compared to 91% of students from 2020/2021.

	Academic Year 2019/2020			Academic Year 2020/2021		
	Yes	No	No answer	Yes	No	No answer
The Master Program was well structured	84%	12%	4%	94%	3%	3%
The offer of courses was wide and fit for my ambitions after the graduation	86%	10%	4%	88%	6%	6%
This program has increased my interest in this field of study	93%	3%	4%	97%	3%	0%
This program gave me confidence to do more advanced work in the subject	92%	4%	4%	91%	3%	6%
I believe that what I am being asked to learn in this program is important	86%	7%	7%	91%	3%	6%
The readings were appropriate to the goals of the Program	93%	4%	3%	94%	0%	6%
The written assignments contributed to my knowledge of each course material and understanding of the subject	96%	4%	0%	97%	3%	0%
Expectations for student learning were clearly defined	97%	3%	0%	91%	3%	6%
Exams/assignments were a fair assessment of my knowledge of the course material	89%	7%	4%	94%	3%	3%
The examinations/projects measured my knowledge of the course material	84%	7%	9%	91%	6%	3%

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Feedback from the students on the Material of the programme

In this section, it can be noticed how students from 2020/2021 provided more positive responses than in 2019/2020. This statement is true for all questions but "*the instructional materials (i.e., books, readings, handouts, study guides, lab manuals, multimedia, software) increased my knowledge and skills in the subject matter",* to which 100% of the students from both academic years answered positively. Moreover, another exception concerns the question "*the courses workload and requirements were appropriate for the course level*", to which more positive responses were received by students in 2019/2020 (90%) than 2020/2021 (88%).

	Academic Year 2019/2020			Academic Year 2020/2021		
	Yes	No	No answer	Yes	No	No answer
The lectures, readings and assignments complemented each other	98%	2%	0%	100%	0%	0%
The instructional materials (i.e., books, readings, handouts, study guides, lab manuals, multimedia, software) increased my knowledge and skills in the subject matter	100%	0%	0%	100%	0%	0%
The courses workload and requirements were appropriate for the course level	90%	5%	5%	88%	12%	0%
The courses were organised in a manner that helped me understand underlying concepts	91%	2%	7%	97%	0%	3%
The course assignments (readings, assigned problems, laboratory experiments, videos, etc.) facilitated my learning	88%	7%	5%	97%	3%	0%
Exams and assignments were reflective of each course's content	93%	7%	0%	97%	0%	3%

Another difference can be also remarked in the number of students who did not provide any answer; whereas almost the entirety of students in the 2020/2021 academic years provided answers, the same cannot be said for the 2019/2020 academic year. To the question "*the courses workload and requirements were appropriate for the course level*" and "*the course assignments (readings, assigned problems, laboratory experiments, videos, etc.) facilitated my learning*" 5% of students did not provide an answer. Moreover, 7% of students did not provide an answer to the question "*the courses were organised in a manner that helped me understand underlying concepts*".

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External evaluator

On the whole, the Program has received very positive feedback from the external evaluator, nonetheless, some aspects should be addressed and reviewed.

Here below please find the scheme of the implemented action as remind.

	Chinese Credits / Hours	ECTS	Notes	Year
Public Courses	6/126	*Not applicable*	Courses such as "*Foreign language*", "*Dialectics of Nature*" and "*Theory and Practice of Socialism with Chinese Characteristics*"	YEAR 1
Degree Courses	8~9 / 144~162	20	These are the courses that are necessary to get the *"Degree in"*	
BBChina Obligatory Courses	5~6 / 90~108	10	These are the obligatory courses of the BBChina	
BBChina Elective Courses	12/216	30	These are the elective courses of the BBChina	
Project + entrepreneurship + Traineeship/internship Master Thesis	Chinese system doesn't calculate credits for this part	30	Entrepreneurship Course, Project elaboration, Traineeship/Internship	YEAR 2 & First half YEAR 3
		30	Master Thesis	
Total:		120		

With regards to the structure of the Program, the external evaluator indicated that the title of the Program appears misleading; "Master Program on Biobased Circular Economy" emphasises on "circular economy", giving the impression of it being a master's in social sciences. Subsequently, the evaluator suggested replacing the current title with "Master Program on Circular Economy-Oriented Bioenergy, Biofuels and Bioproducts".

1. **DO YOU AGREE?** ***(feel free to also comment)***
    - **Mr. Dongxiao Shi: I agree. The suggested title seems more appropriate.**
    - **Prof. Achim Loewen: Yes, I agree. The focus is on technology and not on economics. However, in the study program I don't find much about biobased products. Most modules are dealing either with bioenergy or process/conversion technologies.**
    - **Prof. Marco Baratieri: In my opinion the title is not misleading and, above all, its keywords are not related to social sciences. Nevertheless, if the managing committee agrees with**

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the external evaluator, it could be interesting to extend the current title inserting the keywords "Bioenergy, Biofuels and Bioproducts".

- **Dr. Filippo Garini: Yes, I agree.**

Moreover, the evaluator remarked the unbalanced distribution of ECTS among obligatory and elective courses; the Programme is in fact structured around 10 obligatory ECTS and 30 electives, but the evaluator suggests changing it to 20 ECTS each.

2. **DO YOU AGREE?** ***(feel free to also comment)***

- **Mr. Dongxiao Shi: I do not agree. Chinese university has the requirement for the minimum and maximum credit hours of obligatory courses. As shown in the table, the credit hours of degree courses (also obligatory courses) and BBChina obligatory courses are around 14 (30 ECTS), which are reaching to maximum. 30 ECTS of elective courses are more flexible for the students to choose courses according to their discipline and research irritation.**
- **Prof. Achim Loewen: Although the ratio is a little unusual, for a master program I think that a higher rate of elective courses is fine.**
- **Prof. Marco Baratieri: In my opinion it depends on the degree of freedom you want to give to students and on organizational aspects. As a whole, the more mature the students the more aware they are about the profile they want to build. In this respect, the suggestion of the external evaluator seems reasonable.**
- **Dr. Filippo Garini: Yes, I agree.**

Similarly, a change in the ECTS should be envisaged for the Master Project and the Master Thesis; instead of weighting 30 ECTS each as they do presently, the evaluator suggested lumping them together for a total of 54 ECTS, and to complement them with a new 6 ECTS course of Transferable/Soft Skills. This new course should focus on topics such as collaboration and teamwork, research ethics and integrity, research planning and management, entrepreneurship and innovation, scientific writing, career planning and networking, and how to prepare for a job interview.

3. **DO YOU AGREE?** ***(feel free to also comment)***

- **Mr. Dongxiao Shi: I do not agree. Ministry of Education in China is trying to reduce the credit hours for graduate courses. I think 60 ECTS (totally around 15 courses including public courses in one year) are already enough for a graduate student (usually the first year is for courses, and the second and the half third year are for thesis proposal and research in China, during which a lot of invited professional lectures will be organized for their selection). In addition, the contents mentioned in the 6 ECT course of Transferable/Soft**

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Skills are already contained in the public and degree courses (research ethics and integrity, scientific writing), BBChina courses (collaboration and teamwork), entrepreneurship course (career planning and networking, entrepreneurship and innovation, job interview). During thesis proposal preparation and research implementation, the other skills such as research planning and management, scientific writing, collaboration and teamwork etc. will be also trained. Research practice is an effective way to pass on the knowledges and skills, it's not just courses that have this function.

- **Prof. Achim Loewen: I think this is a good recommendation.**
- **Prof. Marco Baratieri: I would personally keep separate the Master thesis of 30 ECTs from the other activities, since this can be an advantage for students that want to have recognized the title in other foreign institutions. In fact, the Master thesis usually weights 30 ECTs in most of the international programmes.**
- **Dr. Filippo Garini: Yes, I agree. Soft skills are becoming more and more important, mostly for manager positions.**

As far as the content of the Programme is concerned, some other aspects need to be addressed. Firstly, the evaluator noticed how this Master does not focus on modelling and simulation, despite the key roles that they play in R&D of bioenergy, biofuels and biochemicals. Therefore, he proposes to introduce a new course with a tentative title of "Modelling and Simulation of Bioenergy Conversion Processes" whose potential syllabus should offer an in-depth analysis of the subject. *Here below the Courses included in the BBChina Program.*

Course title
Bioeconomy, Energy Market and Green Market
Biomass Energy: Technology and Application
Biomass process engineering for Bioenergy Production
Bioreactor Engineering
Chemistry of carbohydrates
Combustion
Integrated Solid Waste Management
Life Cycle Assessment
Plant development biology
Renewable Energy Technologies
Thermal Waste management and WtE technologies
Wastewater Treatment: Theory and Technology

4. DO YOU AGREE? *(feel free to also comment)*

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- **Mr. Dongxiao Shi: I agree that modelling and simulation are important. Considering there are different models and simulation methodologies for different fields of study, e.g., wastewater treatment, solid waste management, biological or thermal process, I would like to suggest the inclusion of modelling and simulation in the professional courses, instead of a specified course.**
- **Prof. Achim Loewen: As there is only one year of teaching, time is limited for additional courses. I agree that modelling could be an interesting part of the study program, but I am much more concerned about the lack of dealing with biobased products (production, properties and use of e.g. biopolymers, platform chemicals, biochar etc.). A circular economy is supposed to deal with recycling / material use of of biomass an waste in the first place. Energetic use is also important but should come second if the main focus is on circular economy.**
- **Prof. Marco Baratieri: The proposal of a curricular course on numerical simulation is indeed interesting. Nevertheless, I recommend to previously check the profile of the students to calibrate the level. Moreover, the choice of the applications is also crucial; in fact you could either choose CFD (or even computational thermo-fluid-dynamics), e.g. if you want to focus on biomass CHP, or thermochemical process simulations, e.g. if your target is bioreactor kinetic or thermodynamic simulations.**
- **Dr. Filippo Garini: Yes, I agree.**

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The external evaluator also provided some additional remarks; in fact, he

Bioeconomy, Energy Market and Green Market	**Biomass Energy: Technology and Application**
Introduction to the bioeconomy Techno-economic analysis 1. Capital cost and the manufacturing cost 2. Life cycle cost and learning curve Biomass Market 1. supply chain (demand and supply) and pricing mechanism 2. regional and global market, industry outlook Waste management Regulations and policies 1. Standards and Labels related to Bioenergy and Biobased Products 2. Control of waste and pollutant emissions 3. Incentives strategies Bioenergy financing Business model Circular economy Green Market	The development of biomass energy in different countries The conversion technology for biomass energy: 1. Physical conversion technology 2. Direct combustion technology 3. Gasification technology 4. Pyrolysis and direct liquefaction technology 5. Biodiesel production technology 6. Bio-ethanol and Bio-butanol production technology 7. Hydrogen production technology 8. Biogas production technology Introduction of experimental technology for biomass Introduction of analysis methods for biomass

5. DO YOU AGREE? *(feel free to also comment)*

- **Mr. Dongxiao Shi: I agree. Course 1 and 2 could be grouped and divided by topics. Case/example teaching is an important methodology for graduate education, which has been widely used.**
- **Prof. Achim Loewen: Yes, I agree, but as mentioned before would especially like to see more examples for biobased products different from fuels.**
- **Prof. Marco Baratieri: I do not see overlapping between the two courses, that justify either reshape of the syllabi or any partial merging.**
- **Dr. Filippo Garini: Yes, I agree.**

6. Feel free to provide here below any comments you deem interesting

- **Mr. Dongxiao Shi: The BBChina Project is well done. The developed courses meet the need of the current society. Of course, with the development of technologies and economy, the courses could be dynamically adjusted in the future. Hope the project continues to be implemented even without fund.**

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- **Prof. Achim Loewen: If you don’t intend to deal with biobased products, the title should not include biobased products but just focus on bioenergy including biofuels. Even the term circular economy should be discussed then. My greatest concern is that your title "circular economy" lets one expect that you are also or even mainly dealing with the production, properties, and use of biobased products. In a circular economy, material use should come first, followed by energetic use and, only if the first two options are not possible, disposal. However, in the curriculum I find almost only courses dealing with bioenergy and biofuels. Also, in modules such as bioreactor engineering and chemistry of carbohydrates I only find contents regarding processes and properties of input materials, but nothing about products such as biopolymers, platform chemicals, biochar etc. So it is more a study program which could be called bioenergy and waste treatment, but not biobased circular economy.**
- **Prof. Marco Baratieri: no additional comments provided.**
- **Dr. Filippo Garini: The program is very valid and overall well structured. Nevertheless I believe that the section relating to B2B marketing and sales strategies should be expanded.**

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Conclusions

The external evaluation of the BBChina Master Program has been submitted for comments to the International Advisory Board of the Project, in order to provide final hints and tips for the three Chinese HEIs running the program for mid- and long-term improvements of the action.

With regards to the structure of the Program, the external evaluator indicated that the title of the Program appears misleading, suggesting replacing the current title with “Master Program on Circular Economy-Oriented Bioenergy, Biofuels and Bioproducts”. There is a general agreement on this, and the suggestion is to extend the title, explicitly including the topics related to bioenergy, for example extending the current title with the insertion of the keywords “Bioenergy, Biofuels and Bioproducts”.

Regarding the remarks about the unbalanced distribution of ECTS among obligatory and elective courses, the suggestion is to change the ECTS distribution from around 10 obligatory ECTS and 30 electives to 20 ECTS each. The feedback is the idea that a higher weight for the Elective Course is more in line with the Chinese structure and also allows the student to better build their education and training path. Therefore, the present balance between elective and obligatory courses is in general found appropriate.

The suggestion in changing the ECTS distribution all along the second part of the Program (the one devoted to Project, Thesis and Entrepreneurship Course) has been commented with different feedback. As a primary point, this suggestion seems not in line with the present directions of the Chinese Ministry of Education. Weighting the Final Thesis 30 ECTS (as in the present Program) can also ease the recognition of the title in other foreign institutions. In general, the importance of actions in the direction of improving soft skills (already present in the public courses and in the entrepreneurship courses) is confirmed, especially for the professional figure the Program is aiming to train.

The proposal to include a course focussed on modelling and simulation (with a proposed title like “Modelling and Simulation of Bioenergy Conversion Processes”) encounters a wide approval, although also a course focussing on the production, properties and use of biobased products (e.g. biopolymers, platform chemicals, biochar etc.) is suggested. A course on modelling should also consider to previously check the profile of the students to calibrate the level.

The evaluator states that the content of the courses “Bioeconomy, Energy Market and Green Market” and “Biomass Energy: Technology and Application” could be grouped and divided by topic, to avoid repetitions. Overall, for the evaluators, all courses could include additional content that is strictly connected to the main topic of the course, in order to provide students with a wider insight on the subject. Furthermore, courses should provide more concrete examples. There is a general agreement on the comment.

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As a latter comment, there is in general very positive feedback on the developed Master Program, that is considered very well structured. Some issues regarding the title and the focus on biobased products and bioenergy remain, but there is the possibility to dynamically adjust the courses following the received suggestions.

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