

Budapest University of Technology and Economics

George Oláh Doctoral School

Chemical Sciences, Biotechnology, Environmental and Chemical Engineering

**Curriculum
2016**

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Curriculum of BME's George Oláh Doctoral School

The language and international embeddedness of the doctoral school: The language of this profession is English. Accordingly, events organised by the doctoral school (subjects, presentations, defences) will be in English or Hungarian as required by the participants. Dissertations, research project proposals, thesis defences, examination minutes may be in either English or Hungarian. Depending on the funds available, the George Oláh Doctoral School aims to engage members of the international scientific community in seminars and PhD procedures.

Components of the PhD training: The most important part of the PhD training is the **research activity** focusing on a topic proposed by the doctoral school. Each PhD student is assigned only one supervisor who is exclusively and fully responsible for managing and promoting the studies and the research activity of the PhD student, the publication of the research findings and the writing of the PhD thesis. When an external supervisor is engaged, the George Oláh Doctoral School Council (DIT) designates a consultant to provide support for the supervisor's work and monitor the student's progress. The tutorial nature of the training is reflected by the option of regular consultations recognised with credits (**Consultation 1-8**). Each semester, the supervisor awards a grade for the student's competence and contribution to the consultation sessions. Similarly, the supervisor assesses and confirms the student's research (**Research 1-17** subjects) and publication (**Publication 1-3** and **Presentation 1-3**) activity.

Apart from their research work and the publication of research findings, PhD students are required to complete the majority of the academic components of the PhD programme (subjects (**Lead subject, Secondary subjects 1-2**), seminars (**Seminar 1-2**), guided education (**Education 1-6**) and participation in professional forums (**Professional forum 1-4**) in the first part of their training. These activities represent 48 credits from a total of 120 credits students can obtain in the first part of their training. The second part of the training focuses on research activities, the publication of research findings and the writing of the dissertation. These activities represent 102 credits from a total of 120 credits students can obtain in the second part of the programme. Research and publication activities combined represent 174 credits from a total of 240 credits to be obtained during the four-year programme.

By recognising **publication activities** with credits, the supervisor ensures that

1./ the minimum publication requirements for the comprehensive examination (one presentation, approval for publication of one IF paper with the applicant's dominant (over 50%) contribution among local co-authors not having PhDs) are fulfilled by the end of the fourth semester.

2./ the minimum requirements for launching the PhD procedure (two presentations, approval for publication of two IF papers with the applicant's dominant (over 50%) contribution among local co-authors not having PhDs) are fulfilled by the end of the sixth semester (dissertations must be submitted no later than 3 years after the comprehensive examination).

3./ all the key requirements related to the minimum requirements to obtain a PhD degree are fulfilled by performing the required publication activities (the candidate has 3 IF papers with a dominant (over 50%) contribution among local co-authors not having PhDs, has delivered an oral presentation at an approved forum and has passed an intermediate level (complex) English language examination (or demonstrated documented equivalent language skills) to fulfil one of the language criteria for the comprehensive examination) by the end of the eighth semester.

In consultation with their supervisors, PhD students are required to choose a two-semester **lead subject** (10 credits in total) and two one-semester **secondary subjects** (5 credits each) from the subjects approved by the DIT. One of the secondary subjects may be selected from subjects provided by the doctoral schools of ELTE University (Doctoral School of Chemistry, Physics and Biology), SOTE University (Doctoral School of Pharmaceutical Sciences and Molecular Medicine) and BME's other PhD programmes. Subject to approval by the DIT, the MSc subjects of the above universities and the PhD, or potentially the master's, subjects of other higher education institutions may also be selected. Requests for such approval must be submitted no later than 10 days prior to the registration week. The selected subjects will be included in the work plan prepared by the PhD student every semester and signed by the supervisor (see below). Credits awarded for the completion of the subjects are distributed between the first two semesters of the two-phase programme. The seminar series of the George Oláh Doctoral School (DI) is part of the programme and participation in this during the first two semesters of the programme is compulsory, recognised with one credit for each semester (**Seminar 1-2**).

Attendance at professional forums (conferences, summer universities etc.) is also part of the programme

(**Professional forum 1-4**, 5 credits each).

Guided education is also part of the programme whereby, within the framework of an elective subject, (**Education 1-6**) students work under the guidance of a designated instructor to improve their presentation and communication skills and to develop their professional competence by giving a university contact lesson using pre-prepared and well documented training material. The subject and the assigned credits are determined, in consultation with the supervisor, by the department head of the supervisor/consultant and its completion is confirmed by the department head based on the proposal of the designated (subject coordinator) instructor. In total, 24 credits must be obtained in this educational format over the course of the programme.

An increased number of credits may be awarded for **research work in line with the greater amount of time invested in this as the PhD work progresses**. The topic of the research work and the number of credits assigned in each semester is jointly determined by the supervisor and the student and its completion is confirmed by the supervisor. The number of credits for research work should be determined on the basis that 40 hours of research per week is worth 30 credits. To fulfil the requirements for research work in each semester, students must sign up for the necessary number of **Research 1-17** subjects (5 credits each).

As the publication of the research findings is a prerequisite of the research work, DIT requires students to obtain mandatory **publication credits** in order to acquire an absolutorium as

follows:

Publication: (Publication 1-3 subjects). As a minimum, three English-language *publications* discussing the student's research topic published (or confirmed to have been approved for publication)

in an international journal with an impact factor. Each of these publications is awarded 10 credits. If the authors include several local co-authors without a PhD degree, the credits will be exclusively awarded to the student with a dominant (over 50%) contribution based on the supervisor's confirmation. Students must submit the document confirming the completion of the subject to the staff member in charge of PhD matters in the Dean's Office. If the impact factor of two publications with the PhD's student's dominant (over 50%) contribution among co-authors without a PhD degree is higher than 8, 10 credits for the **Publications 3** subject may also be awarded. No more than one approved patent may be accepted as a publication and recognised with 10 credits.

Presentation: (Presentation 1-3 subjects). PhD students are required to deliver in total three *professional presentations (oral presentation or poster)* relevant to their research work over the course of the programme, including one in the first phase of the programme. As one of the criteria for obtaining a PhD degree is the delivery of an oral presentation, 5 credits are only awarded for the **Presentation 3** subject if the presentations include at least one oral presentation. Oral presentations may be delivered at an international conference, at a working committee session of the Hungarian Academy of Sciences (MTA), at a special group session of the Hungarian Chemical Society (MKE), at the Chemical Presentation Days (KEN), at MKE's national conference, at the annual PhD conference organised by George Oláh Doctoral School or at any other forum approved by the DIT. The document confirming the completion of the subject (authenticated by the supervisor's signature) must be submitted to the staff member in charge of PhD matters in the Dean's Office.

At the beginning of each semester, students are required to submit their work plan, approved by their supervisor, for each specific semester and a report (one page each) on the previous semester verified by their supervisor. Work plans should include the subjects signed up for, the planned educational activities and an overview of the research work planned for the semester. Reports should include the subjects and educational activities completed in the previous semester, an overview of the results achieved in the research work and finally a summary of the publications released by that time. The work plan must be submitted by the end of the third week in the first active semester and the work plan and the report must be submitted by the end of the registration week in any following semesters to the staff member in charge of PhD matters in the Dean's Office.

PROFESSIONAL COMPETENCES TO BE ACQUIRED

The required knowledge of chemists, chemical, biotechnology and environmental engineers

a) with a PhD degree

They have a systematic and relational understanding of the general rules of chemical and biological science.

They know the subject, the general and specific characteristics, the key trends and boundaries as well as proven and disputed relations of their discipline on a research level.

They are familiar with the major relations and theories of the scientific disciplines related to their field of expertise as well as the relevant concept systems and terminology.

They constantly improve their knowledge of the leading international literature relevant to their discipline in a logical and analytical way.

They have the required level of skills in IT, mathematics and physics to productively apply this in order to handle, assess and disclose their research data and findings.

They have the required research methodology competence to be able to conduct independent research in their discipline. They know and understand the correlations and theories, the relevant concept systems and specialised terminology of their research field necessary for productive application.

b) Expected skills

They are able to identify the fundamental chemical and biological principles of natural phenomena as well as to study these phenomena in an experimental way and analyse them in a theoretical way.

In their field, they are able to independently plan and implement new projects and work phases.

In their field of expertise, they are able to perform productive analysis, describe broad and specific correlations in a synthetic and novel way, develop models and conduct evaluative and critical activities.

They are able to use and improve upon the special learning and problem solving methods of their field of expertise.

They are able to creatively develop new and previously unknown methods to apply theories in practice.

They are able to identify the problems relevant to their research field, to define the theoretical and practical backgrounds in a detailed way and, on a research level, to reveal and solve them.

They are able to creatively link unrelated information potentially relevant to other disciplines and to discover correlations between them. At the same time they are able to identify and highlight crucial, essential and important aspects when productively assessing their research findings.

They are able to analyse and assess their own and other people's research findings in a professional, realistic and critical way and treat them based on their worth.

They judge information and news related to the science of chemistry and biology in a

critical way and engage in professional debates presenting expert arguments.

They are able to effectively provide information to both laymen and people proficient in their field of expertise and to participate in expert debates and discussions.

They are capable of spoken and written professional communication and of professional cooperation both with domestic and international partners.

They are able to summarise, present and effectively communicate their understanding of their discipline and their research findings. They know and are able to independently use the standard publication methods in their field of expertise (e.g. writing articles, books and studies on their own).

c) Expected attitude

Typical characteristics include creativity, flexibility, the ability to identify and solve problems, intuition, a systematic approach, and the ability to process data and make decisions.

They are eager to identify and describe unexplored and unsolved scientific problems.

They demonstrate solid professional commitment and accept the necessity of hard work.

They are open to learning about new technologies and emerging research areas, to disseminating the information obtained as well as to integrating and improving the leading elements into their own research and development work.

They demonstrate an open and professionally non-judgemental approach when solving problems and developing models.

They evaluate the results achieved and the performance related both to their own work and that of people under their guidance in a realistic and understanding way.

They acknowledge justified professional criticism and accept the expert arguments of other people.

They are committed and open to participating in and initiating professional collaborations both with domestic and international partners.

They constantly try to maintain an effective balance between individual and team work.

They are able to work in an independent and highly engaged way but are also open to working in a team and supporting the work of other people.

d) Expected autonomy and responsibility

They demonstrate a high degree of independence in the field of modern chemistry and biology in the development of comprehensive and special expert problems as well as in the representation and justification of their expert points of view.

They consciously and responsibly represent their scientific points of view.

They assume the responsibility to address the ethical issues related to the theoretical and practical aspects of their field of expertise.

As the leader of the research project, they make independent decisions to direct the activities of their colleagues and assume responsibility for promoting their professional development.

They engage in debates with professionals in their field of expertise as equal partners.

All their activities reflect a responsible approach, based on their expert knowledge, to protect inanimate nature and improve its condition.

They demonstrate productive and creative independence in developing new areas of learning and proposing new practical solutions.

Comprehensive examination

The application criteria for the comprehensive examination include the following:

- Fulfilment of the English language proficiency requirement from the foreign language requirements of the PhD degree (Language skills must be demonstrated by a certificate of a complex, nationally accredited B2 level language or an equivalent examination as a minimum).
- Presentation of at least one publication released (or confirmed to have been approved for publication) in a journal with an impact factor where the PhD student's contribution among the collaborators without a PhD degree is over 50%.
- Documented delivery of at least one presentation (poster or lecture).
- Acquisition of all the required credits included in the sample work plans in the first four semesters of the PhD programme (i.e. 120 credits in total) in the required distribution. This requirement does not apply to candidates who independently prepare for their PhD degree and establish their student status by applying, and being approved, to take the comprehensive examination.
- The comprehensive examination is taken publicly, in front of an examination board. The examination board consists of at least three members, with at least one third of the members having no employment relationship with the institution by which the doctoral school is operated. The chairperson of the examination board is a lecturer or a researcher holding the academic title of professor, professor emeritus or Doctor of the Hungarian Academy of Sciences. All the members of the examination board are required to have a doctoral degree. The candidate's supervisor may not be a member of the board. No later than one week prior to the examination, the supervisor sends the evaluation of the student's performance to the chairperson of the board in an electronic form. The supervisor will be invited to the comprehensive examination.

The comprehensive examination consists of two main parts, one assessing the theoretical preparedness of the candidate ("theoretical part") and the other assessing the candidate's scientific progress ("dissertation part").

In the theoretical part of the comprehensive examination, the candidate takes examinations in two subjects. A list of these subjects is included in the training plan of the doctoral school and is available on the website of the doctoral school. In the theoretical part, candidates demonstrate their familiarity with the literature of the relevant discipline or branch of art, as well as their current theoretical and methodological knowledge.

In the second part of the comprehensive examination, candidates give a presentation to demonstrate their familiarity with the specialised literature of their research topics, sharing their research goals, set based on their knowledge of the literary background, reporting on their research findings and describing their research plans for the second phase of their PhD training, including the time schedule for preparing the dissertation and publishing the results. The presentation includes a description of the scientific relevance and innovation content of the candidate's findings and, if relevant, the technological motivations of the research and the applicability of the results. No later than one week prior to the examination, candidates must submit to the board, in an electronic form, a short summary of their thesis level findings

achieved up to date as well as their articles submitted for publication and published. PhD students are allowed to retake a failed comprehensive examination once in the same examination period.

The members of the examination board independently evaluate the theoretical and the dissertation part of the examination. The comprehensive examination is passed if the majority of the members of the board consider both parts of the examination to be successful. In the case of a failed theoretical examination, candidates may retake the examination in the non-completed subject(s) once in the same examination period. If unsuccessful, the dissertation part of the examination may not be retaken in the same examination period.

A report, containing a written evaluation, is prepared about the comprehensive examination. The examination results should be announced on the day of the oral examination. The result of the comprehensive examination is not taken into account when deciding on the qualification of the doctoral degree but its successful completion is a condition for entering the second stage of the programme.

Approval of the application in the case of individual preparation is subject to disciplinary compliance and the formal completion of the publication and language requirements of the PhD degree (as thesis points are not required at the time of application, the content is not evaluated and only quantitative indicators need to be met).

Effective date:

This curriculum is applicable to programmes starting on September 1 2016 and enters into force on December 1 2017.

SAMPLE
CURRICULUM

Subject/type	Total credits	1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	7th semester	8th semester
Studies		32/42							
Lead subject ^a E	10/ 10	2/e/5	2/e/5						
Secondary subject E	10/ 10	2/e/5	2/e/5						
Seminar ^b M	2/ 2	1/s/1	1/s/1						
Professional forum attendance E	10/ 20		5		5		5		5
Education		16/ 24							
Education ^d M	16/ 24	4/s/4	4/s/4	4/s/4	4/s/4	4/s/4	4/s/4		
Research		57/129							
Consultation ^e (1-8) M	22/ 44	5/s/5	5/s/5	6/s/6	6/s/6	6/s/6	6/s/6	5/s/5	5/s/5
Research ^f (1-17) M	35/ 85	10	5	15	5	15	5	20	10
Publication		15/ 45							
Publication ^g (1-3) M	10/ 30				10		10		10
Presentation ^h (1-3) M	5/ 15			5		5		5	
Total:	120/ 240	30	30	30	30	30	30	30	30

Symbols used: M Mandatory, E Elective

a Lead subjects are taught for two semesters and are awarded 10 credits each. Secondary subjects are taught for one semester and are awarded 5 credits each.

b Attendance of the seminar series organised by the Doctoral School. The completion of this subject is subject to the documented attendance of the presentations. Subjects **Seminar 1** and

Seminar 2 are awarded 1 credit each.

c Attendance of local or foreign professional conferences, working committee meetings, summer/winter universities and other programmes relevant to the research work confirmed by the supervisor.

Professional 1-4 subjects 5 credits each.

d 4 lessons of guided education per week under the guidance of the subject coordinator instructor and confirmed by the department head of the supervisor/consultant. **Professional 1-6** subjects 4 credits each.

e Tutorial consultation with the supervisor about the research work. **Consultation 1-2** and **Consultation 7-8** 5 credits each and **Consultation 3-6** 6 credits each with confirmation of the supervisor.

f **Research activity 1-17** 5 credits each with confirmation of the supervisor. Subject to the degree of progress made in the research work, more than one subject may be signed up for in each semester.

g **Publication 1-3** in the case of one publication released (or confirmed to have been approved for publication) in a journal with an impact factor, where the PhD student's contribution among the collaborators without a PhD degree being over 50%, 10 credits are awarded. In the case of the impact factor of two publications with the PhD's student's dominant (over 50%) contribution among co-authors without a PhD degree being higher than 10, 10 credits for the **Publications 3**

subject may also be awarded. Overall, one patent granted may be accepted as a publication recognised with 10 credits.

h **Presentation 1-3** Poster presented or oral presentation delivered by the candidate at an international conference, at a working committee session of the Hungarian Academy of Sciences (MTA), at a special group session of the Hungarian Chemical Society (MKE), at the Chemical Presentation Days (KEN), at MKE's national conference, at the annual

PhD conference organised by George Oláh Doctoral School, 5 credits each. The Presentation 3 subject is only recognised with 5 credits if at least one of the three presentations was an oral presentation delivered by the candidate.