DOCTORAL SCHOOL OF MULTIDISCIPLINARY MEDICAL SCIENCES

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CO-OPERATING INSTITUTIONS

Faculty of Medicine, University of Szeged:

Department of Biochemistry
Department of Pharmacology and Pharmacotherapy
1st Department of Internal Medicine
2nd Department of Internal Medicine

Department of Medical Biology
Department of Medical Informatics
Institute of Surgical Research
Department of Anesthesiology and Intensive Therapy

Biological Research Centre, Szeged:

Institute of Biophysics
Institute of Biochemistry
Institute of Genetics
Central Laboratories – Laboratory of Functional Genomics

Institute of Enzymology of the Research Centre for Natural Sciences, Budapest

DOCTORAL TRAINING PROGRAMMES

I. PHYSIOLOGY, PATHOPHYSIOLOGY, AND PHARMACOLOGY OF THE CARDIOVASCULAR SYSTEM

Programme director: **Prof. Norbert Jost habil, PhD, DSc**
Department of Pharmacology and Pharmacotherapy,
Albert Szent-Györgyi Medical School, University of Szeged
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Physiology, Pathophysiology, and Pharmacology of the Cardiovascular System

I/1. Experimental Cardiology and Cardiovascular Pharmacology

Coordinator: **Prof. Norbert Jost habil, PhD, DSc**
Department of Pharmacology and Pharmacotherapy,
Albert Szent-Györgyi Medical School, University of Szeged
H-6720 Szeged, Dóm tér 12, Hungary
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E-mail: jost.norbert@med.u-szeged.hu

I/2. Experimental Study of Clinically Significant Cardiorespiratory Pathomechanisms

Coordinator: Prof. Mihály Boros MD, PhD, DSc
Institute of Surgical Research,
Albert Szent-Györgyi Medical School, University of Szeged

H-6720 Szeged, Szőkefalvi-Nagy Béla u. 6, Hungary
Tel: +36-62-545-103, Fax: +36-62-545-743
E-mail: boros.mihaly@med.u-szeged.hu

II. BIOCHEMISTRY, BIOPHYSICS, MOLECULAR AND CELL BIOLOGY

Programme director: **Prof. Dr. Mária Dux MD, PhD, DSc**
Department of Physiology,
Albert Szent-Györgyi Medical School, University of Szeged
H-6720, Szeged, Dóm tér 10, Hungary

Tel: +36-62-545-374
E-mail: dux.maria@med.u-szeged.hu

STUDY REQUIREMENTS – PHD TRAINING PLAN: (CREDIT PLAN)

Duration of the PhD programme: 4 + 4 semesters

Credits: min. 240 credits / 8 semesters have to be earned by a student of this programme during the doctoral studies

MODULES (SEMESTERS 1–4 OF PHD STUDIES):

Module 1 (Semesters 1–4 of PhD studies): Basic and Major compulsory PhD courses

1a Major (compulsory) PhD courses

1b Major / Special (PhD programme related) compulsory PhD courses

Module 2 (Semesters 1–4 of PhD studies): Research activities (compulsory)

Module 3 (Semesters 1–8 of PhD studies): Educational activities (optional)

Module 4: Publication activities (compulsory, not related to semesters)

MODULES (SEMESTERS 1–4 OF PHD STUDIES):

MODULE 1A: BASIC (COMPULSORY) PHD COURSES
(Semesters 1–4 of PhD studies, 20 credits)**:**

1. semester:

1. Biostatics Lecture (28 hours) – 6 credits

2. Biostatics Practice (20 hours) – 2 credits

Head of the course: Dr. Krisztina Boda PhD
Lecturers: Krisztina Boda PhD, Tibor Nyári PhD, Szűcs Mónika,
Department of Medical Physics and Informatics
Faculty of Medicine, Faculty of Science and Informatics, University of Szeged
H-6720 Szeged, Korányi fasor 9, Hungary,
Tel/Fax: +36-62-544-566, e-mail: office.dmi@med.u-szeged.hu

2. semester

3. Computer-assisted research methodology (28 hours) – 6 credits
Head of the course: Prof. Dr. Ferenc Peták PhD, DSc
Department of Medical Physics and Informatics
Faculty of Medicine, Faculty of Science and Informatics, University of Szeged
H-6720 Szeged, Korányi fasor 9, Hungary
Tel/Fax: +36-62-544-566, e-mail: office.dmi@med.u-szeged.hu

4. Biomedical Ethics (14 hours) – Tbd (in one Block) – **3 credits**
Head of the course: Dr. habil. Oguz Kelemen MD, PhD
Department of Behavioral Sciences, Faculty of Medicine, University of Szeged
H-6722 Szeged, Szentháromság u. 5, Hungary
Tel: +36-62-420-530, fax: 62/420-530; 545-968
e-mail: kelemen.oguz@med.u-szeged.hu

5. Scientific literature (14 hours) -- Tbd (in one Block) – **3 credits**
Head of the course: Prof. Dr. Ernő Duda PhD, DSc
Department of Medical Biology, Faculty of Medicine, University of Szeged
H-6720 Szeged, Somogyi u. 4, Hungary
Tel: +36-62- 545-592
e-mail: duda.erno@med.u-szeged.hu

COMPLEX EXAMINATION: at the end of Semester 4

MODULE 1B: MAJOR COMPULSORY PHD COURSES

(Semesters 1–4 of PhD studies, 18 credits)**:**

Semester 2.

1. **Advanced Biochemistry, Biophysics, Molecular Cell Biology, and Pharmacology I.**
(Biochemistry and Cardiac Electrophysiology and the mechanism of the arrhythmias)
Course type: Lecture
14 x 3 classes per week, 42 hours per semester, 9 credits

Head of the course: Prof. Dr. László Dux MD, PhD, DSc, Department of Biochemistry, Faculty of Medicine, University of Szeged, email: dux.laszlo@med.u-szeged.hu

Prof. András Varró MD, PhD, DSc - Department of Pharmacology and Pharmacotherapy, Faculty of Medicine, University of Szeged, email: varro.andras@med.u-szeged.hu

Biochemistry
Supervisor: Prof Dr. László Dux

1. Membranes I.
Lecturer: Prof. Dr. László Dux DSc,
Department of Biochemistry
e-mail: laszlo.dux@med.u-szeged.hu

2. Crystallization of membrane proteins
Lecturer: Dr. habil. Gerda Szakonyi PhD
Faculty of Pharmacy, Institute of Pharmaceutical Analysis
e-mail: gerda.szakonyi@pharm.u-szeged.hu

3. Membranes II.
Lecturer: Prof. Dr. László Dux DSc,
Department of Biochemistry
e-mail: laszlo.dux@med.u-szeged.hu

4. Non-coding RNAs
Lecturer: Dr. habil. Márta Sárközy PhD
Department of Department of Pathophysiology
e-mail: marta.sarkozy@med.u-szeged.hu

5. Molecular mechanisms of cardiac fibrosis and hypertrophy
Lecturer: Dr. habil. Márta Sárközy MD PhD
Department of Pathophysiology
e-mail: sarkozy.marta@med.u-szeged.hu

6. Molecular Signalling I.
Lecturer: Dr. Anikó Keller-Pintér PhD
Department of Biochemistry
e-mail: keller.aniko@med.u-szeged.hu

7. Molecular Signalling II.
Lecturer: Dr. Anikó Keller-Pintér PhD

Department of Biochemistry

Cardiac Electrophysiology and the mechanism of the arrhythmias PhD course
Supervisors: Prof Dr. András Varró and Dr. Norbert Jost

1. Basic principles of electrophysiology, the impulse propagation in the heart
   Lecturer: Dr. Norbert Nagy
      Transmembrane transport, Donnan equilibrium, resting potential,
      Nernst equation, ion channels, Local and action potentials

2. The action potential and the underlying ionic currents
   Lecturer: Dr. Norbert Jost
      Depolarization and repolarization activated currents, refractoriness
      Relation between the action potential and the ECG
      Action potential and currents
      Na^+, K^+ and Ca^{2+} currents
      Other currents

3. Excitation-contraction coupling in cardiomyocytes
   Lecturer: Dr. Norbert Nagy
      Major cellular structures involved in E-C coupling
      Cardiac action potentials and ion channels
      Na/Ca exchange and the sarcolemmal Ca-pump
      Control of cardiac contraction by SR and SL Ca fluxes
      Cardiac inotropy, Ca „mismanagement”

4. Investigational techniques in cardiac electrophysiology
   Lecturer: Dr. Norbert Jost
      Action potential measurements
      Patch-clamp technique
      Isolated heart technique

5. The mechanism of the cardiac arrhythmias
   Lecturers: Prof András Varró and Dr. Norbert Jost
      Nomotop activity
      Disorder of the automacity (EADs and DAD)s
      Re-entry arrhythmias, AV nodal re-entry
      The arrhytmogen mechanism of the repolarization inhomogeneity

6. Genetic background of ion-channel disturbances in the heart
   Lecturer: Dr. Norbert Nagy
      The classification of human genetic diseases
      The molecular structure of the cardiac ion channels
      Hereditary ion channel diseases

7. Sudden cardiac death and exercise-induced cardiovascular adaptation

   Lecturer: Dr. Attila Farkas
      Effects of regular physical exercise
      Effects of endurance training - remodelling , the athlete’s heart
      Sudden cardiac death in athletes

      Each course is 3 hours lecture (3 x 45 minutes block)

Each course is supposed to a topic at the exam

Semester 3.

2. **Advanced Biochemistry, Biophysics, Molecular Cell Biology, and Pharmacology II.**
(Molecular Cell Biology and Biophysics)
Course type: Lecture
14 x 3 classes per week, 42 hours per semester, **9 credits**

Head of the course: Prof. Dr. László Dux MD, PhD, DSc, Department of Biochemistry, Faculty of Medicine, University of Szeged, email: dux.laszlo@med.u-szeged.hu

Dr. József Mihály PhD, DSc - Institute of Genetics, Biological Research Center, Szeged
email:
Prof. László Zimányi, PhD, DSc - Institute of Biophysics, Biological Research Center, Szeged
email:

SPECIAL ELECTIVE PHD COURSES:

Animal experiments in medicine – Level A

Course type: **Lecture**
20 hours per semester, **4 credits**

Head of the course: Prof. Mihály Boros MD, PhD, DSc
Institute of Surgical Research, Albert Szent-Györgyi Medical School, University of Szeged
Béla Szőkefalvi –Nagy str. 6., H-6720 Szeged Hungary
Tel: +36-62-545-103, Fax: +36-62-545-743
E-mail: boros.mihaly@med.u-szeged.hu

2. Animal experiments in medicine – Level A

Course type: **Practice**
20 hours per semester, **4 credits**

Head of the course: Prof. Mihály Boros MD, PhD, DSc
Institute of Surgical Research, Albert Szent-Györgyi Medical School, University of Szeged
Béla Szőkefalvi –Nagy str. 6., H-6720 Szeged Hungary
Tel: +36-62-545-103, Fax: +36-62-545-743
E-mail: boros.mihaly@med.u-szeged.hu

3. **Introduction to the basics of cardiovascular research I.-IV.**

Course type: **Lecture**
28 hours per semester, **5 credits**

Head of the course: Dr. habil. Csaba Csonka PhD
Supervisors: Prof. Dr. Tamás Csont, Dr. Gergő Szűcs PhD
Department of Biochemistry,
Albert Szent-Györgyi Medical School, University of Szeged
H-6720, Szeged, Dóm tér 9, Hungary
Email:csonka.csaba@med.u-szeged.hu

4. **Pre-clinical cardiovascular research I.-IV.**

Course type: **Lecture**
28 hours per semester, **5 credits**

Head of the course: Dr. habil. Márta Sárközy PhD

Department of Pathophysiology,
Albert Szent-Györgyi Medical School, University of Szeged
Béla Szőkefalvi –Nagy str. 6., H-6720 Szeged Hungary
Email:sarkozy.marta@med.u-szeged.hu

MODULE 2: RESEARCH ACTIVITIES
Compulsory: 5-20 credits per semester, max. 172 credits per 8 semesters

A total No. of **min. 130 credits and max. 172 credits/ 8 semesters** is required (1 credit=30 hours)

The module consists of 2 parts:

- **Experimental research work** 5-20 credits per semester
- **Research report** 3 credits

The total number of reports cannot exceed 4.
Reporting is recommended at the end of semesters 2, 4, 6 and 8, 4 credits =12 credits.
PhD students cannot be allocated more than 172 credits for completing their research activity.
Further *elective* credits can be allocated for other research activities:

Participation in continuing education courses 2 credits

2. Summary of work completed: 3 credits/ summary **max. 12 credits/ 8 semesters**

Module 3 Teaching activity (optional)
A total No. of min. 0 and max. 48 credits/ 8 semesters (max. 8 credits/ semester)

- 1 class/week 2 credits
- 2 class/week 4 credits
- 3 class/weeks 6 credits
- 4 class/weekr 8 credits

Note: Credits can only be allocated for teaching activity in the Hungarian language program (giving contact lessons, marking test papers, supervising written exams, participation in oral exams).
Credits cannot be allocated for teaching activities in the English or German program since PhD students receive a fee for those lessons.

Module 4 Publication activity
A training criterion unrelated to semesters (completion: min. 2 items, min. 65 credits, max. 90 credits)
Number of publications required for the completion of the PhD training:

- min. 1 paper where the student is the lead author
- min. 2 original researh articles, min. 1 of which is published in a journal with an impact factor and the combined impact factor of the 2 articles has to fulfill the requirements of the subprogram

The number of impact factors required by the Doctoral School of Multidisclinary Medicine:

1. Experimental Cardiology and Cardiovascular Pharmacology 2.5
2. Biochemistry, Biophysics, Molecular and Cell Biology- 4,0

- The lead author has to issue a statement authorising the PhD student to include the paper in their thesis.

Number of credit points for publication activity:

Poster presentation at a Hungarian event:	3 credits
Poster presentation at an international event:	5 credits
Oral presentation at a Hungarian event:	3 credits
Oral presentation at an international event*:	5 credits

**(also if held in Hungary)*

English article with no IF:	20 credits
English article with IF:	45 credits

Total number of credit points for publication activity (publication, poster and oral presentation): min. 65 – max. 90 credits

STUDY REQUIREMENTS

General rules:

- Minimum 20 and maximum 45 credits should be earned in each semester.
- Minimum 90 credits should be earned in Semesters 1–4; min. 90 credits are required for the admission to the complex examination.
- Students should earn minimum 240 credits during the 8 semesters (2 + 2 years).
- For doing teaching activity, 8 credits can be given per semester, up to a total of 48 credits.
- Summary of the work completed: 3 credits for each; minimum 1 maximum 4 summaries can be rewarded by a total of 12 credits.

The training plan consists of 4 parts (modules):

Basic Module 1/subject credit *(min. 38 credits)*

Part A Basic module (20 credits)

Basic module												
Course name	**Name of department coordinator**	**Total number of classes**	**Requirements**	**Number of credits in the given semester**								**Total No. of credits**	**Form of evaluation**
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
Computer-assisted research methodology	Department of Medical Physics and Informatics Prof. Dr. Ferenc Peták	28	C*	0	6	-	-	-	-	-	-	6	E5
Biostatistics Lecture	Department of Medical Physics and Informatics Dr. Krisztina Boda	28	C	6	-	-	-	-	-	-	-	6	E5
Biostatistics Practice	Department of Medical Physics and Informatics Dr. Krisztina Boda	20	C	2	-	-	-	-	-	-	-	2	E3
Scientific communication and publication. Methods, rules, and ethics.	Department of Medical Biology Prof. Dr. Ernő Duda	14	C	-	3	-	-	-	-	-	-	3	E5
Biomedical Ethics	Department of Behavioral Sciences Dr. Oguz Kelemen	14	C	-	3	-	-	-	-	-	-	3	E5
The total No. of credits in Basic Module 1				**8**	**12**	**-**	**-**	**-**	**-**	**-**	**-**	**20**	

*C (Compulsory subject)

Part B

Compulsory subjects related to the PhD subprogram (specialization)

(in each PhD subprogram (specialization) **min. 18 credits** must be collected in Semesters 1–4)

The complex examination must be completed at the end of Year 2 (Semester 4).
Sum of all compulsory training credits (basic and subprogram (specialization) credits: 20 + 18 = 38 credits
Compulsory subjects of the 2 subprograms of the Doctoral School of Multidisciplinary Medicine, University of Szeged, of which min. 18 credits must be collected in Semesters 1–4:

Compulsory subjects related to the PhD subprogram (specialization)												
Course name	**Name of department coordinator**	**Total number of classes (hours)**	**Requirements**	**Number of credits in the given semesters**								**Total No. of credits**	**Form of evaluation**
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
Advanced Biochemistry, Biophysics, Molecular Cell Biology, and Pharmacology I. (Biochemistry and Cardiac Electrophysiology and the mechanism of the arrhythmias)	Department of Biochemistry - Prof. Dr. Laszlo Dux; Department of Pharmacology and Pharmacotherapy - Prof. Dr. András Varró	28	C	-	**9**	-	-	-	-	-	-	**9**	E5
Advanced Biochemistry, Biophysics, Molecular Cell Biology, and Pharmacology II. (Molecular and Cell Biology and Biophysics)	Department of Biochemistry Prof. Dr. László Dux, - Institute of Genetics, BRC - József Mihály, Res. - Institute of Biophysics, BRC - Prof László Zimányi	28	C	-	-	**9**	-	-	-	-	-	**9**	E5
The total No. of credits for the compulsory subjects in the PhD sub-program (specialization)				-	**9**	**9**	-					**18**	
***All compulsory trainings credits** (the total No. of credits in the Basic module and for the compulsory subjects related to the PhD subprogram (specialization)*				**8**	**21**	**9**	**-**	**-**	**-**	**-**	**-**	**38**	

Elective subject related to the PhD subprogram (specialization)												
Course name	**Name of department coordinator**	**Total number of classes (hours)**	**Requirements**	**Number of credits in the given semesters**								**Total No. of credits**	**Form of evaluation**
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
Theory of animal experiments in medicine – Level A	Institute of Surgical Research - Prof. Mihály Boros,	28	E	-	-	**6**	-	-	-	-	-	**6**	E5

Student Circle – lectures in cardiovascular electrophysiology	Department of Pharmacology and Pharmacotherapy - Prof. Dr. András Varró	28	E	-	-	**-**	**6**	-	-	-	-	**6**	E5
The total No. of credits for the elective subject in the PhD sub-program (specialization)				-	-	**6**	6					**12**	

Module 2 Research Activity *(min. 130 credits) (30 hours = 1 credit)*													
Course name	**Name of department coordinator**	**Total number of classes (hours)**	**Requirements**	**Number of credits in the given semesters**								**Total No. of credits**	**Form of evaluation**
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
Research activity Semesters 1–8 *a total No. of 300 hours/semester)*	Department of Biochemistry Prof. Dr. László Dux	300	CE	10	10	10	10	10	10	10	10		E3
Research activity Semesters 1–8 *a total No. of 450 hours/semester)*	Department of Biochemistry Prof. Dr. László Dux	450	CE	15	15	15	15	15	15	15	15		E3
Research activity Semesters 1–8 *a total No. of 600 hours//semester)*	Department of Biochemistry Prof. Dr. László Dux	600	CE	20	20	20	20	20	20	20	20		E3
Research report *(Up to 4 times/8 semesters)*	Department of Biochemistry Prof. Dr. László Dux	14	C	-	3	-	3	-	3	-	3	12	E3
The total No. of credits for the Research activity				min. 10, max. 20	min. 10, max. 23	min. 10, max. 20	min. 10, max. 23	min. 10, max. 20	min. 10, max. 23	min. 10, max. 20	min. 10, max. 23	min. 130, max. 172	

Module 3 Teaching activity *(max. 8 credits can be given /semester, a total No. of min. 0 credit and max. 48 credits)*													
Course name	**Name of department coordinator**	**Total number of classes**	**Requirements**	**Number of credits in the given semesters**								**Total No. of credits**	**Form of evaluation**
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
Teaching activity Semesters 1–8 (1 hour/week)	Department of Biochemistry Prof. Dr. László Dux	14	E	2	2	2	2	2	2	2	2		E3
Teaching activity Semesters 1–8 (2 hours/week)	Department of Biochemistry Prof. Dr. László Dux	28	E	4	4	4	4	4	4	4	4		E3
Teaching activity Semesters 1–8 (3 hours/week)	Department of Biochemistry Prof. Dr. László Dux	42	E	6	6	6	6	6	6	6	6		E3
Teaching activity Semesters 1–8 (4 hours/week)	Department of Biochemistry Prof. Dr. László Dux	56	E	8	8	8	8	8	8	8	8		E3
The total No. of credits for the Teaching activity:				0–8	0–8	0–8	0–8	0–8	0–8	0–8	0–8	min. 0, max. 48	

The total No. of credits for the Compulsory training + Research activity + Teaching activity:	min. 0, max. 43	min. 33, max. 54	min. 10, max. 28	min. 10, max. 31	min. 10, max. 28	min. 10, max. 31	min. 10, max. 28	min. 10, max. 31	min. 168, max. 218

Module 4 Publication activity a training criterion unrelated to semesters (completion: min. 2 items, min. 65 credits, max. 90 credits)													
Name of course	**Name of department coordinator**	**Total number of classes (hours)**	**Requirements**	**Number of credits in the given semesters**								**Total No. of credits**	**Form of evaluation**
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
English article with no IF (8 hours a week) Semesters 1–8	Department of Biochemistry Prof. Dr. László Dux	112	E	20	20	20	20	20	20	20	20		E3
English article with IF (16 hours a week) Semesters 1–8	Department of Biochemistry Prof. Dr. László Dux	224	C	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*		E3
Poster presentation at a Hungarian event Semesters 1–8	Department of Biochemistry Prof. Dr. László Dux	14	E	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*		E3
Poster presentation at an international event (Hungary incl.) Semesters 1–8	Department of Biochemistry Prof. Dr. László Dux	28	E	*5*	*5*	*5*	*5*	*5*	*5*	*5*	*5*		E3
Oral presentation at a Hungarian event Semesters 1–8	Department of Biochemistry Prof. Dr. László Dux	14	E	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*		E3
Oral presentation at an international event Semesters 1–8	Department of Biochemistry Prof. Dr. László Dux	28	E	*5*	*5*	*5*	*5*	*5*	*5*	*5*	*5*		E3

The total No. of credits for the Publication activity:		**65–81**	

The total No. of credits **in Modules 1–4:** completion of min. 20, max. 45 credits / semester**;** a total of min. 240 credits / 8 semesters; max. 360 credits / 8 semesters	***min. 233, max. 289**	

Recommended Curriculum

Min. and max. number of credit points in each semester for full-time students in the 4-year (2+2) program (min. 20, max. 45 credits)

Semester 1:

Subjects in the Basic Module:	6+2 credits =	8 credits
Research activity:		20 credits
Total number of credits:		28 credits

Semester 2:

Subjects in the Basic Module:	6+3+2 credits =	11 credits
Compulsory subject:		9 credits
Research activity and research report:		20+3 credits
Total number of credits:		43 credits

Total number of credits for Semesters 1 and 2: 71 credits

Semester 3:

Compulsory subjects:	9 credits
Research activity:	20 credits
Total number of credits:	29 credits

Semester 4:

Research activity:	20 credits
Research report:	3 credits
Total number of credits:	23 credits

Total number of credits for Semesters 3 and 4: 52 credits

Total number of credits for Semesters 1-4: 71 + 52 credits = 123 credits

Minimum 90 credits should be earned in Semesters 1–4 in order that the student can take the complex examination. The acquisition of 90 credits is feasible for all PhD students.

Semester 5:

Research activity:	20 credits
Total number of credits:	20 credits

Semester 6:

Research activity:	20 credits
Research report:	3 credits
Total number of credits:	23 credits

Total number of credits for Semesters 5 and 6: 43 credits

Semester 7:

Research activity:	20 credits
Total number of credits:	20 credits

Semester 8:

Research activity:	20 credits
Research report :	3 credits
Total number of credits:	23 credits

Total number of credits for Semesters 7 and 8: 43 credits

Summary: total number of credits that can be acquired (compared to the minimum)
Semesters 1-4: 123credits > 90 credits
Semesters 5-8: 86 credits
Semesters 1-8: 123+86= 199 credits

The total number of credit points for publication activity *(min. 65 – max. 90 credits)* is added to this number independent of the semester.

FURTHER REQUIREMENTS

1. Annual summary of the work completed

At the end of each academic year students have to submit a report of max. 1 page that summarizes the work they performed during the year. For the formal requirents of this summary see Appendix 1.
The summary must specify:
- the accurate data of the student and the subprogram (e.g. John Smith, 2nd year full-time PhD student, Neptun ID, email address, name of subprogram, thesis supervisor and institute)
- the courses taken and completed by the student, grades, number of credits
- teaching activities, number of classes and credits (title and code of the subject)
- most important findings of research work
- oral presentations given (event, location, date, title of presentation, certificate, e.g. conference brochure)
- list of publications submitted, accepted and/ or published

The signature of the student's thesis supervisor confirms the truthfulness of the activities listed, whereas the signature of the chair of the doctoral school indicates his/ her approval.
The thesis supervisor, the chair of the Doctoral School and the secretariat of the Doctoral School have to receive a copy of the summary by 15 September of the given year.

2**. Language skills**

1. All students are required to have a B2 level English language knowledge according the Common European Framework of Reference for Languages (CEFR), which has to be proved by a certificate. The equivalence of language exams and exam certificates is governed by government decrees. If there is no decree to cover certain individual cases, the appraisal of the Department of Foreign Languages has to be asked for.
PhD students participating in teaching at the German Program for students of Medicine and/ or Dentistry may choose to meet the above mentioned requirement by presenting a language certificate of their German language skills.
2. A lower level examination or its equivalent (CEFR level A2 or B1) is required in a second foreign language. Alternatively, a certificate issued by the Department of Foreign Languages is acceptable for this purpose.
3. In the case of foreign citizens whose mother tongue is not Hungarian, their knowledge of that given language entitles them to meet one of the language requirements if it fulfils the regulations of the doctoral school. Hungarian is considered to be a foreign language for such students.

3. Requirements of the complex examination for full-time students in the 2+2-year program
The complex exam is conducted in front of a committee of min. three members, min. one of whom is not employed by the University of Szeged.

1. The chair of the examination committee is a professor of the University of Szeged (SZTE).
2. Another member of the committee is a scientifically qualified researcher of SZTE and the member not employed by SZTE is also scientifically qualified.

The Doctoral School will announce 1-2 dates for the complex examination. Ideally, the examinations are scheduled to take place in the second part of May or the first part of June, so that they will be completed before the entrance exam of the new full-time students.
The complex examination consists of two main parts:

a. theoretical part (equivalent to the previous final examination): can be re-taken once in the same exam period
b. dissertation part: the candidate is required to give an account of his or her progress in the chosen field of research as well as his/ her research plans for the next 2 years

Complex examination at the end of Semester 4: consists of 2 parts (50-50%)

a. theoretical part (equivalent to the previous final examination)

   The two subjects for the theoretical part of the complex examination can be selected from a list containing the compulsory courses of the subprogram.

b. dissertation part: the candidate is required to give an account of his or her progress in the chosen field of research as well as his/ her research plans for the next 2 years

Recommendations for the complex examination:

- The PhD student should either prepare a Power Point presentation or a 1.5-2-page report that has to be enclosed with the written record of the exam
- The assessment of the student shall be made in writing before the complex examination by the supervisor. The one-page assessment may be sent to the members of the committee before the examination.
- The student shall prepare a written dissertation report before the exam, which may be sent to the members of the committee before the examination.
- The candidate's supervisor cannot be the member of the committee; however, they should be present during the dissertation part of the exam.

Regulations concerning the written record of the complex examination:
Government Decree 87/2015 (IV.9.) on the Implementation of certain provisions of Act CCIV of 2011:
(4) 110 The written record of the complex examination shall contain:
a. the name and institutional ID of the higher education institution
b. the name, student ID, previous qualification(s) and degree(s) of the candidate
c. the name and faculty ID of the thesis supervisor
d. the discipline and the disciplinary area of the doctoral degree
e. the subjects of the theoretical part, questions asked and evaluation of the responses
f. the result of the complex examination
g. the name, faculty ID and signature of the chair and other members of the examination committee

FORMAL REQUIREMENTS OF THE DOCTORAL DISSERTATION:

The dissertation has to be written and submitted in English. The length of the dissertation including figures, graphs, tables and references may not exceed 50 pages. The dissertation has to be printed (character type Time 12, line spacing at 1.5, type-area 16 x 23) and bound before submission.

The front page must include the title of the dissertation, the “PhD thesis” or “Doctoral thesis” designation, the author’s name and the year of submission.
The inner title page must include the title of the dissertation, the names of the author, supervisor and co-supervisor (if appropriate), the place and the date of the dissertation and the name of the Doctoral School. The next page shall include a list of scientific papers that cover the same topic as the dissertation. The items of the list shall be numbered by using Roman numerals. The structure of the dissertation shall correspond to the professional requirements of scientific publications. The individual sections (Introduction, Methods and Materials, Results, Discussion, Conclusion, Acknowledgements, References) of the dissertation shall be proportionate. The system of citations shall correspond to the citation system commonly used in the given field.
A summary of the dissertation has to be enclosed with the thesis, both in English and Hungarian.

The copies of all the candidate's relevant publications (already published or accepted for publication) have to be included in the Appendix.

The dissertation has to be submitted in 5 copies together with a 10-15-page thesis booklet (summary of the dissertation), which has to be written both in Hungarian and in English and submitted in 15 copies in both languages. Every candidate has to send an electronic version (pdf format) of the entire dissertation and the Hungarian and English thesis booklet to the Doctoral School.

Every candidate has to upload the entire dissertation together with the thesis booklet on the SZTE Doktori Repozitórium operated by Library Klebelsberg while, at the same time, submitting them to the Dean's Office.The evaluation of the dissertation may not start before the dissertation has been submitted and uploaded.

When the defence of the thesis is announced, the relevant Faculty or Doctoral School or PhD Secretariat uploads the names of the thesis defence board members into the Repository. The names of the thesis defence board members shall be displayed on the invitation for public disputation.

APPENDICES

Appendix 1.

Regulations governing Doctoral Training programs at the University of Szeged (26 June, 2017)

MANAGING CREDIT POINTS IN THE DOCTORAL TRAINING PROGRAMME

1. During the doctoral training all learning outcomes shall be measured in credits (study credit points). Credits shall be granted for only those study activities that are graded on a 3-level or 5 level grading scale system.
2. During the 48-month-long training period – divided into 8 examination periods – a total of 240 credit points shall be earned to be eligible for a completion of studies certificate.
3. At least 20 and at most 45 credit points shall be collected during each examination period.
4. If a student participates in a partial study at a foreign or other Hungarian university, the relevant Doctoral School Council may grant exemption from the above-mentioned requirements. The credit point value of the courses that had been completed at a foreign or other Hungarian university shall be judged by the relevant Doctoral School Council.
5. With research work such as bibliography, library and archives research, follow-up on journal articles, conference participation – where the student presents a poster or holds a lecture – and publishing articles in journals a total of at least 130 credit points shall be achieved.
6. The credit point value of the theoretical course with two lessons per week (14 weeks/semester) shall be 3-6 points. The credit point value shall change in proportion with the change in the total number of lessons i.e. taking an intensive course with an external lecturer. At least 5 theoretical courses of 2 classes/week have to be completed by the students.
7. For the pre-degree certificate that states that all courses have been covered at least 15 credits points shall be achieved from the theoretical courses.
8. The credit point value of the weekly one lesson per week (for 14 weeks) practical session (seminar) shall be 1-2 credit points. With teaching activities 48 credit points shall be achieved at the most; 8 credit points per semester at the most. No credit points shall be granted for lessons that the PhD student is paid for.
9. Should the school set it as a requirement that, at certain intervals, during departmental or research group seminars, the PhD student shall give an account of his research activities then one such report may worth 3-5 credit points. It is recommended to require at least one such report (in the sixth examination period, for example). The Doctoral School Council shall determine the number of reports to be recognised with credit points.
10. PhD students may be granted credit points for journal articles and active conference participation with lectures and posters if they are published in the conference publications. The credit point value of the above-mentioned activities shall depend on the students' level of contribution to the achieved outcomes. With the consent of the relevant Disciplinary Doctoral Council (DDC) and Doctoral Council of the relevant Branch of Science, such credits shall be determined by the relevant Doctoral School Council.

Government decree Section 11 (2) For medical residents and medical in-house practitioners–who are participating in a particular training programme to ensure the succession of academic tutors at medical higher education institutions–out of their completed core training modules and professional practice period, the relevant Credit Transfer Committee–in pursuant of the doctoral regulations–shall only permit the recognition of two semesters or sixty credit points.

11. With the consent of the relevant DDC, recognition of credit points – in pursuant of the Government Decree – shall be decided by the Doctoral School Council. Such recognition shall only be possible with PhD students in the organised training programme.
12. The credit points recognised on the basis of the previous section shall be confirmed by the head of the Doctoral School, and the acquisition of the training credit points shall be confirmed by the lecturer of the theoretical course. The Doctoral School Council shall determine the credit points to be confirmed by the head of the training/research programme. The supervisor shall be responsible for the confirmation of the remainder of the credit points.
13. Countersigned by the Chair of the DDC, the completion of each study period shall be certified by the Dean for Research Affairs at the Faculty in the relevant branch of science.

Molecular Cell Biology
Complex Exam Topics for PhD students
2023

1. Cellular regulation, the role of formins in actin and microtubule cytoskeleton regulation
2. Zinc-finger nucleases (ZFNs)TALEN, and CRISPR/Cas-based methods for genome engineering
3. Fluorescent microscope techniques
4. Mammalian artificial chromosomes in gene-based cell therapy
5. Chromosome / genome stability
6. Regulation of cell division: role of protein degradation and phosphorus regulation
7. DNA repair mechanisms
8. Autophagy

Biochemistry
Complex Exam Topics for PhD students
2023

1. Structure of proteins and methods of protein structure analysis
2. Function and methods of protein function analysis, proteomics, enzymology
3. Structure, types and function of nucleic acids
4. Nucleic acid Research methods, genomics, transcriptomics
5. Regulation of metabolic processes, test methods
6. Bioenergetics, metabolomics
7. Possibilities and limitations of molecular-based drug development
8. Information transmission systems and research methods of biological signal transduction

Recommended reading list:

Lehninger: Principles of Biochemistry (David L. Nelson, Michael M. Cox) 7.kiadás 2017

Paul R. Graves and Timothy A. J. Haystead: Molecular Biologist's Guide to Proteomics, MICROBIOLOGY AND MOLECULAR BIOLOGY REVIEWS, Mar. 2002, p. 39–63

Fabian Hosp and Matthias Mann, A Primer on Concepts and Applications of Proteomics in Neuroscience, Neuron 86, 558-571, 2017