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Date : 15th September 2022

PROGRAMME DOCUMENT

Doctorate in Computer Science and Systems

Objectives of the Programme

The doctorate represents a transitional phase between a person's studies and their own research work and is a means of acquiring knowledge and skills relating to their own subject, as well as those that cut across other areas or have more to do with methodology. It is also an opportunity to build networks within the academic community. It prepares a person for research-oriented work at either a university or in the outside world (wider society, finance, administration, etc.) and equips them to take on a wide variety of demanding professional duties and roles.

The core focus of a doctorate is the acquisition of academic skills by drafting a piece of academic work (dissertation). Depending on the faculty, the dissertation can take the following forms:

- a monograph (an individual, "self-contained" paper) or
- articles published in recognized specialist journals relating to either several or one specific area of research (cumulative dissertation).

COURSE LEARNING OUTCOMES

The learning outcomes described in Annex 1 of the Higher Education Standard have been completely achieved in the curriculum. The curriculum development and adoption is an ongoing process that shall continue for many study cycles to come. Evolving, experimenting



and developing a curriculum is the primary goal of a progressive 21st century Higher Education Institution, yet it has to adhere to the learning outcomes described in Annex 1 of the Higher Education Standard.

Doctoral program objectives include:

- To provide students with the opportunity to learn the latest academic theories, concepts, techniques and applications with emphasis on teaching, research, practice, Innovation, and consulting.
- To extend the knowledge, expertise and skill of students through the application of research to real life technical / Software and systems related problems and issues by including internships, teaching experiences, and special study projects as a part of the curriculum.
- To develop the student's ability to carry out independent research at an advanced level, and enhance their ability to deliver their ideas, research methodology and findings by means of formal presentations with critiques of their analytical, written, oral and media presentation skills in technical, professional, and educational environments.
- To create opportunities for the University's bachelor and master degree students to continue their business education by undertaking the doctoral degree course of study. The Ph.D. program is designed to serve this need by providing doctoral-level education to professional practitioners in Computer Science, Communication Systems and Information Technology domains.
- extending the limits of what is currently known through innovative and high-quality work
- the capacity to devise, design and conduct research that has real academic weight, is targeted and shows integrity
- systematic understanding of a subject and mastery of the skills and methods associated with this subject



- the capacity for critical analysis, assessment and synthesis of new and complex ideas
- the capacity to develop further the progress made in technological, social or cultural terms within an academic and professional context
- Satisfying standards associated with national and international peer-reviewed publications

LEARNING OUTCOMES

On completion of this Doctorate programme, the student shall:

- Have broad-based knowledge and a systematic overview of his research field, as well
 as deep and up-to-date knowledge in a narrower part of the research field;
- Be able to understand the meaning and scope of existing and cross-disciplinary knowledge and research methods in order to expand, re-evaluate and reformulate them when necessary;
- be able to independently and critically analyze, synthesize and evaluate new and complex subject-specific ideas and creatively and scientifically identify and formulate research questions;
- master the research methodologies of their research field;
- be able to act independently in a complex, including international work and study environment, including research, which requires management and teamwork skills, innovative thinking and the ability to make strategic decisions;
- be able to initiate, plan, implement and critically evaluate research and development works that lead to new knowledge and procedural solutions;
- be able to make scientific ethical assessments, understand the possibilities and limitations of science, the social role of science and the responsibility of people in the use of scientific achievements;
- be able to analyze social norms and relationships, respond to them and, if necessary, act to change them;



- be able to verbally and in writing present the problems, conclusions and the theories underlying them both to an audience of specialists and in communication with nonspecialists, to argue and participate in relevant discussions in the language of study and in a foreign language important to one's field, including publishing original research results in peer-reviewed scientific publications or arts creative works in the fields for an international audience;
- be able to identify one's needs for new knowledge or skills and to support the learning of others both in the context of education and science as well as on a wider societal level;
- be competently able to pass on your knowledge by teaching, coaching or otherwise.

CURRICULUM OUTLINE (180 ECTS)

- General Education provides basic knowledge and skills required for understanding and managing Business and Management specific subjects.
- Core studies includes courses about macroeconomics, business mathematics, Supply Chain Management, statistics, logistics, international business, and ethics, etc.
- Seminar Courses This seminar series has two objectives: first, to provide a regular opportunity for doctoral students to share their research ideas and progress; and second, to create a low-stake forum in which students can give and take feedback on each other's research. Students will be asked to present, submit early drafts or proposals, and referee or discuss them. Our goals are to via practice and advice improve students' presentations and writing, teach how to give constructive criticism, speed up research progress, and advise on the academic job market.
- Elective courses student can freely choose any courses offered by the university without any restrictions.



- **Graduation thesis** classical thesis (formulation of a practical problem with corresponding analysis and solution) related to Business Administration or Management.
- General studies cover compulsory courses such as IT foundations, and working environment and ergonomics, as well as elective courses - business English, Estonian language and culture, contemporary international relations, philosophy, personal finance, etc.

• DEGREE

Doctorate in Computer Science and Systems

- COMMENCEMENT OF SESSION
 January 2023 (then 4 times a year; Oct, Jan, Apr or Jul)
- STUDY MODEL
 Online studies

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APPROVAL

To be approved by the Ministry of Education and Research, Estonia.

• DURATION

36 months

• CREDITS

180 EAP / ECTS



ASSESSMENT METHODOLOGIES / TOOLS

- 1. AWB : Advanced Workbook,
- 2. BWB : Basic Workbook,
- 3. BSG : Business Game,
- 4. CWB : Creative Workbook,
- 5. ORA : Oral Assignment,
- 6. CSS : Case Study,
- 7. WRA : Written Assignment,
- 8. EXM : Exam.

List 1: Elective Courses

MODULES

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	Research			n X Mod				STUCH
SNO	COURSE CODE	COURSE	EAP	HOURS / WEEK	L	Ρ	Е	MODE
1	DPCS0651	Modern Cryptology	4	4	2	2	0	E- Learning
2	DPCS0652	Algorithmic Coding Theory	4	4	2	2	0	E- Learning
3	DPCS0653	Complexity Theory	4	4	2	2	0	E- Learning
4	DPCS0654	Linear Programming and Combinatorial Optimization	4	4	2	2	0	E- Learning
5	DPCS0655	Distributed Network Algorithms	4	4	2	2	0	E- Learning
6	DPCS0656	Cyber Forensics	4	4	2	2	0	E- Learning



	7	DPCS0657Penetration TestingDPCS0658Social and Information Network Analysis		4	4	2	2	0	E- Learning
	8			4	4	2	2	0	E- Learning
	9	DPCS0659	DPCS0659 Advanced Algorithms		4	2	2	0	E- Learning
	10	DPCS0660	Machine Learning	4	4	2	2	0	E- Learning
	11 DPCS0661 and Probabil	Randomized Algorithms and Probabilistic Analysis	4	4	2	2	0	E- Learning	
	12	DPCS0662	Parameterized	4	4	2	2	0	E- Learning
	13	DPCS0663		4	4	2	2	0	E- Learning
F	14	DPCS0664	Secure Multiparty Computation	4	4	2	2	0	E- Learning
	15	DPCS0665	Advanced Data structures	4	4	2	2	0	E- Learning
	16	DPCS0666	Advanced Machine Learning	4		2	2	0	E- Learning
	17	DPCS0667	Approximation Algorithms	4	4	2	2	0	E- Learning
			Algorithmic Game Theory	4	4	2	2	0	E- Learning
	19	DPCS0669	Introduction to Computational Number Theory	4	4	2	2	0	E- Learning
	20	DPCS0670	Advanced Computational Number Theory	4	4	2	2	0	E- Learning



List 2: Seminar Courses

SNO	COURSE CODE	COURSE	EAP	HOURS / WEEK	L	Ρ	Е	MODE
1	DPCS0791	Seminar Course-I	4	4	2	2	0	E- Learning
2	DPCS0792	Seminar Course-II	4	4	2	2	0	E- Learning
3	DPCS0793	Seminar Course-III	4	4	2	2	0	E- Learning

List 3: Core Course

SNO	COURSE CODE	COURSE	EAP	HOURS / WEEK	L	Ρ	Е	MODE
1	DPCS0601	Research Methodology	4	4	2	2	0	E- Learning
2	DPCS0602	Research and Publication Ethics	4	4	2	2	0	E- Learning

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Guidelines:

A student should meet 180 credit / EAP requirements as follows:

- 1. In the first semester, the student will do 6 courses from List 1, and DPCS0791 Seminar Course-I.
- 2. In the second semester, the student will do 4 courses from List 1, and DPCS0792 Seminar Course-II, and DPCS0793 Seminar Course-III.
- A student has to compulsorily attend and pass a Research Methodology course - DPCS0601 in the first semester and Research and Publication Ethics in the second semester.



4. Total EAP for Semester 1 : 32 EAP. Total EAP for Semester 2 : 28 EAP.

- The seminar courses can be on any advanced topic on Computer Science as suggested by the doctoral monitoring committee.
- The performance in the courses will be assessed through assignments, student presentations, viva, Discussion Forum and / or written examinations. The contact hours for each course will be 4 hours per week.
- Having completed the course work successfully, a student will appear for Oral General Comprehensive Examination (OGCE) conducted by the monitoring committee. OGCE will be based on all the courses that a student has taken and will be conducted before the registration of the third semester. The process of choosing a Ph.D. / Doctorate Advisor / Guide starts only after the successful completion of OGCE and it has to be done within two months from the date of completion of the comprehensive examination.
- A doctoral committee is constituted by the Vice Rector / Dean (Academics) as per Eurmost guidelines after a guide and topic have been decided. The doctoral committee should meet at least once a year to monitor the progress of a student. Advisor / Guide, who is the convener of the doctoral committee, will send the annual progress report of the student to the Vice Rector / Dean (Academics) every year before registration of the odd/even semester depending upon the joining date of the student.



Comparison of curriculum(s) and learning outcomes of the higher education standard

	learning outcomes for a prate degree.	Name of the study programme: Doctor of Business Administration					
highe corres studie	er learning outcomes of the r education levels in the sponding higher education es, as described in Annex 1 <u>Higher Education Standard</u>]	curriculum.					
4.1	In order to obtain a doctoral	The learning outcomes described in Annex					
	degree, a student must:	1 of the Higher Education Standard have					
4.1.1	have broad-based knowledge and a systematic overview of his	been completely achieved in the curriculum. This is an on-going process that shall continue for many study cycles to come.					
	research field, as well as deep and up-to-date knowledge in a narrower	Evolving, experimenting and developing a curriculum is the primary goal of a progressive 21 st century Higher Education					
4.1.2	part of the research field; to understand the meaning	Institution, yet it has to adhere to the learning outcomes described in Annex 1 of					
	and scope of existing in-	the Higher Education Standard.					
	and cross-disciplinary knowledge and research methods in order to expand, re-evaluate and	The learning outcomes of the curriculum, modules and subjects are defined based on the expected learning outcomes of the respective study level described in the Higher Education					



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		reformulate them	when	Standard, school goals, employers'				
		necessary;		expectations and labor market needs, sectoral				
	4.1.3	be able to independ	dently	strategies and global trends. Learning				
		and critically and	alyze,	outcomes describe the competencies that a				
		synthesize and eva	aluate	student has acquired after completing the curriculum or its part(s).				
		new and complex su	bject-					
		specific ideas	and	One of the measures used for ensuring the				
		creatively and scientif	fically	compliance of study programmes and learning				
		identify and form	nulate	outcomes implements two types of matrices that provide, on the basis of learning outcomes,				
		research questions;						
	4.1.4	master the rese	earch	a systemic semester- by-semester overview of				
		methodologies of	their	obtained competences and the compliance of				
		research field;		learning outcomes with applicable requirements				
/	4.1.5	be able to	act	and needs:				
		independently in	а					
		complex, includi		correspondence matrices - coherence o				
		international work	and	learning outcomes with the Highe				
		study environ	ment,	SearEducation Act odern Stud				
		including research, w	which	 competence matrices, which describe 				
		requires managemen	t and	the development of professional and				
		teamwork skills, innov	vative	general competencies through th				
		thinking and the abil	ity to	acquisition of subjects.				
		make strategic decisio	ons;	Our priorities regarding general and future				
	4.1.6	be able to initiate,	plan,	competences are set out on the basis of the				
		implement and crit	tically	Eurmost Mission, Vision and Institutional				
		evaluate research	and	Objectives. Eurmost supports study courses				
		development works	that	that foster innovation, expertise and				
		lead to new knowledge	e and	entrepreneurship with the aim of encouraging				
		procedural solutions;						



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- 4.1.7 be able to make scientific ethical assessments, understand the possibilities and limitations of science, the social role of science and the responsibility of people in the use of scientific achievements;
- 4.1.8 be able to analyze social norms and relationships, respond to them and, if necessary, act to change them;
- 4.1.9 be able to verbally and in writing present the problems, conclusions and theories underlying the them both to an audience specialists of and in communication with nonspecialists, to argue and participate in relevant discussions in the language of study and in a foreign language important to one's field, including original publishing research results in peerscientific reviewed

our students to adopt and develop an entrepreneurial frame of mind in an open civil society.

In order to find out the most important general competencies, we have carried out several studies, a working group for the study of general competencies is operating, on the basis of whose work the categories of general competencies have also been developed. Our group organization careerera.com has been working in the field on providing meaningful higher education to the students for the past 12 years.

In order to assess the importance of selected general competencies in learning, we have included relevant questions in feedback surveys of various stakeholders (alumni, employers, students) and have relied on other surveys.

When opening new study programmes, the supervisory board of EURMOST receives, among other documents, a comparative analysis of similar study programmes in other (foreign) higher education institutions and a description of the qualifications, the standard of research activities and the specialist competences, which are specific to the branch of study, of the teaching staff implementing the



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publications or arts creative works in the fields for an international audience;

- 4.1.10 to be able to identify one's needs for new knowledge or skills and to support the learning of others both in the context of education and science as well as on a wider societal level;
- 4.1.11 be competently able to pass on your knowledge by teaching, coaching or otherwise.
- **4.2** The learning outcomes that can be achieved upon completion of the doctoral study program are in line with the general requirements described in the eighth level of the qualification framework.

study programme, to emphasise that the study programme is based on current know-how and research in the field.

While designing and developing curricula, we consider the vertical and horizontal rationality of the curriculum and learning outcomes important to ensure that the completion of the curriculum enables the learner to acquire the competencies described in the curriculum objective and learning outcomes.

The vertical and horizontal cohesion of the study programmes will be monitored throughout the academic year and the standard period of study of the study programme.

Vertical rationality. To support the acquisition of the contents of а specialisation, study programmes have been divided into substantive modules in which study courses or topics are united into purposeful and cohesive sets. General and main study modules comprise purposeful sets of study courses that make it possible for a student to acquire and deepen their general, entrepreneurship, research and area-specific competences.

Specialisation study modules comprise study courses that are directly relevant to



level.

the specialisation to ensure the acquisition of competences directly or generally related to the specialisation, which are necessary for starting work in the chosen profession or continuing studies at the next level

Horizontal rationality. The study courses available in the modules allow to acquire the necessary learning outcomes and may also become input for study courses in other modules. Thus, when planning the order of study courses, the chronological cohesion of study courses, the alternation and balance between theoretical and practical study and between independent work and practical training, which are necessary for achieving the goals of the study programme, are observed when planning the order of study courses to achieve horizontal cohesion between modules.

The development of study programmes is led by the vice rector / CEO – Prof. Shailendra Naresh Kulkarni together with the heads of specialisations and modules and the study designer. As experts in their respective fields, heads of specialisations are open to proposals with respect to developing study programmes and monitor the satisfaction and needs of



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labour-market, students and teaching staff as an ongoing process for the purposes of collecting input for the study programme council, which is required for preparing the study programme development plan and the improvement and approval of study programme versions.

The changes, study programme development plans and study programme versions for fall semester admissions, which are approved by the study programme council, are submitted by the head of specialisation to the vice rector for academic affairs, who must also evaluate and analyse these and forward them to the academic council for approval. The changes and study programme versions approved by the academic council shall be duly entered in the EHIS.

The owners of the Institution provide their approval for opening new study programmes, support the development of new study programmes and the improvement of existing study programmes and monitor their cohesion with the goals set out in the development plan through regular meetings of the supervisory board of EURMOST.



CAREERS

With our approach to learning, our students will gain the expertise, knowledge, and soft skills to become a valuable employee in any team or company. With an emphasis on leadership roles, and the experience of working with cultural diversity in the classroom, a doctorate prepares you to work in a number of different positions, with salary varying by position.

Jobs for PhD Computer Science graduates of the program will be found in both public and private IT companies with competitive salaries. Jobs on PhD Computer Science course careers include Computer Scientist, Computer Systems Engineer, Computer Science Professor, Computer Network Architect, Research and Development, Senior Developer and Architect, Senior Professor, Educational Head, Senior Research Engineer, R&D Lab Professionals, Start-Up Mentors, Authors, and Senior Research Scientists. Graduates of the PhD Computer Science program can choose from a number of career paths.

Career Prospects and Job Scope for PhD Computer Science Course

Students enrolled in a PhD Computer Science course get trained to become highly skilled professionals, preparing them for careers in computer networking and database management systems fields. Upon completion of the Doctorate of Philosophy in Computer Science program in India, students have a variety of options based on their interests and abilities. \

- Senior Developer and Architect
- Senior Professor
- Educational Head
- Senior Research Engineer
- IT Officer
- Project Team Leads
- Technical Manager



- University Professor
- Industrial R&D Lab Professionals
- Start-Up Mentors
- Authors
- Senior Research Scientists

Areas of Recruitment for PhD Computer Science Course

PhD Computer Science jobs are available in both the public and private sectors. The scope of a PhD Computer Science course and salary depends on the graduates' education and experience. Students pursuing a PhD Computer Science degree have a wide range of options available to them. The following are some areas in which PhD Computer Science graduates are recruited:

- IT Companies
- Telecommunication Sector
- Software Development Firms
- Public Sector Undertakings
- Research and Development
- Laboratory
- University
- Colleges
- Healthcare

Following are the emerging career options for Doctorates in Computer Science:

- Associate Editor
- Editorial Reviewer
- Editor



- Associate Consultant
- Research Intern
- Senior Engineer
- Senior Manager
- Digital Developer
- Computer Vision Algorithm Researcher
- Technical Account Manager
- Business Development Manager
- Staff Engineer
- Senior Data Scientist
- Senior Research Engineer
- Data Historian Consultant
- Senior Research Principal
- Senior Software Engineer
- Deputy Director
- Team Lead
- Senior Software Developer

FUTURE AND TARGET GROUP

A Ph.D. degree is an excellent opportunity for candidates who wish to further their careers and gain advanced knowledge in Computer Science. This degree will make you apt for formulating and executing innovative technological and research based solutions, exploring and integrating new trends and technologies, and creating new innovative principles by intensive research.

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Whether you are working for another organization or an entrepreneur yourself, a Ph.D. degree will be a great asset to your arsenal.